

EXECUTIVE SUMMARY
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LIMITATIONS STATEMENT

This Development Proposal and Environmental Management Plan (DPEMP) has been prepared in accordance with the scope of services agreed upon by SEMF Holdings Pty Ltd (SEMF) and Forestry Tasmania ('the Client'). To the best of SEMF's knowledge, the proposal presented herein represents the Client's intentions at the time of printing of the report.

Forestry Tasmania affirms that the Development Proposal and Environmental Management Plan represents the intentions for the development of this stage.

However, the passage of time, manifestation of latent conditions or impacts of future events may result in the actual project and its impact differing from that described in this report.

In preparing this report, SEMF has relied upon data, surveys, analyses, designs, plans and other information provided by the Client and other individuals and organisations referenced herein. Except as otherwise stated in this report, SEMF has not verified the accuracy or completeness of such data, surveys, analyses, designs, plans and other information.

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EXECUTIVE SUMMARY

The Proponent, Roles and Responsibilities

Forestry Tasmania (FT) is the proponent for the Wood Centre Development (approx 90 ha), the location of which is shown in Figure I and Figure IV. The latter figure shows the location in the regional context. The aim of the Wood Centre project is to focus local value-added processing of hardwood and special timber resources in the Huon District State forest, to enable the integration of different wood processing activities, greater recovery of hardwood timber and beneficial use of wood residues and processing by-products.

This will be implemented through the development of the proposed site to an investment-ready state, and the concurrent and subsequent attraction of private sector investment for the proposed timber-processing facilities.

An infrastructure company will undertake the development of the site and the ongoing management of site infrastructure (e.g. roads, stormwater, wastewater and process/potable water supply and disposal).

Each processing facility on the site is expected to have an individual operator who will hold a sub-lease with the infrastructure company and be responsible for meeting the environmental permit conditions for their respective leases. A site wide Environmental Management Committee will be established to ensure the coordinated management of environmental issues across the site.

A community consultative committee will meet regularly with the Site Manager to review potential impacts on neighbouring communities including:

- Traffic;
- Changes in noise environment;
- Air Quality;
- Water Quality; and
- General effect on community fabric.

The Wood Centre Development

The hardwood and special timber processing facilities to be established on-site will include:

- A merchandising yard;
- A regrowth sawmill;
- A rotary peeled veneer mill;
- A wood fibre production facility; and
- A wood-residue-fired power station.

Figure I Wood Centre Location (Map Sheet 4823 Glen Huon)



Not to Scale

Figures II and IX illustrate the proposed location of these facilities on the site. Hardwood resource will be distributed through the site from the Merchandising Yard. At the Merchandising Yard, timber will be segregated and sorted into saleable products that will be temporarily stored and, where necessary, prepared for receipt by other wood processing operations. The aim of the centralisation of wood resources at the site is to improve recovery of materials for value-adding processes.

The site rezoning that has been proposed allows for other value-adding timber industries to locate at the site in the future. Each of these industries will lodge their own development application and separate DPEMP where applicable.

The sawmill will process regrowth logs on-site, air and kiln dry the timber product, which may also be dressed and moulded on-site and then sawn timber will be transported to market.

The rotary peeled veneer mill will be the first facility using state-of-the-art equipment of its kind in the state. Suitable logs will be peeled, veneer sheets produced, kiln-dried, composed (where necessary), stacked, and packaged. This material will then be transported to market.

The hardwood fibre production facility will generate wood fibre that will be transported off site for export and/or use in the State.

The proposed hardwood residue-fired power station will use forest residue from logged coupes as fuelwood to produce power from a renewable resource for the site and sale to the community. The burning of these residues in a power station rather than on the forest floor will greatly reduce burn intensity and the levels of smoke emissions.

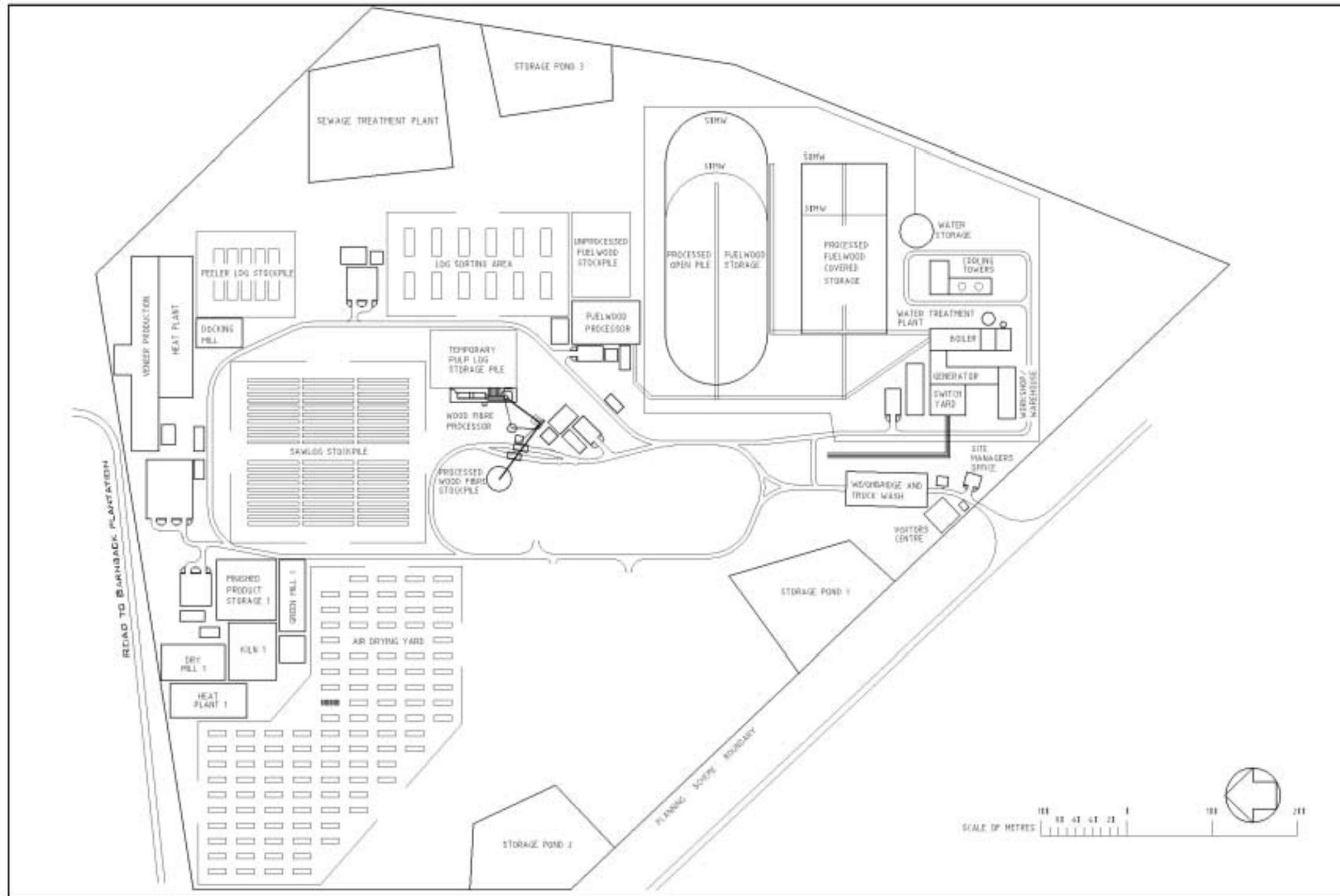
Processing of forest residues at the fuelwood processor will involve using a hogger; a large rotating horizontal drum with a series of radial “hammers” that break up pieces of wood against an anvil to produce fuel to the required specification.

If timing issues associated with the independent development of the projects dictate, forest and wood residues fired heat plants will be established on-site at the sawmill and rotary peeled veneer mill. Fuelwood material for these facilities will be collected from harvested forest coupes and timber by-products generated on-site by timber processing operations.

Detailed descriptions of each of the timber processing operations proposed at this stage are provided in the relevant environmental management plan section of this DPEMP.

A flow diagram showing the wood flow through the Wood Centre is provided in Figure III.

Figure II Conceptual Site Plan



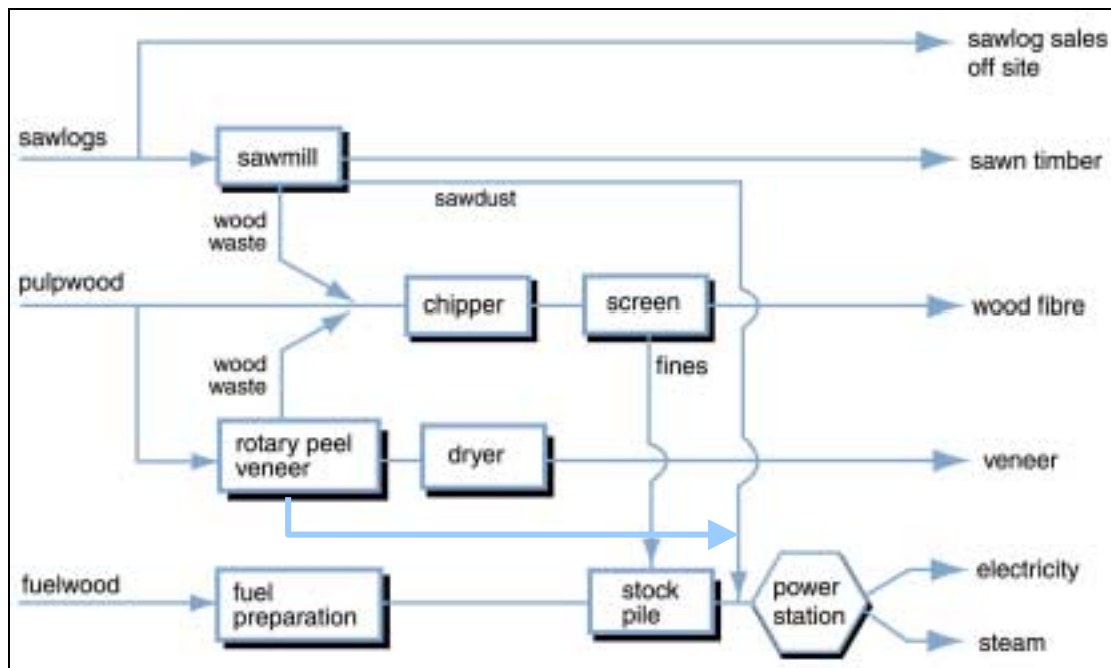
Quantity of Production

The estimated average annual hardwood and special timber inflow and product outflow is outlined below.

Raw Materials	Green wood inflow (pa)
Sawlogs	88,000 m ³
Pulpwood	300,000 T
Rotary Peeler Logs	150,000 T
Forest Residue	300,000 T
Total	838,000 T

Product	Estimated product outflow (pa)
Sawn timber and sawlogs	64,000 m ³
Wood fibre product	340,000 T
Dried rotary peeled veneer with packaging	57,000 T
Electricity (+steam)	30-50 MW
Total	461,000 T

Figure III Wood Centre Wood Flow



Source of Wood

Wood processed in the Wood Centre will be sourced from the Southern hardwood forests in accordance with the Huon and Derwent Forest District Forest Management Plans (FT, 1999) and Regional Forest Agreement (RFA). The development will not

result in any change to the areas of State forest that are harvested on a sustainable basis, in compliance with the RFA and the Forestry Act.

Tasmania's Forests

In total Tasmania has over 3,350,000 ha under forest. State forest managed by Forestry Tasmania comprises about 1.5 million ha, about 30% (1,035,000 ha) of Tasmania's forests are privately owned.

The estimated volumes of merchantable wood in forest areas that will be placed in production over time are shown below (Source: State of the Forest Nov 1998).

Table 1 Estimated Volumes of Merchantable Wood Over Time

Total area	Multiple use forest	1,770,000 ha
	Private forest	1,040,000 ha
Forest area available for production	Multiple use forest	780,000 ha
	Private forest	550,000 ha
Standing volume sawlog	Multiple use forest	18,600,000 m ³
	Private forest	7,300,000 m ³
Standing volume pulpwood	Multiple use forest	142,000,000 tonnes
	Private forest	46,600,000 tonnes

All native forest on public land that is harvested is regenerated, mostly back to native forest but some is converted to plantation.

The Huon Forest District comprises 762,800 ha of land, the land tenure of which is shown in Table 2.

Table 2 Land Tenure in the Huon Forest District

Tenure	Area (Ha)	% Total Area	Total Afforested Area (Ha)	Old Growth Area (Ha)
Reserved under the National Parks and Wildlife Act 1970	503,600	66	172,200	139,100
Private Land	125,500	17	59,500	2,600
Multiple-use State forest, includes 5,000 ha of old growth forest protected by Management Decision Classification (MDC)	115,800	15	101,700	20,600
State forest Reserves and other areas	7,300	1	6,000	1,300
Other Crown Land	10,700	1	5,100	400

(Source: Forestry Tasmania June 2001)

The area available for wood production from Multiple-use State forest totals 95,100 ha (77% of the total FT managed area) including areas that require special management because of identified values. Within the wood production area, 7,900 ha are managed for special species timber production in accordance with the Forests and Forest Industry Strategy for continuing supplies of these species. The timber harvesting plans for the next 10 years will result in about 2000 ha of State forest being

harvested and regenerated each year.

Planning Issues

The proposed Wood Centre site is currently zoned Rural. The intent of the Rural Zone does not match the existing or potential use of the site. In the Rural Zone a Timber Mill is discretionary and Light and General Industry are not permitted which includes the wood fired power station and rotary peeled veneer plant. It is noted that the use "*land clearing*" is a permitted use in the Rural Zone. The site is currently bushland with poor soils and is not suitable for agricultural use. The subdivision minimum in the Rural Zone is 20 ha. In many cases developments proposed for the site will require less than 20 hectares.

For the integrated timber processing operation to occur on the subject land an amendment to the planning scheme is required.

It is considered that the tenor of the *Huon Planning Scheme 1979* supports the development of an integrated timber-processing site. For example, the development of the Wood Centre will assist in preserving the economic viability of the local economy without destroying the rural and scenic character of the Municipality, which the planning scheme iterates as its main aim. Good agricultural land will not be destroyed nor will an environmentally sensitive area. There is nothing in the tenor of the planning scheme that suggests the proposed amendment should not be approved.

In accordance with Section 43A of the *Land Use Planning and Approvals Act 1993* a request has been made to amend the *Huon Planning Scheme 1979* to introduce a specific zone for the subject site to permit the proposed current and future intended uses.

Social and Economic Issues

The proposed project will deliver significant economic and social benefits to Tasmania and the Huon Valley in particular.

Employment resulting from the proposed development will include stability for the 15 to 20 harvesting contracting companies, currently employing some 100 to 150 operational staff in the area. A further 200 to 250 new jobs will be created at the Wood Centre. There are no identifiable negative impacts on employment opportunities in existing industries from the Wood Centre development. All existing wood supply contracts to local mills will be retained.

This employment will contribute about \$8.1 million a year in wages and salaries to the economy. The construction period will also create around 200 direct jobs over a period of 12 months. The flow on effects will mean that at least the same number of jobs (200), will be created indirectly.

There will be additional benefits to existing sawmillers including:

- Improved inventory control with reduced log holding capacity required by sawmillers;
- Improved safety for forest workers preparing logs;
- Improved log specification and quality control as a result of improved log

grading and preparation within the Merchandising Yard; and

- Improved delivery lead times as a result of improved transport efficiencies and stockholding.

There will be a greater volume of timber recovered to solid wood products locally.

Modifications in traffic flows should have positive regional social benefits by reducing log traffic through several major population centres. Further, by moving processing facilities closer to the forest, most of the wood that is moved away from the site will be in enclosed vehicles. Redirection of the traffic flow will impact on some smaller centres.

Electricity generation on-site will assist in increasing the reliability of power supply south of Huonville. Additional generating capacity at the end of the transmission network provides an attractive method of improving reliability of the network as a whole.

The Wood Centre will make a significant contribution to the Huon Valley Municipality rate base.

A community advisory committee has been established and will be maintained, to ensure that along with local government input, there is a direct opportunity for the community to have ongoing input to the project.

Tourism

Creation of the Wood Centre as a showcase for hardwood and special timber processing includes the opportunity for visitors to view the operations. An on-site visitor centre and conducted tours of the site are part of the development plan. Viewing galleries and vantage-points around the site will allow visitors to see the operations and gain a greater knowledge on how value is created from our forests.

The Huon Valley has a growing tourism industry that in part depends on the forests. FT is seeking to enhance this tourism appeal through provision of interpretation in the forest and establishment of tourist-centred facilities such as the Tahune Forest AirWalk. Forestry and tourism have developed side-by-side over the past 100 years. Various tourist operators benefit from using infrastructure developed by FT to provide access to forest pursuits in State forest. These and new operations will continue to benefit from infrastructure improvements that are occurring. In addition, the public will be able to view the hardwood and special timber processing in the Wood Centre as a showcase.

In support of this positive social and economic development, the proposed Wood Centre will cause a minimal impact to the visual integrity of the forests while increasing productivity and maximising use of residues.

Transport and Roads

The potential impacts of traffic movements to and from the Wood Centre include:

- Noise, dust and vibration associated with truck movement;
- Increased traffic;

-
- Deterioration of road surfaces due to heavy vehicle movements;
 - Incompatibility with the present design standard of the roads; and
 - Interference with school bus times and/or other sensitive activities along the transport route.

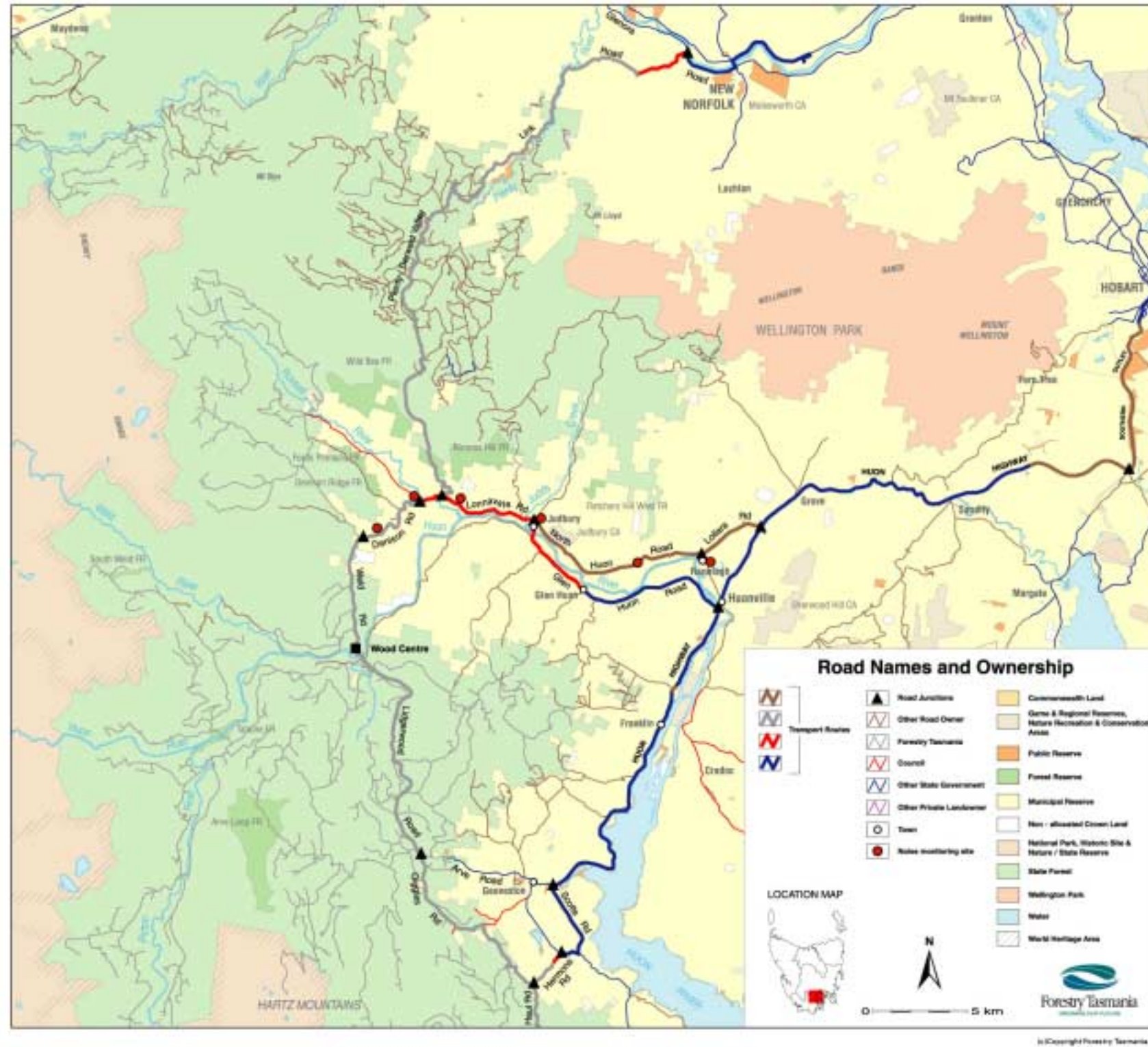
These potential impacts have been assessed in detail along the proposed transport routes to and from the Wood Centre. An assessment of the indirect transport costs (in terms of environmental noise, greenhouse emissions, local air pollution, water pollution, road construction and maintenance, and road accidents) of the existing transport arrangements when compared to those proposed for the Wood Centre, identified that there would be a decrease in these costs of about 40% for the preferred transport option.

A wide range of mitigation measures will be undertaken to minimise the potential transport impacts. These include:

- Upgrading of transport routes to Department of Infrastructure, Energy and Resources and AUSTROADS standards;
- Stormwater Management during construction to Soil and Water Management Guideline Standards (June 1999);
- Use of a modern, well maintained transport fleet;
- Training of drivers for operations on the transport routes;
- Development and implementation of a comprehensive Traffic Management Plan, covering all aspects of the transport operation; and
- Regular monitoring and enforcement of the transport operation.

While the transport associated with the Wood Centre will result in the redirection of the traffic flow through some smaller population centres (Figure IV), it will result in an overall reduction in log traffic and total traffic through several major population centres. It is considered that the transport impacts on the community are capable of being satisfactorily managed, once an agreed range of remedial work, identified with the community to ameliorate these impacts, are implemented.

Figure IV Transport Routes and Ownership



Environmental Management Issues

The proposed development will be constructed and operated in accordance with the principles of best practice environmental management as defined in the *Environmental Management and Pollution Control Act 1994*.

Terrestrial Issues

The development is to be established in an area on the top of a ridge, which has no significant land constraints. The significant fluvio-glacial terrace escarpment that encircles the ridge will be mapped and records kept where excavations are likely to intercept it.

Atmospheric Emissions

Diffuse And Point Source Emissions

Management measures are to be implemented within each on-site wood processing facility to minimise potential dust emissions from vehicular movements, storage and handling of wood materials and emission of particulates.

A potential contributor to aerosol emissions may arise from wastewater irrigation. The issue of irrigation will be fully assessed and documented in an Irrigation Management Plan to be submitted separately from this DPEMP.

The main point source atmospheric emissions to be associated with the operation of the Wood Centre are stack emissions from the power station and heat plants at the sawmill and rotary peeled veneer mill. The effective design, operation and monitoring of these facilities using best commercially available technology will ensure that emissions meet regulatory standards.

Greenhouse Gases

The Wood Centre development will impact on the global greenhouse environment as follows:

- In the Tasmanian context, the release of CO₂ will effectively remain the same. This is because the same amount of CO₂ will be released whether the wood is burnt in the power station, or on the forest floor in the establishment of new forests.
- By reducing fuel used for transport, less CO₂ will be emitted from this source.

In summary, the CO₂ production of the power industry will remain the same, while the CO₂ produced by forestry activities will be reduced.

Hydrology, Water Supply and Wastewater Emissions

The proposed maximum extraction of 5 Megalitres a day from the Huon River for use within the Wood Centre wood processing operations represents only 0.07% of the average flow conditions (1% of minimum flow conditions) and so no adverse impact are expected to the existing ecology of the Huon River.

Figure V illustrates the water balance for the Wood Centre. Contaminated stormwater and process wastewater from the wood processing facilities will be managed in accordance with a comprehensive collection, treatment and reuse system. Each facility will maximise the reuse of wastewater on-site, and any excess wastewater treated prior to release to the site-wide storage ponds. Additional water requirements for each facility will be drawn from these ponds as required to minimise the need for raw water from the Huon River.

During high rainfall events, excess wastewater will be released from the storage pond in a controlled manner. For the purpose of this document a “high rainfall event” is defined as a one in ten year, 72 hour rainfall event.

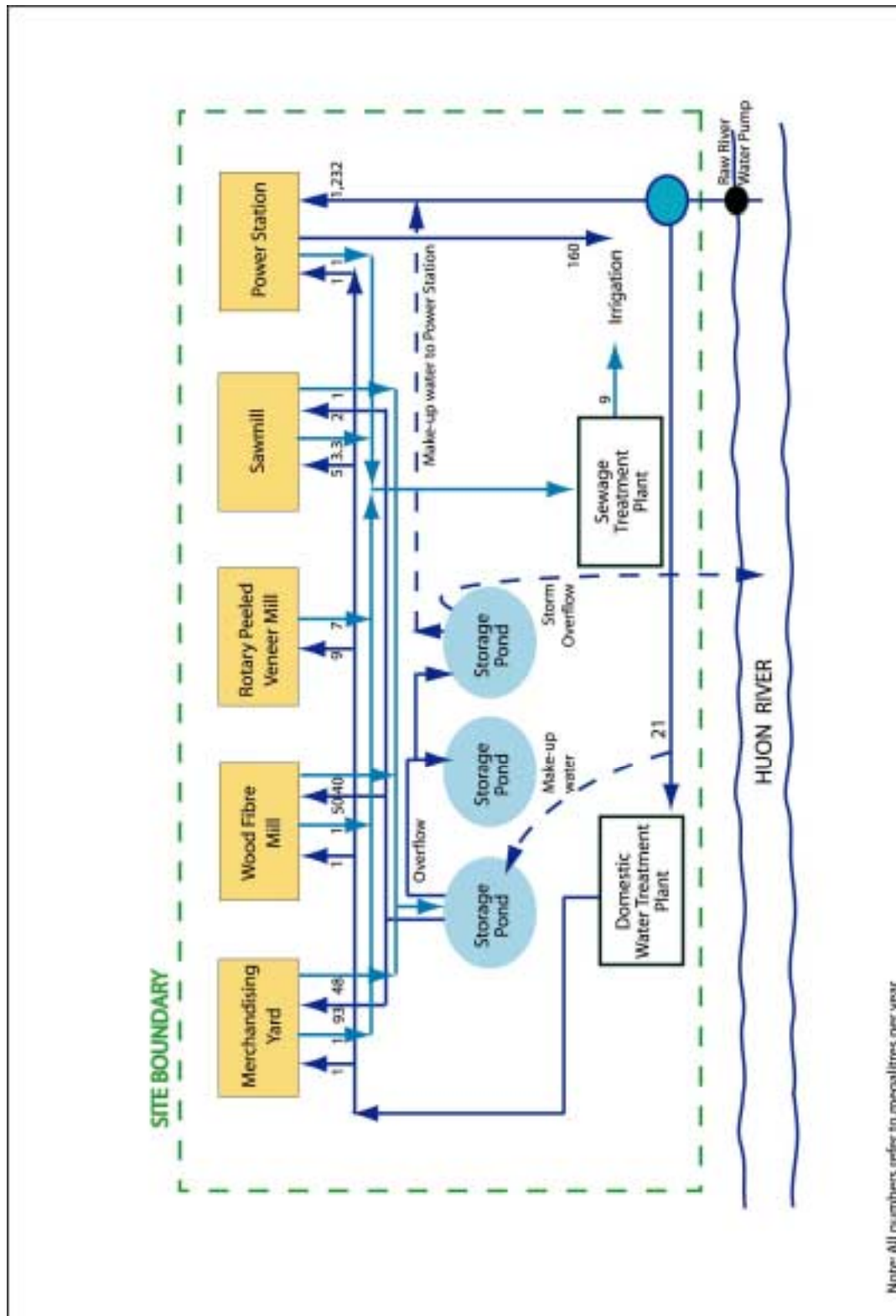
The wastewater management approach proposed for the site will provide a multi-level protection system for any on-site spills or accidents, thereby minimising the opportunity for off-site environmental harm.

The domestic wastewater generated on-site will be directed to a sewage treatment plant for treatment, prior to pumping to an area off-site for controlled irrigation.

An extensive water monitoring program will be implemented. Monitoring will include process water streams from each of the facilities, recycled wastewater, ground water at the irrigation site, river water quality upstream and downstream from the site.

Publication of results via a regularly maintained Wood Centre website will be provided on www.southwoodresources.com.au .

Figure V Wood Centre Water Balance



Noise Emissions

The sound pressure level for the site as a whole was derived from the anticipated main noise sources from the wood processing facilities.

The main noise sources at each facility area follows.

Merchandising Yard

- Log drops
- Log loaders
- Chainsaw
- Fuelwood processor

Sawmill

- Log drops
- Log loader
- Chainsaw

Rotary Peeled Veneer Mill

- General machine hall noise
- Log drops
- Log loader
- Chainsaw

Wood Fibre Mill

- General chipping operations

Wood Fibre Power Station

- General power station operations
- Transformer.

The wood fibre processor is the main noise source on the Wood Centre site. This facility will be fully enclosed in a sound absorbing structure, oriented so that its opening is not directed towards off-site residences. In addition, where possible fuelwood processors (hoggers and/or tub grinders) will be situated behind other buildings so that the buildings provide additional noise barriers in the direction of residences. The proposed location of potential noise producing equipment is shown in Figure VII.

The calculated noise level at the nearest residence, 6 kilometres from the Wood Centre is Leq 28.4 dB(A) compared to a background noise level of Leq 38-44 dB(A).

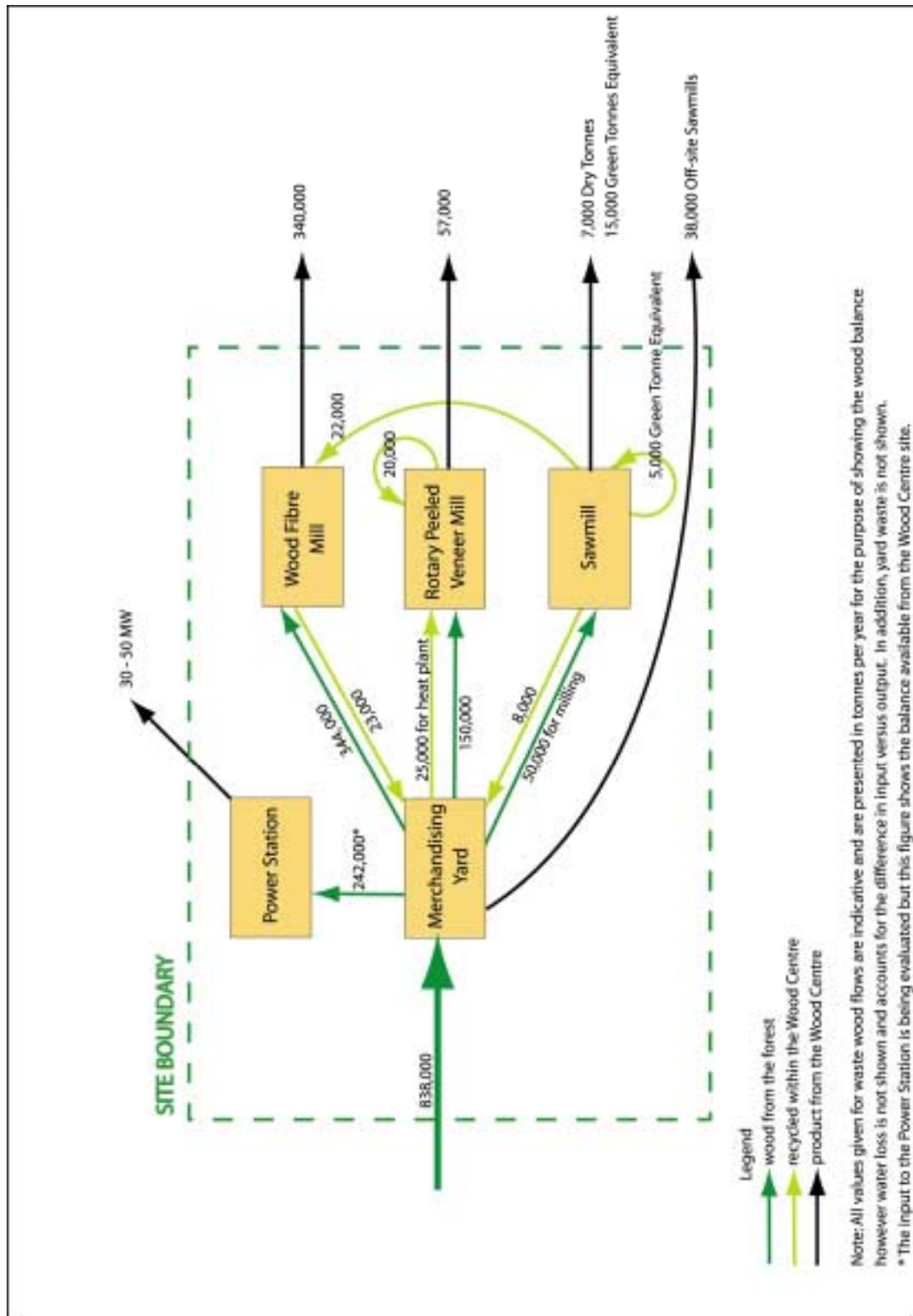
Due to the isolated nature of the proposed development and the management measures proposed for implementation, noise from the operation is considered to have a very low potential for nuisance to any residence.

These noise emissions relate to the emissions from the site whereas noise that may affect the health of employees on site is considered as a component of the Health Impact Assessment.

Solid Waste Generation and Disposal

Solid wastes generated on-site will be managed in accordance with the waste management hierarchy of waste avoidance and minimisation, resource recovery and disposal. The establishment of the wood processing operations on the Wood Centre site will enable maximum recovery of wood and reuse of the wood by-products generated, predominantly as fuelwood in the wood fired power station and heat plants (Figure VI). The environmental impact of solid waste generation will be minimal.

Figure VI Wood Product and Waste Flow



Hazardous Materials

The main types of hazardous material to be stored and handled on the Wood Centre site are petroleum hydrocarbons (e.g. diesel) in relatively small volumes. Minor quantities of other materials such as LPG, water and wastewater treatment chemicals, herbicide, and paints will also be stored on-site. There is a low potential for spillage of these materials during storage, as secure stores and bunds will be provided in accordance with relevant Australian Standards and statutory requirements. The locations of the stores are shown in Figure VII.

In the event of spillage, contingency measures will be in place on each wood-processing site for the containment and clean-up of materials, including:

- Standard response procedures and training of site personnel in response;
- Maintenance of spill kits on-site;
- Establishment of bunds where necessary;
- Ability to collect and recover spillages in wastewater collection sumps; and
- Implementation of incident reporting procedures.

The *Environmental Management and Pollution Control Act* (1994) provides penalties for companies and individuals for breaches of the Act.

Health Impact Assessment

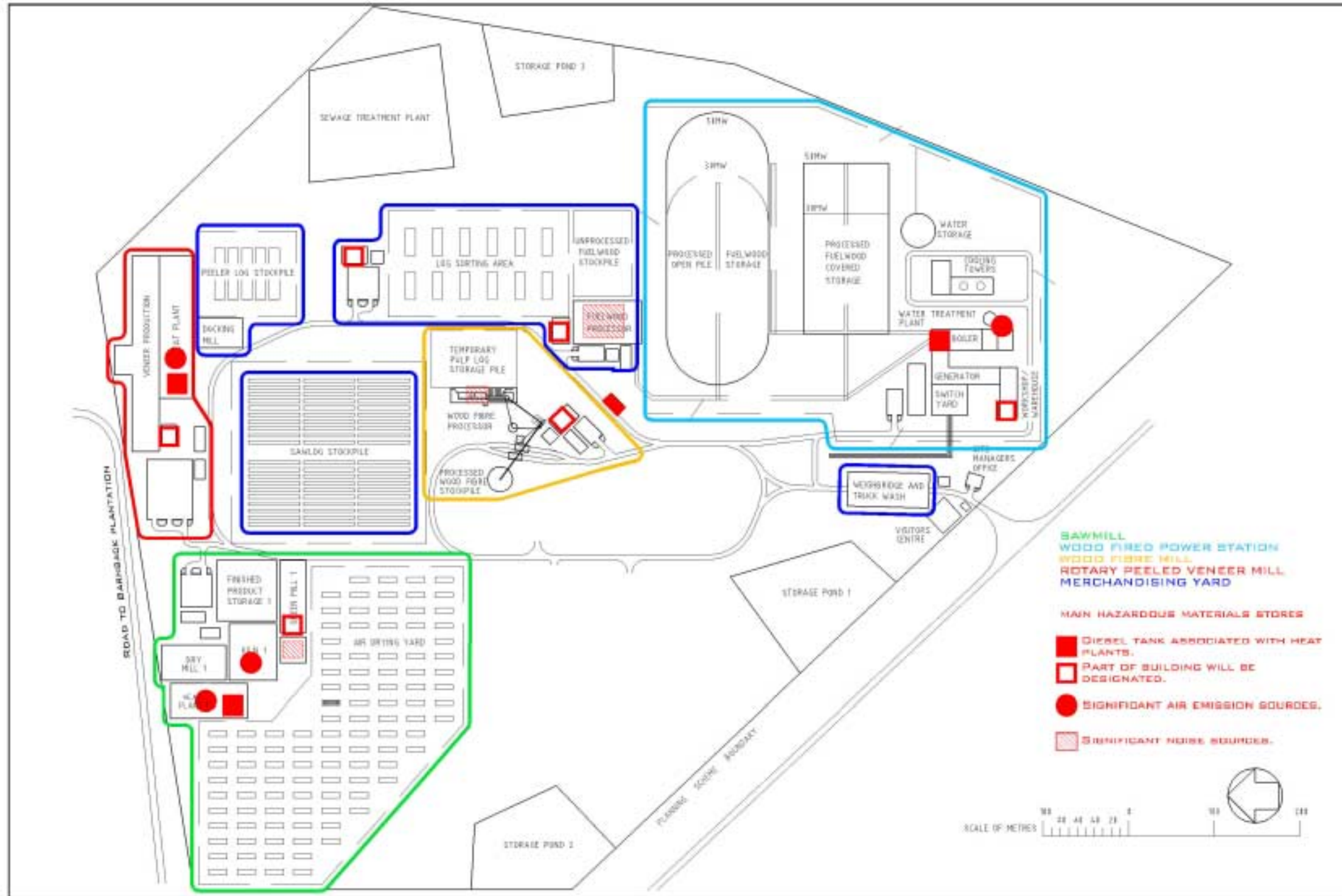
The key health issues associated with this project have been identified and include:

- Noise;
- Air pollution;
- Wastewater management;
- Control of biological hazards;
- Occupational health and safety; and
- Transport related impacts.

The most significant noises that may affect the health of employees on-site are those generated by the breakdown of wood, movement of logs between operating units, vehicle noises, and operating machinery. Of these, the chipper at the wood fibre plant is considered the loudest. The operation of this equipment within enclosed facilities will confine the potential noise impact for off-site receptors, with no off-site impacts anticipated.

The most significant air emissions will originate from the power plant boiler. Location of the 40 m boiler stack on higher ground and the use of best commercially available pollution control measures will reduce the risk of off-site impacts.

Figure VII Wood Centre Hazardous Materials Stores and Emission Sources



The Wood Centre development reduces open-air regeneration burning. Further advantages include:

- Particulate emissions are reduced due to filtration of the combustion gases;
- Dispersion of emissions is better controlled since there is only one point source; and
- Better combustion process and control resulting in lower levels of emissions.

Implementing the mitigation measures proposed means that the increased human health impact of air emissions will be negligible compared to existing levels.

Wastewater generated during on-site processing will be directed to storage ponds and reused on-site with minimal releases to the external environment. Domestic sewage is to be treated in an on-site sewage treatment plant, and irrigated in accordance with an irrigation management plan. No significant health impact is likely to occur once the defined management measures are implemented.

A number of measures will be incorporated in the design of the power station's cooling tower to prevent the potential risks associated with *Legionella*, including the following:

- Exclusion of sunlight;
- Stainless steel cooling tower construction;
- Monitoring and dosing the water; and
- Location of towers away from any type of disturbance and fresh air intake vents.

To minimise the risk associated with mosquitoes in the on-site storage ponds, it is proposed that continuous monitoring of the ponds will be carried out to check for mosquito larvae, at critical times of the year.

Occupational health and safety standards will be followed at each facility. The procedures and measures to be taken by operators will be defined in the facility standard operating procedures prior to commissioning.

Transport of logs and products to and from the site will result in changed traffic movements and an increase in traffic and associated noise in some areas along the route but decreased noise in other areas. A wide range of mitigation measures will be undertaken in consultation with the community including:

- Treatment of wood fibre transport bins to minimise drumming noises when empty;
- Minimising the number of fleet vehicles;
- Reducing transport vehicle speed;
- Keeping the trucks well maintained; and
- Using electro-magnetic rather than engine exhaust braking.

The transport related safety issues involve consideration of the roads, the vehicles,

and the drivers, to ensure that the overall transport operations are safe, and follow best practice.

It is considered that the transport impacts on the community are capable of being satisfactorily managed.

In summary, the detailed assessment of each of the potential health issues has concluded that, provided contemporary occupational health and safety practices and procedures are implemented, and the proposed environmental management and mitigation measures are in place, adverse health impacts will be minimised.

Hazard Analysis and Risk Assessment

A preliminary hazard identification and risk assessment was conducted on the power station. The potential hazards were systematically identified using a preliminary Hazard and Operability Study (HAZOP) in conjunction with the schematic process flow diagram for the power station.

The HAZOP study identified the following areas of the power station as having the potential to kill, injure, or cause significant engineering and environmental damage, resulting from abnormal operating conditions or accident based activities:

- Fuel Stockpile;
- Boiler;
- Steam Lines;
- Turbine;
- Cooling Tower;
- Particulate Filter System;
- Air Circulation System; and
- Chemical Storage.

Each of these identified areas has been assessed under the Rapid Environmental Risk Assessment Checklist (RERAC) method.

The Hazard Identification above was then used to assess the risk of the most critical hazards present within the power plant site. The RERAC methodology was used to quantify the likelihood and severity of an incident or hazard. This resulted in a ranking of each hazard in terms of total assessed risk (TAS). Events which are ranked the greatest TAS should be given the highest priority in terms of preventative action.

$$\text{TAS} = \text{Likelihood} \times \text{Severity}$$

There were no Category One hazards (requiring immediate action) identified. The vast majority of all RERAC assessments fell under a TAS ranking of 5, the recommended level for industry operations.

Only one hazard fell under Category Two (requiring medium term action), and that was the hazard associated with ruptures of lines containing high-pressure steam. Whilst deemed hazardous, it is generally not a catastrophic event. There are no direct

environmental effects associated with this hazard.

This preliminary RERAC study did not identify any catastrophic environmental hazard event scenarios. Based upon the HAZOP and RERAC studies, it was concluded that if the actions and recommendations outlined in the *Preliminary Hazard Analysis and Risk Assessment for the Wood Centre Development* (Appendix T) are acted upon, then there is little risk associated with hazards, which have significant environmental consequences.

Fire Fighting and Emergency Services

The temporary storage and processing of stockpiles of wood material on the Wood Centre site is a potential source of fuel in the event of a fire. Other potential fire hazards include the:

- Storage of fuels for loaders and equipment used on-site;
- Conducting vehicle and equipment maintenance, and possibly oxy-acetylene activities within workshop areas; and
- Location of the site within bushland.

A number of management measures will be implemented on-site including:

- Storage of fuels in approved facilities and wood materials will not be stored in close proximity to fuels;
- Maintenance of site fire main and adequate numbers of appropriate fire extinguishers on-site;
- Construction of buildings with cladding exteriors; and
- All vehicle and equipment maintenance and oxy-acetylene activities will be undertaken within confined areas with appropriate separation to stored flammable materials (e.g. workshop areas).

A fire service system will be installed at the site in accordance with the requirements of the Tasmania Fire Service and the relevant Australian Standards, including the Building Code of Australia.

In addition, a Fire Management Plan and an Emergency Response Plan will be developed for the site by the Site Manager to meet the requirements of the Tasmania Fire Service and the State Emergency Service, which will contain more specific plans for the respective facilities.

Flora and Fauna

No plant species of local, state-wide or national conservation significance were located on the site during survey of the site and review of literature and databases regarding flora in the region. During construction of the new bridge across the Huon River, *Westringia angustifolia* was identified. This is a rare listed species occurring mainly in the riparian zone. Any activities that have the potential to impact on the riparian zone will be preceded by a flora survey.

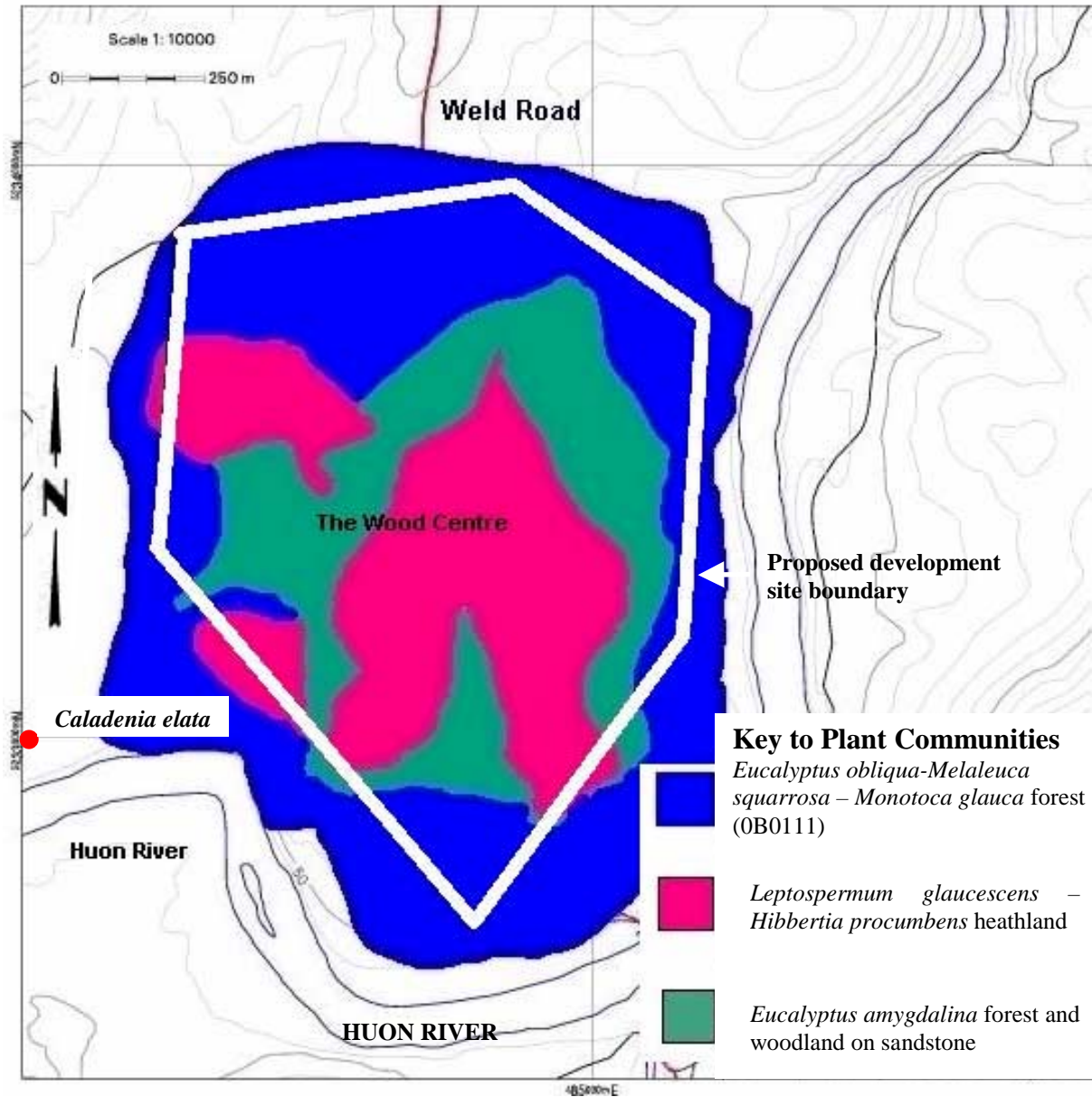
The proposed development will result in some loss of the intermittent remnant copses of *Eucalyptus amygdalina* woodland community (Figure VIII). This impact is not considered to be significant as this forest type is considered to be sufficiently protected under the RFA (pers. com., Stephen Casey 2001). An occurrence of *Caladenia elata* occurs near the site, this plant was previously considered endangered, it is far enough from the site not to be disturbed.

Seven faunal species of conservation significance are known, or are likely, to occur in the area of the proposed development. The proposed development will, however, only have potential to directly impact on one of these species, the Mt Mangana Stag Beetle. This impact is due to the necessity for clearing of some areas of wet *Eucalyptus obliqua* forest vegetation situated around the periphery of the site that is potential habitat for the stag beetle. A survey will be undertaken prior to construction to determine if the stag beetle is present within the wet *E.obliqua* forest around the periphery of the site. The areas, if found, will be delineated in order to protect the species. Where this is not possible, a permit to relocate due to damage to the area will be sought from DPIWE.

Management measures will be implemented to limit the extent of disturbance during construction and any disturbed areas will be rehabilitated as defined in the landscape master plan.

The project was referred to the Federal Minister for Environment under the *Environmental Protection and Biodiversity Conservation Act* who determined that there were no controlled actions.

Figure VIII Wood Centre Flora



Archaeology and Cultural Heritage

The Wood Centre development will not impact on European heritage sites, as no sites are known to occur on, or within six kilometres of, the site. The site of a 1950's spot mill is known to occur on the creek to the north of the Wood Centre.

No Aboriginal cultural heritage sites were discovered on the Wood Centre site during a site investigation, nor records of known sites located on the Tasmanian Aboriginal Site Index. Although no Aboriginal sites were located due to poor visibility of the ground surface, clearing of the site in preparation for development may uncover relics or features that were not previously evident due to the presence of thick vegetation.

As a precaution, an additional investigation of representative areas will be undertaken during the construction period to determine if any Aboriginal cultural heritage features are present and management measures will be implemented for the protection of any Aboriginal sites located during construction activities.

Visual Impact

The site is situated on top of a ridge within State forest, and has been partially modified in several areas by quarrying activities and associated vehicle tracks and a major new road. No designated vantage-points are situated within the vicinity of the site that are accessible by vehicles.

Potential areas that may overlook the site are as follows:

- Top of Barn Back from a Forestry Tasmania road;
- A 200 metre section of Bermuda Road (Forestry Tasmania section);
- Hartz Mountain looking north; and
- Edwards Road (Forestry Tasmania road).

In general, the views that are provided from these areas are restricted and distant from the site (Plate 1). The site may also be viewed during flights in the vicinity of the Wood Centre.

Given this and the measures to be used to mitigate any potential visual impacts including, use of similar architecture of the main buildings; the use of building and roof colours to minimise contrast with the surrounding vegetation; and the development of a landscape plan for the site, the visual impact of the Wood Centre will be minimal (Figure IX).

Plate 1 View from Edwards Road

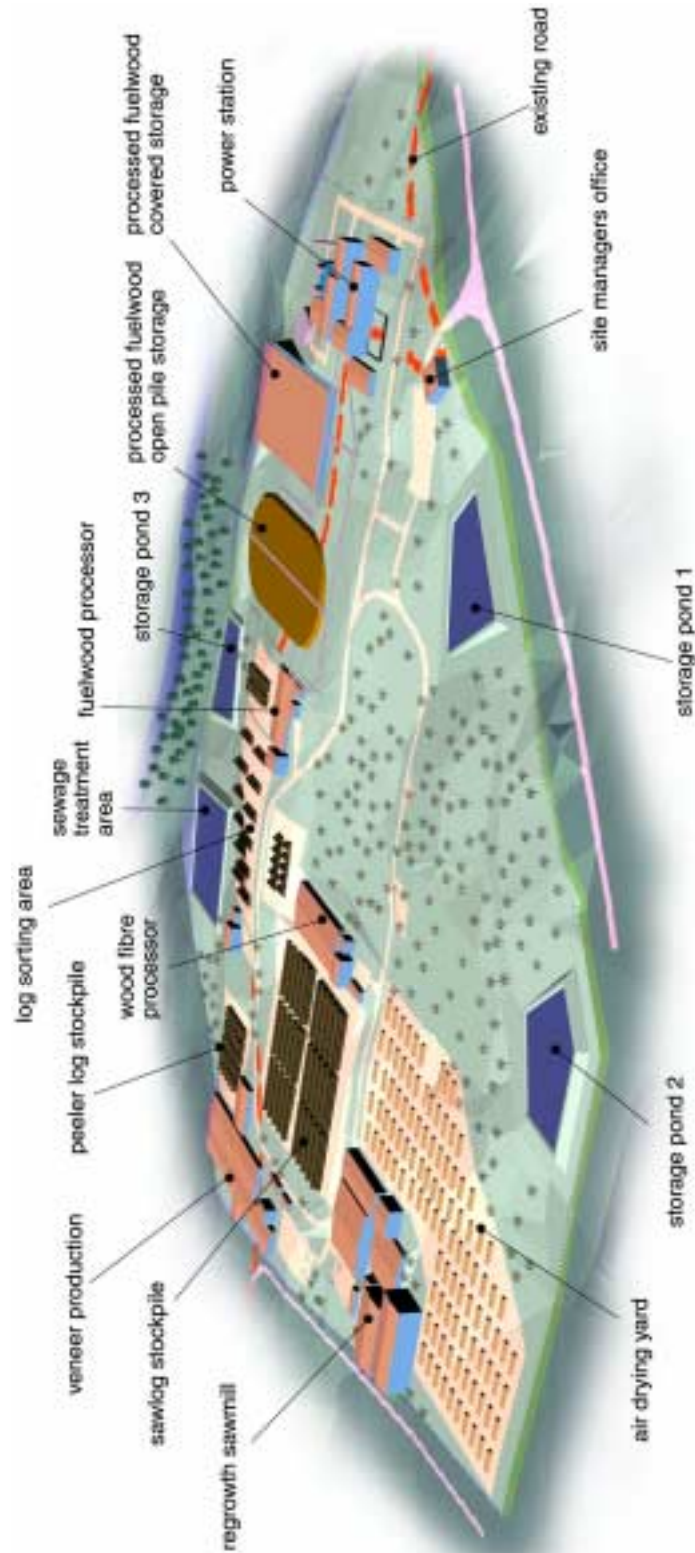


Energy Use

Electrical power demand for the site is estimated to be up to 10 MW. In addition to electrical power, the Rotary Peeled Veneer (RPV) mill and Sawmill will require thermal power for drying and conditioning.

The establishment of the wood-fired power station for power and thermal generation on the site means that, on the whole, the site will be a net exporter of energy.

Figure IX Conceptual Visual Impact of the Wood Centre



The following management measures will be implemented:

- Overall energy use will be minimised by selecting where possible motors, lighting and drying equipment that are efficient with respect to power usage;
- The detailed process design will maximise the potential to recover process heat and considerable use will be made of regenerative heat exchangers to achieve the aim; and
- The heat plants will include flue gas economisers for heat recovery.

Monitoring

The effectiveness of management measures associated with the development and operation of the Wood Centre and its wood processing components will be monitored to ensure impact on the environment is minimised, statutory requirements are met, and environmental management commitments are implemented. In summary, monitoring of site operations will include:

- Construction operations;
- Water quantity extracted from the Huon River and comparison to flow data;
- Water quality in the Huon River;
- Discharge of wastewater from wood processing sites to the site-wide management system (for internal management purposes);
- Discharge into and from the storage ponds;
- Soil and groundwater at the irrigation sites;
- Ambient noise monitoring;
- Obscuration monitoring of combustion plant discharges;
- Recording of noise level emissions associated with noisy equipment (as necessary);
- Monitoring of surface waters in the vicinity of the wastewater irrigation site(s).
- Observation of dust generation from highly trafficked areas (for internal management purposes);
- Maintenance of solid waste records (for internal management purposes);
- Maintenance of hazardous materials records for each wood processing operation (for internal management purposes);
- Complaints and incident recording, investigation and rectification; and
- Quantity of raw materials being used.

In addition, a site environmental committee will be established to oversee environmental management issues on the site.

Commitments

Forestry Tasmania is committed to operating the Wood Centre responsibly with respect to the environment. This includes not only meeting the specific regulatory requirements of the relevant agencies, but where possible, achieving best practice environmental management.

FT has identified more than 350 environmental commitments for this development, which are detailed in Table 89, Chapter 12. This table summarises each commitment according to the operational site and identifies the timing to carry out the commitment.

It is expected that many of these commitments will be converted to conditions on the development permit.

Conclusions

This DPEMP describes all aspects of the proposed Wood Centre including the critical environmental effects, both positive and negative.

This project meets the commitment by FT to promote sustainable work and innovative practices. By initiating a project that involves the manufacture of value added wood products on a central site within the forests, FT is allowing for local employment opportunities and improved transport efficiencies.

The Wood Centre development focuses on maximising overall returns and achieving greater resource recovery from existing levels of timber supply in the Southern Forests without significant impact on the natural environment.

The site has been selected and the proposed development will be managed in accordance with best practice environmental management techniques and procedures and the *Environmental Management and Pollution Control Act 1994*(EMPCA). These techniques and procedures have included:

- A detailed site selection process;
- The provision of a buffer zone around the site;
- The proposed development of the site;
- The proposed minimisation of waste production;
- Detailed environmental management and site operations;
- The progressive and final site rehabilitation; and
- The proposed monitoring and reporting procedures.

FRONTISPIECE

Details of Proponent

Forestry Tasmania
ARBN 91 628 769 359
79 Melville Street
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Function of the Development Proposal and Environmental Management Plan

The Development Proposal and Environmental Management Plan (DPEMP) has been prepared to support a Development Application by Forestry Tasmania (FT), to the Huon Valley Council ("the Council")

The DPEMP aims to provide information about the proposal to the decision making authorities, the Board of Environmental Management and Pollution Control (the Board), the Council, the Resource Planning and Development Commission (RPDC), State and Commonwealth Government referral Agencies and to the general public.

It provides information on the present environment of the proposed Wood Centre development, including such matters as zoning, land use, flora, soils and climate. It also describes the proposed timber processing activities in detail, the emission sources, and the development timetable. The environmental management plan sections of the DPEMP identify each of the potential environmental issues associated with the proposed developments, and provide detail regarding how each of these issues will be addressed. The infrastructure issues and the social and economic issues of the proposed development are also discussed.

The DPEMP generally follows the guidelines produced by the Board and provided in Appendix A.

Role in the Approval Process

An application for rezoning of the site will be considered concurrently with the permit application in accordance with Section 43 A of the *Land Use Planning and Approvals Act 1993* (LUPAA). FT have submitted a development application to the Council and a request for the Council to amend the Huon Planning Scheme. The development application will be supported by the DPEMP and the planning amendment by a planning report.

Upon receipt of the permit application the Council will refer the application to the Board, who will release the DPEMP for public comment. The Board will assess the DPEMP, and the public comments received and make a decision on the permit application, and will then advise the Council of the conditions to be imposed if the development is to proceed. The Board may request FT to provide a supplement to the DPEMP following this comment period.

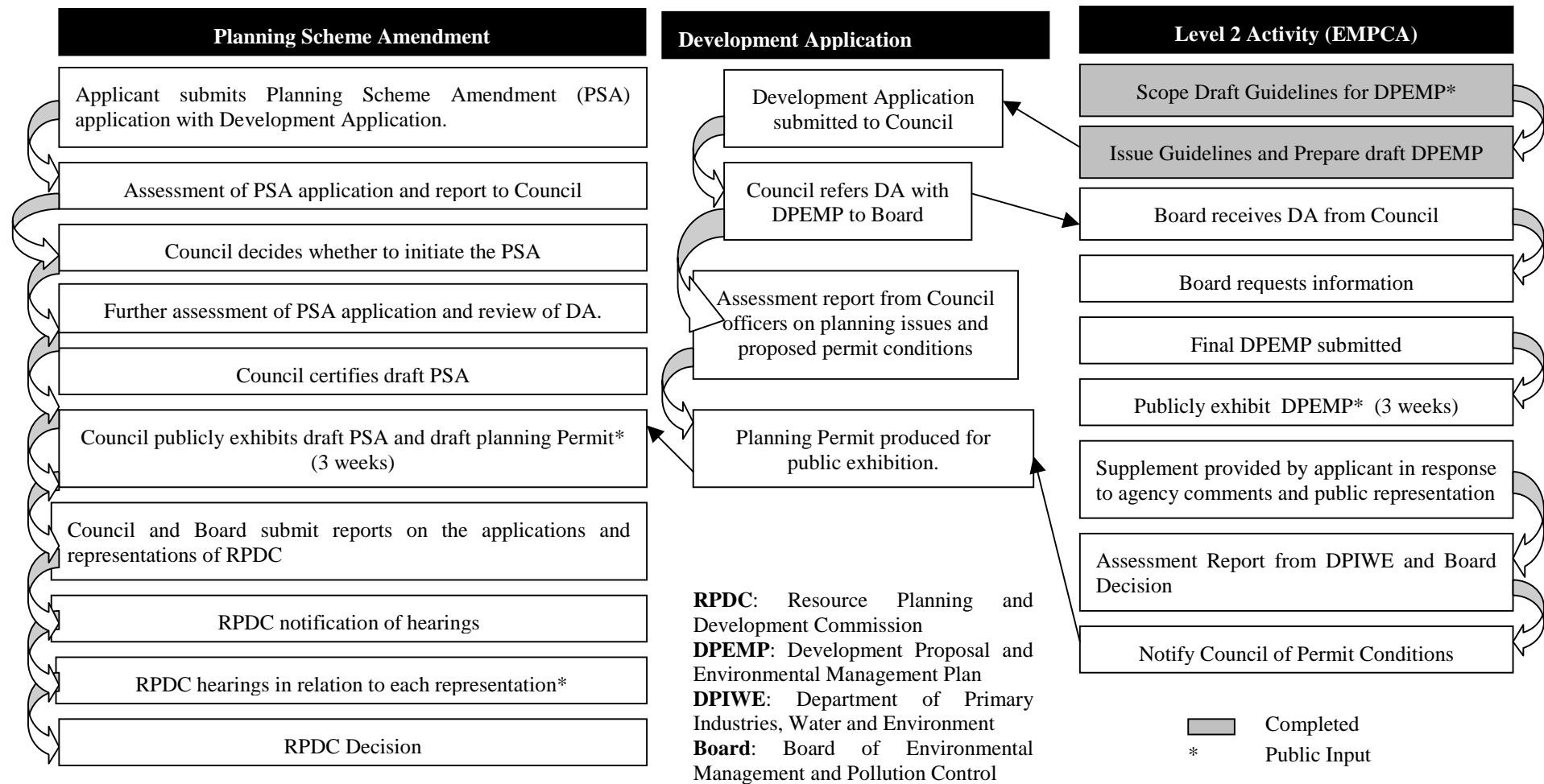
The Council will then make a decision on the permit application and exhibit the draft permit for public comment.

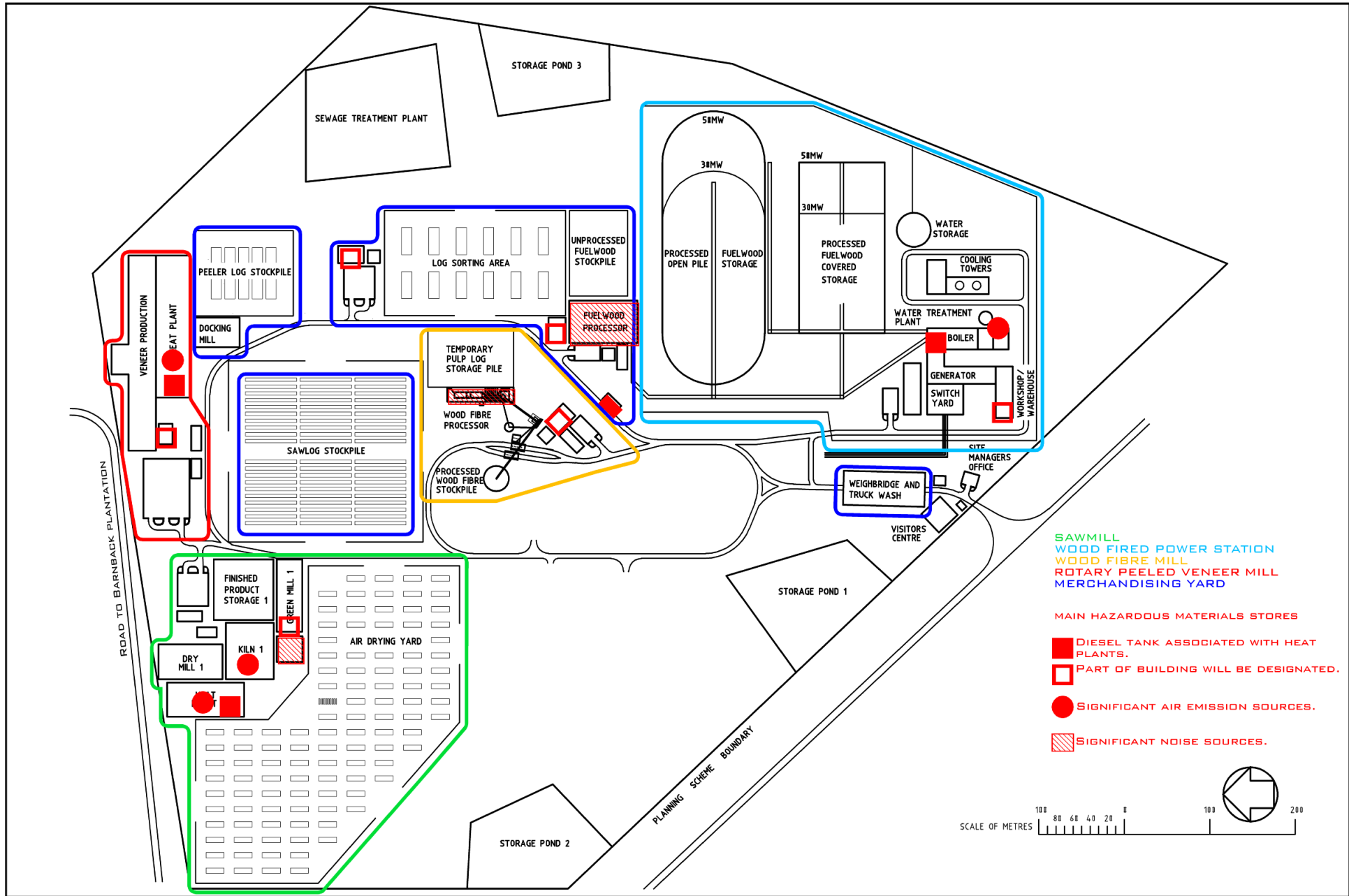
In parallel with the permit process, the council considers the planning scheme amendment and may certify the draft amendment, which is then placed on public exhibition with the draft planning permit.

The Council and the Board then submit reports to the Resource Planning and Development Commission (RPDC) on the application and representations received.

The RPDC will then hold public hearings on the proposed planning amendment and the permit application, and then make a final decision on both the amendment and the permit. The planning approval process is illustrated in Figure X.

Figure X Wood Centre Planning Approval Process





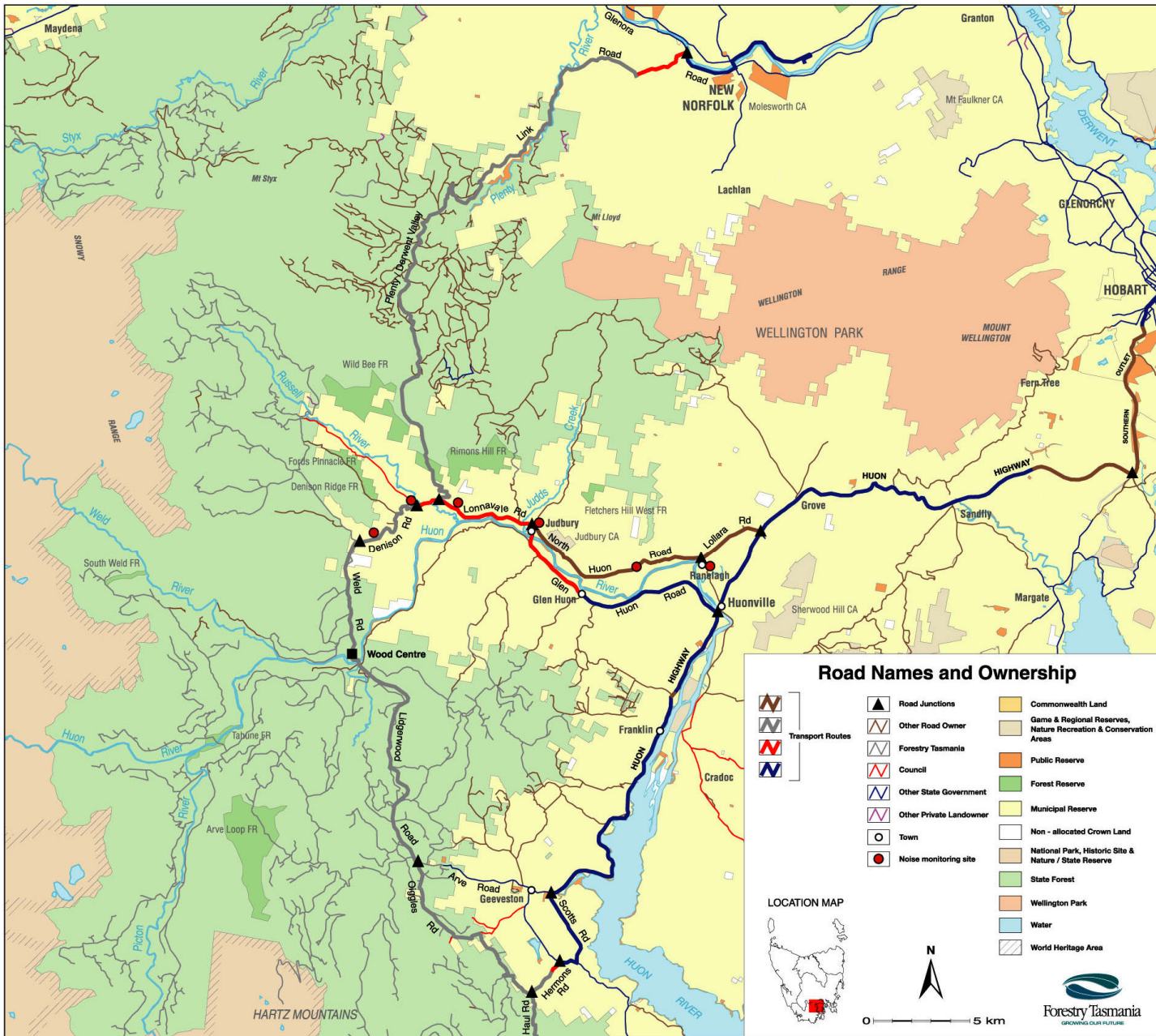


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APPENDICES

A	Guidelines for the preparation of Development Proposal and Environmental Management Plan for the establishment of an Integrated Processing Yard (IPY) for Timber Products. DPIWE, 2000.
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G	Revised Botanical Resources Survey of a Site Proposed for the Huon Integrated Timber Processing Yard, Glen Huon, Southern Tasmania. BIOLOGICAL CONSULTANTS, January 2001.
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Q	Implications of Transport Movements to and from the Huon Integrated Timber Processing Site. INDEC, January 2001.
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U	Air Quality Modelling for the Southwood Power Station – SEMF HOLDINGS PTY. LTD., July 2001.
V	Commonwealth Minister for Environment Declaration under EPBC Act 1999.
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X	Water and Wastewater Report for the Wood Centre Development Southwood Resources – Huon. SEMF HOLDINGS PTY LTD., July 2001.

ABBREVIATIONS

µS/cm	Micro siemens per centimetre.
ADO	Automotive Diesel Fuel
AHU	Aboriginal Heritage Unit (DPIWE)
ANZECC	Australian and New Zealand Environment and Conservation Council.
AS	Australian Standards.
BOD	Biochemical Oxygen Demand.
BPEM	Best Practice Environmental Management
CEPBC	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
CESPA	Commonwealth Endangered Species Protection Act 1992 (superseded by EPBC Act).
CH ₄	Methane.
CO	Carbon oxide.
CO ₂	Carbon dioxide.
CO _x	Carbon oxide compound.
dBa	Decibels.
DA	Development application.
DEM	Director of Environmental Management
DIER	Department of Infrastructure, Energy and Resources.
DO	Dissolved oxygen.
DPEMP	Development Proposal and Environmental Management Plan.
DPIF	Department of Primary Industries and Fisheries
DPIWE	Department of Primary Industries, Water and Environment.
EAP	Environmental Action Plan
EMP	Environmental Management Plan.
EMPCA	Environmental Management and Pollution Control Act 1994
ESP	Electrostatic precipitator.
FT	Forestry Tasmania.
GLC	Ground Level Concentration
HAZOP	Hazard and Operability Study
HCHRP	Huon Catchment Healthy Rivers Project.
Ha	Hectare.
HPV	High Performance Vehicle.
HVAS	Heavy Vehicle Accreditation Scheme (National).
HVC	Huon Valley Council.
ID	Induced Draft.
IFM	Intensive Forest Management.
kg/s	Kilograms per second.
km	Kilometres.
kpa	Kilo pascals
kV	Kilo volts.
Leq	The equivalent “A” weighted noise level.
L ₉₀	The noise level that is exceeded for 90% of the time
LPG	Liquid Petroleum Gas.
LUPAA	Land Use Planning and Approvals Act 1993.
M/s	Metres per second.
MI	Mega litres.
MSDS	Material Safety Data Sheets
MW	Mega Watts.
MWe	Mega Watt equivalents.
MWh	Mega watt hours.
N	Normal
NEPC	National Environment Protection Council.

NEPM	National Environmental Protection Measures
NMVOC	Non-Methane Volatile Organic Compound
N ₂ O	Nitrogen oxide
NO ₂	Nitrogen dioxide
NO _x	Nitrous oxide compound.
NPV	Net Present Value.
NTU	Nephelometer turbidity units.
NW Bay	North West Bay.
O ₂	Oxygen.
pa	per annum
PM ₁₀	Particulate Matter
RERAC	Rapid Environmental Risk Assessment Checklist
RFA	Regional Forest Agreement.
RMPS	Resource Management and Planning System
RPDC	Resource Planning and Development Commission.
SAR	Sodium adsorption ratio.
SCAG	Southwood Community Advisory Group.
SETAC	South East Tasmanian Aboriginal Corporation.
T	Tonnes.
TALC	Tasmanian Aboriginal Land Council.
TAR	Total Assessed Risk
TDS	Total Dissolved Solids.
TPH	Total Petroleum Hydrocarbon.
TSP	Total Suspended Particulates.
TSS	Total Suspended Solids.
TTSPA	Tasmanian Threatened Species Protection Act 1995.
VAC	Vertebrate Advisory Committee 1994.
VOC	Volatile Organic Compound.

GLOSSARY OF TERMS

*Class 1 watercourse	Rivers, lakes, artificial storages (other than farm dams) and tidal waters.
*Class 2 watercourse	Creeks, streams and other watercourses from the point where their catchment exceeds 100 ha.
*Class 3 watercourse	Watercourses carrying running water most of the year between the points where their catchment is from 50 to 100 ha.
*Class 4 watercourse	All other watercourses carrying water for part or all of the year for most years.
Cogeneration	A process in which fuel is burnt in a boiler and simultaneously produces steam for manufacturing processes and electricity.
Condenser	A heat exchanger that cools steam to form water.
Coupe	An area of forest designated to be harvested at a particular time, usually between 50 and 100 ha.
Dry Mill	A part of a sawmill in which sawn timber is dried in a kiln and is then dressed to achieve required dimensions.
Forest residue	Comprises primarily bark and branches that are not otherwise used as forest products.
Fuelwood	Forest residue (a renewable resource) used to produce power for the site as well as the local community.
Generation	Process of producing electricity.
Green recovery mill	A sawmill in which logs are sawn into green boards.
Kiln	A building normally heated by steam in which sawn wood is dried.

Kyoto Protocol	A multi-national agreement aimed at limiting green house gas emissions.
Laminated veneer lumber	A product thicker than plywood, comprising layers of veneer to produce building elements such as beams and flooring.
Log segregation	A process of separating wood into merchantable product streams.
Mega litres	1 000 000 litres
Mega Watt	A measurement unit for electrical power (mega watt) equal to 1000 kW.
Natural drainage line	An undisturbed naturally occurring depression that carries water during or shortly after rainfall.
Particulates	Small particles of solid material in an exhaust gas stream.
Plywood	A wood product comprising a number of layers of veneer glued together in sheet form.
Rotary peeling	A process in which a log is rotated in a lathe and a knife peels a continuous length of veneer from the outside surface of the log.
Screening	A process in which wood chips are passed over a fixed opening grate to remove under sized and over sized chips.
Site-Wide	Refers to the Wood Centre as a whole and the facilities shared communally by individual operations on the site such as the water supply and wastewater management and managed by the Site-Wide Manager.
Turbine	A device that converts high pressure steam to electricity.
Veneer	A thin thickness of wood obtained by slicing or peeling a log.
Volatile Organic Compound (VOC)	The various organic compounds contained in wood that evaporate as wood is heated.
*Watercourse	A natural depression carrying perennial or intermittent flows of surface water for part or all of the year in most years, consisting of a defined channel, with banks and bed along which water may flow.
Wood	Refers to hardwood throughout this document.
Wood residue	Wood that cannot be used for production of sawn timber, veneer or chips for pulp and paper.
Wood fibre	Wood in chip form for further processing.

* As defined in the Forest Practices Code 2000.

CHAPTER 1 INTRODUCTION

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1. INTRODUCTION

1.1. The Proponent

Forestry Tasmania (FT) is a government business enterprise owned by the State of Tasmania. It is recognised as an innovative forest manager. Its forest operations are conducted in a sustainable manner and are covered by an independently administered *Forest Practices Code 2000* developed under the *Tasmanian Forest Practices Act 1985*. FT manages 1.5 million hectares of land applying nearly 80 years of continuous forest management knowledge.

The Regional Forest Agreement (RFA) has established a framework within which the concept of sustainable management of multiple use forests can be advanced. The establishment of more intensive forest management practices and new plantations forms the basis for an internationally competitive forest products manufacturing sector.

FT is committed to innovative and sustainable work practices, differentiating itself from other timber producers in terms of wood quality and the silviculture of intensive forest management. FT is committed to the improvement of environmental management of its activities and has reflected this in its environmental policy (Appendix B).

Work in progress includes:

- Introducing an externally certified, auditable Environmental Management System complying with ISO 14001;
- Undertaking regular internal and external reviews of environmental performance;
- Implementing silvicultural regimes to improve physical timber properties;
- Competitive work practice benchmarking;
- Continuing to implement environmental management plans for new developments; and
- Continuing research and development.

Roles and Responsibilities

FT intends to lease the whole Wood Centre site to an infrastructure company (Site Manager). The Site Manager will undertake overall development of the site. The Site Manager's responsibilities will include the establishment and ongoing management of

common use services such as roads, stormwater, wastewater and process/potable water supply. Each processing facility on the site is expected to have an individual operator who will hold a sub-lease with the Site Manager and be responsible for meeting the environmental permit conditions for their respective leases.

1.2. History of the Proposal

Historically, wood processing infrastructure in Southern Tasmania was sited close to the timber resources used. However, the closure of the Australian Paper Mills (APM) pulp mill in the early 1990s at Port Huon has resulted in the Southern Forest resource being transported long distances to be processed, with consequential lower returns to FT and reduced local socio-economic benefits.

Establishment of the Wood Centre development will provide potentially greater returns to the southern region from its timber resources and the economies of scale to sustain a modern, competitive wood processing sector.

Ryan (1999) in *A review of log segregation and utilisation in Tasmania* indicated that there were opportunities within the Southern Forests for improved timber management and value adding by using a merchandising yard concept.

As landowner and custodian of the forestry resource to be utilised by this development, FT wishes to promote the expansion and diversification of forest-based industries. FT has prospective proponents considering the development of various operations that comprise the Wood Centre. However, in order to market the development more effectively it wishes to have approvals finalised for the operations that are proposed.

The Southern Forests link road was built to facilitate economic transport of logs between the Huon and Derwent Valleys. This road development led to the investigation of a number of suitable sites for establishing the Wood Centre.

1.3. Need and Justification for the Development

The Wood Centre Development is aimed at producing an investment ready timber production site that will attract private sector investment to develop innovative timber processing in Southern Tasmania. The project involves centralised, local value-added processing in the Huon District State forest. Value-added hardwood products are manufactured on a central site within the forests allowing for local employment opportunities and improved transport efficiencies due to the hardwood resource being hauled to a site within the local region as opposed to more distant locations outside of the Huon District. The project will introduce the first modern rotary peeled veneer facility to the state, which will make a significant contribution in extracting up to 25%

solid timber product from the existing pulpwood stream with no increase in harvesting intensity or area.

Currently, post harvest forest residue in the form of tree crowns, branches and non-commercial forest produce is burnt to expose mineral soils to form a seed bed. The proposed power station will use some of this forest residue as fuel wood to produce power from a renewable resource for the site as well as the local community. The resultant emissions traditionally associated with post harvest re-establishment burns will be reduced. The removal of forest residues lowers the fuel load within the coupe thus greatly reducing burn duration and levels of smoke emission.

The forest products manufacturing base in Tasmania currently comprises:

- Pulp and/or paper mills at Boyer, Wesley Vale and Burnie;
- A medium density fibreboard mill at Bell Bay;
- Wood fibre mills at Burnie, Hampshire, Waverley, Bell Bay, Long Reach and Triabunna; and
- A number of sawmills and veneer mills ranging in productive capacity from <2,000 m³ per year to >100,000 m³ per year.

An internationally competitive wood processing sector is vital to the future prosperity of the forest industry in Tasmania. In 1998, the Deputy Premier launched the Forestry Growth Plan that mapped out a 10 year process for development of the forest industry in Tasmania. The process is underpinned by three key drivers:

- Establishment of a world-scale forest resource;
- Encouraging world-scale processing operations; and
- Ensuring suitable development sites for processing operations are “investment ready”.

This development contributes to progressing the second and third of these key drivers. Investment is sensitive both to total lead times before production begins and project risk due to unknowns that might be encountered in the planning stages. By having sites that are “investment ready”, a significant contribution to enhancing investment confidence is achieved (Tony d’Alessandro pers. com., 2000).

The Wood Centre will create local employment opportunities, contributing 200-250 jobs and approximately \$40 million directly to the Tasmanian economy.

Total project lead times are reduced by having established zoning and permit conditions for the site progressed through the State approvals processes. These processes traditionally take between 9 and 12 months. Further, by establishing performance parameters for the developments in advance, investors can take environmental management issues into consideration during the project feasibility studies with more certainty.

The State forests within the Huon District which, the development will progress, currently has a hardwood resource that is being managed to contribute to a world-scale wood resource in the State. But, the District, does not have any “investment ready” sites for world-scale timber processing. Without such development logs will continue to be exported in raw form reducing benefits to the Tasmanian economy.

1.3.1. Need for the Development and Project Benefits

As noted in Section 1.2 above, the establishment of the Wood Centre will provide potentially greater returns to the Southern Region from its timber resources and the economies of scale to sustain a modern, competitive wood processing sector. Such returns and economies of scale will arise through a re-engineering of the current timber supply chain so that greater value recovery is realised and better outcomes overall can be achieved. These outcomes relate to increased wood recovery, greater operational safety, improved product quality and transport efficiencies.

The objectives of this project are:

- To improve overall quality and value-adding capability in log manufacturing by enabling better grading and preparation decisions, more control of log presentation and a greater number of log specifications;
- To reduce variability of raw material to producers of high grade timber products;
- To provide more flexibility in lead time for purchase and delivery of logs to sawmillers, thereby reducing their stock holding overheads;
- To enhance community amenity by increasing processing within forest boundaries and reduced road cartage through built-up areas;
- To improve the use of forest residue by producing sustainable and renewable electricity thereby reducing emissions.
- To introduce world-scale rotary peeled veneer product manufacturing;
- To improve the efficiency of the total transport effort; and

- To increase overall financial returns by improving recovery of higher grade materials and by reducing overall cartage costs.

Further, the proposed development represents a significant opportunity for Tasmania to achieve world-scale timber processing operations.

The development of the Wood Centre also has the ability to increase the reliability of power supply south of Huonville.

The most striking point of this project is that all these potential benefits and operational efficiencies can be realised while maintaining sustainable timber harvesting practices in compliance with the RFA. The Wood Centre Development focuses on maximising overall returns and achieving greater resource recovery from areas harvested in the Southern Forests. The key forest resources used by the project are regrowth trees, and over time an increase in plantation hardwood will be processed.

It is also recognised that existing wood processing industries will progressively become less competitive as wood quality changes in the move from mature to regrowth and plantation hardwood, proposed to occur in the Forests and Forest Industry Strategy 1990.

Forest activities, in compliance with the Forests and Forest Industry Strategy are increasingly moving to harvest younger wood. The plantation strategy being undertaken as part of the Forestry Growth Plan 1998 is seeking to produce more plantation wood that is suited to re-engineered timber products rather than pulpwood. The Wood Centre provides a focus for increasing the capability of industries to process regrowth and plantation wood. The principal value-adding industries on the site will use regrowth wood and once it becomes available hardwood plantation wood exclusively.

1.3.2. Consequences of Not Proceeding with the Development

If the proposed project were not to progress, a number of potential outcomes may not be achieved. The most significant of which are those defined as the project objectives listed above.

The project not proceeding will represent a foregone opportunity to achieve an internationally competitive wood processing sector and increased export of wood in raw material forms.

The Wood Centre Development also has the potential to deliver a range of socio-economic benefits. Of greatest significance are the estimated 200 jobs that will be created during the construction phase, and a similar number of full-time jobs estimated to be generated and sustained post construction. This represents an

\$8.1 million contribution to the economy (in wages) each year. In addition, the infrastructure being developed to support the site will also be available to service regional development in the area.

The development of the Wood Centre further offers the opportunity to redirect current traffic flows, thereby reducing the number of log trucks passing through major population centres. Maintenance costs to existing public roads will in turn be reduced with more of the log traffic restricted to within the forest.

The project not proceeding will represent a foregone opportunity to capitalise on the potential benefits of modifying existing routes and traffic flows.

By constructing processing facilities closer to the forests, most of the wood moving away from the site will be transported in enclosed vehicles thus improving the transport safety of forest produce. By not developing the project, the status quo remains unchanged and there will be no safety benefit derived from enclosed forest produce transport.

Refer also to Section 2 for further discussion of potential socio-economic impacts associated with the proposed development.

1.4. Project Timeframes and Development Linkages

The project is scheduled to commence as soon as development approval is achieved. FT has development agreements with proponents for all of the key components outlined in this DPEMP. The feasibility studies for all of these developments are well underway.

It is estimated that a decision will be made on this application by early in 2002. The development phase, if approvals are achieved, will take approximately 15 months.

As indicated above, proponents for all aspects of the development have been identified. But, the minimum configuration of industries that need to be established on the site to make the Wood Centre economic include the rotary peel veneer mill, the merchandising yard and a wood fibre mill.

The timing of the power station will be subject to factors external to the project which impact on the overall economics of the power station development. It is hoped these will be resolved in time for the power station to be constructed within the 15 month first stage construction.

Future stages of construction (separate approvals processes) and their approximate timings are:

- Additional sawmills relocating 1-5 years

- Plywood mill or Laminated Veneer Lumber Mill 3 years
- Medium Density Fibreboard Mill 7 to 10 years
- Oriented Strand Board Mill 10 years

1.5. Required Approvals

Approvals required prior to the commissioning of the Wood Centre are identified in the following table along with their approval status. Some licences will only be applied for by the individual facilities of the Wood Centre.

Table 1 Required Approvals

Approval	Status
Water Licence	Application made
Environmental Protection and Biodiversity Conservation Act	Minister for Environment (Comm) determination 30 June 2001 no controlled actions
Planning Permit from Huon Valley Council	Application with DPEMP
Plant Item Registration	Application to be lodged by Facility Managers
Certificate of Competency	Application to be lodged by Facility Managers
Verification / Certification of Weights, Measures, Weighing and Measuring Instruments	Application to be lodged by Site Wide Manager
Exemption Certificate Loading Zone	Application to be lodged by Site Wide Manager
Building Permit	Application to be lodged by Site Wide Manager and Facility Managers
Certificate of Occupancy	Application to be lodged by Site Wide Manager and Facility Managers
Licence to keep Dangerous Goods	Application to be lodged by Site Wide Manager and Facility Managers
Plan Approval of Premise Construction or Alteration for Dangerous Goods	Application to be lodged by Site Wide Manager and Facility Managers
Licence to Construct, Erect or Alter any Sign or Advertising Structure	Application to be lodged by Site Wide Manager and Facility Managers
Plant Item Registration of Schedule 7 Plant (including boilers and pressure vessels)	Application to be lodged by Facility Managers.
Plumbing Connection Permit from Huon Valley Council	Application to be lodged by Facility Managers.

1.6. Alternative Site Options Investigated

Various sites were inspected between Geeveston and Karanja, with underlying assumptions being that the site should be located to permit 24 hour operation as well as the capacity to allow more efficient configuration of log loads.

The sites considered were:

- Boyer (Norske Skog Mill);
- Karanja;
- Plenty and Puzzle River Junction;
- Russell Road;
- Denison/Weld Road Junction;
- North bank Huon River; and
- Former APM site at Port Huon.

An initial assessment of the above sites yielded the following findings:

- The Karanja site was too remote from the Huon District to allow economic cartage of timber to the site;
- The Denison/Weld Road site could not access a sufficient amount of water to provide adequate capacity for the envisaged integration of other industrial activities on site; and
- The APM site at Port Huon did not have sufficient flat land and was in private ownership.

Site Selection Criteria

The remaining four sites were then evaluated against an extensive set of selection criteria that included:

- Present zoning status of the site.
- Surrounding land use and compatibility with existing activities.
- Availability of infrastructure for:
 - Power supply;

-
- Water supply;
 - Sewer and domestic wastewater; and
 - Fire services.
 - Land availability for proposed site (approximately 90 ha).
 - Land suitability in terms of:
 - Topography;
 - Geology/soils;
 - Site history/contamination; and
 - Natural hazards.
 - Water issues:
 - Impacts on surface water and groundwater quality;
 - Proximity to water courses; and
 - Stormwater/wastewater management strategies required.
 - Other environmental issues:
 - Visibility of the site and associated potential landscaping requirements to minimise visual impact;
 - Solid waste management;
 - Quantification and impact of air and noise emissions;
 - Proximity of residences to the site and existing buffers;
 - Potential flora and fauna disturbance; and
 - Cultural heritage and features of archaeological significance.
 - Off-site impacts:
 - Material flow to the site and associated traffic effects;
 - Transport of product from the site and available route options (Chapter 4); and
-

- Employment catchment regions, commute distances and access routes most likely to be used.

Site Assessment Findings

A brief description of each of the four sites compiled during the assessment of the above criteria is presented below.

Boyer Site

The Wood Centre was seen as being integrated with the Norske Skog Boyer Mill. The proposed processes are already permitted uses undertaken by Norske Skog.

The site is privately owned and has paper making and softwood chipping facilities. Gunns Veneer Mill is located in close proximity.

The site slopes towards the Derwent River like all of the surrounding land. A residential area is located opposite the site on the south bank of the river. However, there are adequate buffers in the form of trees and hills to the east and west.

Minor infrastructural development would be required to provide sufficient, reliable power and water supply and to ensure the effective processing of sewer/domestic wastewater.

However, the amount of land required is not available. The total distance that unprocessed wood has to be carted is significantly higher than other available sites.

Plenty and Puzzle River Junction Site

Although an exact final location was not identified, a number of potential sites between the Plenty and Puzzle River confluence were identified as suitable for establishment and development of the Wood Centre.

There are no significant zoning issues expected as the area is remote from residential and other industrial areas. The land uses in the area primarily comprise pine plantations (operated by Norske Skog) and some State forest areas.

Any of the potential sites would be located on land falling towards either the Plenty or Puzzle Rivers. As both of these waterways are classified as Class 1 watercourses, development would need to have a buffer of at least 100 metres from the watercourse.

There is no suitable power supply near the site and no reticulated water available at the site. Infrastructure development enabling the processing of sewer and domestic wastewater would need to be provided, as well as creation of a dam for water supply for fire fighting activities. Water needs for the site could not be reliably met by the

Plenty or Puzzle Rivers. In addition, there was a probability of snow hampering winter operations.

Russell Road Site

Two potential sites were identified at the Russell Road/Denison Road Junction. The first site – on the northern side of the Russell Road – backs onto the Russell River, while the second site – on the southern side of Russell Road – backs onto Denison Road. Both sites are privately owned.

There is no suitable power supply to the site, no reticulated water supply and lack of appropriate facilities/infrastructure for the processing of sewer and domestic wastewater. There are no fire services on site, but water for firefighting could be drawn from the Russell River continuously.

Advice from DPIWE indicated that the Russell River could not meet the site's projected water needs.

While zoning issues have not been investigated, land use in the area is mainly pastoral. Although there are no residences within 1 km of either site, development of the Wood Centre was likely to impact on the essentially rural/residential nature of the area. This was a further consideration in not selecting either of the two sites as preferential options in determining the overall preferred site.

North Bank Huon River Site (above new bridge)

The site is located about 500 metres from the Huon River on an area of flat land about 50 metres above the normal river level. The site does not appear to have any value as productive forestry land due to prevailing soil and vegetation types.

No significant zoning issues are expected as the site is remotely situated with respect to residential and other industrial areas. The nearest house is 6 km away.

An issue of compatibility arises from the potential impact industrial development may have on the aesthetic value and recreational amenity of the Huon River, and the potential for buildings on site to impact on the skyline. But these are manageable through appropriate screening with vegetation.

There is no power supply to the site, no reticulated water supply and lack of appropriate facilities/infrastructure for the processing of sewer and domestic wastewater.

However, an abundant water supply to the site can be obtained from the Huon River. Power can be supplied from the Kermantie Substation.

Overall Preferred Site

Based on assessment of the site selection criteria and subsequent economic modelling for each respective site, FT was able to progress the selection process and identify a preferred location for establishment and development of the Wood Centre, this being the North Bank Huon River Site.

In summary, this location:

- Is more remote from habitation than the Russell Road site and the water supply from the Huon is more reliable than that from the Russell;
- Has in general, the lowest environmental impact of the sites considered;
- Has significantly lower average delivery log costs than other non-Huon sites considered; and
- Is already owned by FT.

1.7. Public & Stakeholder Consultation

1.7.1. Consultation Overview

Consultation to date has engaged Local Government, State Government departments, political representatives, industry groups, community groups and individual companies. Public information sessions and presentations to community and other groups have been made (Table 2).

A three phase approach to consultation is being used;

- | | |
|---------|--|
| Phase 1 | Provision of information to stake holders and community issues identification. |
| Phase 2 | Community participation (advisory group and focus groups) |
| Phase 3 | Statutory approval consultation phase. |

1.7.2. Phase 1 Information on Project Concept

A community consultation strategy has been prepared to cover issues associated with both the site and the required transport links to export facilities and local markets. In line with this strategy, a number of Community Information Days have been held which have provided members of the general community the opportunity to view the project plans and seek information regarding the project. Community groups were

provided with presentations and information. A public consultation report has been compiled by Corporate Communications and is provided in Appendix C.

Information Days have included display panels, project maps and brochures. Members of the community have also been supplied with self-addressed comment forms to complete and submit regarding the project. Input from the public consultation process has been taken into account by project management in the formulation of development strategies. Relevant technical personnel have been on hand at such meetings to answer community questions.

Consultation to Date

Major information sessions and community groups consulted to date and other groups/businesses that have been contacted are detailed in Table 2. The following groups/businesses have advised that no briefing is required:

- Apple & Pear Growers Association
- Grove Store
- Leslie Vale Progress Association
- Huon Protection Group

Table 2 Summary of Information Sessions and Parties Consulted

Information Sessions and Community Groups Consulted	Other Groups/Businesses That Have Been Contacted
Sandfly Community Information Day (30/9/00)	Huon Valley Mushrooms
Judbury Information Session (7/10/00)	Huonville Apex Club
Ranelagh Information Session (7/10/00)	Rotary Club of Huonville
Huonville Information Session (8/10/00)	Rotary Club of D'Entrecasteaux
Margate Information Session (9/10/00)	Glen Huon Progress Association
North-West Bay Concerned Citizens meeting (10/10/00)	Howden Progress Association
Huon Opportunities Group (19/10/00)	Coningham Progress Association
Cygnets RSL (20/10/00)	Snug Progress Association
Geeveston Residents Information Group (21/10/00)	Kingborough Chamber of Commerce & Industry
Huon Kingborough Tourism Operators (25/10/00)	Huon FM
Huon Valley Land Care Group (31/10/00)	Margate businesses Fuglsang Shipbuilders, Hazells, and fish processors
Judbury Residents session (6/11/00)	NW Bay River Management Committee

Information Sessions and Community Groups Consulted	Other Groups/Businesses That Have Been Contacted
Dover Residents session (14/11/00)	Huon Agribusiness and Landcare Group – Allison Clark
Huonville Show (18/11/00)	Kingborough Landcare and Coastcare Groups
Southwood Supporters Group – Inaugural Meeting (20/11/2000)	Glen Huon Primary School (parents and teachers)
Geeveston Residents’ Information Session (28/11/2000)	Huon Senior Citizens
North West Bay Progress Association (6/12/2000)	Margate Christian Church/Childcare
Snug/Coningham Residents’ Information Session (11/12/2000)	Margate Primary
Howden Residents’ Information Session (13/12/2000)	Country Women’s Association of Margate
Cygnets Residents’ Information Session (12/12/2000)	Tasmanian Aboriginal Land Council
Kingston Probus Club (29/12/2000)	

A project web site has been established at www.southwoodresources.com.au. In addition, FT began public tours of the proposed site in January 2001.

Outcomes of Phase 1

Approximately 5000 comment forms were distributed during information sessions in both Kingborough and Huon Valley Municipalities. The responses to date are as follows:

- 110 comment forms were received back from Huon Valley Municipality residents;
- 13 emails were received on the project. - 10 opposing, 2 supportive, 1 neutral;
- 4 letters - 2 supportive, 2 opposing;
- 4 Ministerials from people who had not provided other written communications; and
- 137 phone calls were received with approximately equal numbers in support and opposing the project.

Table 3 summarises the key issues and nature of written comments.

Many of the environmental comments were related to forest management issues but several included concerns about water pollution and emissions from the power station.

Comments on community impacts related to issues such as lifestyle, noise and visual amenity from the road transport component.

To the end of April 2001, over 500 visitors toured the site by way of bus tours.

Table 3 Summary of Initial Community Consultation

Consultation Issue	Supportive	Opposed	Neutral
Community Impact	2	14	2
Consultation	2	11	2
Contact (request to be on a mailing list)	0	0	2
Economic	1	2	3
Environment (includes forest management protest)	0	22	2
Infrastructure	4	0	0
Opposition - Unspecified	0	4	0
Rate Options	7	1	1
Welcome the project - Supportive	48	0	0
Transport	0	0	1
Total	64	54	13

Public concern with the proposal, resulted in some protest rallies in Hobart.

1.7.3. Phase 2 Community Consultation (Focus Groups and Advisory Groups)

As part of its commitment to the public consultation process, FT has engaged the services of a social research consultant. The consultant, Jean Grosse, has conducted a series of focus group sessions in order to facilitate the objectives listed below:

- To gather the perceptions of community attitudes and aspirations from a range of people from Geeveston, Huonville, Judbury, Glen Huon and Ranelagh; and
- To analyse and report on the focus group findings. Provide feedback to the Southwood Community Advisory Group (SCAG) (see 1.7.4) and to jointly brief the SCAG on the road options and issues in conjunction with FT and the Huon Valley Council.

The strategy pursued to achieve these objectives is outlined in Table 4.

Table 4 Public Consultation Strategy

Method	People Involved	Issues	Outcomes	Date of Consultation
(1) Focus Groups (four) in the Huon Area.	<ul style="list-style-type: none"> Range of people from Geeveston, Huonville, Judbury, Glen Huon and Ranelagh. 	<ul style="list-style-type: none"> Community aspirations – lifestyle, fears, jobs, priorities; knowledge about and attitude towards project. 	<ul style="list-style-type: none"> Community reassurance that their voice is heard. 	Dec 3 - 17 2000
(2) Seminar briefing of SCAG – focus group report.	<ul style="list-style-type: none"> SCAG members, FT and HVC 	<ul style="list-style-type: none"> Community priorities 		Jan-Feb 2001
(3) Road option workshops with target groups.	<ul style="list-style-type: none"> People who live near and/or use the roads in question. 	<ul style="list-style-type: none"> Preferred route for transport: North Huon Road vs Glen Huon Road & Lollara Road vs Glen Road. 	<ul style="list-style-type: none"> Understanding of core community priorities. 	Mar 2001
(4) Selected road option workshops with target groups.	<ul style="list-style-type: none"> Three groups of residents who live on the selected transport route. 	<ul style="list-style-type: none"> Acceptable mitigating factors for residents affected by choice of road – safety and amenities. 	<ul style="list-style-type: none"> Encourage acceptance of the transport changes in the area. 	July - August 2001

In focus groups conducted in the Huon Valley (Huonville, Geeveston, Franklin, Judbury) in December 2000 (EES Enterprises), relating to the Wood Centre proposal, participants:

- “Expressed fear and uncertainty about changes the project might bring to the valley but also revealed a yearning for an exciting “something” which could lift the depressed spirit of the valley;

-
- Felt cautious about trusting outsiders with “their” valley but were prepared to work in partnership with proponents of the wood centre if the partnership arrangements had continual and genuine ‘local involvement and input’
 - expressed pride in the Valley’s history of achievements in timber and fruit growing.”

The **key findings** were:

- respondents “insisted that the Huon was where they wanted to live,” but the valley “is not what it used to be.” Feelings of nostalgia for the days of prosperity, jobs aplenty, local services such as banks and transport and a resignation that those days were gone forever.”
- a desire for the project to provide skills and job training, coupled with concerns to keep their children in school to completion
- the project must not threaten the perceived clean, green and natural beauty values of the valley
- a substantial amount of apprehension based on misinformation and a genuine desire for more and continuing information, particularly at the level of “what it would mean in everyday life” and “what sort of jobs would there be for us.”
- specific community amenity and information issues identified in the public information process were confirmed at a local level.

The **response** by FT has involved:

- Forestry Tasmania and EMPCA introduced a new opportunity for public input, additional to the statutory planning process, with the release of the Draft Environmental Management Guidelines for public scoping, on 13 January 2001. (comment period close: 2 Feb 2001).
- a full-time Community Liaison Officer was appointed to the Huon District to assist with public information at the regional level and the provision of public information relating to issues raised by the community will be ongoing.
- free public information bus tours of the site and forest were advertised in the press, to date over 500 people have visited the site on a bus tour.
- a public information campaign with press ads and features on the main concerns – wood-fired power generation, rotary peeling, environmental management of the site – were arranged with THE MERCURY and THE HUON NEWS

-
- community amenity issues, particularly road transport (route options, noise, safety etc) have been referred to specialists to survey and review with the respective residents.

The workshop recommended use of North Huon Road as preferable to Glen Huon Road but did not resolve a route through Ranelagh.

A follow up workshop with the participants was conducted to complete the work. The route through Ranelagh was agreed by extending North Huon Road to Ranelagh Street and then using Marguerite Street and Lollara Road to the Huon Highway.

FT engaged management consultants, Global Value Management Pty. Ltd. to conduct workshops with residents to explore the alternatives, which could provide the basis for the ultimate choice of route, and to report these findings to the SCAG.

The objectives of the consultancy were:

- To arrive at a consensus on alternate road route options;
 - North Huon Road or Glen Huon Road; and
 - Lollara Road or Glen Road.
- Explore the possibilities of mitigating factors for the residents affected by the final choice of road route;
- To prepare a written report summarising the findings (refer to Appendix P).

Additional consultation work with affected residents is now being undertaken.

1.7.4. Regional Advisory Group

FT has established a Regional (Huon Valley) Advisory Group known as Southwood Community Advisory Group (SCAG) representing a broad range of business and resident's interests in the Huon Valley. The main purpose of this group is to help with independent advice on the community issues associated with the Wood Centre development.

The Group is chaired by a respected solicitor with local knowledge and a proven capacity for objective facilitation. Membership of the group was established by direct invitation from the chairperson and was designed to be broadly representative of the community. The final decision on membership was made by the group.

The terms of reference for the SCAG are to:

- Review community and business concerns;

- Provide FT with advice on regional development impacts;
- Provide comments on proposed approaches to mitigating community issues;
- Propose recommendations to enhance community benefits from the proposed development;
- Assist the resolution of related community concerns;
- Focus on issues within the Huon Valley and provide comments on related issues in that context; and
- Assist with the identification of offsets that might be provided where impacts may not be mitigated.

Timely advice has been provided since 15 November 2000 and will continue through 2001, with the key stages being:

- Submission for planning approval (estimated August 2001);
- The associated public comment period (mid-August to mid-November 2001); and
- The environmental management planning period (to December 2001), including public input to the draft DPEMP guidelines.

The SCAG will keep itself informed about community issues and provide advice for input to FT, Local Government and planning authorities, specialists and the project community consultation consultant (Jean Grosse) during the term of her engagement.

1.7.5. Phase 3 Statutory Consultation process

The statutory consultation phase comprises four opportunities for detailed input by the public.

- The draft environmental guidelines and a detailed project description provided as a basis for public input in January 2001.
- This DPEMP written in response to the guidelines will be put on public exhibition for public comment in August 2001.
- It is estimated that, draft permits and the environmental management plan will be publicly exhibited for comment again in November 2001 by the Huon Valley Council.

- It is estimated that, the Resource Planning and Development Commission (RPDC) will conduct public hearings into the proposal in December 2001.

During this third phase FT will continue to organise site visits and briefings for interested people to help them learn more about the project and to highlight any additional issues.

1.8. Relevant Legislation, Regulations, Codes and Policies

Legislation, regulations, policies and guidelines that are likely to be relevant for this development include the following:

- Environmental Management and Pollution Control Act 1994 (and associated Policies and Regulations regarding water pollution, noise, etc);
- Land Use Planning and Approvals Act 1993;
- Water Management Act 1999;
- Environment Protection and Bio-diversity Conservation Act 1999 (Commonwealth);
- Forestry Act 1920
- Threatened Species Protection Act 1995 (State);
- Aboriginal Relics Act 1975;
- Historic Cultural Heritage Act 1995;
- Workplace Health and Safety Act 1995
- Dangerous Goods Act 1998;
- Dangerous Goods (General) Regulations 1998;
- Renewable Energy Act 2000 (Commonwealth);
- State Policies and Projects Act 1993; and
- State Policy on Water Quality Management 1997.

Relevant codes, guidelines and agreements include:

- Forest Practices Code 2000;
- Tasmanian Regional Forest Agreement 1997;

- Sawmill Environmental Code of Practice 1995;
- Guidelines for Re-use of Wastewater in Tasmania 1994 (Soon to be superseded by Draft Guidelines for the use of Recycled Water in Tasmania 2000);
- Sewage Pumping Station Environmental Guidelines 1999;
- Guidelines for Acceptance of Liquid Wastes to Sewer (DELM 1994)
- Tasmanian Biosolids Reuse Guidelines 1999; and
- Relevant National Environment Protection Measures.

1.9. Structure of this Report

Due to the multi-faceted nature of this proposed development, the DPEMP is a large document. Every effort has been made to make this report as user friendly as possible. A brief description of the main sections of the report is provided in Table 5.

Table 5 Brief Description of the DPEMP Report Structure

Section Heading	Brief Description of Information Provided
Frontispiece	A brief description of the environmental and planning approval process through which the proposed development is to pass and to which this DPEMP provides supporting information.
Executive Summary	A summary of the proposed development and information provided in the DPEMP in support of the development application and environmental and planning approvals.
1. Introduction	Description of the proponent, the proposals history, justifications for the development, and a list of relevant legislation and policies that have been considered when preparing the DPEMP.
2. Development Proposal	Description of the proposed development as a whole.
3. Existing Environment	Description of the existing environment, with identification of significant features, which may necessitate the implementation of management measures to minimise potential impacts of the development.
4. Transport and Roads	Description of the existing road transport operations, alternative transport arrangements and road routes considered, potential environmental impacts associated with road transport and proposed mitigation measures.

Section Heading	Brief Description of Information Provided
5. Site-Wide Issues – EMP	Discussion of site-wide issues (such as common services), with respect to their potential impacts and management measures.
6. Merchandising Yard - EMP	Detailed description of the facility’s operations, with discussion of its potential impacts on the existing environment and the management measures proposed.
7. Sawmill - EMP	As above
8. Rotary Peeled Veneer Mill – EMP	As above
9. Wood Fibre Production – EMP	As above
10. Wood-Fired Power Generation – EMP	As above
11. Health Impact Assessment	Discussion of the potential health related impacts of the development.
12. Cumulative Effect of the Development, Conclusions and Commitments	Consideration of the possible cumulative effect of the proposed development on the environment. Summing up of the report findings and commitments for the prevention of pollution and protection of the environment.

CHAPTER 2 DEVELOPMENT PROPOSAL

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2. DEVELOPMENT PROPOSAL

2.1 Site Location

The proposed site for the Wood Centre comprises about 90 ha located on the top of a ridge, approximately 75-100 metres in altitude. The ridge runs approximately north-south and is relatively flat on top where the proposed development is to be situated. The Huon River forms a significant bend around the ridge.

The Wood Centre is located on the Glen Huon 4823 map (Tasmania 1:25,000 Series) at grid reference 484750E 5233250N (Figure 1 and Figure 13 in Chapter 4) on the Weld Road. The Wood Centre is located approximately 25 km due west of Huonville and about 16 km north northwest of Geeveston.

2.2 General Site Description

The selected site is on a ridge approximately half a kilometre north of the Huon River opposite the Arve River confluence. The majority of the site is undeveloped, remaining under low scrub, or wet sclerophyll forest. Past land use has involved quarry activities. These activities have resulted in the progressive extension of the road along the ridge top and numerous tracks across the site (Figure 2). The area impacted by these activities is generally linear but includes several areas opened up for extraction purposes.

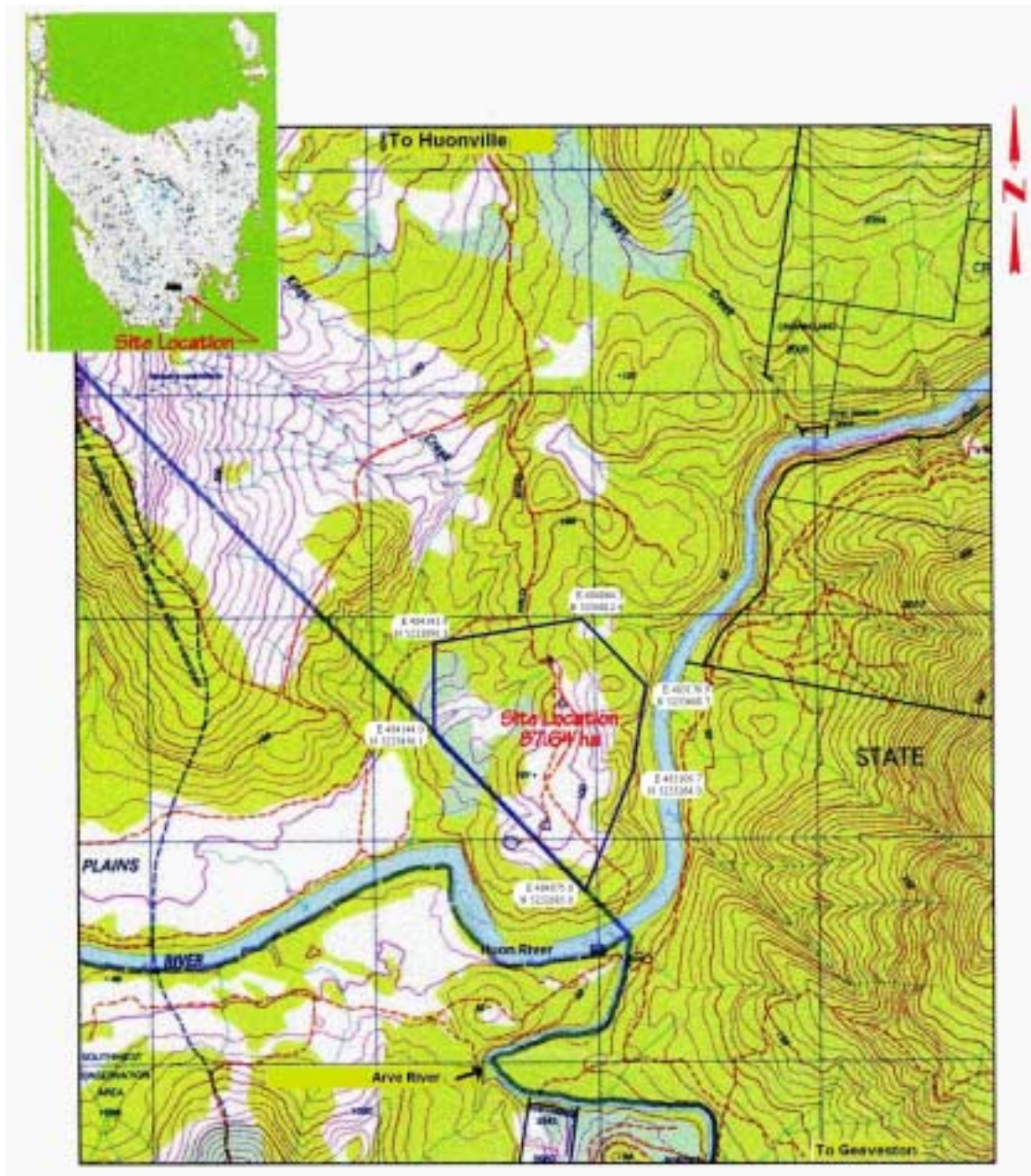
Access to the site is via the Weld Road, and is on the Southern Forest link road network. The existing track to the former quarries has been upgraded and extended to the river as part of the Weld Road upgrade and extension. A bridge has been built across the Huon River to allow access for log trucks from the south as part of the link road concept. The road is considered part of normal forestry road infrastructure upgrading and has not been built explicitly to service the requirements of the Wood Centre.

To the north and west, eucalypt plantations have been established. There are no publicly accessible lookout points in the vicinity. Refer to the Chapter 3 of the report for further discussion of the existing environment. An aerial photograph of the site taken in about 1998 is shown in Figure 2.

2.3 The Wood Centre Operation

The site will act as a central processing location for hardwood currently harvested in the Southern Forest. Most of the logs will be hauled to the site using forestry roads. A major reduction in log truck traffic on the Huon Highway north of Geeveston will occur as a result. Where wood is hauled wholly on FT roads, 24 hour per day cartage may occur.

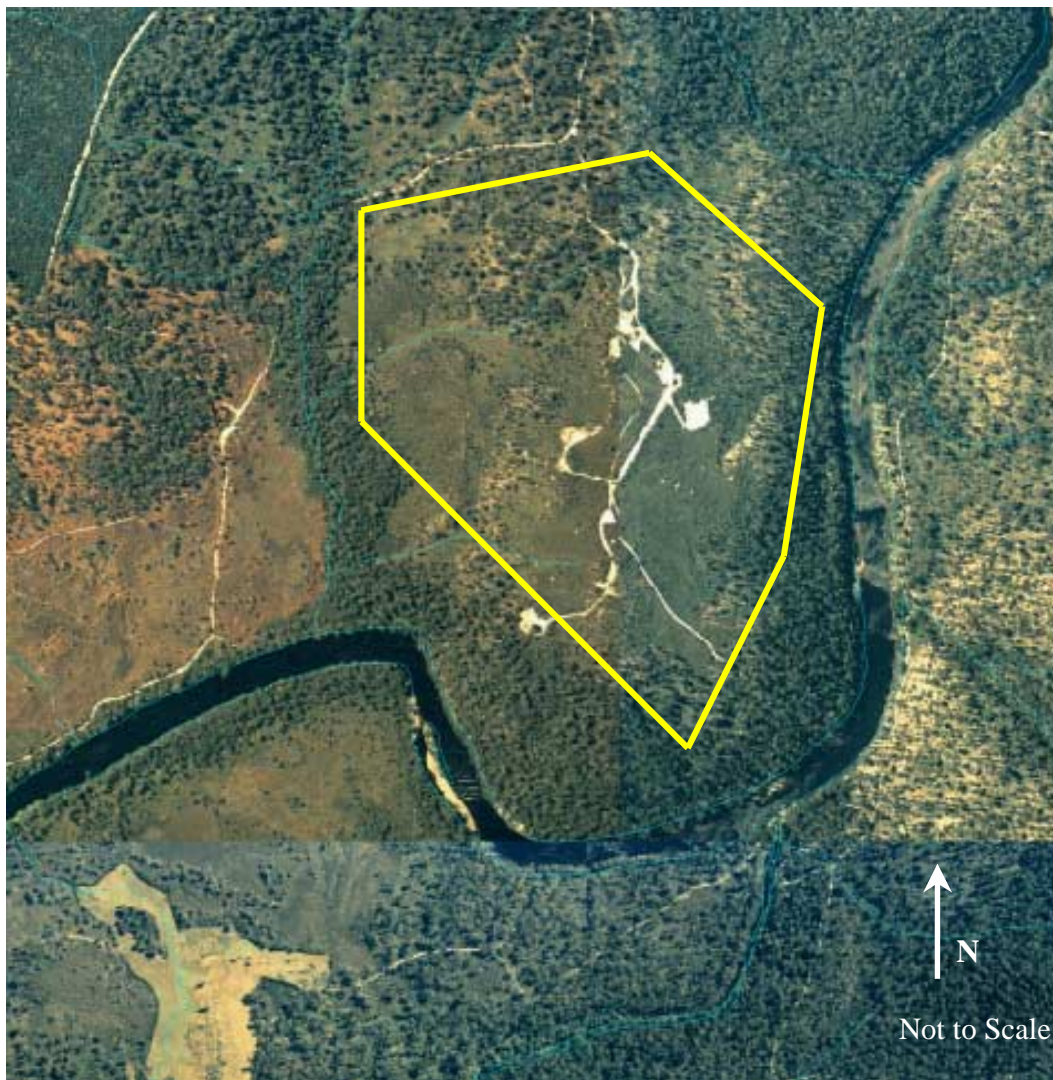
Figure 1 Site Location (Map 4823, Glen Huon)



Not to Scale

For a regional view see Figure 13 in Chapter 4.

Figure 2 Aerial Photograph of Existing Site with Approximate Proposed Site Boundary



Circa 1998

The facilities proposed for development on the site, and for which development approval is being sought, include:

- Merchandising yard (receiving, weighbridge for log segregation, cross cutting and sawlog sales and storage);
- Sawmill (for green timber recovery, kiln drying, air drying, planing and moulding);
- Rotary peeled veneer mill (for veneer production);
- Wood fibre mill (for wood fibre production);
- Forest residue and timber processing by-products fired power station;
- Associated site-wide wastewater management (for collection, treatment and reuse of wastewater from the above facilities); and
- Water supply and pumping.

A composting plant (making use of on-site wood by-products such as offcuts, shavings sawdust and ash generated from the log processing activities within the Wood Centre) will be the subject of a separate application on land adjacent to, but outside the site.

The following are brief descriptions of the general process of each facility. The details of the process descriptions are provided in the relevant environmental management plan sections of this DPEMP. Figure 3 illustrates the flow of wood through the Wood Centre.

Merchandising Yard

Trucks entering the site are weighed and in wet weather will be washed beforehand to remove mud. The logs are then unloaded, broadly sorted, washed and scanned for value recovery. The classifier examines each log and marks it out for the various product types. The log is then cross cut to extract the products identified.

Sawlogs will be moved in the Merchandising Yard using rubber-tyred loaders. Peeler logs and pulpwood will be transferred to the rotary peeled veneer mill and wood fibre mill respectively. Fuelwood will be hauled to the power station. Sawlogs will be stored in steel cradles when necessary under a water spray. Sawlogs sold to off-site sawmills will be moved by conventional log trucks.

Sawmill

A green recovery mill will be constructed in the first stage, ultimately augmented with a dry mill and associated kilns and timber planing processes. Green wood waste from the sawmilling process will be fed by conveyor or loader to the wood fibre plant or to the facility heat plant, which may provide heat for reconditioning and drying.

Sawdust and dry waste will be fed into bins that will be moved to the fuelwood storage for the power station or facility heat plant. Sawn product will be moved from the site on conventionally sized trucks. Approximately 64,000 m³ of sawn timber, depending on the degree of drying undertaken, will be transported each year, principally to Hobart.

Rotary Peeled Veneer Mill

Logs entering the rotary peeled veneer mill will be initially conditioned by immersion in water. Different water bath temperatures are used depending on the conditioning needs. After conditioning, logs are placed on a lathe and are peeled into varying veneer thicknesses. The veneer is classified and guillotined to desired length before being dried. The drying process lasts about half an hour and reduces the moisture of the veneer from green wood (about 50% wet basis) to the target moisture (about 4% wet basis). The dryers are hot air (160°C), heated by steam coils in the facility heat plant.

Dry veneer is then trimmed to final size. Approximately 57,000 tonnes of dried veneer will be transported each year from the site to Hobart for subsequent shipping overseas.

Wood Fibre Mill

Wood fibre is generated from wood that is not suitable for a higher value-adding process. Pulpwood logs from the merchandising yard and other solid wood wastes will pass through the wood fibre mill comprised of a chipper.

The chipper will be in a sound insulated structure, oriented to minimise noise impact on-site and the surrounding area. After screening, fines will be conveyed to the power station for incineration. Oversized chips will be re-chipped. Wood fibre will be collected in an overhead bin prior to export or local transport by semitrailer-mounted chip bins. Approximately 300 000 tonnes of wood fibre will be transported from the site each year for export, a further 40 000 tonnes a year will be moved to local users.

Power Station

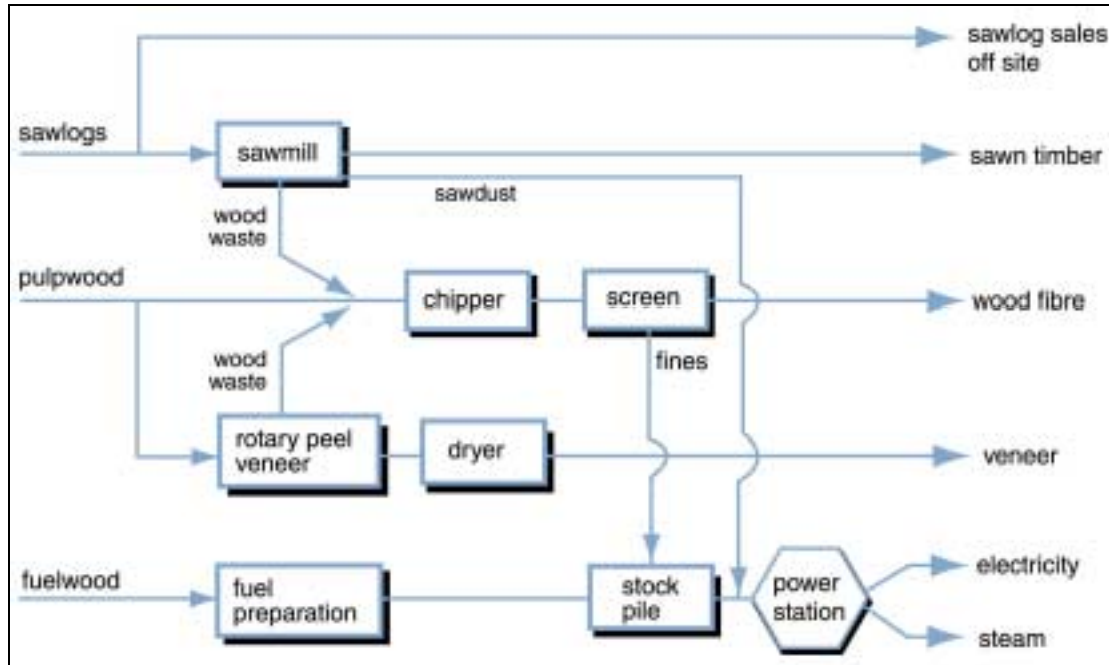
A wood-fired power station generating between 30 and 50 MW will use residues from forest operations and processing residues. About 300,000 tonnes per annum of forest residues will be gathered from existing integrated harvesting operations in the local area.

Forest residues left in the coupe are currently burnt to assist with regeneration and future site management. By harvesting a part of this residue for use as fuelwood in the power

station, the amount of residues burnt in the coupes will be substantially reduced and air quality may improve as a result of smoke reduction. Leaves and small branches will not be taken, providing nutrients, some large material will be left for biodiversity conservation. Using wood for power generation is sustainable and does not lead to increased carbon emissions. Indeed, due to the use of pollution control equipment, a number of environmental benefits will accrue including lowering particulate emissions, lowering of methane production from decaying wood and displacement of a modest level of coal from conventional coal-fired power stations in Australia (providing there is a market).

A stockpile of forest residue fuel will be created at the power station. The burning process and flue gas particulates will be strictly controlled to minimise impacts from the power station stack emissions. High-pressure steam from the boiler will be fed to a turbine to generate electricity. Low-pressure steam from the turbine exhaust may be piped to the kilns and the rotary peeled veneer mill at the Wood Centre for heating and drying processes. Excess steam will be cooled through a condenser connected to a cooling tower. During start-up, the boiler will be fired with a light diesel oil.

Figure 3 Wood Centre Wood Flow



2.4 Site Layout

A conceptual site layout has been developed to show the general areas for each facility (Figure 5). The location of each facility has been determined based primarily on flows of materials between the facilities, topography, and the requirement for close proximity to the communal power and steam resource.

Of the 90 ha site identified as the proposed development site, approximately 16 ha has been determined to be of unsuitable topography for development. The predicted area requirements for each facility are given in Table 6.

Table 6 Predicted Area Requirements for Facilities

Facility	Approximate Allowable Area (ha)
Merchandising yard and log storage	15.0
Sawmill	14.0
Rotary peel veneer mill	6.5
Wood fibre mill	1.0
Wood-fired power station	20.0
Communal wastewater management facilities	5.5
Total	62.0

2.5 Estimated Quantities of Production

The estimated quantities of production from the various facilities are summarised in Table 7 below and Figure 6 illustrates the raw material and product flow. The quantities of product and wood by-product are discussed in more detail in the relevant environmental management plan sections for facilities. The raw materials will enter the Wood Centre directly from the forest and the product is ready for transport off-site. The estimated product outflow is greater than the inflow for pulpwood because wood fibre from other Wood Centre facilities will contribute to the outflow. The production residue is utilised either as wood fibre or as fuelwood in the power plant and is not accounted for in the table. In addition, losses of water effect weight that contributes to imbalance in the values.

Table 7 Estimated Annual Hardwood and Product Flows

Raw Materials	Green wood inflow (pa)	Product	Estimated product outflow (pa)
Sawlogs	88,000 m ³	Sawn timber and sawlogs	64,000 m ³
Pulpwood	300,000 T	Wood fibre product	340,000 T
Rotary Peeler Logs	150,000 T	Dried rotary peeled veneer with packaging	57,000 T
Forest Residue	300,000 T	Electricity (+steam)	30-50 MW
Total	838,000 T	Total	461,000 T

The projected change in product mix over time as a result of introducing the Wood Centre is shown in Figure 4 below.

Figure 4 Change in Products Over Time

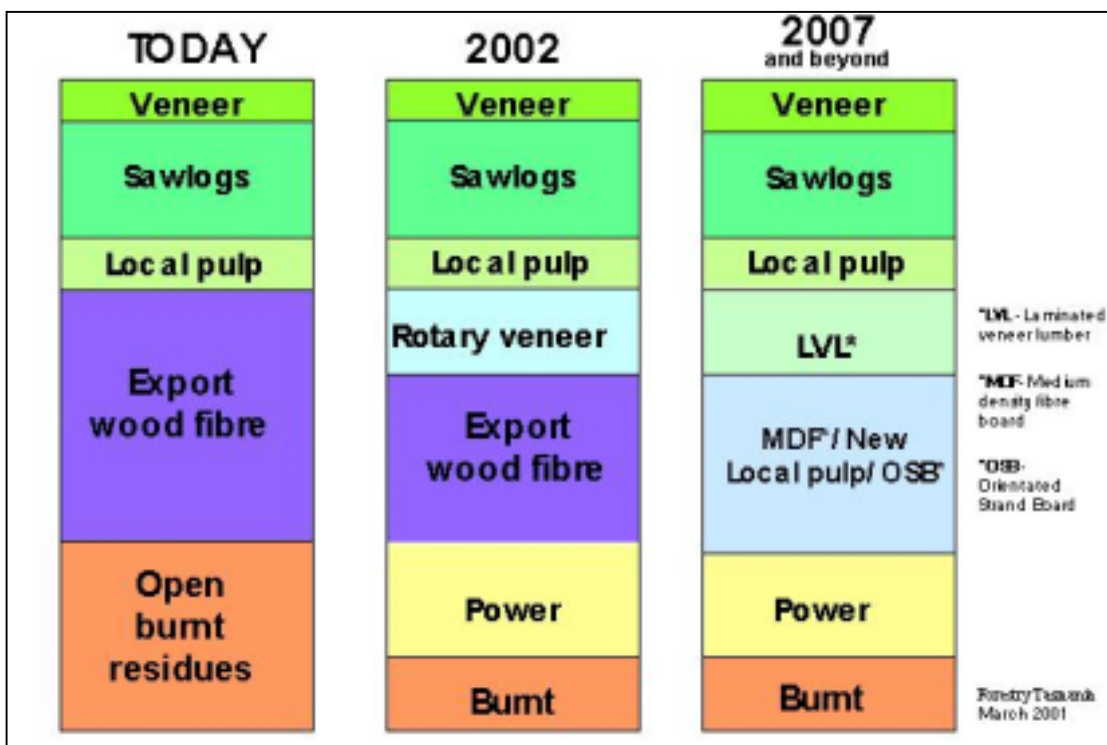


Figure 5 Conceptual Site Layout

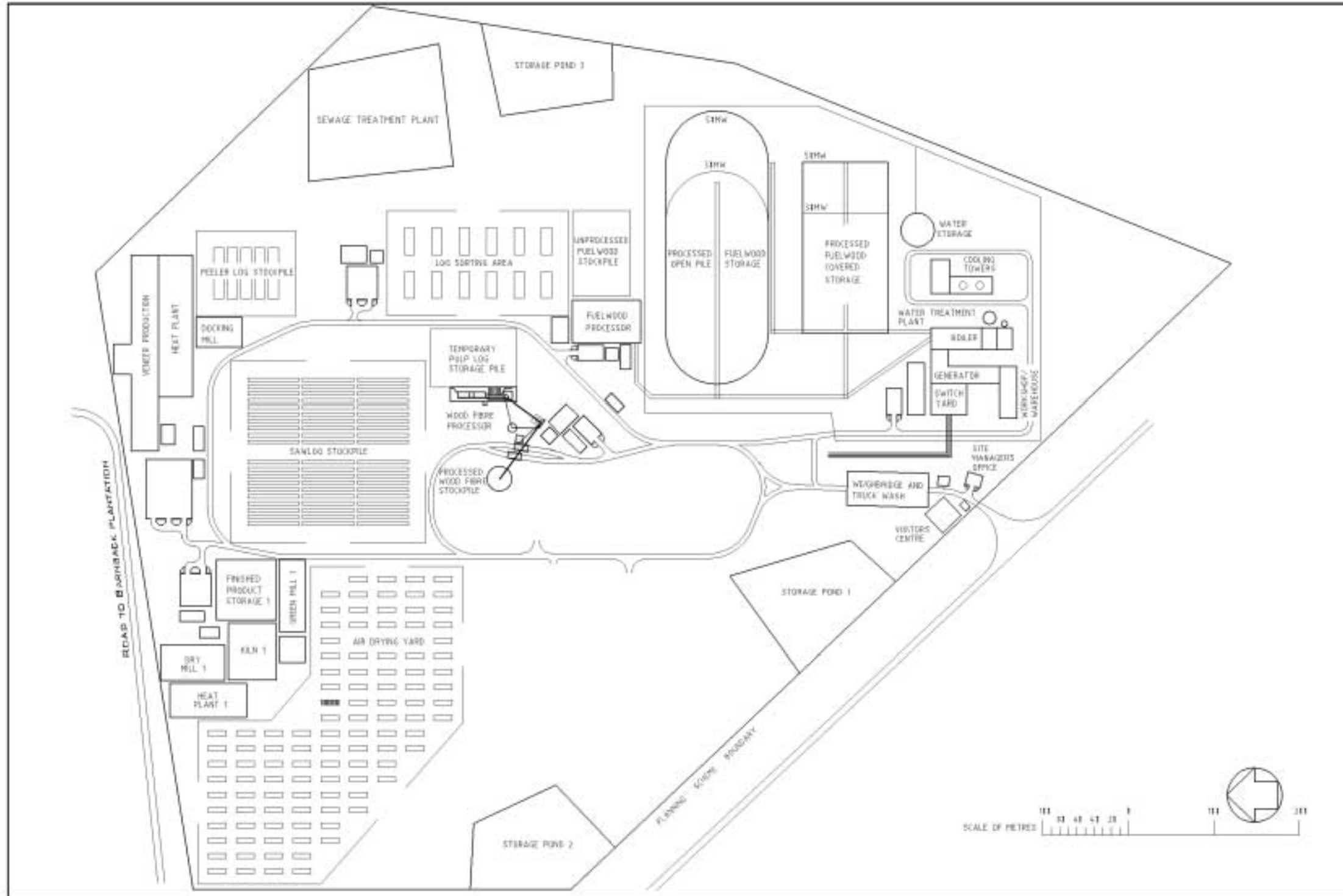
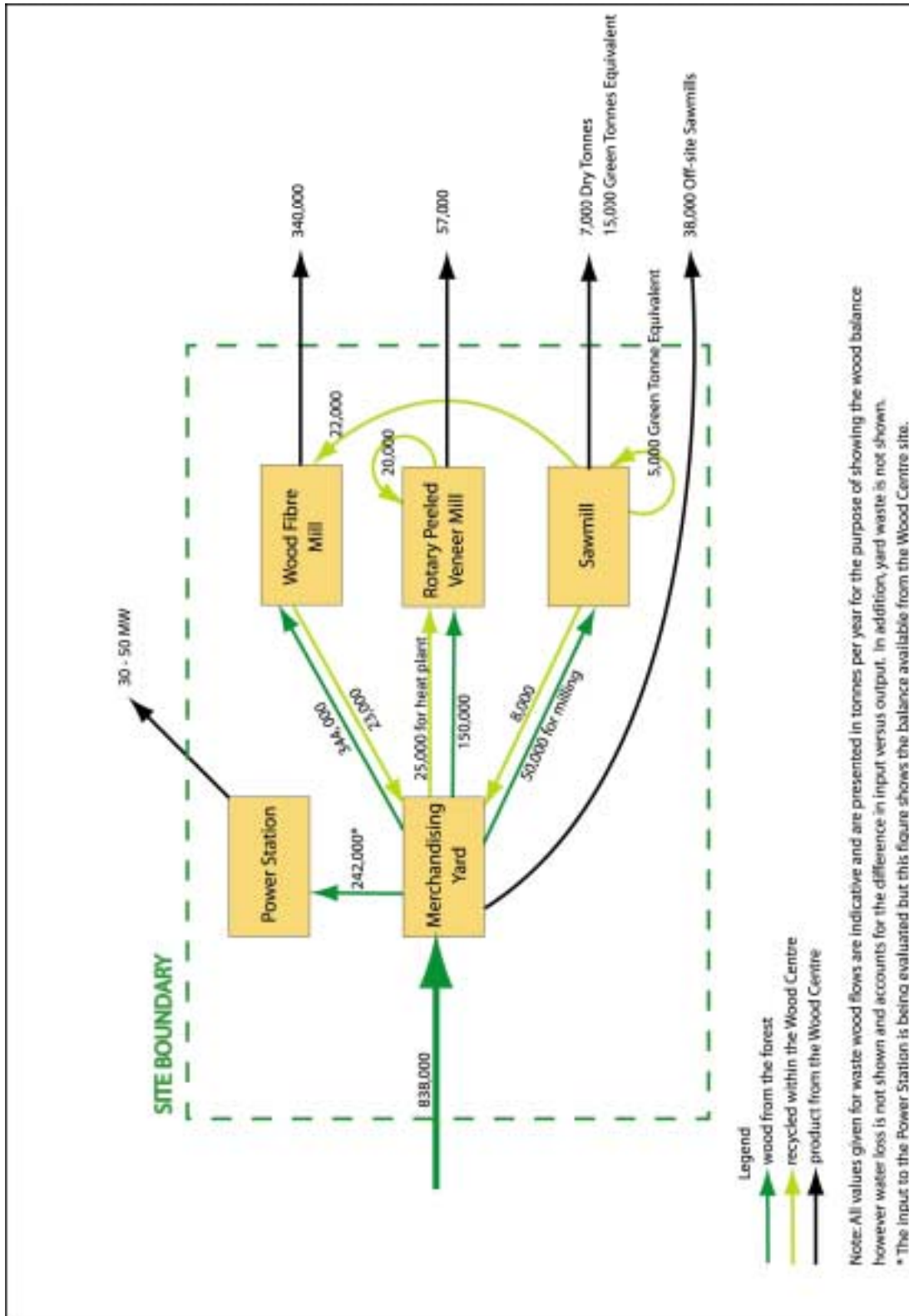


Figure 6 Raw Material and Product Flow



2.6 Wood for the Proposed Development

2.6.1 Tasmania's Forests

In total, Tasmania has over 3,350,000 ha under forest. About 30% (1,035,000 ha) of Tasmania's forests are privately owned.

The estimated volumes of merchantable wood in forest areas are shown below.

Table 8 Merchantable Wood in Multiple Use and Private Forest Area

Total area	Multiple use forest	1,770,000 ha
	Private forest	1,040,000 ha
Forest area available for production	Multiple use forest	780,000 ha
	Private forest	550,000 ha
Standing volume sawlog	Multiple use forest	18,600,000 m ³
	Private forest	7,300,000 m ³
Standing volume pulpwood	Multiple use forest	142,000,000 tonnes
	Private forest	46,600,000 tonnes

(State of the Forest Report November 1998).

All native forest on public land that is harvested is regenerated, mostly back to native forest but some is converted to plantation.

2.6.2 The Regional Forest Agreement

In November 1997 the State and Commonwealth Governments signed the Tasmanian Regional Forest Agreement (RFA) following a comprehensive regional assessment of Tasmania's forest. The process involved major studies of the environmental, economic, heritage and social values of the forest. The RFA has increased reserve areas by 420,000 hectares to a total area of 2.7 million hectares, 40% of the total land area in the State. Under the RFA, a world-class "Comprehensive, Adequate and Representative" (CAR) forest reserve system based on nationally agreed reserve criteria (JANIS) was established.

The CAR reserve system is one that is:

Comprehensive: includes the full range of forest communities recognised by an agreed scientific classification at appropriate hierarchical levels.

Adequate: maintains the ecological viability and integrity of populations, species and communities.

Representative: those sample areas of the forest that are selected for inclusion in the reserves should reasonably reflect the biotic diversity of the communities.

Governments agreed to use the following criteria for the protection of biodiversity, old-growth and wilderness as a basis to establish the reserve system:

- 15% of the distribution of each forest ecosystem that existed prior to Europeans arriving in Australia;
- 60% or more of existing old growth forest;
- 90%, or more, of high quality wilderness.

The outcomes of the RFA process for Tasmania in terms of reserves and extent of conservation of forest types on public land are shown in the Table 9 below.

Table 9 Outcomes of RFA process

Forest Conservation Reserves

TYPE	1993	1998 (post RFA)	Reserved on public land
wet eucalypt forest	15%	33%	39%
dry eucalypt forest	16%	32%	60%
rainforest	34%	68%	71%
other native forest	22%	30%	44%
All forests in Tasmania	19%	40%	

Forest community and Old-growth reservation in the CAR reserve system on Public Land

Community Reservation	Forest Communities: Biodiversity Criteria (JANIS Report 6.1.2)	Old-Growth Communities: Old-Growth Criteria (JANIS Report 6.2.2)
Communities that have fully met the criteria under the JANIS Report	Coastal <i>E. amygdalina</i> forest	Coastal <i>E. amygdalina</i> forest
	<i>Allocasuarina verticillata</i> forest	<i>Banksia serrata</i> woodland
	<i>Acacia melanoxylon</i> forest on rises	<i>E. coccifera</i> dry forest
	<i>E. coccifera</i> dry forest	Dry <i>E. delegatensis</i> forest
	Dry <i>E. delegatensis</i> forest	King Billy Pine with deciduous beech forest
	Tall <i>E. delegatensis</i> forest	Grassy <i>E. globulus</i> forest
	King Billy Pine with deciduous beech forest	Huon Pine forest
	Huon Pine forest	<i>Leptospermum</i> sp./ <i>Melaleuca squarrosa</i> swamp forest
	<i>Leptospermum</i> sp./ <i>Melaleuca squarrosa</i> swamp forest	Callidendrous and thamnic rainforest on fertile sites
	Callidendrous and thamnic rainforest on fertile sites	Thamnic rainforest on less fertile sites
	Thamnic rainforest on less fertile sites	Dry <i>E. nitida</i> forest
	Dry <i>E. nitida</i> forest	<i>Notelaea ligustrina</i> and/or <i>Pomaderris</i>
	Furneaux <i>E. nitida</i> forest	

Community Reservation	Forest Communities: Biodiversity Criteria (JANIS Report 6.1.2)	Old-Growth Communities: Old-Growth Criteria (JANIS Report 6.2.2)
	Tall <i>E. nitida</i> forest Dry <i>E. obliqua</i> forest Tall <i>E. obliqua</i> forest <i>E. pulchella</i> - <i>E. globulus</i> - <i>E. viminalis</i> grassy shrubby dry sclerophyll forest Pencil Pine with deciduous beech forest Pencil Pine forest <i>E. regnans</i> forest <i>E. sieberi</i> forest on granite Silver wattle (<i>Acacia dealbata</i>) forest <i>E. sieberi</i> forest on other substrates <i>E. subcrenulata</i> forest <i>E. tenuiramis</i> forest on granite <i>E. tenuiramis</i> forest on dolerite King Billy Pine forest	<i>apetala</i> forest Tall <i>E. nitida</i> forest Pencil Pine with deciduous beech forest Pencil Pine forest <i>E. pauciflora</i> forest on sediments <i>E. subcrenulata</i> forest <i>E. tenuiramis</i> forest on granite <i>E. tenuiramis</i> forest on dolerite King Billy Pine forest
Communities that have met the practical limits of reservation on public land* (private land required)	Inland <i>E. amygdalina</i> forest <i>E. brookeriana</i> wet forest <i>Banksia serrata</i> woodland <i>Callitris rhomboidea</i> forest <i>E. viminalis</i> and/or <i>E. globulus</i> coastal shrubby forest Grassy <i>E. globulus</i> forest King Island <i>E. globulus</i> / <i>E. brookeriana</i> / <i>E. viminalis</i> forest <i>Melaleuca ericifolia</i> forest <i>Notelaea ligustrina</i> and/or <i>Pomaderris apetala</i> forest Shrubby <i>E. ovata</i> forest <i>E. risdonii</i> forest <i>E. rodwayi</i> forest Inland <i>E. tenuiramis</i> forest <i>E. viminalis</i> grassy forest Furneaux <i>E. viminalis</i> forest Wet <i>E. viminalis</i> forest on basalt	Inland <i>E. amygdalina</i> forest <i>Allocasuarina verticillata</i> forest <i>E. brookeriana</i> wet forest <i>Callitris rhomboidea</i> forest <i>E. viminalis</i> / <i>E. ovata</i> / <i>E. amygdalina</i> / <i>E. obliqua</i> damp sclerophyll forest <i>E. viminalis</i> and/or <i>E. globulus</i> coastal shrubby forest <i>Melaleuca ericifolia</i> forest Shrubby <i>E. ovata</i> forest <i>E. pauciflora</i> forest on dolerite <i>E. rodwayi</i> forest <i>E. sieberi</i> forest on granite <i>E. sieberi</i> forest on other substrates Inland <i>E. tenuiramis</i> forest <i>E. viminalis</i> grassy forest Wet <i>E. viminalis</i> forest on basalt
Communities that have met the criteria under the flexibility provisions of the JANIS Report	<i>E. amygdalina</i> forest on dolerite <i>E. amygdalina</i> forest on sandstone <i>Acacia melanoxylon</i> forest on flats <i>E. viminalis</i> / <i>E. ovata</i> / <i>E. amygdalina</i> / <i>E. obliqua</i> damp sclerophyll forest <i>E. pauciflora</i> forest on dolerite <i>E. pauciflora</i> forest on sediments	<i>E. amygdalina</i> forest on dolerite <i>E. amygdalina</i> forest on sandstone Tall <i>E. delegatensis</i> forest Callidendrous and thamnnic rainforest on fertile sites Dry <i>E. obliqua</i> forest Tall <i>E. obliqua</i> forest <i>E. pulchella</i> - <i>E. globulus</i> - <i>E. viminalis</i> grassy shrubby dry sclerophyll forest <i>E. regnans</i> forest

* Note that a number of forest and old-growth communities have been reserved to the maximum practical extent on public land. These communities have a limited extent on public land, are often fragmented and scattered, and will require protection on private land.

The RFA is a 20 year agreement with five yearly reviews. The key elements of the RFA

are legally binding. The whole thrust of the RFA is to ensure that systems of sustainable forest management are implemented in Tasmania.

In August 1996 the Commonwealth and States agreed to establish the Montreal Process Implementation Group for Australia (MIG) to develop the framework of regional criteria and indicators. The MIG completed its work with the adoption of the document entitled "A framework of regional (sub-national) level criteria and indicators of sustainable forest management in Australia" in August 1998. This provided for a set of core indicators (Category A) to be implemented immediately for most forests, plus Category B and Category C indicators, the implementation of which will be subject to feasibility of their inclusion in the core set.

A joint Tasmanian and Commonwealth review of performance implementation of the RFA is scheduled for 2002. A paper titled: *Tasmanian Regional Forest Agreement - Sustainability Indicators for the first review in 2002* June 2000, has been developed to support the review.

The following table provides a summary of sustainability indicators the review will cover for reporting in 2002:

Table 10 Sustainability indicators for reporting in 2002

Criterion 1: Conservation of Biological Diversity

- 1.1.a Extent of area by forest type and tenure.
- 1.1.b Area of forest type by growth stage distribution by tenure.
- 1.1.c Extent of area by forest type and reservation status (modified National Indicator 1.1.c).
- 1.1.d Area of old growth by forest type by reservation status (modified National Indicator 1.1.d).
- 1.2.a A list of forest dwelling species.
- 1.2.b The status (rare, vulnerable, endangered, or extinct) of forest dwelling species at risk of not maintaining viable breeding populations, as determined by legislation or scientific assessment.
- 1.2.c Population levels of representative species from diverse habitats monitored across their range.

Criterion 2: Maintenance of Productive Capacity of Forest Ecosystems

- 2.1.a Area of forest land and net area of forest land available for timber production.
- 2.1.c The area, age class and future yield of plantations of native and exotic species.
- 2.1.d Annual removal of wood products compared to the sustainable volume.
- 2.1.e Annual removal of non-timber products (modified Regional Indicator).
- 2.1.f Area of plantation established meeting effective stocking one year after planting. (modified Regional Indicator).
- 2.1.g Area and per cent of harvested area of native forest effectively regenerated.

Criterion 3: Maintenance of Ecosystem Health and Vitality

- 3.1.a Area and per cent of forest affected by processes or agents that may change ecosystem health and vitality.

Criterion 4: Conservation and Maintenance of Soil and Water Resources

4.1.a Interim indicator: Area and per cent of forest land systematically assessed for soil erosion hazard, and for which site-varying scientifically-based measures to protect soil and water values are implemented.

Criterion 5: Maintenance of Forest Contribution to Global Carbon Cycles

5.1.a Total forest ecosystem biomass and carbon pool (modified Regional Indicator).

Criterion 6: Maintenance and Enhancement of Long-Term Multiple Socio-Economic Benefits to meet the needs of Societies

6.1.a Value and volume of wood and wood products production, including value added through downstream processing.

6.1.b Value and quantities of production of non-wood forest products.

6.1.d Value of wood and non-wood products production as percentage of regional value of production.

6.2.a Area and per cent of forest land available for general recreation and tourism

6.2.b Number, range and use of recreation/tourism activities available in a given region.

6.2.c Number of visits to recreational sites per annum (modified Regional Indicator).

6.4.a(i) Area and per cent of forest land in defined tenures, management regimes and zonings which are formally managed in a manner which protect Indigenous peoples' cultural, social, religious and spiritual values, including non-consumptive appreciation of country.

6.4.a(ii) Number of places of non-Indigenous cultural values in forests formally managed to protect these values (modified Regional Indicator).

6.5.a Direct employment in the forest sector and forest sector employment as a proportion of total employment (modified Regional Indicator).

6.5.b Average wage rates and injury rates in major employment categories within the forest sector.

6.6.a Extent to which the management framework maintains and enhances Indigenous values including customary, traditional and native title use by Indigenous peoples and for Indigenous participation in forest management.

Criterion 7: Legal, Institutional and Economic Framework for Forest Conservation and Sustainable Management

7.1 (Narrative) Extent to which the legal framework (laws, regulations, guidelines) supports the conservation and sustainable management of forests. Includes 7.1.a, 7.1.b, 7.1.c, 7.1.d, 7.1.e.

7.2 (Narrative) Extent to which the institutional framework supports the conservation and sustainable management of forests. Includes 7.2.a, 7.2.b, 7.2.c, 7.2.e.

7.4 (Narrative) Capacity to measure and monitor changes in the conservation and sustainable management of forests. Includes 7.4.a, 7.4.b.

7.5 (Narrative) Capacity to conduct and apply research and development aimed at improving forest management and delivery of forest goods and services. Includes 7.5.a, 7.5.d, 7.5.f.

2.6.3 Threatened species and forest communities

Tasmanian forests are home to some threatened species of flora and fauna and include some threatened forest communities. The RFA establishes and maintains effective strategies to protect these species and communities, taking priorities into account.

Research for the RFA identified 170 species of flora and 59 species of fauna as priority species for protection. Under the RFA, they are being protected through management of the CAR reserve system or by applying relevant management prescriptions in non-CAR areas. Priority species requiring consideration are listed in Attachment 2 of the RFA.

By focussing attention on species in the comprehensive regional assessment, the RFA has accelerated the recovery process for a number of species. Two examples are the recovery plans developed for the Swift parrot and the giant freshwater lobster.

Recovery action has been initiated for a number of threatened forest plants with the formation of a 'multi-species' recovery team. Work began as part of the RFA and a project was established to include both nationally listed and State listed species, which often occur in the same habitats.

2.6.4 World Heritage and Wilderness

Native forests cover more than a third of the 1.38 million hectares of Tasmanian Wilderness World Heritage Area.

The governments agreed that any additional nominations to World Heritage in Tasmania will come from the dedicated reserves of the CAR Reserve system. The Commonwealth agreed that any World Heritage nomination of places in Tasmania will give full consideration to potential social and economic consequences and will only occur after the fullest consultation and with the agreement of the Tasmanian State Government.

During the RFA process, wilderness values were identified using the National Wilderness Inventory procedures. Forests only have high quality wilderness value where the level of remoteness and primitiveness is commensurate with that required to classify the land on which they are growing as wilderness. A total of 1.944 million hectares of high wilderness quality in Tasmania was identified in the RFA. Much of this carries non-forest vegetation. The RFA increased the level of reservation of wilderness areas to 95% of all high quality wilderness areas identified.

2.6.5 Ramsar Wetlands

There are no Ramsar wetlands in or in the vicinity of the timber catchment area. The closest wetlands on the register are Lake Sydney and South East Cape Lakes which are contained in a national park and Oyster Cove Wetland located on land managed by the Tasmanian Aboriginal Land Council.

2.6.6 Tasmanian Heritage Register

Culturally significant sites located in the harvesting area have been placed in Cultural Heritage Special Management Zones or Protection Zones. Historic sites of State significance are protected by Forestry Tasmania and can receive additional legal

protection if listed under the *Historic Cultural Heritage Act 1995* whilst others are managed through the *Forest Practices Code*.

Forestry Tasmania is supportive of the development of cooperative management arrangements for areas of particular importance to traditional land user groups. Such arrangements could include for example, joint maintenance of tracks used for recreational purposes.

2.6.7 Areas of Aboriginal Heritage Significance

The reporting of Aboriginal sites is mandatory under the *Aboriginal Relics Act 1975*. Sites are reported to the Department of Primary Industries, Water and Environment and must not be knowingly disturbed without an official permit. Sites located by Forestry Tasmania are reported initially to the Forest Practices Board (FPB) and then forwarded by FPB to DPWIE. Once known, management of Aboriginal sites often involves the establishment of a Special Management Zone.

Forestry Tasmania is supportive of the establishment of cooperative management arrangements with Aboriginal people in areas of particular significance to them in a manner consistent with other management objectives. This is explicitly recognised as an objective within the *Forestry Act 1920* with respect to Forest Reserves.

2.6.8 National Estate Values

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) places a duty on all Commonwealth ministers and Authorities to ensure their actions do not adversely affect national estate values. The Commonwealth government has certified in the RFA that its actions comply with the Act.

National Estate Values are fully considered in development of Forest Management Plans by Forestry Tasmania.

2.6.9 Private Land CAR Reserve Program

Timber sourced from private land will only be derived from land that has approved Forest Practices Plans, consequently private land CAR Reserve program issues will have been dealt with as part of the planning approval process for these plans.

2.6.10 Greenhouse Gases

Some forestry operations, such as burning, lead in the short term to the accelerated release of carbon dioxide into the atmosphere. However, by capturing carbon dioxide within trees and wood products, sustainable forestry also potentially results in a longer-term net reduction in greenhouse gases in the atmosphere.

2.6.11 Forestry legislation and management responsibilities

The principal Acts under which forests and the forest industry in Tasmania is managed and regulated is the *Forestry Act* 1920, which was substantially amended by the *Forestry Amendment (Forestry Corporation) Act* 1994, the *Forest Practices Act* 1985 (amended in 1994), the *Public Land (Administration and Forests) Act* 1991 and the *Private Forests Act* 1994.

The *Forestry Act* prescribes objectives and functions of Forestry Tasmania. These include objectives to:

- optimise the economic returns from its wood production activities;
- optimise the benefits to the public and the State of the non-wood values of forests;
- manage Multiple Use Forest Land (State forest entered in the Register of Multiple Use Forest Land) for wood production and, in a manner consistent with sustainable forest management and forest production policy, for other purposes including:
 - conservation of fauna and flora, landforms and cultural heritage;
 - care of the environment, including scenery; and
 - recreation.
- promote and encourage exploration and development of mineral resources in Multiple Use Forest Land;
- maintain Forest Reserves and Management Decision Classification areas in State forest; and
- provide information to and recreation facilities for the public, including the use of forestry roads.

Under the *Forestry Act*, Forestry Tasmania is vested with exclusive management and control of:

- all State forest, and, if the Director-General of Lands consents, forests and all forest products on other Crown land;
- forest operations; and
- development, control and delivery of the corporation's commercial policy.

The *Forest Practices Act* establishes a system of oversight and control of forest management on private and public land and prescribes the powers and functions of the Forest Practices Board.

The *Forest Practices Code* sets the standard by which forest practices on public and private land are conducted, and is enforced through the provisions of the *Forest Practices Act*. The *Forest Practices Code* sets out conservation and environmental protection provisions for soils, water quality and flow, site productivity, biodiversity, landscape, archaeology and landforms which may be affected by forest operations. The code was first published in 1987, and updated in 1993 and 2000.

The *Forests and Forest Industry Strategy* (FFIS) underpins forestry policy and management in Tasmania. The strategy was developed by a Ministerial Council, the Forests and Forest Industry Council (FFIC), in 1989-90.

The FFIS recommendations cover conservation management, public forest resource supply, management of public forests, special species timber supply and other forest products, and the timber industry.

2.6.12 Management and regulation of private forestry

About one third of forests in Tasmania are on freehold land. Private forest owners are required to adhere to the provisions of the *Forest Practices Act* relating to the *Forest Practices Code*, Timber Harvesting Plans, three year plans, and Private Timber Reserves.

The management of forests on private land in Tasmania is facilitated by Private Forests Tasmania. Private Forests Tasmania is a state authority established under the *Private Forests Act*. Under this Act, Private Forests Tasmania is responsible for providing advice to private forest managers on sustainable management of forests, marketing and sale of forest products, advising and assisting the Forest Practices Board in the implementation of the *Forest Practices Act* on private land. It also processes applications for Private Timber Reserves under delegation from the Forest Practices Board.

2.6.13 Three-year plans

The *Forest Practices Act* provides that a person who has harvested more than 100 000 tonnes of timber in the preceding twelve months must prepare a three year plan which gives the location, volumes and transport routes planned for each of the three years. A three year plan may be varied if, after conferring with the person who prepared the plan, the Board considers that transport or harvesting is too concentrated in particular areas.

2.6.14 Forest Practices Plans

Prior to harvesting any coupe constructing a road or establishing a plantation a Forest Practices Plan must be developed in accordance with the Forest Practices Code 2000. The Plan addresses management requirements to ensure adequate protection of values such as soils, water, flora, fauna, apiary resources, geomorphology, cultural heritage and visual landscape. The Plan identifies harvesting methods and restoration methods following harvesting including how the area is to be re-forested. Within the Plan, provisions for fire management, pest, disease and weed control have to be detailed.

The Plans are certified by an authorised Forest Practices Officer prior to the commencement of operations and on completion of operations.

The majority of the areas harvested are regenerated as native forest. Wherever possible, seeds are collected from the coupe and/or equivalent seed zone before felling and re-broadcast in the coupe to re-establish the native forest. Coupes re-generated as hardwood plantations are usually planted with seedlings of *Eucalyptus globulus* at lower altitudes and *Eucalyptus nitens* in frost prone areas. Most plantations are pruned and thinned periodically to enable production of sawlog and veneer.

This forest management approach ensures that the supply of wood from State forest can be maintained at sustainable levels in compliance with the Regional Forest Agreement.

2.6.15 The Intensive Forest Management Program

An Intensive Forest Management (IFM) program has been adopted by FT to further improve wood quality from State forest. The program has the aim of achieving 16,850 ha of hardwood plantations and 2,900 ha of thinned native forest in the Huon District. Although nearly 17,000 ha of plantation area is significant, it represents less than 5% of the total Public Forest Estate in the Huon Forest District.

2.6.16 Forest Management Strategies

FT uses a number of production strategies in its forest management approach:

- A very long rotation strategy that will deliver a mix of special species timber and older eucalypts;
- Extensive management aimed at the sustainable production of high quality eucalypt sawlog and veneer logs over a rotation of 80 –100 years (normal native forest strategy);
- A more intensive strategy aimed at producing high-value boards and structural timber over a rotation of 60 years (thinned native forest strategy); and
- Plantations on 20-25 year rotations pruned for high value products such as sawlogs and rotary peeled veneer.

The management of State forest is based on long-term plans that schedule the harvesting and replanting of multiple use forest areas. The principal management zones are forest blocks whose boundaries are normally defined by major topographic features. Within the forest blocks the forest is divided into coupes, areas of about 70 ha, that are then managed on a particular production strategy. Wherever possible, a dispersed harvesting approach is adopted so that adjacent coupes are not harvested concurrently.

2.6.17 The Source of Wood

The Wood Centre will be provided with timber harvested from the existing forest estate and additional from plantation areas in the future. The Wood Centre site is developed around the concept of young wood processing, with the primary feedstock coming from regrowth and plantation timbers.

All of the wood supply for the site is harvested in accordance with the Regional Forest Agreement and Forest Practices Code to ensure a long-term sustainable output is maintained.

The majority of wood will be harvested in State forest in the Huon District. Some additional regrowth pulpwood from the southern part of the Derwent District may also be conveyed to the site to augment the supply of rotary peelable material. Respective processors on-site may also purchase timber from private land.

The Huon Forest District comprises about 762,900 ha of land, the land tenure of which is shown in Table 11.

Table 11 Land Tenure in the Huon District

Tenure	Area (Hectares)	% Total Area	Total Afforested Area (Hectares)	Old Growth Area (Hectares)
Reserved under the National Parks and Wildlife Act 1970	503,600	66	172,200	139,100
Private Land	125,500	17	59,500	2,600
Multiple-use State forest, includes 5,000 ha of old growth forest protected by Management Decision Classification (MDC)	115,800	15	101,700	20,600
State forest Reserves and other areas	7,300	1	6,000	1,300
Other Crown Land	10,700	1	5,100	400
Totals	762,900		344,500	164,000

(Forestry Tasmania June 2001)

The area available for wood production from Multiple-use State forest totals 95,100 ha (77% of the total FT managed area) including areas that require special management because of identified values. Within the wood production area, 7,900 ha are managed for special species timber production in accordance with the Forests and Forest Industry Strategy for continuing supplies of these species. The timber harvesting plans for the next 10 years will result in about 2,000 ha of State forest being harvested and regenerated each year.

The native eucalypt forests of the Huon District are of relatively even ages due to past fire events or silvicultural activities. Large fires have impacted the District in 1892, 1934, and 1967. Intense fire removes the shade and exposes mineral soils, the necessary conditions for successful regeneration of eucalypts. The clearfelling and slash burning regimes used to re-establish forests in the Huon District are based on the natural regeneration process which occurs through wildfire events.

Following clearfelling a large amount of timber that cannot be sold due to failure to meet market product specifications is left in the coupe. This includes old logs on the forest floor, logs with charcoal or logs with excessive rot. Where plantations are to be established, the residue wood is usually windrowed and burnt. Where native forest is to be regenerated a broadcast burning technique is used.

Apart from the benefits in allowing eucalypt trees to re-establish, burning the residue is important to provide protection of the new growth from wild fire. The residue would otherwise dry out and provide a high fuel load that can promote intense bushfires. Management of fuel build up in forests has contributed to a major reduction in bushfire impacts.

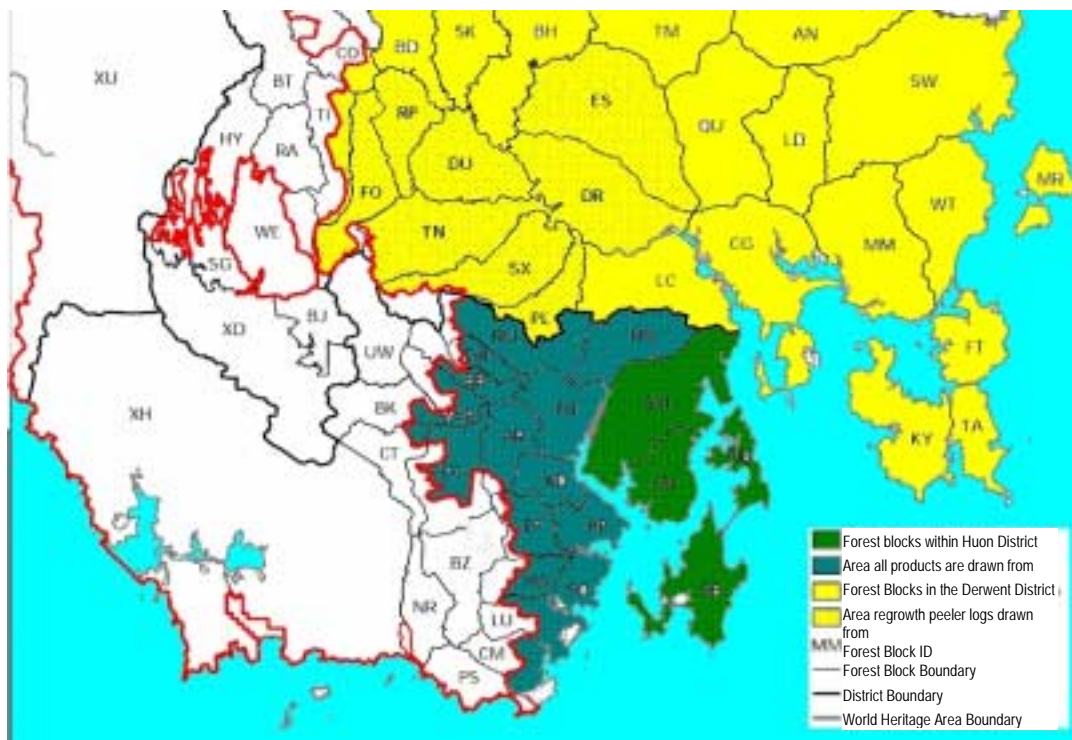
Recovery of this forest residue for power station fuelwood means that less material will need to be open air burnt. It will lead to an increase in utilisation of wood and produce a high value resource - electrical energy - from what is now a waste product. Approximately 300,000 tonnes per annum of fuelwood will be recovered from coupes prior to regeneration or plantation establishment burns. Despite this recovery of residue, it is envisaged that not all residue material will be utilised as fuelwood and as a result some forest residue will continue to be burnt in post harvest burns. Mostly, the largest pieces of wood such as downers and large branches will be utilised as fuelwood. It is not intended to remove root systems and stumps as part of the fuelwood harvesting process, nor will significant quantities of small branches and leaves be taken as these are important for nutrient recycling.

A process is underway with the Forest Practices Board to define the practices to be used in harvesting residue in order to minimise impacts on biodiversity in general and to ensure that sustainable management objectives are maintained.

Underpinning this process will be the various silvicultural research projects currently being undertaken at the Warra Long Term Ecological Research Site. These projects include several different silvicultural regimes and their effects on various aspects of biodiversity (including invertebrates, log decay, bryophytes, lichens etc). Results of these research projects will be used to further refine forest practices.

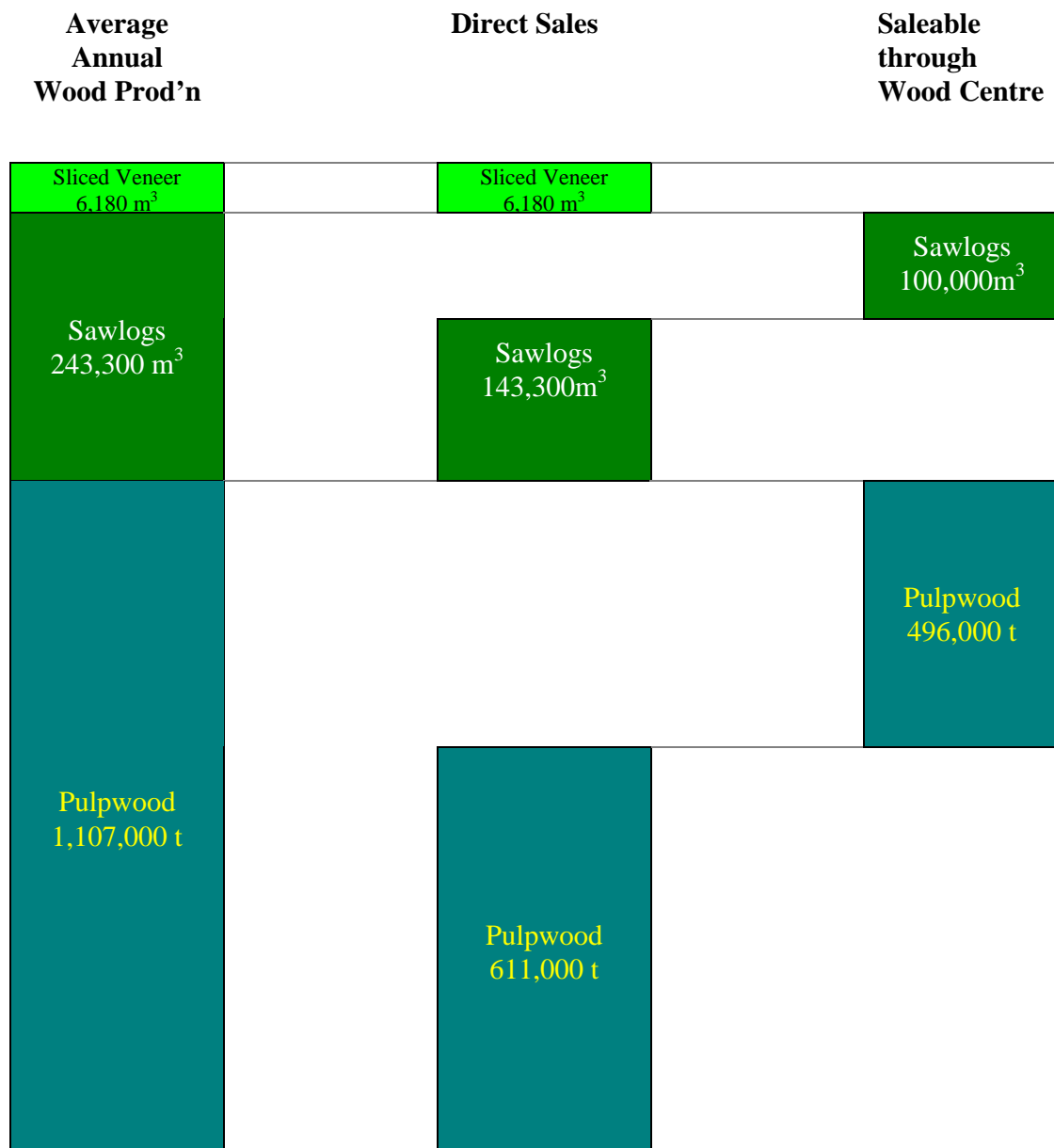
The notional supply area for the Wood Centre is shown in Figure 7 below:

Figure 7 Notional Wood Supply Zone



The extent of hardwood resource available for sustainable harvest from the Derwent and Huon Districts including committed resource is shown in the Figure 8 below. The committed resource is shown in the second column as direct sales. The third column illustrates the amount of wood available to be sold through the proposed Wood Centre.

Figure 8 Indication of Sales of Wood From State Forest in the Huon and Derwent Districts



“Direct sales” will be delivered from the forest landings directly to customers, volumes “saleable through Wood Centre” comprises wood that either needs processing to extract

additional value material or wood that does not have a current contract for sale.

Of the 538,000 tonnes of wood per annum presently available from State forest in the Huon Valley, none of the pulpwood and no more than 20% of the sawlogs is processed in the region. The new development will result in the same 538,000 tonnes of timber largely being processed in the Huon Valley. A further 300,000 tonnes of forest residue, previously burnt to waste in post harvest regeneration burns will be utilised as fuelwood in the Wood Centre power station.

2.7 Infrastructure Overview

2.7.1 Water Supply

The Wood Centre will be designed to operate with mechanisms to minimise water use, and maximise water reuse where possible. The final requirements will depend on the nature and size of operations chosen, but it is predicted to require less than 5 Megalitres of water a day. Water will be pumped from the Huon River as described in Chapters 3 and 5. An application for approval of a water right licence for the Wood Centre has been lodged with DPIWE.

2.7.2 Stormwater and Wastewater Infrastructure

The site will have the capacity to capture any contaminated stormwater and treat to an acceptable level in order to reuse it on the site. Three storage ponds will be located at lower elevations relative to the rest of the facilities for this purpose.

The site will treat most process wastewater prior to directing it to the storage ponds for reuse on site. A small proportion of process wastewater will be treated and used for irrigation of *Eucalyptus globulus* plantations.

The treatment and storage of stormwater and process wastewater is described in detail in the relevant Chapters (6, 7, 8, 9 and 10).

2.7.3 Power

Generally, the site will have the capacity to export power once the power station is built. However, there will be periods when power will be imported, for example, during the construction phase and during scheduled maintenance operations for the on-site power station, from the State Grid and/or in the case where demand by processing activities commences prior to completion of the power station.

It is estimated that there will be between 10 and 30 MW of power available for export from the site. The final installed capacity of the power station will be selected on the amount of fuelwood that can economically be supplied. The installed capacity is

likely to be between 20 and 40 MW. The production facilities on the site will consume about 10 MW, the balance of the power generated will be supplied to the State power grid.

Excess electricity generated on-site will be transmitted by a high tension, pole-mounted line following Lidgerwood Road and Arve Road to Kermantie Substation.

2.7.4 Communications

FT will provide (or arrange for provision by others, eg. Telstra) appropriate connections to a telephone landline at the site boundary as well as a mobile phone base station that covers the entire Wood Centre and surrounding area.

2.7.5 Road and Transport Infrastructure

The transportation infrastructure involves transport to and from the Wood Centre. Much consideration has been given to the alternative modes of transportation and alternative routes. A preferred route has been chosen and is described in detail in Chapter 4.

2.8 Planning Issues

2.8.1 Land Tenure and Use

The site and surrounding area is State forest, owned by the Crown. Areas surrounding the site are predominantly regrowth forests, while some areas near the site have been recently harvested and replaced with eucalypt or blackwood plantations.

There are no residences within 6 kilometres of the site. The closest residences in the region are as follows:

- One residence situated near the Little Denison Bridge (about 6 km away);
- Residences to the north east on She-Oak Road (>6 km away); and
- No residences to the south or west within 15 km.

There is some undeveloped private land on the southern bank of the Huon that extends to within 1 km of the site. This land is zoned Rural and is generally steep. It is unlikely to be developed for intensive residential use, but has the potential for one or two residences in the future. Topography provides natural barriers in the direction of this land.

In general, other than timber harvesting, State forests are utilised for activities such as bushwalking, fishing, horse riding, private and some commercial recreational boating/rafting and four-wheel driving. While the proposed site is not well known for any of these in particular, the upgraded access roads may provide more opportunity for these activities in the future.

Rafting and canoeing on the Huon River is popular. The new road network has made access to launch sites at the Arve River more accessible. The proposed development will not directly impact on natural features of the river.

A recreational/tourism development (Airwalk) is located in the Tahune Forest Reserve with the vision of showcasing environmental best practice in a multiple use forest. The facility aims to provide educational experiences in a natural setting. The reserve is located approximately nine kilometres upstream adjacent to the Huon River. The sealed Arve Road from Geeveston is used to access the development. The road does not pass the Wood Centre and does not provide views towards the Wood Centre proposed site therefore people accessing the Tahune Airwalk will not be affected by the Wood Centre.

2.8.2 *Planning Scheme Controls*

The Huon Planning Scheme 1979 covers the site. The Esperance Planning Scheme 1989 boundary adjoins the south eastern boundary of the project site.

Schedule 1 of the Huon Planning Scheme 1979 sets out some broad aims including:

"The main aim of the Planning Scheme is to establish policies for the guidance and control of development within the Municipality as well as preserving the economic viability and rural character of the Municipality."

"The Planning Scheme aims at preserving the Municipality's landscape and scenic character with particular emphasis on the skyline reserves in and around the built up areas and the river and stream embankments."

"The Planning Scheme aims at protecting the existing environmental quality of the Municipality by:

- *Preserving the areas of natural scenic beauty and rural character;*
- *Preserving all historic buildings and places;*
- *Discouraging the clearing of land in environmentally important areas;*
- *Discouraging the inappropriate development in environmentally sensitive and historic areas; and*

- *Controlling the location of rural holdings."*

"The aims of the subdivision policy are:

- *To preserve the economic viability and rural character of the Municipality;*
- *To accommodate development demands within the Municipality, based on sound planning principles;*
- *To restrict ribbon and scattered development by consolidating future development within the existing built up urban areas and villages; and*
- *Protection of prime agricultural land.*

Other aims deal with consolidation of residential development around existing settlements.

The land is zoned Rural and clause 3.5.12 of the planning scheme implies the intent of the zone is to retain land for rural purposes. In the Rural Zone a Timber Mill is discretionary. Timber Mill is defined in the planning scheme as:

'Land or premises used where logs or timber are sawn or chipped or pulped but does not include a joinery works unless logs or large pieces of timber are sawn therein.'

Light and General Industry are not permitted in the zone. The subdivision minimum area in the Rural Zone is 20 ha. In many cases developments proposed for the site will require less than 20 hectares.

It is noted that the use *"land clearing"* is a permitted use in the Rural Zone. Land clearing is defined as:

"use for the purpose of clearing or preparing land for the other purposes or for the exploitation of natural resources other than minerals, including the felling of indigenous trees or shelter belt plantations, the burning of scrub (otherwise than in accordance with recognised fire prevention practices) and the cutting of live timber for firewood or other purposes where not carried on as part of a regular program of forest management."

The site is currently bushland with poor soils and is not suitable for agricultural use. The intent of the Rural Zone does not match the existing or potential use of the site. For the Wood Centre Development to occur on the subject land an amendment will be required.

It is considered that the tenor of the Huon Planning Scheme 1979 supports the development of an integrated timber-processing site. For example, the development

of an integrated timber-processing site will assist in preserving the economic viability of the local economy without destroying the rural and scenic character of the Municipality, which the planning scheme iterates as its main aim. Good agricultural land will not be destroyed nor will any environmentally sensitive area. There is nothing in the tenor of the planning scheme that suggests the proposed amendment should not be approved.

2.8.3 *Planning Issues*

The planning issues are summarised as:

- The proposed development of the site does not concur with the intent of the Rural Zone;
- The merchandising yard and wood fibre mill are discretionary uses;
- The wood fired power station and rotary peeled veneer plant are prohibited necessitating an amendment to the Huon Planning Scheme 1979;
- A single planning permit will be required for the site;
- To enable a permit application for the proposed uses to be considered, the Huon Planning Scheme 1979 must be amended;
- Except for the merchandising yard and the woodwaste composting operations, all other proposed timber operations are Level 2 activities under the *Environmental Management and Pollution Control Act 1994*;
- The Level 2 activities will require the assessment by the Board of Environmental Management and Pollution Control;
- The Board requires the preparation of a Development Proposal and Environmental Management Plan (DPEMP) to support the Development Application (DA) process;
- The Board has publicly scoped the guidelines for the preparation of the DPEMP;
- Because the development is an integrated timber processing operation all of the elements need to be compatible with the planning scheme; and
- The subdivision provisions need to be cognisant that most uses on the site will be developed by the private sector.

2.8.4 Planning Policy Framework

Resource Management and Planning Scheme

The Resource Management and Planning System of Tasmania (RMPS) provides the planning and environmental policy framework within which the planning merit of the draft amendment can be assessed. The key tenet of the RMPS is the concept of 'sustainable development', which is defined in the *Land Use Planning and Approvals Act 1993 (LUPPA)* as:

managing the use, development and protection of natural resources in a way, or at a rate, which enables people and communities to provide for their social, economic and cultural well being and for their health and safety while:

- (a) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations;*
- (b) safeguarding the life supporting capacity of air, water, soil and ecosystems; and*
- (c) avoiding, remedying or mitigating any adverse impacts of activities on the environment.*

The definition of sustainable development is cognisant that development will have an impact, however the impacts should be 'avoided, remedied or mitigated'. It is submitted that the proposed Wood Centre development has been planned for the subject site to avoid or mitigate impacts as described in this project DPEMP.

The principal objectives of the RMPS are as follows:

- (a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity;*
- (b) to provide for the fair, orderly and sustainable use and development of air, land and water;*
- (c) to encourage public involvement in resource management and planning;*
- (d) to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c); and*
- (e) to promote sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State.*

Change and development is part of modern society. However sustainable development means that any use and/or development that brings change should aim to protect natural and physical resources in a manner which enables the community to provide for their social, economic and cultural well being and for their health and safety.

It is submitted that the proposed amendment will facilitate development that involves localised but manageable impacts and it is consistent with both the principles of sustainable development and objectives of the RMPS. In particular the following reasons are given to support this and the objectives of the RMPS:

- The proposed development has been identified, as being important to ensure maximum utilisation of the State's timber resource;
- The proposed development will be important for the local economy;
- The proposed DPEMP contains specific measures to ensure that the impacts of developing the subject site on air, land and water are avoided or mitigated;
- The proponents have sought public comment from Government agencies and the local community on the proposal. Furthermore, the DPEMP process will seek public comment on the drafting of the guidelines and during the public exhibition period. The process for the proposed planning scheme amendment includes seeking further comment from the public and Government agencies;
- The effects on the cultural heritage socioeconomic, infrastructure and environmental factors have been carefully examined;
- The framework for the planning and environmental approvals for the project will be developed in consultation with the Huon Valley Council and various Government agencies; and
- Because of the size and nature of the proposed development the development will be classified, as a Level 2 activity under the Environmental Management and Pollution Control Act (EMPCA). This means that the Board will assess the development application in accordance with the Environmental Impact Assessment principles outlined in the EMPCA.

State Policies

In accordance with the State Policies and Projects Act, which is part of the RMPS, the following State Policies have to be complied with.

Protection of Agricultural Land

The purpose of this policy is to foster sustainable agriculture in Tasmania by ensuring the continued productive capacity of the State's agricultural land resource. Although the general area around the Wood Centre has been classified as Rural, the Wood Centre site is on Crown Land and has not been classified. The site is considered to have very limited agricultural potential considering the topography, poor erodible soils (stone and quartz soils) and climate.

Water Quality Management Policy

The purpose of the Water Quality Management policy is to protect surface and ground water resources from pollution. The policy states:

“that planning schemes must require that land use and development is consistent with the physical capability of the land so that the potential for erosion and subsequent water quality degradation is minimised (clause 31.5).”

The policy is relevant to the planning, design and management of stormwater, sewage and greywater disposal systems as well as overall site operations. It is the intent to ensure that any point source of diffuse emissions into surface waters or groundwater with a potential to adversely affect environmental values are avoided or minimised. Accordingly, appropriate provisions for siltation and erosion control and stormwater run-off will need to be required by the Council as part of any development permit.

The policy requires that a regulatory authority must not allow a point source discharge of a pollutant to surface waters or groundwater unless it is satisfied that:

- (a) it is not practical to avoid the need for the discharge of wastes by recycling or re-use in accordance with clause 16.2 (which places limits on the discharge of pollutants in accordance with a series of principles);*
- (b) land application of the wastewater in an environmentally acceptable and sustainable manner is not practicable or would result in a higher net environmental risk than disposal of surface waters or groundwaters;*
- (c) any avoidable discharge will not prejudice the achievement of the water quality objectives for the receiving waters; and*
- (d) discharge would not give rise to pollution within terms of the Groundwater Act 1985, beyond the boundary of any attenuation zone in accordance with clause 25 of this policy.*

The policy also requires that regulatory authorities should not approve the application of wastes to land unless they are satisfied that it:

- a) *Can be carried out in an environmentally sustainable manner;*
- b) *Incorporates the use of best practice environmental management;*
- c) *Will not compromise the water quality objectives for surface and groundwaters;*
- d) *Will not give rise to an unacceptable risk to human or animal health; and*
- e) *Involves less net environmental risk than other strategies for dealing with the wastes.*

Various measures will be put into place to ensure that during both the construction and production phases of the site, the quality of the water will be protected and to ensure the flow rates for the Huon River are sustainable. Specific measures will also be implemented to ensure protection of groundwater at both the processing site and the irrigation area. Detailed measures for the management of siltation, erosion and stormwater runoff are provided in this DPEMP.

Coastal Policy

One of the principles of the Coastal Policy is that:

"The Coast shall be used and developed in a sustainable manner."

Although the site is not located on the coast it is important to recognise that the water that flows from the Huon River to the coast is not impacted by activities conducted on the site.

Chapter 5 of this report outlines the measures to be put in place to ensure the water quality in the Huon River is protected.

2.8.5 Proposed Amendment

The Huon Planning Scheme 1979 gives little guidance on how a large project such as this one should be developed or where it should be located. The areas zoned for industrial purposes are not suitable, being too small or, more importantly, being in the wrong location. The proposed site was selected on the basis it is the most central to the forest resource.

The objectives of the amendment are to:

-
- establish certainty to allow the development of wood based industries on the site; and
 - provide a mechanism whereby Council can assess proposed development or use of the site and impose standards.

In accordance with Section 43A of the *Land Use Planning and Approvals Act 1993* the request is to amend the Huon Planning Scheme 1979, to introduce a specified departure for the subject site and to enable the issue of planning permits for the following uses:

- (a) log segregation, cross cutting of logs and sawlog sales;
- (b) sawmilling and timber drying;
- (c) rotary peeling and production of veneers and plywood plants;
- (d) composting plant;
- (e) wood fibre production plant;
- (f) wood fired power generation plant;
- (g) timber sales yard;
- (h) joinery;
- (i) all other uses which are related to the downstream processing of the timber resource;
- (j) infrastructure that is integral to the development of the above uses;
- (k) visitor information centre;
- (l) engineering and maintenance workshops;
- (m) signs;
- (n) weighbridge;and
- (o) subdivision.

The manner in which the proposed amendment has been constructed is explained below.

A new zone was not considered suitable because the amendment sought is for a limited specified area of approximately 90 hectares with the uses being known and limited to timber processing. A zone is usually considered when there are a number of suitable locations throughout the municipal area. Also, with a zone, the specific uses for specific sites are largely unknown and a zone is thus usually more flexible in the range of developments and uses allowed.

The Huon Planning Scheme has undergone numerous amendments and it is somewhat unclear in its construction. It also has few development control measures or criteria. As a result, a separate schedule is considered the best and most transparent method of amending the scheme. The Light Industrial Zone is not suitable as general industry is not permitted and to amend the scheme to do so may create conflict between uses in other parts of the municipal area. It is noted the specified departure mechanism has been used a number of times to amend the Planning Scheme for a variety of developments and uses.

The amendment sets out the intent and objectives of the special area that is identified on a separate plan. A plan also identifies the proposed layout for developments and uses on the site.

The uses or development are identified in the schedule and the request is for a single permit to cover all of the listed uses. This is important as the staging of development of various components of the site are not known yet and may take longer than the statutory 2 year period.

Even though most of the developments will be classed as Level 2 activities under EMPCA and therefore become discretionary, it is proposed to make it clear what information is required by the Council and how a development application will be assessed when it is submitted for approval.

Because a site layout plan will be approved with the uses and areas defined it is unnecessary to require an application for subdivision and to have minimum areas set. Proposed amendment clause 11.9.2 establishes that no minimum areas are required and subdivision is to be treated as permitted.

Finally, the proposed amendment sets some minimum setbacks and car parking standards.

2.9 Social and Economic Impacts

A detailed socio-economic report on the Huon Valley has been prepared and the potential impact of the Wood Centre development on the region considered as part of the preparation of this DPEMP. The report is provided in Appendix D and is summarised below.

The proposed project will deliver significant economic and social benefits to Tasmania and the Huon Valley in particular.

The Huon Valley has a long history as a resource based economy from its early beginnings with fruit and vegetables and an ever-expanding logging industry (refer to Appendix D). Although the Huon Valley, the birthplace in Tasmania of hardwood pulp processing still has some small sawmills, it has no forest product manufacturing base, yet it produces some 16% of the State forest wood volume (not including fire wood).

The Wood Centre proposed by Forestry Tasmania has the potential to expand on the historical base and will impact on the socio-economic foundation of the valley. Positive impacts will be felt in the manufacturing sector, regional employment, traffic and electricity supply without changes to planned current or future harvesting rates.

The proposed development will have a long-term beneficial impact on the size of the manufacturing base in the region. Employment resulting from the proposed development will include stability for the existing 15 to 20 contract-harvesting businesses that employ some 100 to 150 operational staff operating in the area. A further 200 to 250 new jobs will be directly created at the Wood Centre. The occupational range is likely to be a mix of 20% basic vocational, 65% skilled vocational and 15% diploma or degree. The likely catchment for the source of employees will include Dover and Cygnet. No negative impacts on employment levels in existing businesses have been identified.

This employment will contribute about \$8.1 million a year in wages and salaries to the economy. The construction period will also create around 200 direct jobs over a period of 12 months. The flow on effects will mean that at least the same number of jobs again will be created indirectly.

It is not expected that the Wood Centre will have a negative social or economic impact on operations at Triabunna or on Sawmills in southern Tasmania. Existing sawlog contracts will be fulfilled with the site offering additional benefits to sawmillers constituting the current FT customer base. These include:

- Improved inventory control with reduced log holding capacity required by the sawmiller;
- Improved log specification and quality control as a result of improved log segregation within the Merchandising Yard.
- Improved delivery lead times as a result of improved transport efficiencies.

Modifications in traffic flows should have positive social benefits by reducing log traffic through several major population centres. Further, by moving processing

facilities closer to the forest, most of the wood that is moved away from the site will be in enclosed vehicles. Redirection of the traffic flow will impact on some smaller centres.

Electricity generation on site will assist in increasing the reliability of power supply south of Huonville. Currently the Huon Valley is served by a single circuit transmission line from Chapel Street to substations at Huonville, Electrona and Kermandie. Transend has a consultancy underway that is looking at the management of loads and methods for improving reliability. Additional generating capacity at the end of the transmission network provides an attractive method of improving reliability of the network as a whole. Any fault along the transmission line currently results in the whole of the area south of the fault being blacked out. A new generating source at the end of the line will result in near continuous availability of power.

The Wood Centre will become a major ratepayer within the Huon Valley Municipality. It will make a significant contribution to the Huon Valley Municipality rate base. One of the few tangible services that the Wood Centre will receive from the Council is maintenance of roads owned by Council used to transport products from the Wood Centre to the Huon Highway.

The Huon Valley has a growing tourism industry that in part depends on the forests. FT is seeking to enhance this tourism appeal through provision of interpretation in the forest and establishment of tourist-centred facilities such as the Tahune Forest AirWalk. Forestry and tourism have developed side-by-side over the past 100 years. Various tourist operators benefit from using infrastructure developed by FT to provide access to forest pursuits in State forest.

The proposed development features processes that will use a wide range of wood assets thereby increasing productive use and reducing residues. No changes to sustainable forest practices will occur as a result of the development. Where wood is sourced from private forests, the requirements for the forest to be managed sustainably and in compliance with the Forest Practices Code will be observed.

CHAPTER 3 EXISTING ENVIRONMENT

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3. EXISTING ENVIRONMENT

3.1 Terrestrial

Coffey Geosciences Pty Ltd conducted a preliminary geotechnical assessment of the Wood Centre site on 11 August 2000. This assessment comprised a desktop review of available information, a series of test pits and reconnaissance of the geology and geomorphology of the area (Coffey Geosciences, 2000; Appendix E).

Refer to Chapter 2 Figure 2 for an aerial view of the site.

3.1.1 *Topography*

The proposed development is to be situated on a low ridge (100m altitude), roughly North-South in orientation. The low ridge is situated at the eastern end of the Weld Plains. The Huon River makes a significant bend around the ridge. The ridge lies on the north bank of the Huon River, opposite the confluence of the Arve and the Huon Rivers (Figure 1).

The slope on the ridge is gentle with local slopes up to 9 degrees. The edge of the ridge is embayed in places and slopes may steepen up to 14 degrees, for example where the site grades steeply down towards the Huon River. Around the eastern and southern edge of the ridge, an escarpment slope of about 28 to 32 degrees leads to the relatively narrow modern floodplain of the Huon River.

The slope is more gradual towards the Weld Plains to the west, and a valley with an intermittent creek to the northeast.

3.1.2 *Geology and Soils*

The Geological Atlas 1:250,000 digital series Geology of the Southeast Tasmania produced by Mineral Resources Tasmania (1999 edition) shows the underlying bedrock geology to be Permian marine siltstones and sandstones.

A fluvio-glacial terrace escarpment encircles the ridge. The Pleistocene glacio-fluvial deposits are of cobble and boulder grade. This landform when located in the Weld Plains by Sharples was classified as “Representative at the State Level” and “Outstanding at the Regional level”. He considered them to be “vulnerable to degradation if disturbed by specific activities”. The terrace remnants are reported to be “..vulnerable to excavation; some quarrying has already taken place-features are still in good condition, but future quarrying should be monitored to ensure important features are preserved” (Sharples, 1994).

The light grey quartzite gravel has been quarried for road construction materials in the past.

In general, the proposed site is underlain by alluvial and glacio-fluvial deposits. The typical soils overlying these materials are as described in Table 12. Most of these units were determined to be suitable for use as fill on-site. The depth of each unit varies by sample site but average depths are given in the table.

Table 12 Typical Soil Profile Description

(Based on test pit investigations conducted by Coffey Geosciences Pty Ltd, 2000)

Unit/ Horizon	Depth (m)	Soil / Geological Description
Unit 1	0.2	Silty SAND to Sandy GRAVEL, dark grey to black, subrounded quartzite gravel, roots and rootlets, organic (The topsoil has a peaty characteristic and can be easily scraped and stored for landscaping and/or re-spreading).
Unit 2	0.3	Sandy GRAVEL to Gravelly SAND, light grey to white, subrounded quartzite gravel, some cobbles.
Unit 3	0.1	Silty GRAVEL to SAND, dark brown to black, subrounded quartzite gravel, sometimes cemented.
Unit 4	0.6	Gravelly CLAY to Sandy GRAVEL, mottled yellow-orange-brown, subrounded quartzite gravel, trace cobbles.
Unit 5	0.2	Silty CLAY to Sandy SILT, extremely weathered siltstone rock with soil-like properties.
Unit 6		SILTSTONE, orange - grey, distinctly weathered siltstone rock with rock mass defects.

3.2 Climatology and Air Quality

Climatology

Two weather stations exist in the Huon Valley; Geeveston (Forestry Cemetery Road) and Grove Research Station. Although these sites are the closest ones that exist to the site and may provide indicative information, neither is likely to provide a true indication of rainfall, or localised wind direction and strength, as the site is situated further inland in a relatively mountainous area. The indicative climatology of the area is representative of a temperate climate (Table 13).

The highest rainfall is likely to be received during the months of April to December, while the temperature has the potential to be below zero in any month of the year except for January.

Table 13 Climatological Summary for the Region

[Measured at meteorological stations at Geeveston (Forestry Cemetery Road) during the period 1971 to 2000, and Grove Research Station during the period 1952 to 2000]

Parameter	Geeveston	Grove Research Station
Annual Mean Daily Max Temp (°C)	16.8	17.0
Annual Mean Daily Min Temp (°C)	5.7	5.8
Mean Days with Strong* Winds (days)	14.4	12.7
Annual Mean Daily Pan Evap (mm/month)	2.4	2.7
Annual Mean Number of Days with Snow (Days)	3.3	4.5
Annual Mean Number of Days with Frost (Days)	25.5	64.9
Annual Mean Number of Days with Fog (Days)	7.3	29.2
Mean Monthly Rainfall Range (mm/month)	51.9 to 94.1	47.4 to 75.8
Annual Mean Rainfall (mm/yr)	881.4	754.7

*Strong winds are defined as > 30 km/h

The prevailing wind direction for the site can not be determined without on-site monitoring being undertaken, as the prevailing wind recorded at the Geeveston monitoring station was from the north west, while it was recorded as being from the south west at the Grove Research Station weather station.

The site is likely to experience a greater frequency of frosts and fog than either weather station location, as the site is located further inland. The steep slopes grade from the ridges towards the river, giving rise to a strong drainage of air.

The climatic conditions of the region can result in temperature inversions. The conditions are most likely to occur in wintertime when dense cloud formations may trap air emissions within the site. The inversion could potentially range from 50 to 100 m above the ground. Little meteorology data is available to determine the significance of the temperature inversion to atmospheric emissions.

Air Quality

There is no known background air quality information for the proposed site. This is due to the undeveloped nature of the region. Reference to maps, together with site inspection findings, indicate that the nearest residential occupation is over six kilometres from the site.

Current air quality on the site is high as apart from forest and recreational activities no other human activities occur nearby. The site suffers the same inversion effect that the rest of the Huon Valley experiences but the airflow tends to be down river on such occasions.

3.3 Hydrology and Water Quality

3.3.1 Surface Water / Site Drainage

The Huon River catchment is approximately 3,900 square kilometres and comprises 20 sub-catchments. The major tributaries of the Huon River are the Anne, Cracroft, Picton, Weld, Arve, Little Denison and Russell Rivers. The first four rivers listed join the Huon River upstream of the proposed development site and the confluence with the Arve River is immediately opposite the site.

The hydrology of the Huon River was modified in the 1970s when the construction of Scotts Peak Dam diverted the upper reaches of the river to the Gordon Stage 1 Power Scheme.

The Huon River headwaters drain the Arthur Range at an elevation of 1180 m. After approximately 30 km the river flows out of the Southwest National Park (World Heritage Area) and meanders through relatively undeveloped State forest for approximately 18 km, agricultural lands for approximately 15 km and finally terminates in D'Entrecasteaux Channel.

A Catchment Management Plan has been developed for the Huon River by the Huon Catchment Healthy Rivers Project Group (HCHRP, 1997). This plan is presently being revised. The aim of the Healthy Rivers Project is "...to protect the ecological balance of the Huon Catchment through sustainable use, development and management of natural resources" (HCHRP, 1997). As a new component of the catchment, the proposed development will strive to meet the objectives of the revised Huon Catchment Management Plan.

As indicated in Section 3.1.1, the site is situated on a low ridge that forms a significant meander in the Huon River channel. Some small intermittent creeks are sourced from the site. Some drainage lines flow west into Kings Creek, and the steeper areas to the north east of the site, drain directly into the Huon River. Due to the small and intermittent nature of these watercourses, there is no information available regarding their flows and water quality.

3.3.2 *Huon River Hydrology*

The following information is based on daily flow data that was recorded on the Huon River upstream of Frying Pan Creek since 1970. Frying Pan Creek is situated approximately four kilometres downstream from the proposed development site.

The minimum, average and maximum flow rates of the Huon River at the proposed development site are predicted based on the flow rates measured on the Huon River at the Frying Pan Creek monitoring station. The measured and predicted flow rates are provided in Table 14. Predictions for flows in the vicinity of the proposed development site have been calculated by scaling the Frying Pan Creek monitoring station data to reflect the Huon River Catchment upstream of the proposed development site.

Table 14 Recorded and Calculated Huon River Flows

(As measured above Frying Pan Creek and at the Proposed Site)

	Typical Months When Flows Occur	Recorded Frying Pan Creek Flow* (m ³ /sec)	Conversion Factor	Calculated Huon River Flow at the Site	
				(m ³ /sec)	(ML/day)
Min Flow	Feb. and Mar.	6	0.999	6	497
Average Flow	-	81	0.988	80	6,960
Max Flow	August	1,800	0.939	1,690	146,000

* Measured at the DPIWE Frying Pan Creek monitoring station during the period 1 January 1970 to 3 August 2000.

An Olympic size swimming pool holds a little more than 2.5ML. At minimum flow the Huon River at the site will fill about 200 Olympic size swimming pools a day, at maximum flow it will fill about 60,000 such pools a day. The average flow will fill about 2,700 such pools a day. The proposed maximum extraction of 0.09 m³/sec (5 ML/day) is equal to the volume of 2 Olympic pools. This rate of extraction represents 1.5% in minimum flow conditions, 0.07% in average flows and 0.003% during maximum flows which it is considered will not impact on environmental flows in the Huon River.

3.3.3 *Huon River Water Quality*

Indicative Ambient Water Quality Near the Site

Grab samples were collected from both the Arve River and Huon River in the vicinity of the proposed site on 28 September and 10 October 2000 to obtain an indication of the existing ambient water quality. These samples were collected using approved methodology and analysed by a NATA registered laboratory. However, the limited number of grab samples (2) makes the results fairly insignificant in view of the more comprehensive Huon Estuary Study. Where acceptable limits exist, the findings have been related to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 1992). Refer to Table 15 (refer also to the analysis results provided in Appendix F).

Table 15 Huon River Water Quality Recorded Adjacent to the Site

(measured at Wood Centre during sampling period September and October 2000; FT 2000)

Analyte	Units	Draft ANZECC Guidelines 2000 for ecosystem protection unless otherwise stated	ANZECC Guidelines 1992	Huon River Samples	
				28/09/00	10/10/00
pH		6.5 - 8.0 (Lowland River)	6.5 – 9.0	5.8	5.6
Total Dissolved Solids, TDS	mg/L	2400 (dairy cattle)	<5000 for livestock	52	56
Total Suspended Solids, TSS	mg/L	Refer to turbidity value	<10	<10	18
Turbidity	NTU	6-50 (default trigger value SE Aus Lowland Rivers)			
Alkalinity HCO ₃	mg/L CaCO ₃	≥ 20 (aquaculture)	-	27	11
Chloride	mg/L	Irrigation water - crop dependent	400	11	13
Nitrate	mg/L	0.7 (toxicant)	-	<0.03	<0.03
NOx(Lowland Rivers)	mg N/L	0.04(default trigger value SE Aus Lowland Rivers))			
Sulphate	mg/L	< 50 (aquaculture)	-	1.8	1.9

Analyte	Units	Draft ANZECC Guidelines 2000 for ecosystem protection unless otherwise stated	ANZECC Guidelines 1992	Huon River Samples	
				28/09/00	10/10/00
Hardness	mg/L CaCO ₃ / L	20-100 (aquaculture) >50 to minimise corrosion	500	26.0	15.0
Iron, Fe (Total)	µg/L	300 (interim indicative working level but further data for Australian conditions is necessary) 200 (long term trigger value for irrigation)	1000	281	664
Calcium, Ca (Total)	mg/L	<1000 (stock water)	-	5.20	2.65
Potassium, K (Total)	mg/L	NA	-	0.49	0.66
Magnesium, Mg (Total)	mg/L	Insufficient information but some adverse effects occur between 500-1000 in stock water	<600 for livestock	3.25	1.93
Sodium, Na (Total)	mg/L	Irrigation water - crop dependent	-	6.24	6.87
Silica, Molybdate Reactive	mg/L	NA	-	6.3	6.6

The indicative water quality recorded near the site is of high quality, reflecting the expected low inputs upstream associated with the limited human activity. The water was found to be slightly acidic, with suspended solids that were slightly above the ANZECC Guidelines for freshwater aquatic ecosystems, and elevated iron levels.

The water quality of the Huon River is discussed in more detail below with respect to findings of long term monitoring.

Long Term Water Quality Monitoring

As a component of the Huon Healthy Rivers Project, *The Huon Valley Water Quality Report 1996-2000* (Otley 2001) indicates that the quality of water in the western part of the Huon River catchment is better than the eastern portion due to the lack of human settlement in the West. The water quality is relative to the extent of change to the natural catchment, including vegetation clearance and soil disturbance, spread of foreign riparian vegetation species and presence of gravel roads, domestic animals and septic systems.

The Arve and Picton Rivers flow into the Huon River from the south and are the closest to the vicinity of the Wood Centre that have undergone regular water quality monitoring. Based on the water quality information, Otley suggests that the Arve and Picton Rivers are not significantly effected by present land uses and the current land and water management practices in place should be continued along with the current monitoring program.

The results indicate that preventative measures should be taken with regard to new development in the western region of the Huon catchment. Special attention to management of vegetation clearance, soil and riverbank erosion and most importantly gravel road drainage.

DPIWE maintains a monitoring station at Judbury on the Huon River (downstream of the proposed development site) and at Frying Pan Creek (downstream of the site). Water quality and flow data from both sites has been considered below with respect to the proposed development site.

The Judbury monitoring station formed part of a single point-in-time survey of the water quality of rivers in the Huon Catchment conducted by DPIWE. The purpose of the survey was to identify areas where water quality deterioration was occurring relative to the rest of the catchment (Department of Primary Industries and Fisheries, 1998). The Huon River at Judbury was found to be the best water quality of the rivers surveyed.

Subsequent data collected from these locations for the period December 1997 to December 2000 reflect the results provided in the survey (Table 16).

Table 16 Huon River Long Term Water Quality Monitoring Results

(Measured at Judbury during the Sampling period February 1974 to 1997; DPIWE 1997; Forestry Tasmania 2000)

	Temperature (°C)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	Turbidity NTU	pH
ANZECC Guidelines 1992*	<2°C increase	1,500	>6 (>80-90% saturation)	<10% change seasonal mean concentration	6.5-9.0
ANZECC Guidelines 2000 Draft	- trigger value is 20 th percentile and 80 th percentile of the seasonal distribution of temp. data at the reference site - the short-term change should be < 2 °C.	30-350 (SE Aus) 90 (Tasmania)	> 85 - < 110 % saturation (lowland rivers)	6-50 (lowland rivers) - low risk trigger value is the 80 th ile of the seasonal distribution of turbidity data at the reference site. - <10% change in the euphotic depth	6.5-8 (lowland rivers)
Sampling Period	5/7/90-3/8/00	22/6/96-7/4/00	27/4/74-2/4/00	22/6/96-23/1/00	27/2/74-2/4/00
Minimum	4.21	0.0	7.3	1.0	6.3
Average	11.0	78.4	10.2	4.5	7.3
Maximum	24.0	215.1	13.2	91.8	8.3

* ANZECC Guidelines 1992 - Fresh and Marine Water Quality Guidelines

Note: Comparison of ANZECC trigger values and CSIRO results requires conversion from microM to mg.

Temperature

The relatively low water temperature of the Huon River at Judbury is maintained by input from higher altitude terrain. The temperature generally ranges between 8 and 13 °C.

Conductivity

Conductivity of water is the measure of dissolved salts in the water. During dry periods conductivity generally reflects groundwater salinity levels. In high flows, after rain, conductivity is more indicative of dissolved material in run-off and surface drainage. The Huon River water has dissolved salt levels with a median less than 100 µS/cm. The National Guidelines (ANZECC 1992) recommend freshwater conductivity should not rise above 1,500 µS/cm.

Dissolved Oxygen

The level of dissolved oxygen (DO) in rivers significantly impacts the type of aquatic animals able to live in the river. The ANZECC Guidelines (1992) state that to maintain aquatic health, DO concentrations should not fall below 6 mg/L and that where possible DO should be measured at night when lowest levels occur. In the data provided by Forestry Tasmania (2000) only daytime readings were taken.

The DO of the Huon River at Judbury had a median of 10.18 mg/L and ranged between 7.30 and 13.20 mg/L. These concentrations are indicative of a healthy system however this is not conclusive as measurements were taken during daytime not night time.

Turbidity

Turbidity is a measure of the capacity of light to pass through water and generally reflects the amount of suspended material in the water. High turbidity values indicate higher levels of suspended matter and reduced light penetration, while low values indicate clear water. The pattern and magnitude of turbidity may be expected to change with river flow during events of different sizes. In addition, land use practices commonly contribute to sedimentation from soil and stream bank erosion.

The recommended total suspended solids (TSS) is less than 10 % change seasonal mean concentration. The Huon River grab sample results at the site indicate that TSS was less than 10 mg/L and 18 mg/L. This may indicate that the spring change in TSS was less than 10% however the seasonal change cannot be conclusively determined from the results of 2 grab samples.

The Huon River at Judbury had a median turbidity of approximately 4.49 nephelometric turbidity units (NTU) and had a range of 90.81 NTU. These results demonstrate that the pattern and magnitude of turbidity probably changes with river flow during events of different sizes in the Huon River and may be affected by land use practices.

Field pH

When results of the samples taken adjacent to the site are compared to the ANZECC Guidelines (1992) it is determined that the pH of the Huon River and the Arve River is lower (more acidic) than recommended for the protection of aquatic ecosystems. However, the pH was measured in the lab and as such may have been affected by changes in temperature and the container environment.

The long-term study results for field pH are between 6.3 and 8.3, which are generally within the ANZECC Guidelines (1992) of 6.5 to 9.0. Based on these results, no

definitive conclusions regarding the results and the effect on the environment for aquatic biota can be reached because toxicity of several pollutants is affected by changes at pH in this 5 to 9 range.

Nutrients

The nutrient export load data for the Huon River as measured at Judbury during the 1996/97 DPIF survey and in the riverine environment during the Huon Estuary Study 1996/98 CSIRO (2000) is provided in Table 17.

Table 17 Huon River Water Nutrient Export Load

Nutrients	ANZECC Guidelines 1992 (µg/L)	ANZECC Guidelines 2000 (µg/L)	1996/97 Concentration (µg/L) DPIF	1996-98 Concentration (µM) CSIRO
Total Ammonia (NH ₃ /NH ₄)		910	10	0.05-0.14
Nitrate and Nitrite (lowland rivers)		40 (default trigger value SE Aus Lowland Rivers)	N/A	<0.05-0.7
Nitrite				<0.03-0.06
Total Nitrogen (TN)	100-750	500 (default trigger value SE Aus Lowland Rivers)	190	8.5-16
Dissolved Reactive Phosphorous (DRP)	15-30	20 (default trigger value SE Aus Lowland Rivers)	< 10	<0.03-0.09
Total Phosphorous (TP)	10-100	50 (default trigger value SE Aus Lowland Rivers)	< 10	<0.08-0.64

Based on this data, the estimated nutrient mass load of the Huon River upstream of Judbury was calculated to be more than 38 tonnes of phosphorous and 1,355 tonnes of nitrogen when measured over a 16 month period from June 1996 to October 1997 (DPIF, 1998). The levels of TN and TP are well within the recommended limits (ANZECC 1992).

3.3.4 Groundwater

The twelve test pits undertaken by Coffey Geosciences as part of their geotechnical assessment of the site in August 2000 failed to intercept groundwater. These test pits were typically shallow (between 1 and 6 metres in depth) indicating that groundwater on-site is not typically close to the surface.

No other investigations to specifically locate groundwater have been undertaken at the site, nor in the immediate area.

A preliminary assessment of the hydrogeology of the site has been undertaken (Weldon, 2001: Appendix W). The assessment suggests that the development site, on a ridge, should be a re-charge area of groundwater. However, engineering logs indicate that there are natural materials in the soil profile that act as a barrier to infiltration. It is expected that most infiltration will move along the top of the natural barrier materials, which may not be continuous. Springs have not been observed around the outer slopes of the ridge but an inspection of the escarpment was undertaken only in the south where a road was constructed recently to provide access to the Huon River bridge crossing. The groundwater table beneath the ridge is expected to be relatively flat and, because of the presence of the Huon River, it is unlikely to be highly elevated.

3.4 Flora

The proposed development site was surveyed by Biological Consultants on three separate occasions (26/08/00, 2/12/00 and 13/01/01; Appendix G). The purpose of the surveys was to record the plant species and communities present on the proposed development site.

As part of an environmental assessment for the construction of the access road into the area, Ms Karen Ziegler (FT) conducted a botanical (quadrat sample) survey of the proposed development site on the 20th of February 2000. The data from this previous survey was included in this study.

Three main floral communities exist on-site, as shown in Figure 9. These floral communities are described and their importance noted with respect to the Regional Forest Agreement Community Code and Vegetation Management Strategy Code in Table 18.

The plateau, which constitutes the majority of the site is dominated by *Leptospermum glaucescens* - *Hibbertia procumbens* heathland growing on sand, or muck peats, that overlay a Permian quartzite bedrock (siliceous). The margin of the heathland and slopes at the top of the plateau are dominated by a heathy *Eucalyptus amygdalina* woodland and forest growing on a quartzite bedrock (siliceous). The forest

component is comparable to the Regional Forest Agreement community of *E. amygdalina* forest on sandstone (see also *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995)). Most disturbed areas of this community are regenerating back to heathland, with small intermittent copses of stunted *E. amygdalina* (approx. 15 ha). The lower slopes of the ridge are dominated by *Eucalyptus obliqua* forest with a midstorey of both wet and dry tree and shrub species depending on the proximity to the river and aspect. Refer to Appendix G for further information on the distribution of floral communities.

Table 18 Floral Communities on Site and their Descriptions

Plant Communities	Regional Forest Agreement Community Code	Vegetation Management Strategy (2000) Code
<i>Leptospermum glaucescens</i> - <i>Hibbertia procumbens</i> heathland	Not applicable (non-forest community).	Lowland and intermediate heath (Hh).
Heathy <i>Eucalyptus amygdalina</i> open forest and woodland on sandstone	<i>Eucalyptus amygdalina</i> forest on sandstone (forest component) and non-forest (woodland component).	<i>Eucalyptus amygdalina</i> forest on sandstone and <i>E. amygdalina</i> woodland.
<i>Eucalyptus obliqua</i> - <i>Melaleuca squarrosa</i> - <i>Monotoca glauca</i> forest (OB0111)	<i>Eucalyptus obliqua</i> dry forest/ <i>E. obliqua</i> wet forest	<i>Eucalyptus obliqua</i> dry forest/ <i>E. obliqua</i> wet forest

Leptospermum glaucescens - *Hibbertia procumbens* heathland and dry to wet *Eucalyptus obliqua* forest are adequately reserved within the Tasmanian reserve system (Kirkpatrick and Harris 1999; S. Harris pers. comm.).

Eucalyptus amygdalina forest on sandstone is a high priority for conservation under the Regional Forest Agreement Private Land Reserve Program, but is not a priority for conservation on public land (e.g. State forest). There is no requirement for the forest or non-forest communities located within the boundary of the proposed development site to be reserved on public land (pers. comm. S Casey 2001).

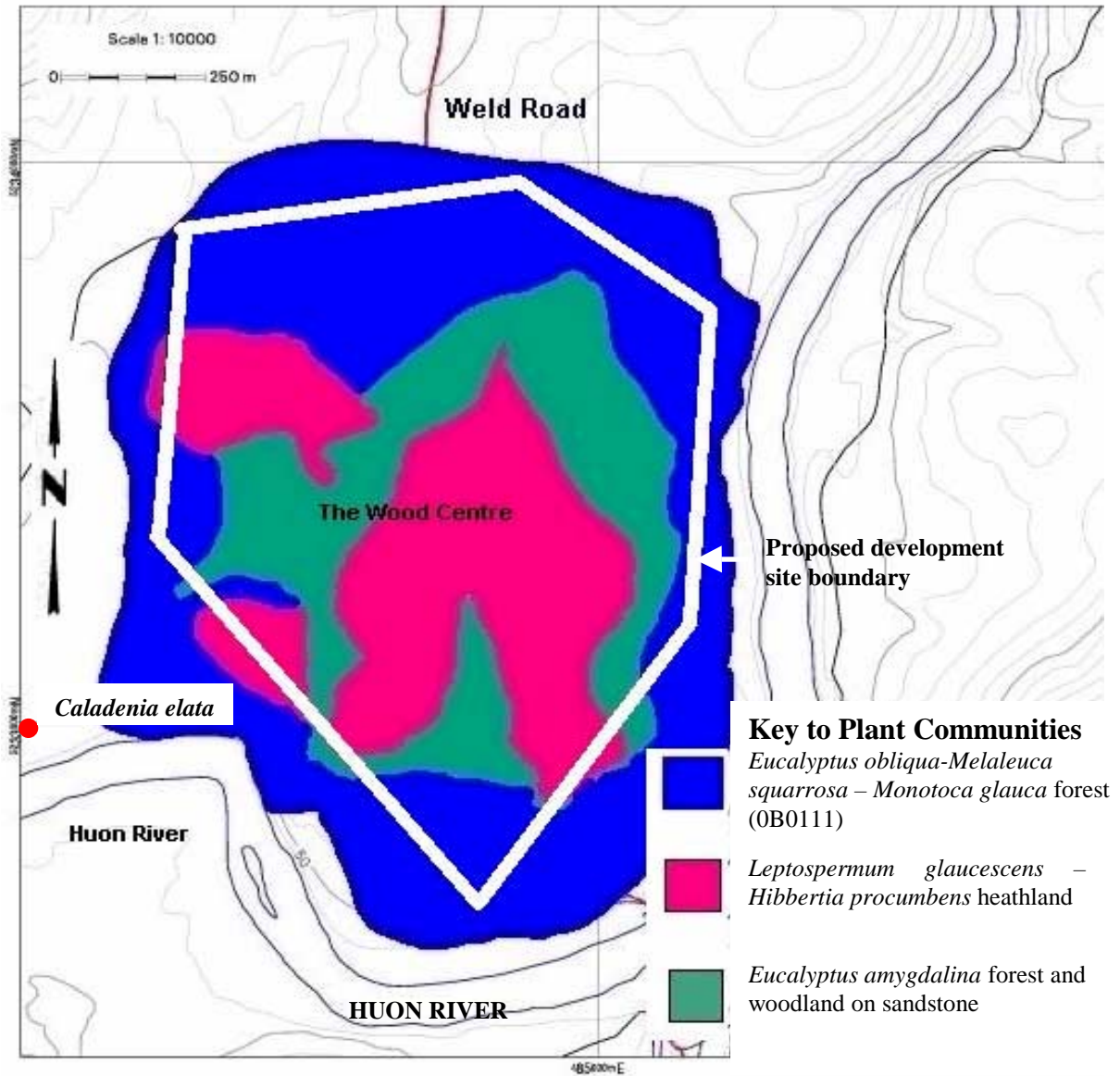
No plant species of local, statewide or national conservation significance were located on the site during the surveys. The initial survey indicated that the possibility remained that the orchid species *Caladenia alata* could occur on-site within the *Leptospermum glaucescens* - *Hibbertia procumbens* heathland and *E. amygdalina* forest and woodland on sandstone communities present within the boundary of the site. This species was previously listed as a Rare Schedule 5 species under the Tasmanian *Threatened Species Protection Act 1995* but was recently removed.

The follow-up survey of the proposed development site conducted on 2nd December 2000, again recorded no *Caladenia alata* plants within the boundary of the proposed development site. The species flowers in October therefore it may be present but due to its removal from the Rare Schedule 5 species list, it is not considered to require specific conservation protection.

The only orchid species recorded within the site's boundary was *Thelymitra cyanea* (veined sun orchid). Plants of this species were more abundant along the roadsides, cutlines and areas that had been disturbed by track maintenance and quarrying activities than in the undisturbed heathland vegetation. *Thelymitra cyanea* is not considered to be a rare and/or threatened species.

During construction of the new bridge *Westringia angustifolia* was identified at E485140 N523600. This site is located on the opposite side of the Huon River.

Figure 9 Existing Vegetation



3.5 Fauna

The proposed development site was surveyed by Stephen Mallick (Fauna Consultant) on the 27th of August 2000 to record the faunal species and habitats present (Mallick, 2000; Appendix H).

The desktop research determined that seven species of conservation significance are known, or are likely, to occur in the area of the proposed development. Refer to Table 19.

Table 19 Significant Faunal Species Recorded On or Near the Site

Species (Common Name)	Listed	Listing	Identification
<i>Aquila audax fleayi</i> (Wedge-tailed Eagle)	TTSPA	Vulnerable	Record from region, potential habitat
	CESPA/ CEPBC Act	Endangered	-
<i>Lathamus discolor</i> (Swift Parrot)	TTSPA	Vulnerable	Potential (post-breeding) habitat
	CESPA/ CEPBC Act	Endangered	-
<i>Accipiter novaehollandiae</i> (Grey Goshawk)	TTSPA	Rare	Potential habitat
<i>Dasyurus maculatus</i> (Spotted-tailed Quoll)	CESPA/ CEPBC Act	Vulnerable	Potential habitat
	VAC	Requires Monitoring	-
<i>Dasyurus viverrinus</i> (Eastern Quoll)	VAC	Unknown Risk Status	Potential habitat
<i>Prototroctes maraena</i> (Australian Grayling)	TTSPA	Vulnerable	Potential habitat
<i>Lissotes menalcas</i> (Mt Mangana Stag Beetle)	TTSPA	Vulnerable	Record from region, potential habitat

CESPA Commonwealth Endangered Species Protection Act 1992.

CEPBC Act Commonwealth Environment Protection and Biodiversity Conservation Act 1999

TTSPA Tasmanian Threatened Species Protection Act 1995.

VAC Vertebrate Advisory Committee 1994.

Aquila audax fleayi (Wedge-tailed Eagle)

The Tasmanian subspecies of the wedge-tailed eagle occurs in the general region; however, the nearest recorded nest-site is 8 to 9 km distant. There is tall forest on the slope to the east of the development site that could potentially be suitable for wedge-tailed eagles. However, the slope is very exposed to the prevailing westerlies and is considered unlikely to support a nest site.

Lathamus discolor (Swift Parrot)

The swift parrot has been recorded to the east of the proposed development site on coastal *E. globulus*, and may potentially utilise *E. obliqua* within the area as a post-breeding food supply.

Accipiter novaehollandiae (Grey Goshawk)

The grey goshawk nests in all types of wet forests, particularly along watercourses, although blackwood swamp forest and wet forest where blackwoods occur are the preferred habitat. No Grey Goshawk nests were observed during field surveys in the area of the Wood Centre (pers. comm. S. Mallick 2001).

Dasyurus maculatus (Spotted-tailed Quoll) & *Dasyurus viverrinus* (Eastern Quoll)

The spotted-tailed quoll (*Dasyurus maculatus*) is primarily a wet forest species that may also utilise woodland and heath, while the eastern quoll (*Dasyurus viverrinus*) is most common in areas with a mosaic of native forest/woodland and pasture. Both quoll species may occur in the area.

Prototroctes maraena (Australian Grayling)

The Australian Grayling occurs in the lower-middle reaches of rivers and streams in Tasmania. The species is likely to occur in the Huon River in the vicinity of the proposed development.

Lissotes menalcas (Mt Mangana Stag Beetle)

The Mt Mangana stag beetle is known to occur in the region. The species inhabits rotting logs on the floor of *E. obliqua*, *E. regnans* and *E. globulus* forest, so the wet *E. obliqua* forest could be suitable habitat for this species.

While it is possible that this species, may exist on, or within the vicinity of, the site; the survey found no evidence to suggest that the site contained critical habitat for this species.

3.6 Archaeology and Cultural Heritage

3.6.1 *Aboriginal Heritage*

Preliminary Site Survey

A preliminary archaeological survey was undertaken by the Forest Practices Board to provide an indication of the potential for Aboriginal sites to be present (Appendix I). The survey located no sites and recorded that the site did not have a high potential for recovery of Aboriginal sites.

Consultation and Tasmanian Aboriginal Site Index Search

Discussions have been held with the Tasmanian Aboriginal Land Council (TALC), Aboriginal Heritage Unit (AHU) of the Department of Primary Industries, Water and Environment, and the South East Tasmanian Aboriginal Corporation (SETAC) regarding the proposed development and potential significance of the site with respect to Aboriginal cultural heritage.

The initial request for permission to undertake a survey of the site was refused due to SETAC and TALC's concern regarding general management of Aboriginal sites within forestry areas in the past. Upon further consultation, permission for access to the Tasmanian Aboriginal Site Index (TASI) was granted, with the following qualification:

“That the (Forestry Tasmania) proposal not be endorsed and that we (TALC) do not endorse an Aboriginal heritage officer to conduct the survey.”

A copy of correspondence from SETAC and TALC is attached in Appendix J.

A search of the TASI found no recorded sites within the proposed development area, or immediate vicinity. A site across the Huon River suggests that there was historical Aboriginal activity in the area.

An Aboriginal heritage officer conducted further consultation on behalf of FT with TALC and SETAC to identify their concerns. These concerns (as detailed in Appendix I) were in general, regarding broader forest and Aboriginal site management issues, and are beyond the scope of the DPEMP for this proposed development. These concerns are being addressed within FT's existing ongoing consultation process.

Findings of the Site Survey

A site survey was conducted by an Aboriginal heritage officer during the period 6 to 9th January 2001 (Scottney, 2001; Appendix K). No Aboriginal sites were located

during the survey which concentrated on disturbed areas, with visibility restricted to less than 5% by thick undergrowth over much of the site.

The abundance of cultural resources in the area, the ethnohistory for the area, and the local oral knowledge indicated that the project area was extremely rich with Aboriginal cultural values and had potential to be of significance.

The survey report indicated that the North West Bay region was within the territory of the South East Tribe (which possibly comprised up to 10 bands), with a total population of 400-500 people. Vegetation types noted to be present on-site have potential to have been Aboriginal cultural resources used as traditional food, a source of medicine, and/or fibre for building shelters and weaving baskets. Similarly, the types of mammals and birds that are likely to be present may have been a source of food (eg. possums, wallaby, wombat and echidna).

Further survey of the site after removal of vegetation was determined to be necessary for identifying the presence or absence of Aboriginal sites.

3.6.2 *European Heritage*

Timber harvesting has been a part of the Huon Valley's history for over 180 years with wood production growing side by side with recreation and tourism over the last few decades. The predominant resources of the area were and remain its forests and waterways (Forestry Tasmania, 2001; Appendix L).

The timber industry supported the other enterprises in the area including whaling, prospecting, fur farming, vegetable and fruit growing, and farming. By 1850 (during the gold rush), timber was exported to Victoria. As industrialisation made inroads automation of the industry evolved. European exploration and settlement of the area started in the early 1800s. Experimental planting of fruit proved successful and export of fruit began in 1840.

A survey of the site and discussions with locals indicate there are no significant remains of European cultural activity at the Wood Centre site that need to be addressed. A small family spot mill was operated near the northern boundary of the site by the Watson family in the 1940s and 50s, but this area will not be disturbed by the development.

There are the remains of two sawmills (McMullen's Leithbridge Sawmill, the McMullen's Bermuda Road Mill) and a connecting tramway (McMullens Leithbridge Tramway) about 8 kilometres east of the Wood Centre site. These sites were built in the 1930s and have been rated as low to medium significance by Parry Kostoglou in his "Historic Timber Getting in the Southern Forests – Statements of Site Significance and Management Recommendations" (Forest Research Council, 1996).

McMullen’s sawmill was probably Franklin’s largest sawmill in c.1932. It was situated at the end of New Road and is believed to have closed by about 1954. Historical remains of the operation comprise a sawmill shed, tramway and mill skids.

3.7 Ambient Noise

The Wood Centre is the first major development of this type within the State forest in the Huon Valley and Tasmania. Consequently, true background noise levels are obtainable that are not inflated by the presence of other industrial noise in the area. Noise measurements (15 minute statistical analysis) were taken during the day and night and are recorded in Table 20.

Table 20 Results of 15 Minute Statistical Noise Analysis (dB(A))

Time	L _N	L ₄₀	L ₉₀	L _{eq}
1435 h	51.3	47.3	36.8	44.0
1830 h	41.0	39.8	36.5	38.3

In Table 20, L_N is the noise level exceeded for N% of the sampling time. L₉₀ is a description of the background noise levels encountered. L₁₀ is a description of the fluctuating higher noise levels. L_{eq} is the equivalent ‘A’ weighted noise level. For example, a fluctuating noise having an L_{eq} = 38.3 has the same acoustic energy as a steady noise of 38.3 dB(A). A brief explanation of noise and noise measurement is provided in Appendix M.

Results of rural and semi-rural noise surveys in Tasmania over the past 18 years indicate that the day time rural background (L₉₀) noise levels are higher than the noise levels recorded in semi-rural areas. Rural areas are not always tranquil, there are watering systems, tractors, distant sawmills and quarries. Furthermore, the ambient noise in forest and wooded rural areas depends on the wind speed interaction with vegetation and fauna especially birds, frogs and insects. The background noise levels can vary from 20 dB(A) on a still night without insect noise, to over 50 dB(A) during moderate winds. At night, the rural and semi-rural noise climate are similar, with a mean background L₉₀ level of about 32 dB(A) (Terts, 2001; Appendix N).

The proposed development will result in a change and probably an increase in the existing ambient noise level in the immediate vicinity of the site. The nearest residence is situated approximately six kilometres away, near the junction of Denison and Weld Roads. Significant topographic and vegetation barriers are present between the site and the residences in the area. The site’s location and proposed mitigation

measures will ensure that the noise sources should not be perceived at nuisance noise levels and be cause for complaint. A detailed assessment of the potential noise impacts of each of the proposed developments is provided in Chapters 6, 7, 8, 9 and 10 and cumulative noise impacts in Chapter 5.

3.8 Hazard Issues

Potential natural hazards that may need to be considered when developing the site include flooding, fire, landslip and erosion.

The site is situated on the top of a ridge and should not be subject to flooding as it is well drained. The potential impact and management of flooding will not be considered further.

Blackened tree trunks observed on-site are evidence of historic bushfires. The heath community is also likely to be evidence of regular or recent bushfire. Fire management will be a significant consideration, given the evidence of fire in the region, and the development of the wood processing operation in an isolated and predominantly forest area.

During the geotechnical assessment of the site, an old landslide feature was observed in a road cutting below the proposed location for the power station. Construction of the road was thought to have exposed some of the tension cracks associated with the movement (Coffey Geosciences, 2000).

As noted in Section 3.1.2, the sandy gravel, and glacio-fluvial gravel sub surface layers of the soil profile have erosive potential. When constructing batters in these materials batter slopes of 1.5:1 (H:V), or flatter are recommended.

Development of the site will need to consider the possible landslip potential on steeper areas of the site and the potential for erosion of the quartzite soils when exposed, or destabilised.

Limited activity has been undertaken on-site, with the exception of localised quarrying, so there has been limited potential for contamination of soil, or water, on-site. No obvious site contamination has been noted during site inspections.

3.9 Visual

The site is situated on top of a low ridge within State forest, and has been partially modified in several areas by quarrying activities and associated vehicle tracks. An upgraded road formation visible in Plate 1 was constructed in early 2000. No readily accessible vantage points are situated within the vicinity of the site (ie. on public

roads, accessible by vehicles). Access to the area is possible only along the Weld Road.

Architecture of the site will be developed to ensure buildings have similar visual elements. Choice of building and roof colours will be made to minimise contrast with the surrounding vegetation.

Large areas such as processing yards and product storage spaces have the potential to appear visually intrusive due to the white gravel that naturally occurs in the area. (Figure 2). Existing native vegetation will be retained to the maximum extent possible in development of the site. Where the site is disturbed and vegetation buffers can be established, these will be undertaken in accordance with the landscape master plan for the site (see Chapter 5).

After flowing through relatively flat areas of the Arve Plains, the Huon River enters steeper country about ½ km west of the site. The section of river that flows around the site is generally in steeply banked terrain. The buffer areas around the site mean that the tree line at the top of the banks will not be disturbed.

The only feature of the site that may become visible from the Huon River is the top few metres of the Power Station stack. For the most part, river users in the vicinity of the Wood Centre will experience a natural riparian forest buffer on the steep banks adjacent to the Wood Centre and will pass under the new bridge.

Potential areas that may overlook the site are described below see Figure 10.

Top of Barn Back

There is a FT road near the top of Barn Back ridge, but it is not frequented by the public. From this perspective (looking south - south east) the site will be most visible with the Sawmill visible on the lower level and the Power Station, Wood Fibre Mill and Merchandising Yard on the upper level.

Section (200 m) of Bermuda Road

A view of the site looking west is gained from a 200 m section of this road. However regrowth of trees in the felled coupe beside the road will block this view within five years.

Hartz Mountain looking North

This view from Hartz Mountain looking north already overlooks human activities. The Wood Centre buildings are unlikely to be distinguishable due to the distance (over 15km) and elevation of the viewing point.

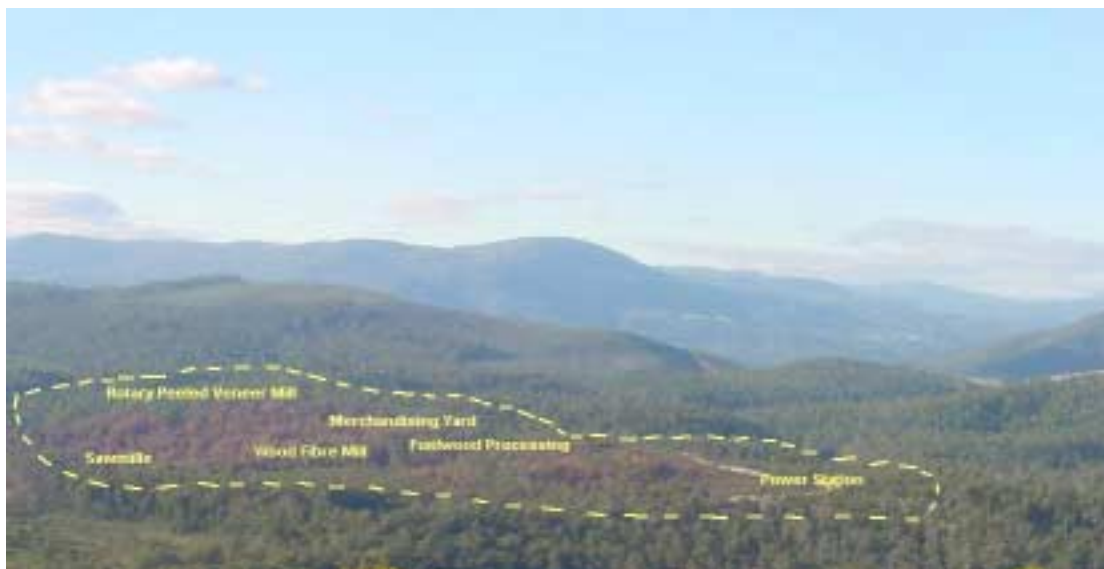
Figure 10 Potential Vantage Points in the Vicinity



Edwards Road (now bypassed)

This is a FT road on the south bank of the Huon River. Whale Point on the road overlooks the site from about a 100 m elevation differential and a distance of 1km (Plate 1). A new lower level connection link has been recently constructed, so it is unlikely that public traffic will continue to use the upper link. The key site elements that will be seen include the Power Station and main entrance. None of the other site buildings are likely to be highly visible from this view due to the natural vegetation that will be retained around them.

Plate 1 View from Edwards Road



Views from the Huon River

River users in the vicinity of the proposed Wood Centre will experience a natural riparian forest buffer adjacent to the Wood Centre. Depending on the height of the Power Station stack relative to the tree heights, the stack is the only component of the Wood Centre that may be visible from the river. The river users will pass under the new bridge that crosses the Huon River adjacent to the Wood Centre and there is potential for this becoming a new access point for river users.

In general, public viewing areas of the site are limited.

Tahune Forest Reserve

As mentioned in Chapter 2, the Tahune Forest Airwalk tourism development is located approximately nine kilometres upstream of the proposed Wood Centre. There is no direct line of sight from the reserve to the Wood Centre and the access road (Arve Road from Geeveston) does not have viewpoints to the Wood Centre.

CHAPTER 4 TRANSPORT AND ROADS

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4. TRANSPORT AND ROADS

4.1 Introduction

The objective of the Wood Centre is to value-add to the timber close to source and within State forest. The effect of the Wood Centre on transport of wood products in Southern Tasmania will be to substantially reduce the total number of vehicle movements. The assessment of the transport related impacts of the Wood Centre development are described in this chapter substantiate this outcome. The chapter has been structured as follows:

4.1.1 Projected Transport of Wood without the Wood Centre

This section describes the projected transportation of wood from the Southern Forests, which will occur without the Wood Centre development. Refer to Figure 11. It also describes the current transport vehicles used.

4.1.2 Transport During Construction of the Wood Centre

This section describes the proposed transport operation during construction, its potential impacts and the proposed mitigation measures.

4.1.3 Transport of Raw Material to the Wood Centre

This section describes the transport arrangements proposed for the Wood Centre for the transport of raw material to the site. Potential impacts of the proposed arrangement are presented followed by mitigation measures.

4.1.4 Transport of Product from the Wood Centre

This section describes the proposed transport of finished product from the site. In terms of the transport of finished product from the Wood Centre, the following aspects are considered:

- Alternative forms of transport and transport vehicles;
- Alternative transport routes are considered for each product including sawlogs, sawn timber, veneer and wood fibre for local and export markets; and
- Potential impacts and mitigation measurements to address issues of the social costs of transport, vehicle numbers, noise, vibration, dust, vehicular emissions, safety; and monitoring.

4.1.5 Summary and Conclusions

This section provides a brief summary of each of the above aspects of the transport assessment.

The roads discussed in this chapter are shown in Figure 12.

4.2 Projected Transportation of Wood without the Wood Centre

4.2.1 Introduction

This section describes the projected transportation of wood from the Southern Forests that will occur without the Wood Centre development. State Forests are managed in accordance with the Regional Forest Agreement and harvesting and replanting of the forest is undertaken in accordance with the Huon District Forest Management Plan and Forest Practices Plans as outlined in Chapter 2 and Appendix O. A 10-year tactical plan is used for forest management and estimates of wood harvested can be derived from this plan. By combining the harvesting schedule with road network data (FT Most Economic Haul Route Estimator), a projection of traffic flows on various roads in the district has been undertaken.

This analysis assumes that sawlogs will be transported to various sawmills and that pulpwood will continue to flow to Triabunna (Figure 13). The analysis undertaken applies only to wood from State Forest. Private forest wood analysis is mainly pulpwood and as such, the volumes produced on a year-to-year basis cannot be accurately determined. It is likely however, that private forest pulpwood will be approximately half the volume as State Forest pulpwood. Further, as a significant investment into plantation establishment on private land has occurred with many plantations being managed on pulpwood rotations, volumes beyond year 10 from private forests may increase.

Logs are carried on a combination of High Productivity Vehicles (HPVs) and conventional log jinkers. HPV have a payload of about 44 tonnes while log jinkers have payloads of about 28 tonnes.

4.2.2 Transport Routes

South of Geeveston, all the timber flows to the Huon Highway. Most of the timber then moves north along Scotts Road, bypassing Geeveston. From the forest blocks located around Geeveston, most of the timber moves along the Arve Road to the Huon Highway at Geeveston. Timber from the forest blocks north of the Huon River moves along Glen Huon Road to join the Huon Highway at Huonville. All of the vehicles currently have to negotiate Macquarie Street on their way to Triabunna or to sawmills in the northern suburbs and Davey Street on the way back.

Road ownership for non-Forestry Tasmania roads, projected average annual tonnages and annual log truck movements and annual log truck movements from 2001 to 2008 without establishment of the Wood Centre are shown in Table 21. The log truck movements per day on these roads for the same time period and without the establishment of the Wood Centre are shown in Figure 11.

4.2.3 Vehicle Movements

The average transport distance to Triabunna is 175km. Movement of timber to sawmills is an average distance of 80km. Assuming that on average the loads are 33 tonnes the number of vehicle movements required to move the volume of wood to Triabunna and to local sawmills each year is shown in Table 21. A vehicle movement for this report is defined as either an inward or outward journey. Thus a load of timber transported to a customer comprises two vehicle movements, a load vehicle movement to the customer and an unload movement back.

Table 21 Road Ownership of Principal Non-Forestry Tasmania Roads Used for Log Carting, Annual Tonnages and Truck Movements

Road	Owner/ Manager	Annual tonnage	Annual Log Truck Movem'ts	Log Truck Movem'ts per day
Huon Hwy south of Geeveston (sealed)	DIER	245,000	14,850	50
Arve Road (5km) (sealed)	Huon Valley Council	170,000	10,300	34
Huon Hwy Geeveston to Huonville (sealed)	DIER	415,000	25,150	84
Denison Road / Lonnvale Road (15km) (gravel)	Huon Valley Council	98,000	5,940	20
Glen Huon Road (sealed)	DIER	98,000	5,940	20
Huon Highway Huonville (sealed)	DIER	513,000	31,090	104

Truck movements occur on a 24 hour basis, normally 6, but at times 7 days a week.

Figure 11 Estimated Vehicle (Log Truck) Movements Per Day (vmpd) without the Wood Centre

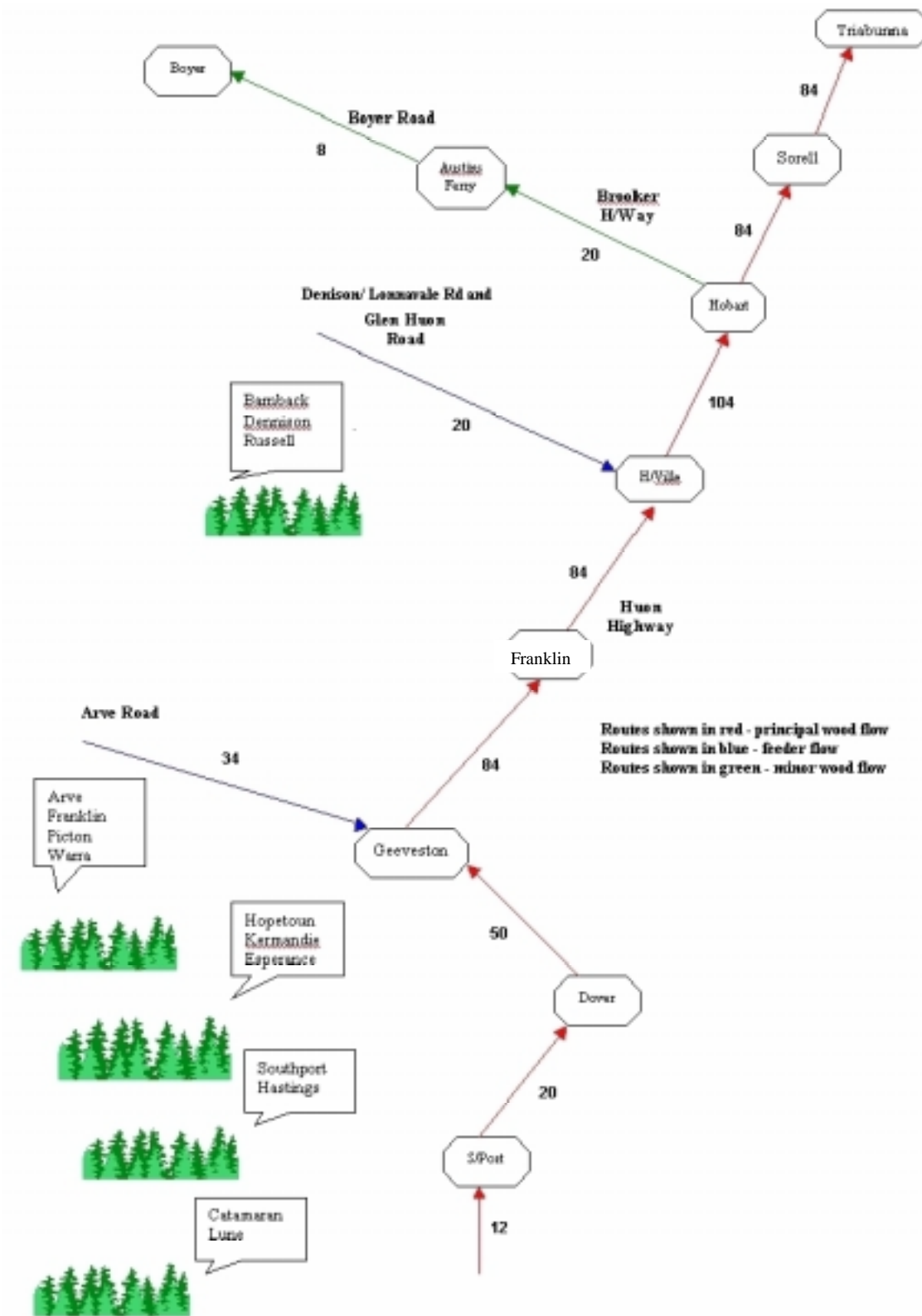


Figure 12 Road Names and Ownership

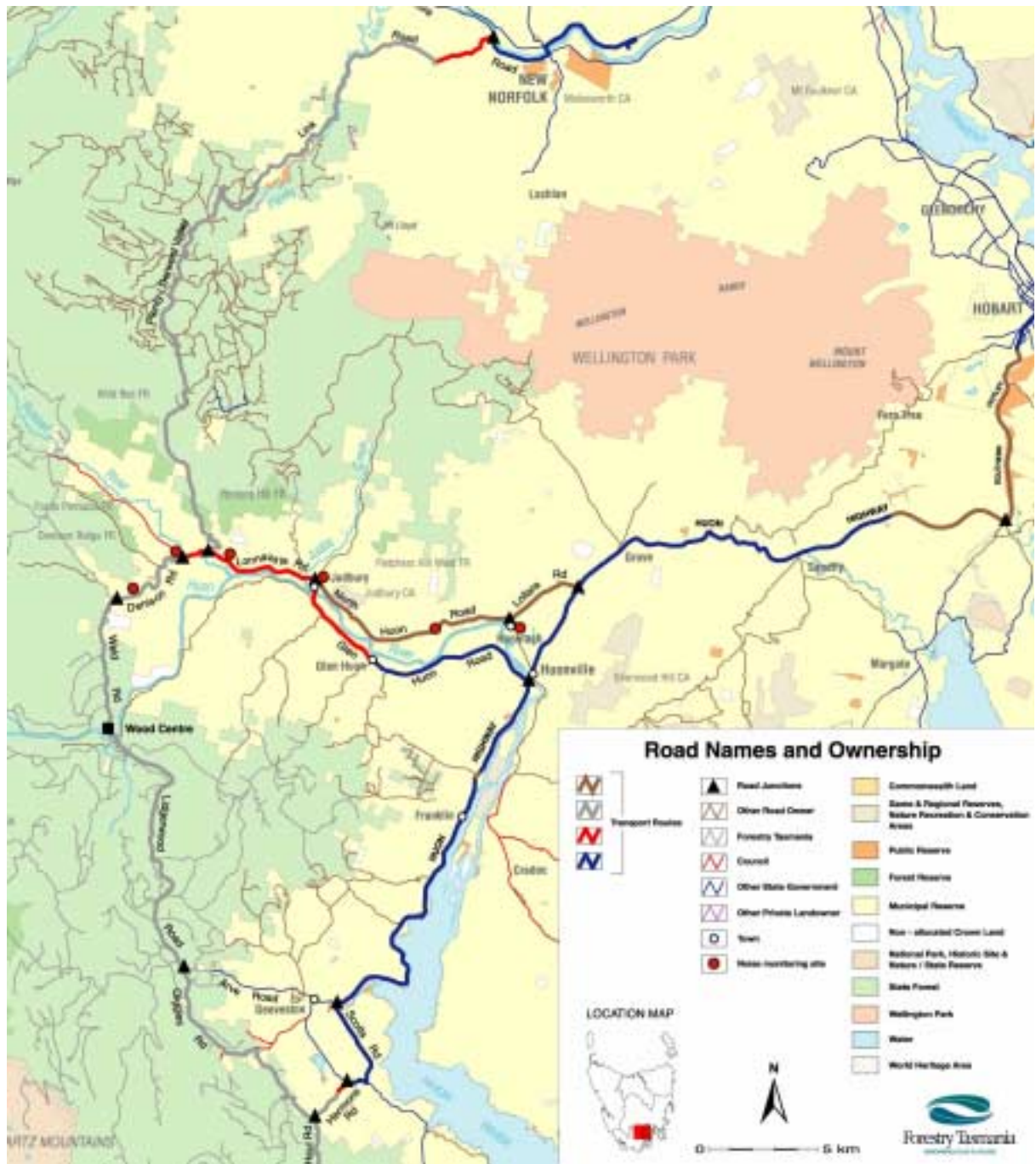
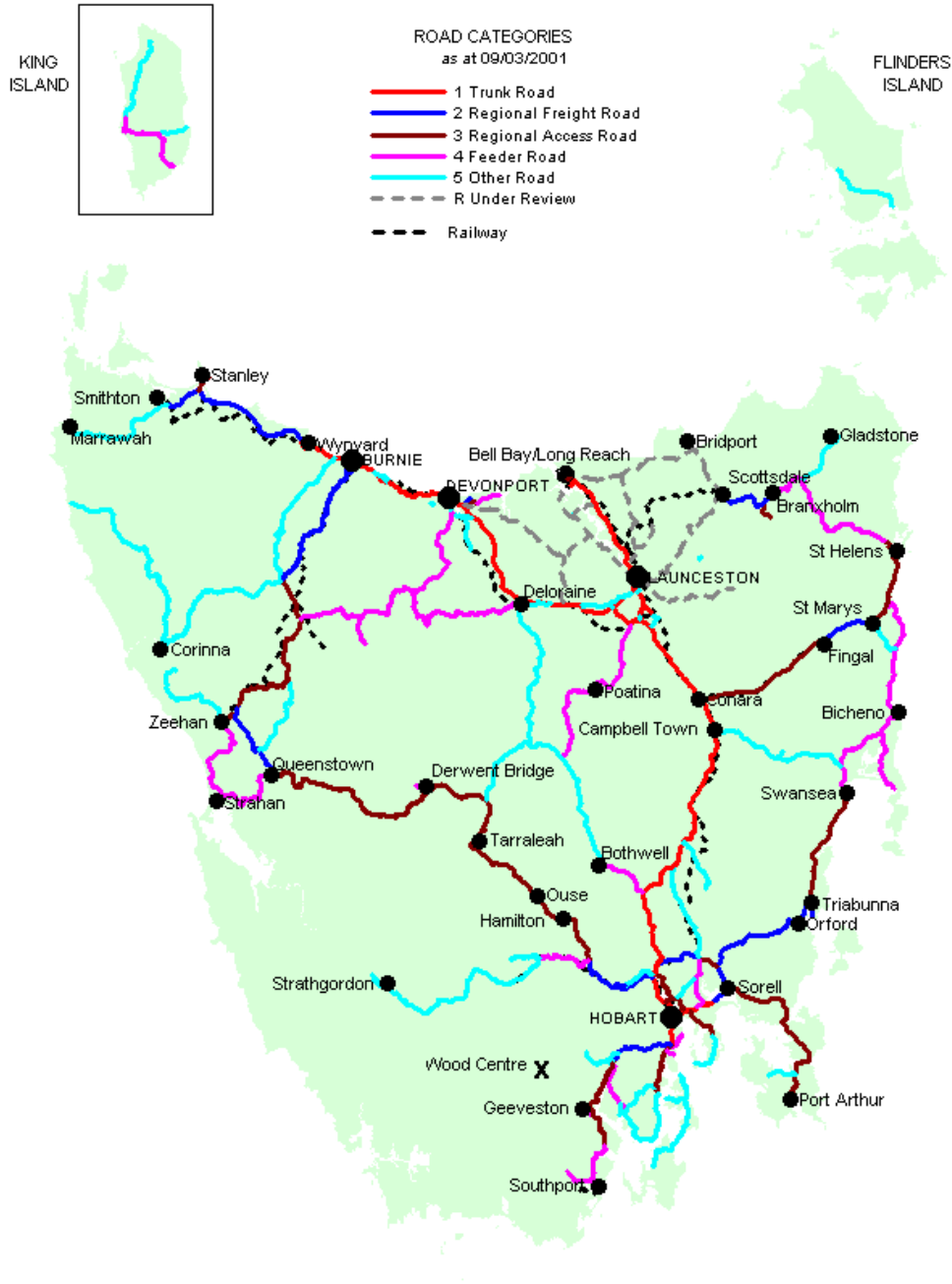


Figure 13 Regional Map showing Triabunna and Bell Bay



4.3 Transport During Construction of the Wood Centre

4.3.1 *Proposed Transport Operation*

During the construction phase, log traffic will continue along the routes as listed in Table 21 and Figure 11. Construction traffic will therefore be additional to the existing traffic patterns for heavy vehicles.

The intention is that all developments will occur almost simultaneously. The overall construction timeframe will be between 12 and 15 months.

The labour force during construction is expected to peak at 200 personnel on site about 7 months after commencement and taper down from that point. However, during the commissioning phase of the development, from month 10 onwards, training of the operating labour force will commence and, it is expected that this ramp up of labour force will counter-balance the run-down of the construction work force.

Construction will be undertaken by a prime contractor with local subcontractors providing the various trades required. The greatest level of traffic movement will be labour force vehicles. Consideration is being given to establishing temporary site accommodation for part of the labour force, but the impact of such an approach on traffic is likely to be small as movement of traffic from the site after hours will still occur.

Two peaks in heavy vehicle traffic are anticipated. The first will occur about 3 months after the start of construction when concrete and structural materials are moved to the site. The peak is likely to be for a period of about two months. The second peak will occur at about 8 months after the start of construction when processing equipment is moved to the site. This second period is likely to comprise several over-dimensional vehicles with road escorts.

4.3.2 *Potential Impacts*

Construction traffic will access the site both from Huonville along Glen Huon Road, North Huon Road and Denison Road and from Geeveston along the Arve and Lidgerwood Roads.

Estimated vehicle movements for the North Huon Road and Arve Road/Lidgerwood Road are shown in Table 22. Each movement is a single leg of the journey either to or from the site.

Table 22 Changes in Traffic Volume – Associated with Construction Activities

Vehicle Type	North Huon Road			Arve Road / Lidgerwood Road
	Current Road Traffic Volume (AAWT)*	Additional number of vehicles**	% Increase	Additional vehicles
Trucks	66	15	23	10
Cars	384	50	13	30
Total	450	65	14	40

* Annual Average Weekday Traffic

** Assumes 50 % of vehicles use the Glen Huon Road

Currently there is a load limit on North Huon Road. Loaded log trucks turn off at Judbury and use Glen Huon Road. Occasionally, log trucks return empty along North Huon Road.

The increase in truck traffic along the North Huon Road during construction is estimated to be 23%, with a 13 % increase for cars and a 14% increase overall.

There are no existing vehicle movement numbers available for the Arve Road / Lidgerwood Road. However, this is a Forestry Tasmania road, so the increase in construction traffic will have minimal impact on the community and other road users.

Traffic changes associated with construction of the proposed Wood Centre are likely to have an impact on vertebrate fauna along the feeder road (Mallick 2001, Appendix H).

4.3.3 Mitigation Measures

The potential impacts of construction traffic are similar to those identified for the operational phase of the development, however, the potential impacts of the construction traffic are only for a limited period of time. These impacts will include noise, vibration, dust, vehicular emissions, an potential impact on safety, stormwater contamination and vertebrate fauna.

The construction traffic volumes are considerably lower than for the operational phase, and so any potential impacts will be proportionally less.

The potential impacts of traffic during the operational phase and the proposed mitigation measures to be implemented are described in detail in Section 4.5. The mitigation measures that will be implemented for the construction phase have been identified in this section and summarised below.

- Construction traffic will generally be restricted to daylight hours¹;
- Speed restrictions for construction traffic will be imposed in sensitive areas²;
- Drivers will be given training with respect to operation on sensitive sections of the route during construction³;
- Erosion control measures detailed in the Forest Practices Code will be implemented during the construction program⁴; and
- A preliminary survey of habitats along the road to delineate any ‘hotspots’ where vertebrate roadkills are likely to be high and/or where a threatened species or species of conservation significance is at an increased risk of roadkill will be undertaken⁵. Where such hotspots are identified, measures will be applied to ameliorate the putative increased risk of roadkills. Such measures may include culverts for movement of wildlife, education of drivers regarding roadkill hotspots, reduced traffic speed through ‘danger’ zones (particularly at night), and signage to warn drivers of wildlife on road. Consultation will be held with the Director of Environmental Management on the outcomes of the survey.

It is considered that with these measures in place, and due to the limited duration of the construction program, the overall impact will be minor.

4.4 Transport of Raw Material to the Wood Centre

The raw material for the Wood Centre will comprise the current wood that is harvested from State Forest in the Huon District and forest residues that have traditionally been burnt on the forest floor post harvesting in preparation for regeneration of the forest.

4.4.1 Proposed Transport Operation

The proposed location of the Wood Centre has been selected to lower the amount of log movement through most townships in the Huon Valley. Logs for the Wood

¹ Commitment: Construction traffic will generally be restricted to daylight hours.

² Commitment: Speed restrictions for construction traffic will be imposed in sensitive areas.

³ Commitment: Drivers will be given training with respect to operation on sensitive sections of the route during construction.

⁴ Commitment: Erosion control measures detailed in the Forest Practices Code will be implemented during the construction program.

⁵ Commitment: Conduct preliminary survey to identify vertebrate roadkill ‘hotspots’ prior to construction and apply appropriate mitigative measures where necessary.

Centre will be sourced principally from State Forest, but private industry wood is also likely to be sourced. Average haulage distances from the forest to the Wood Centre are about 38 km.

The establishment of the Wood Centre will see a basic redirection of State Forest wood. Generally, it is expected that there will be a significant reduction of wood flowing on public roads. Wood from South of Geeveston will flow to the Wood Centre either via the Huon Highway or via the high level Haul Road. Forestry Tasmania is committed to developing a practical bypass to Geeveston for wood flow north to the Wood Centre along the Huon Highway. Wood north of Geeveston will flow to Lidgerwood and Arve Roads and from there to the Wood Centre.

North of the Wood Centre, wood will flow along the new link road from the Derwent Valley and Denison Road.

The wood flow along non-Forestry Tasmania roads following construction of the Wood Centre is shown in Table 23 and Figure 14. Table 23 is a comparison of existing log truck traffic on non-Forestry Tasmania roads to log truck traffic after the commissioning of the Wood Centre. Figure 14 illustrates the log truck movements along the individual routes once the Wood Centre is operating and reflects the figures in column 6 of Table 23.

Table 23 Comparison of Log cartage flows on non-Forestry Tasmania roads with and without the Wood Centre

Road	Owner/ Manager	Annual tonnage	Annual Log truck Movem'ts	Log Truck Movem'ts per day (without the Wood Centre) ⁴	Log Truck Movem'ts per day (with the Wood Centre)	% increase on current
Huon Hwy south of Geeveston (sealed)	DIER	266,000	16,121 ¹	50	54	+6 %
Arve Road (5km) (sealed)	Huon Valley Council	0	0	34	0	-100%
Huon Hwy Geeveston to Huonville	DIER	160,000	4800 ²	84	32	-62%
Denison Road	Huon Valley Council	283,000	12,860 ³	20	42	116%
Glen Huon Road	DIER	0	0	20	0	-100%
Huon Highway (nth of Huonville)	DIER	195,000	5400 ³	104	36	-65%

1. Two way movements with 33 tonnes per truck.

2. Two way movements with 33 tonnes per truck.

3. Two way movements with a mixture of 28 tonnes and 44 tonnes per truck.

4. From Table 21

The principal addition to the current transport movements is the extraction of forest residues. About 300 thousand tonnes of this forest residue is to be carted to the wood centre for electricity generation, the average transport distance is about 30 km. The addition of the wood residue cartage has been made to the figures shown in Table 23 above.

The Wood Centre will cause major changes to the flow of wood from the Southern Forests as described. For example, log trucks which currently cart wood from State Forest along the Huon Highway between Geeveston and Hobart, will comprise only those trucks carting mature pulpwood and some sawlogs directly from forest landings. (Figure 14).

There will be fewer truck and car interactions, fewer log jinkers on public roads, lowering both the visual impact and the potential for material loss during transport.

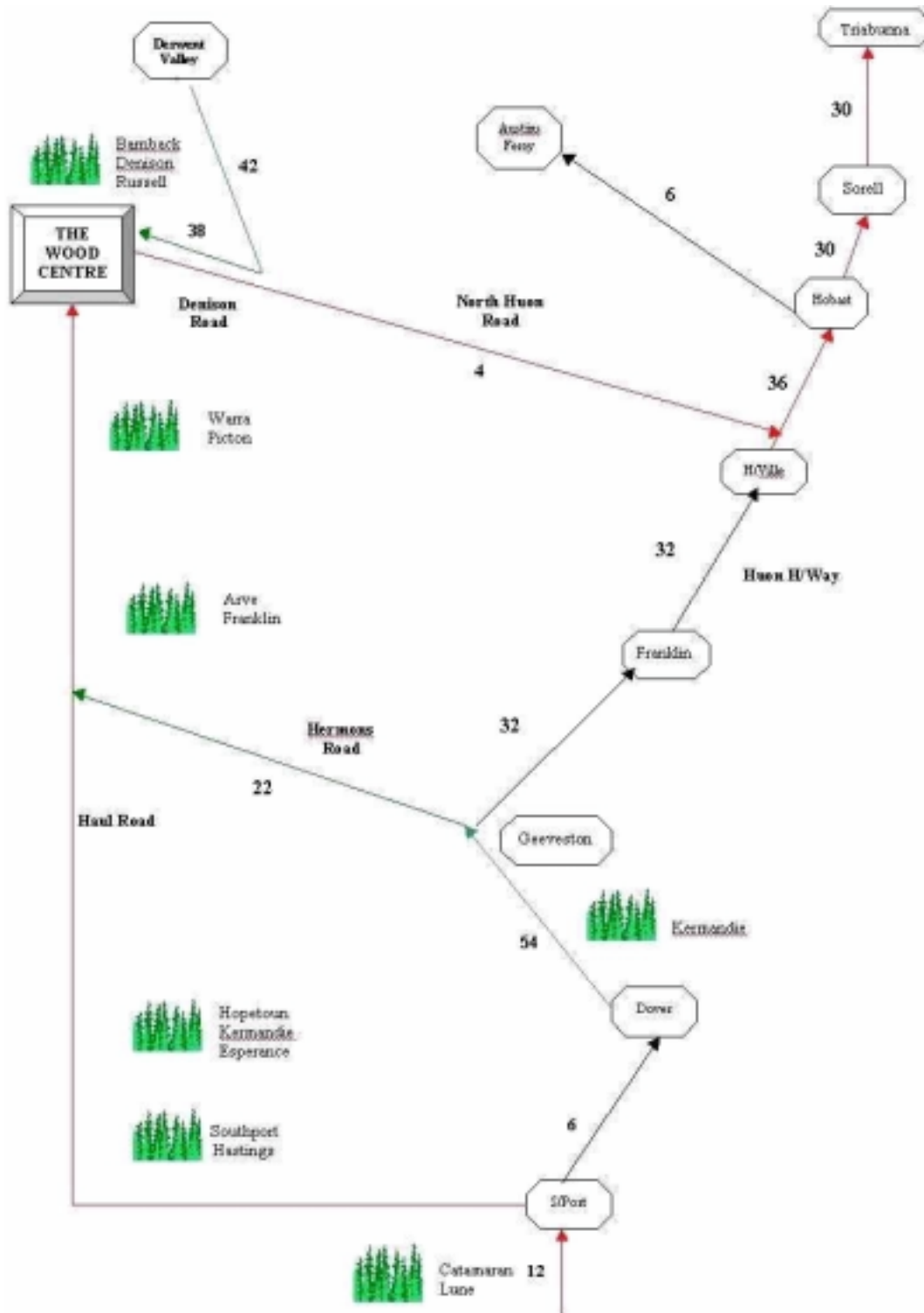
4.4.2 Potential Impacts

The key potential impacts are noise, vibration, dust, vehicular emissions, safety and vertebrate roadkill.

However, as detailed in Section 4.4.1 the development of the Wood Centre will result in raw materials being delivered to the site largely on Forestry Tasmania roads. As such, there is a substantial benefit, in terms of road maintenance and safety issues on public roads, arising from the development of the Wood Centre. The only roads on which there will be a significant increase in traffic is the Denison Road and the Derwent Valley link. The latter section of road is owned by Forestry Tasmania, and is not a public road.

For the other roads as traffic numbers will not increase, there are no adverse potential environmental impacts associated with the transport of raw materials to the site, so they will not be considered further.

Figure 14 Estimated Vehicle (Log Truck) Movements Per Day (vmpd) with the Wood Centre on Non Forestry Tasmania Roads



4.4.3 *Mitigation Measures*

The Denison Road has recently been extensively upgraded to a design standard for 2000 vpd well in excess of the vehicle movements specified. Denison Road is an important connection to Snowy Range Trout Farm, an increasingly visited tourist destination. The upgrading of the road makes access to the Trout Farm easier for visitor, reducing travel time and increasing safety compared with the current route.

There is only one residence within sight distance of the road. However, there is considered to be little likelihood of impact, as in the vicinity of the house the road is relatively flat so noise should not be an issue. If dust is an issue then sealing of a section of road sufficient to eliminate the dust hazard will be undertaken.⁶

As discussed in Section 4.3.3, vertebrate roadkill hotspots will be surveyed prior to commencement of construction and mitigative measures will be applied. In addition, regular (weekly) monitoring of roadkills will be conducted during the first two years of the Wood Centre operation⁷. A central database set up to record the species and location of all roadkills will be developed. The job of monitoring will be delegated to specified Wood Centre staff members who traverse the road regularly. Once identified and recorded, roadkills should be removed from the road to avoid scavenging by other animals and recounting of the roadkill during subsequent surveys. The on-going monitoring of roadkills may identify subsequent hotspots where roadkills are an ongoing problem. Once identified, these new hotspots will be considered for remedial actions, as discussed in Section 4.3.3.

4.5 **Transport of Product from the Wood Centre**

4.5.1 *Introduction*

The material transported from the site in tonnes per year will consist of:

- Export Wood fibre (300,000 tpa);
- Locally-used Wood fibre (40,000 tpa);
- Sawlogs and sawn timber (64,000 tpa); and
- Rotary Peeled Veneer (57,000 tpa).

⁶Commitment: Seal those road sections where dust is a problem to residents on sections of Denison Road.

⁷ Commitment: Monitor road kill on Weld and Denison Road during first 2 years operation.

The greatest volume of material to be moved from the site will be export wood fibre, comprising approximately 24 loads (48 truck movements) a day, 6 days per week if high productivity vehicles (HPV) are used. The hours of product transport operation will preferably be 24 hours per day to minimise traffic density and maximise utilisation of the truck fleet.

However, voluntary curfews to suit sensitive times such as school bus times will be observed and enforced through central scheduling of truck movements.

Work is continuing with the local residents to determine all of the factors that need to be addressed in respect of truck operations. Discussions with residents may lead to further voluntary curfews being adopted. An on-going dialogue through the Community Consultative Committee will ensure that impacts are actively reviewed and further mitigation actions taken.⁸

4.5.2 Alternative Forms of Transport and Transport Vehicles

Sawlogs, sawn timber and veneer will be transported from the Wood Centre using conventional road transport. Alternative forms of transport have only been considered for export wood fibre, as this is the bulk of the product to be transported. This export wood fibre, is generated from wood that is unsuitable for higher value adding. While initially wood fibre is destined for export, the longer-term intention is that other value-adding processes such as medium-density fibre board or oriented-strand board processing facilities will be established on the site that will use the fibre produced.

Rail

Rail has been considered as an option from the Wood Centre site to Huonville with loading to road transport at Huonville.

The maximum slope that a freight train can readily negotiate without traction assistance is 3% (3 m vertical in 100 m horizontal). The terrain in the Huon Valley is characterised by steep hills forming a divide between the Wood Centre site and Huonville or the Derwent Valley and between Huonville and Hobart. Rail is relatively expensive to develop with costs for a link between Smithton and Wiltshire on relatively flat land estimated at about \$900,000 per km, not including acquisition of land for a rail corridor.

The only practical link to Huonville requires the rail to follow the course of the Huon River. This would entail laying about 30km of rail and some major river crossings including the Little Denison River, Russell River and Judds Creek. With a total cost in excess of \$27 million this method cannot be supported on economic grounds. Rail to Hobart or the Derwent Valley is similarly impractical.

⁸ Commitment: Truck operating times will be reviewed and amended with the Community Consultative Committee.

Airship

The use of a heavy lift airship was investigated as an airship has the capacity to eliminate many of the impacts on people. Construction of a vessel with a lift of 160 tonnes is being undertaken in Germany at present. Indications are that such a vessel will cost in excess of \$US 40 million. In addition to the costs of the airship, a docking station will be required at each end of the transit. The requirement to return the airship to the site in ballast means that large volumes of water will be transported to the site. Disposal of this water at the site will prove problematic. Also, prevailing winds and bad weather may further impact on viability.

The overall cost of this method of transport particularly due to the capital costs indicates that it cannot be sustained on economic grounds. However, this should be reviewed periodically.

Road

The only practical form of transport for products from the site is by road. A detailed description of the vehicles to be used is provided in Section 4.5.3, and the alternative road routes considered are provided in Section 4.5.4.

4.5.3 Current and Proposed Transport Vehicles

The current truck fleet is of variable age and with a variety of engine, braking and suspension configurations. The typical specifications for vehicles currently operating in the Southern Forests are shown in Table 24.

Table 24 Specifications for Transport configurations presently used

Components	Specifications
Log Trucks	
Engine	470 HP
Engine retard braking system	360 HP
Suspension system	Rigid spring
Gross Vehicle Mass	41 tonnes
Tare	13 tonnes
Payload	28 tonnes
Triaxle jinker trailer	Rigid spring
Unit Length	19 metres
Unit Height	4.3 metres
High Productivity Log Trucks	
Engine	470 HP
Engine retard braking system	360 HP
Suspension system	Air suspension
Gross Vehicle Mass	68 tonnes
Tare	24 tonnes
Payload	44 tonnes
B Double Truck	Air suspension
Unit Length	25 metres
Unit Height	4.3 metres

Modern vehicles can use more advanced designs including electro-magnetic braking and “road friendly” (air-bag) suspension that contributes to lower noise, lower road maintenance and safer truck operation. The vehicles and indicative specifications that will be used to move wood products on and off the Wood Centre are identified in Table 25.

Table 25 Indicative Vehicle Specifications for Proposed Development

Vehicle	Component	Specification
Finished Product Cartage	Engine	550HP
	Electro-magnetic braking system	400HP
	Suspension system	Air suspension and Central inflation
	Gross Vehicle Mass	68 tonnes
	Tare	23 tonnes
	Payload	45 tonnes
	B Double Truck	Air suspension
	Unit Length	25 metres
	Unit Height	4.3 metres
	Log Cartage	Engine
Engine retard braking system		360 HP
Suspension system		Rigid springs
Gross Vehicle Mass		41 tonnes
Tare		13 tonnes
Payload		28 tonnes
Triaxle jinker trailer		Rigid Springs
Unit Length		21 metres
Unit Height		4.3 metres

Table 25 demonstrates that the finished products leaving the Wood Centre will be carted by more powerful, longer vehicle trailers with improved electro-magnetic retard braking systems and air bag suspension. The proposed truck tractor for log cartage has additional wheels that will disperse weight, thereby decreasing compaction pressure on the ground and reducing vibration. Furthermore, gross trailer mass allowance on air suspension trailers is 22.5 tonnes per axle group as opposed to 20 tonnes per axle group on spring suspension trailers. There is thus an incentive to operate air suspension trailers as opposed to spring suspension variants. In addition, the greater mass allowance means that there are less vehicle movements required for a given wood load, with the consequent reduction in environmental impact. A description of the mitigation measures associated with commitments to be implemented in terms of vehicles is provided in Section 4.5.5. An illustrative comparison of a log truck currently used for log transport and a High Productive Vehicle proposed for wood fibre transport is shown in Figure 15.

4.5.4 *Alternative Transport Routes Considered*

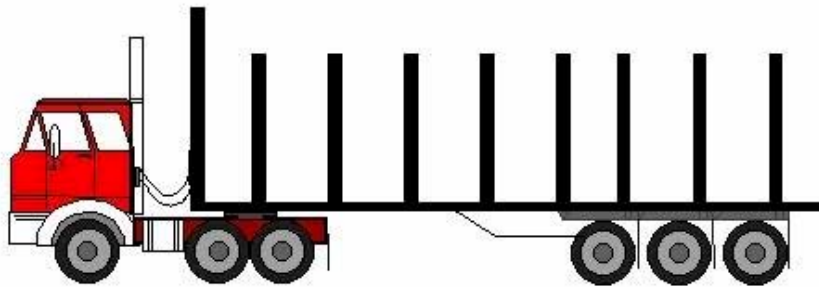
Transport of product from the site requires a safe corridor that is suitable for the task. Traffic is a contentious issue in rural communities particularly where large changes in heavy traffic patterns occur. The potential destinations of the various products from the Wood Centre are summarised in Table 26 below and discussed in the following section. Refer to Figure 13 to locate the potential destinations.

Transporting finished product from processor to end-user is a cost that needs to be minimised to ensure that market competitiveness is maintained. Apart from local wood fibre all of the other products from the wood centre (sawlogs, sawn timber and veneer) are likely to move to Hobart irrespective of the final destination of the export wood fibre.

Table 26 Destination of products from the Wood Centre

Product	Potential destination	Transport Mode
Sawlogs	Hobart	Road
Sawn Timber	Hobart	Road
Veneer	Hobart	Road
	Bell Bay via Hobart or Derwent Valley	Road / Rail
Local Wood Fibre	Boyer	Road
Export Wood Fibre	Bell Bay via Hobart or via Derwent Valley	Road / Rail
	Triabunna via Hobart or via Derwent Valley	Road

Figure 15 Comparison of a Log Truck and B-Double Truck (HPV) Configuration



Articulated Log Truck Configuration	
Maximum Height	4.3 Metres
Maximum Width	2.5 Metres
Maximum Length	19 Metres
Gross Combination Mass	32 to 34 tons
Average Payload	28 to 30 tons



Tri - Tri B Double Configuration	
Maximum Height	4.3 Metres
Maximum Width	2.5 Metres
Maximum Length	Up to 25 Metres
Gross Combination Mass	Up to 62.5 tons
Average Payload	35 to 42 tons

- Bigger payload = less truck movements
- Enclosed bin = safer transportation
- Improved technology = better braking and suspension as well as a quieter haul

Sawlogs, Sawn Timber and Veneer

A summary of the transport route options for sawlogs, sawn timber and veneer, including their advantages and disadvantages is provided in Table 27

Table 27 Consideration of Transport Route Options – Sawlogs, Sawn Timber and Veneer

Route	Advantages	Disadvantages
Wood Centre – Judbury/Ranelagh – Hobart (65 km)	Shortest distance; Route has best alignment; Impacts on the lowest number of properties	New communities impacted along the route; Cost of road upgrades
Wood Centre – Glen Huon – Huonville – Hobart (70 km)	State road network from Judbury; Existing heavy vehicle usage	New communities impacted along the route; Costs for upgrading the route are higher than for North Huon Road
Wood Centre – Geeveston – Huonville – Hobart (88 km)	Communities traditionally impacted by heavy traffic.	Increased haul distance; Huon Highway south of Huonville not of a high standard Cost of upgrading the route
Wood Centre – New Norfolk – Hobart (95km)	Communities traditionally impacted by heavy traffic	Longest distance Route has significant climb – likely to be unpassable on some winter days Highest cost of upgrading

A comparison of the above route options has identified the Wood Centre – Judbury/Ranelagh – Hobart as the preferred route. The main advantages of this route are as follows:

- Shortest travel distance;
- Lower fuel usage;
- Lower road maintenance costs;

- Existing road alignment requires lowest level of upgrading; and
- Route when upgraded will provide improved access for the community.

The preferred route is the Wood Centre to Lonnvale Road along the Weld Road and an upgraded section of Denison Road. From there it will flow down the North Huon Road (11km). A new road link in Ranelagh (Plate 2) was proposed through community consultation. The route will continue to the Huon Highway (4.8km) via Marguerite Street and Lollara Road. Marguerite street is a short part of Lollara Road through Ranelagh and is not indicated as separate from Lollara Road in Figure 12. The route will follow the Huon Highway to the Southern Outlet and proceed to Hobart by Macquarie Street. The return journey will use Davey Street to the Southern Outlet and then along the same route as outlined above.

The community consultation process undertaken to identify the preferred route through Ranelagh is described under “Wood-Fibre Export” below.

Plate 2 Ranelagh Route



A brief description of the transport system for each of these products (sawlogs, sawn timber and veneer) and the estimated truck movements is provided below.

Sawlogs

Sawlogs that have not been sold directly from the harvesting operation will be “warehoused” on the Wood Centre site at various times of the year.

The variable nature of the sawlog market and general harvesting conditions in the forest means, that at some times of the year a log over supply occurs with logs stored at the landings in the forest, while at other times demand outstrips production. With many landings in operation at one time, control of stock has been difficult and the time lag in responding to the market can be as long as 6 weeks. Centralising the excess sawlogs will result in improved lead times and increased flexibility based on market demand. Most of these logs are used by sawmills in Hobart, so movement from the Wood Centre to Hobart will occur on an as-demanded basis

The estimated average volumes of sawlogs to be moved are shown in Table 28. Two different truck movement rates have been estimated, one using conventional single trailer articulated trucks (28 tonne payload) and the second using high productivity vehicles (44 tonne payload)

Table 28 Future Movement of Sawlogs to Sawmills in Hobart

Vehicle	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	Avg Vehicle Movements per day
Log Trucks	44000	28 or	1571 or	10 or
		44	1000	6

An assessment of the increase in vehicle numbers (including sawlog transport) is provided for all products from the Wood Centre in Section 4.5.5.

The preferred vehicle configuration is a high productivity vehicle, but it is likely that the delivery demand from the sawmills will require a combination of HPV and conventional log trucks to be used depending on the load requirements of the customer.

Sawn Timber

Sawn timber is expected to be dried on site prior to dispatch. The estimated average amount of timber to be moved is shown in Table 29 below. Two different truck movement rates have been estimated one using conventional single trailer articulated trucks (28 tonne payload) and the second using high productivity vehicles (44 tonne payload).

Table 29 Future Movement of Sawn timber to Hobart

Vehicle	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	Avg Vehicle Movements per day
Articulated truck	20000	28 or	714 or	5 or
		44	454	3

An assessment of the increase in vehicle numbers (including sawn timber transport) is provided for all products from the Wood Centre in Section 4.5.5.

Veneer

The estimated average amount of veneer to be moved is shown in Table 30 below. Veneer will be moved in standard shipping-container-sized packs to Hobart. The veneer will be warehoused at the export port so a near uniform transport rate will be maintained. Two different truck movement rates have been estimated one using conventional single trailer articulated trucks (28 tonne payload) and the second using high productivity vehicles (44 tonne payload).

Table 30 Future Movement of Veneer to Hobart

Vehicle	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	Avg Vehicle Movements per day
Articulated truck	57000	28 or	2036 or	14 or
		44	1295	8

An assessment of the increase in vehicle numbers (including veneer transport) is provided for all products from the Wood Centre in Section 4.5.5.

Wood Fibre – Local

Locally used wood fibre to Boyer will flow over the upgraded link road to the Derwent Valley. The total distance to Boyer is 68 km, with the road network in the Derwent Valley already used extensively by log trucks operating for Norske Skog.

The estimated average amount of wood fibre for local processing to be moved is shown in Table 31 below. Wood fibre will be moved on trailers specifically designed to hold the fibre and prevent escape of wind-blown fines during transit. The trailer design will ensure that noise due to flexing of the trailer is minimised. Trailers will be provided with air-bag suspension systems. This wood fibre will be moved to Boyer using the Denison Road, Lonnvale Road and the link road to the Derwent Valley. Two different truck movement rates have been estimated one using conventional single trailer articulated trucks (28 tonne payload) and the second using high productivity vehicles (44 tonne payload).

Table 31 Future Movement of Wood Fibre to Boyer

Vehicle	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	Avg Vehicle Movements per day
Articulated truck	40000	28 or	1428 or	10 or
		44	909	6

An assessment of the increase in vehicle numbers (including local wood fibre) is provided for all products from the Wood Centre in Section 4.5.5.

Wood Fibre – Export

The main transport options considered for Wood Fibre Export are shown in Figure 16 and discussed below.

Option 1: North Huon Road

If the wood fibre is destined for Triabunna, or Bell Bay via Hobart, the trucks will remain on the Huon Highway to the Southern Outlet, and from there they will move down Macquarie Street and along the Tasman Highway to Triabunna or through the planned multi-modal terminal at Macquarie Point. Another alternative route to Triabunna is to use the Brooker Highway and Midlands Highway to Brighton before linking to the high productivity vehicle route through Tea Tree to the East Coast Highway. In each case, the road network will experience a greater decrease in the number of log trucks using the road than the vehicles moving product (at least 5% fewer vehicle movements), so there will be no increase in heavy vehicle traffic.

In addition, there are some sensitive areas along the route, which would be impacted by increased traffic movements. A preliminary survey has identified 15 houses along Lonnavale Road/North Huon Road. There are 31 houses along Lollara Road.

Option 2: Plenty/Derwent Valley Link Road

An alternative route for export wood fibre is to follow the link road into the Derwent Valley along the Plenty Valley Road and be transferred to rail for Bell Bay or continue to Triabunna. This route is not considered a preferred route due to the topography and alignment of the road. While the southern end of the road has been built to a high standard, to allow access to the Plenty Block of State Forest, the balance of the road owned by Norske Skog and Derwent Valley Council will only receive minor upgrading, which is occurring independently of the proposed development. At the northern end of the road, the land is very steep and the width of the road is restricted by the topography. DIER has conducted a safety audit of the road on behalf of Forestry Tasmania, the report is provided as an appendix within Appendix Q. The report identifies many concerns with safety if the route were to be a public road (i.e. intermingling of trucks and private vehicles), a management protocol is being developed to control public access.

The additional traffic generated on the Plenty Valley Road, Glenora Road and Boyer Road would represent a significant increase in heavy vehicle traffic movement. Including Norske Skog traffic this would amount to about 60 heavy vehicle movements a day.

There are a number of areas along the route, which would be impacted by increased traffic movements. A preliminary survey has identified 56 houses along Glenora Road within five metres of the road alignment and one school. Along the Plenty/Derwent Valley Link Road there are 16 houses (14 approximately 20 metres from the road alignment and two within less than two metres).

If the export wood fibre is to go by road to Triabunna, it would follow the highway through New Norfolk to Bridgewater and then through Brighton to the East Coast. This part of the route is currently declared a high productivity vehicle route. The overall costs of accessing Triabunna by this route are much greater than using Option 1.

If the wood fibre is to go to Long Reach, a transfer of wood fibre from road to rail will be required either at Boyer or at a new siding at Plenty. This would be achieved by use of a truck dump into a hopper and then a conveyor to fill dedicated wagons. Tasrail has indicated it does not currently have the rolling stock to accommodate the wood fibre transport task. Further, because the wagons will be of a specialised nature, the return journey will be undertaken with empty wagons. At Long Reach a wagon dump would be required to unload the train, and wood fibre would be stockpiled for export at the current facilities.

This route may be used for some products that need to access northern ports, in which case the number of vehicle movements would increase by about 24 per day.

Option 3: Lanes Link Road to Karanja

Lanes Link Road leaves the link road to the Derwent Valley and descends into the Styx Valley and continues to Karanja. The whole of the route is in State Forest so there are no houses close to the road. At Karanja, a transfer from road to rail will be undertaken. The Derwent Valley line is open to Karanja but will require significant strengthening of culverts to allow fully-laden freight wagon to safely use the line. This route will potentially allow some flexibility both for product from the Wood Centre and for other timber hauling tasks around Karanja.

Option 4: Geeveston

The final alternative route to export wood fibre is to follow the Forestry Tasmania Roads to Hermons Road then on to Scotts Road and the Huon Highway and the Southern Outlet from there they will move down Macquarie Street and along the Tasman Highway to Triabunna. As is the case with Option 1, the road network will experience a greater decrease in the number of log trucks using the road than the vehicles moving product so there will be no increase in heavy vehicle traffic.

A summary of the transport route options for export wood fibre, including their advantages and disadvantages is provided in Table 32.

Table 32 Consideration of Transport Route Options – Wood Fibre

Route	Advantages	Disadvantages
Option 1: North Huon Road	Several communities already impacted by heavy traffic; Lowest total economic cost.	Traffic impacts on Ranelagh and Judbury; Initial Capital Cost.
Option 2: Plenty/Derwent Valley Link Road	Several communities already impacted by heavy traffic; Will limit impacts in Judbury/Ranelagh.	Increased cartage costs; Increased impacts on residents at Feilton and along Glenora Road; Steep climbs along road; Significant capital costs for road upgrades.
Option 3: Lanes Link Road to Karanja	Lowest impact on people along roads	Some traffic will need to flow to Hobart (sawlogs, veneer and sawn timber); Steep climbs along road; Significant capital costs for road and rail upgrades
Option 4: Geeveston	Via Scotts Road will limit impacts in Judbury/Ranelagh.	Cost of road upgrades; Traffic impacts will continue along Huon Highway.

Based on the above comparison, the preferred road transport option for export wood is from the Wood Centre via Judbury and Ranelagh to the Huon Highway to Hobart and then to Triabunna (Option 1). Some product bound for northern ports will potentially use Option 2 and/or Option 3 routes. These routes will be used to the extent feasible and will be dependent on customer and commercial agreements with the road operators.

Figure 17 shows the impact of product traffic on the various options.

Figure 16 Transport Route Options for Products

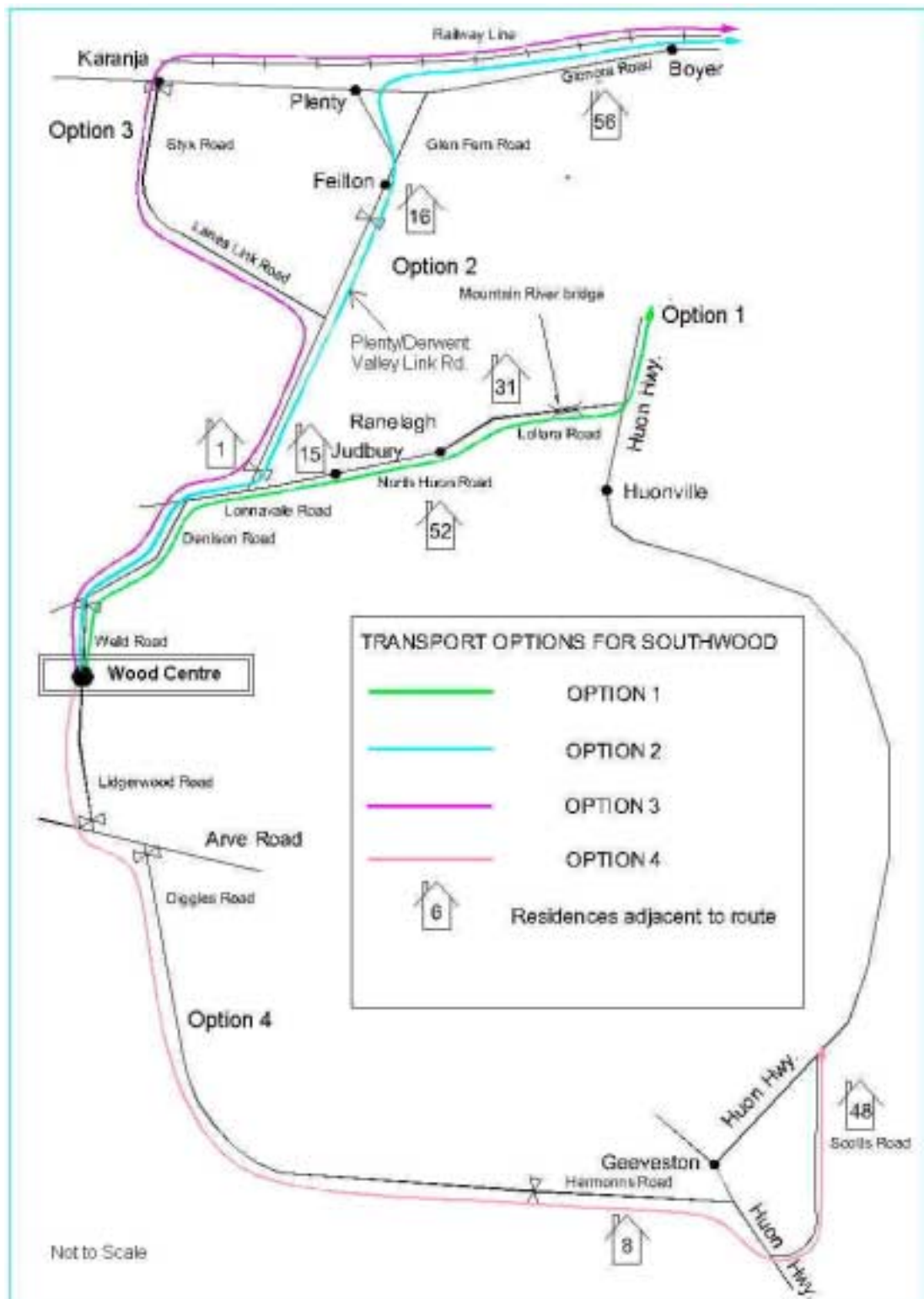
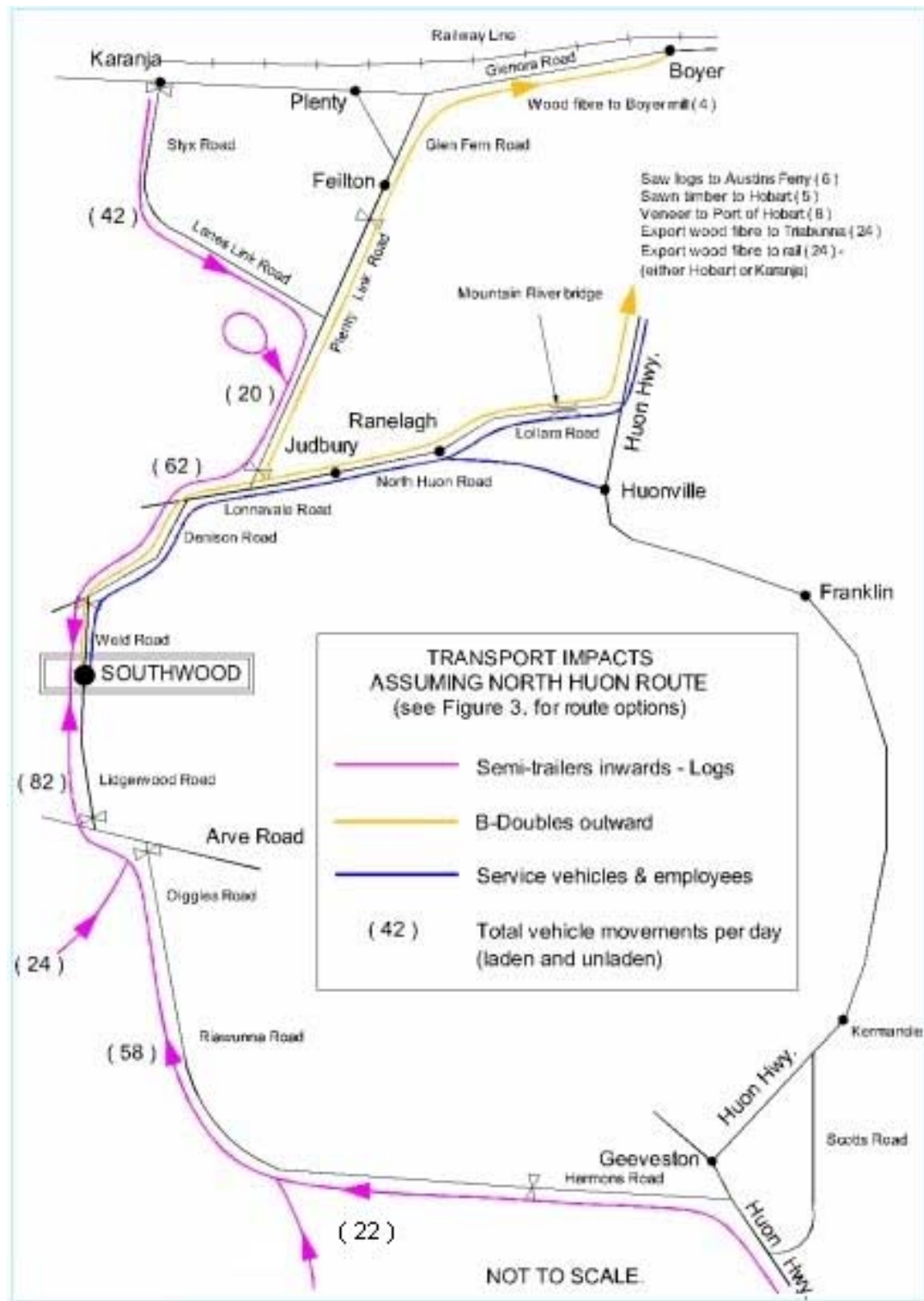


Figure 17 Product Transport Impacts on Various Routes



Community Consultation

A value management workshop to discuss route options within the Huon Valley municipal area has been conducted as described in Chapter 2. The resultant report is provided in Appendix P. The workshop came to the conclusion, although not unanimous, that North Huon Road was a preferable route to Glen Huon Road. It requested that the options for bypassing or travelling through Ranelagh be further developed and discussed with the community. A general view was that the Lollara Road intersection was preferred to the Glen Road intersection for entry to the Highway, but the selection would depend on the final route option chosen through Ranelagh.

A follow up workshop was conducted with the Value Management Workshop participants to finalise route options through Ranelagh. The Workshop agreed that an extension of North Huon Road through the existing playground and vacant land to Ranelagh Street and then along Marguerite Street / Lollara Road (Plate 2) to the Huon Highway was the preferred option.

More extensive discussions are planned with people along the route to define the work required to balance traffic impacts and community needs. This work will continue during the next few months.

The average amount of wood fibre for export per year to be moved is shown in Table 33 below. Wood fibre will be moved on trailers specifically designed to hold the fibre and prevent escape of wind-blown fines during transit. The trailer design will ensure that noise due to flexing of the trailer is minimised. Trailers will be provided with air-bag suspension systems. Two different truck movement rates have been estimated one using conventional single trailer articulated trucks (28 tonne payload) and the second using high productivity vehicles (44 tonne payload).

Table 33 Future Movement of Export Wood Fibre

Vehicle	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	Avg Vehicle Movements per day
Articulated truck	300000	28 or	10714 or	68 or
		40	7500	48

An assessment of the increase in vehicle numbers (including export wood fibre) is provided for all products from the Wood Centre in Section 4.5.5.

Export wood fibre is planned to be moved by HPV so that traffic density is reduced. But, this decision is subject to final consultation with the community on the issue.

Road Upgrading

The existing conditions of the roads to be utilised along the preferred transport route is summarised in Table 34.

Table 34 Existing Road Condition along the Preferred Transport Route

Existing Road	Road Condition
Weld Rd.	Gravel road currently being upgraded Owned by FT
Denison Rd between Weld Rd intersection and Lonnvale intersection	Gravel road in poor condition currently being upgraded by FT Gravel road in reasonable condition Single lane timber bridge (poor condition) being replaced as part of upgrade Owned by Huon Valley Council
Lonnvale Rd. from Lonnvale intersection to Judbury	Gravel road in good condition and about 3km sealed road. Single lane timber bridges(2) (1 good 1 closed) Owned by Huon Valley Council
North Huon Rd from Judbury to Ranelagh	Gravel and sealed sections Single lane timber bridge (poor) Owned by Huon Valley Council
New section to Ranelagh St, Marguerite St and Lollara Rd to the Huon Highway.	New section about 0.25km to be built, playground to be relocated Sealed roads Various sections owned by HVC others managed by DIER Single lane steel truss bridge on Lollara Road (poor condition, replace with new dual lane bridge)
Huon Hwy	Sealed highway Managed by DIER.

Road modifications are required to ensure suitability for safe operation of HPVs and other heavy trucks and to mitigate additional noise caused by the road traffic. A detailed assessment of the preferred transport route has been undertaken to identify the road upgrading required to meet the safe operating requirements (Indec, 2001, Appendix Q).

The road upgrading will include the following works:

- Realignment of the Denison Road (complete);
- Works on Lonnvale Road from Lonnvale intersection to Judbury;
- Minor works along North Huon Road involving:
 - Widening of the seal and realignment and sealing of some sections;
 - Construction of road shoulders; and
 - Rebuilding of bridge over Salters Creek.
- Construction of new section of road in Ranelagh;
- Widening of pavement and construction of shoulders on Lollara Road; and
- Replacement of the bridge on Lollara Road.

Agreements to cover the cost of the road upgrades on Council owned roads will be negotiated with the Huon Valley Council. Some of the upgrading work described above (e.g. the Forestry Tasmania section of the Denison Road) is already completed. The other upgrading works described above will be undertaken prior to the commencement of the transport of product from the Wood Centre⁹. The standard planning and development application process (advertisement etc.) will be followed for the construction of any new road¹⁰.

4.5.5 Potential Impacts and Mitigation Measures

The potential impacts from road transport include:

- Indirect costs;
- Vehicle Numbers;
- Noise;
- Vibration;

⁹ Commitment: Ensure that upgrading work to meet the operating requirements of all road users is completed before production commences as the Wood Centre.

¹⁰ Commitment: Standard planning and development application process will be followed for any new road construction.

- Dust;
- Vehicle Emissions;
- Safety;
- Social and cultural impacts;
- Stormwater contamination; and
- Increased roadkill.

The impacts and proposed mitigation from each of these sources are discussed below.

Indirect Costs of Transport

In order to provide some quantification of the indirect costs of the various road transport alternatives an assessment of the costs has been undertaken.

INDEC (2000) Appendix S has provided estimates of cost of the impact of traffic movement on public roads as follows:

1.5 cents per trip km	for environmental noise *
8.7 cents per trip km	for greenhouse emissions **
10.8 cents per trip km	for local air pollution *
0.9 cents per trip km	for water pollution **
33.7 cents per trip km	for road construction and maintenance ***
5.1 cents per trip km	for road accidents ***

*Luk and Thoresen 1996 modified by INDEC to account only for trucks

**MOT NZ 1996 modified by INDEC to account only for trucks

***INDEC 2000 estimate to account only for trucks

These figures have been used to estimate the annual cost for existing operations, and compares these to those based on the operation of the Wood Centre. These estimates of costs are provided in Table 35. The figures provide an indicative value. Using the same figures on the same route allows a useful basis for comparison. Rather than placing reliance on the absolute value of the indirect costs derived, it is better to compare the relativities between the figures that are derived in the analysis.

The “without the Wood Centre” column represents the costs arising from the existing operations. The sum of the costs to deliver wood to the Wood Centre and products to

their preferred destinations is shown in the preferred destination column. The sum of the costs to deliver wood to the Wood Centre and the products to their “non-preferred destinations” is shown in the non-preferred destination column.

Table 35 Indirect Cost of transport with and without the Wood Centre

Year	Without the Wood Centre	Preferred destinations		Non – preferred destination (worst case)	
		Std	HPV	Std	HPV
Average Annual Cost	\$3,467,000	\$1,951,000	\$1,241,600	\$2,621,300	\$1,797,500

This table illustrates the major advantages that the Wood Centre option has compared to the current transport methods. The preferred destinations using HPV transport represents an annual estimated indirect cost saving of 60% compared to current transport methods.

The costs for non-preferred destinations are higher as the road distances are significantly greater. However, even in the worst case scenario the cost savings are significant when compared to the existing operations. This is therefore considered to be a positive impact.

Vehicle Numbers

Current

In the following discussion current vehicle numbers have been measured in terms of Annual Average Weekday Traffic (AAWT) and Annual Average Daily Traffic (AADT). In general, the AADT will be lower than the AAWT as traffic volumes are higher during the weekdays. When comparing the proposed transport movements with the existing situation the vehicle movements per day (vmpd) have been used for ease of comparison.

Traffic patterns on public roads will significantly change as a result of the proposed development as described in Section 4.4.1 above.

On roads leading from the Wood Centre current “Annual Average Weekday Traffic” (AAWT) seasonally adjusted road traffic volumes, as estimated by DIER, are shown in Table 36.

Table 36 Current Total Road Traffic Volumes - East of Wood Centre

(Seasonally adjusted annual average weekday traffic count information to and from the site)

AAWT	Denison Rd. (vpd)	North Huon Rd. (vpd)	Lollara Road ⁶ (vpd)	Huon Hwy (vpd) ¹
Whole day				
All traffic	N/A	450 ²	1040	6,183
Trucks only	N/A	60	47	650
Morning Peak ³ (2 way)				
All traffic	N/A	43	N/A	516
Trucks only ⁴	N/A	N/A	N/A	N/A
Evening Peak ⁵ (2 way)				
All traffic	N/A	52	N/A	583
Trucks only	N/A	N/A	N/A	N/A

1. Truck and peak traffic volumes factored up from 1993 counts.
2. Another traffic volume count in July 2000 indicated 430 vehicles in total and 52 trucks.
3. Morning peak is 0800 to 0900
4. Trucks defined as any vehicle with more than 3.2 metres between the 1st and 2nd axles or with twin steer axles (ie. AUSTRROADS 1994 Classification).
4. Evening peak is 1700 to 1800.
5. Annual Average Daily Traffic

NA=not available

Hourly traffic volumes are only available for the Huon Highway and North Huon Road and are shown in Figure 16.

These traffic distributions are relatively typical for rural roads as they show reasonably steady usage throughout the 0800 to 1800 period, compared with urban roads that would show more pronounced morning and afternoon peaks. The graphs also show that there is almost no truck movement before 0700 or after 1800.

Proposed

The projected future vehicle movements as a result of the Wood Centre operations are shown in Table 37. These vehicle movements have been calculated using the numbers in Tables 28, 29, 30 31 and 33.

Table 37 Future Vehicle Movements

(Transport information is to and from the Wood Centre)

Vehicle	Truck Transport Route	Tonnes Transported per Annum	Truck Capacity (Tonnes)	No of Return Trips per Annum	Vehicle Movements per day
HPVs to Triabunna	North Huon Rd / Lollara Rd / Huon Hwy	300,000	40	7,500	48
HPVs to Boyer	Derwent Valley Link Rd	40,000	40	1,000	6
Saw-log, veneer etc trucks to Hobart	North Huon Rd / Lollara Rd / Huon Hwy	121,000	44	2750	18
Employee Mini-buses, service vehicles, staff cars and visitors					50
Total		461,000		13,249	126

As there will be a relatively even flow of wood fibre and other vehicles from the Wood Centre throughout the day, the increase in truck numbers is expected to be relatively constant (but potentially peaking at 6-7 vehicles per hour) throughout the day (24 hours).

The estimated changes in road traffic volumes as a result of the development on each section of road between the Wood Centre and the Huon Highway are shown in Table 38 and Figure 19.

Figure 18 Current Road Traffic Volumes (AAWT)

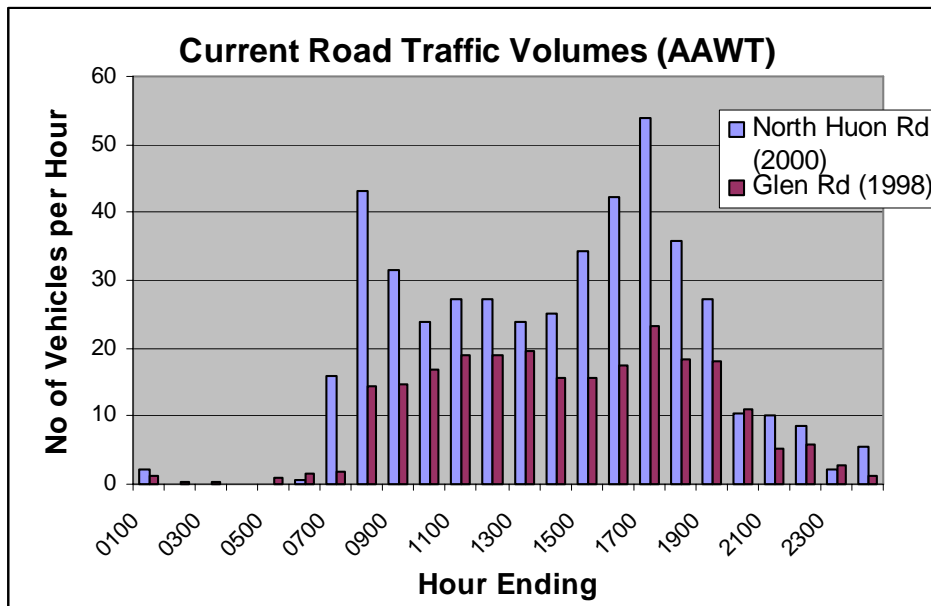
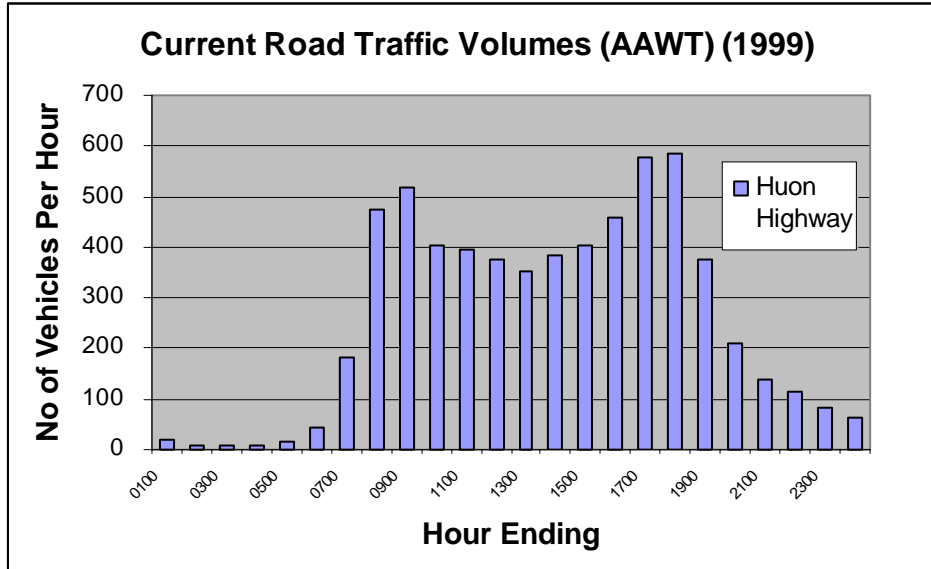
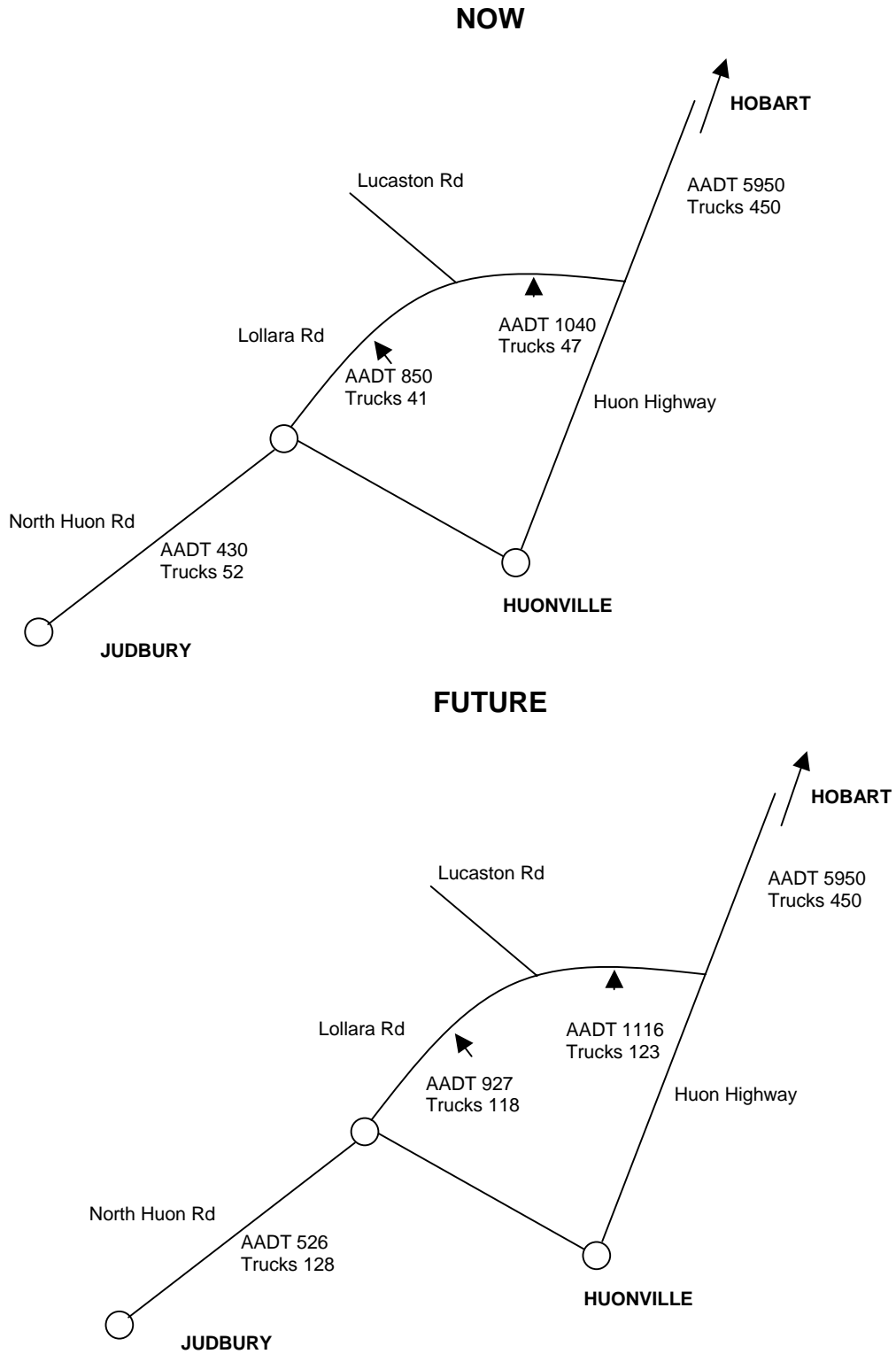


Figure 19 Comparative Traffic Flow on Preferred Route



Based on AADT: Annual Average Daily Traffic, DIER.

Table 38 Changes in Road Traffic Volumes (refer also to Figure 19)

Transport Route		Existing vmpd ¹	Additional vmpd as a result of Wood Centre	Future vmpd	% Increase on Existing Flows
North Huon Road	All traffic	430	96 ²	526	23
	Truck	52	76 ³	128	148
Lollara Road	All traffic	1,040	76 ⁴	1116	7
	Truck	47	76	123	164
Huon Hwy	All traffic	5,950	0 ⁵	5950	0
	Truck	450	0	450	0

1. DIER Annual Average Daily Traffic.
2. Assuming 50% of employee vehicles use Glen Huon Road.
3. Wood Fibre (export), sawlogs, veneer, sawn timber and large service vehicles.
4. Assuming no employee vehicles use Lollara Road
5. The increase in wood product vehicles is balanced by the decrease in log trucks.

An allowance for trucks servicing the Wood Centre as well as trucks moving product from the Wood Centre has been made in this analysis. The net result is that there will not be a change in truck movements north of Lollara Road turnoff on the Huon Highway.

It should be noted in Figure 19, that it is intended to use minibuses where possible to transport employees to the Wood Centre. This will reduce the light vehicle movements to and from the site. Shift changes will generally be at 6.30 am, 3.30pm and 11.30 pm.

DIER has assessed that North Huon Rd, with the exception of the Salters Creek Bridge, is suitable for HPV use (see Appendix Q). Reported accidents for the past five years are 7, none of which involved a heavy vehicle, this may be due to the load limit on Salters Creek Bridge.” (See Appendix Q)

It is estimated that Huon Highway, which is a State road, would have a capacity of 10-15,000 vehicles per day (vpd), considerably greater than the volume that it currently carries. Huon Highway has already been assessed by DIER as being suitable for HPV use (see Appendix Q).

As can be seen from Table 38, the operation of the Wood Centre will result in a significant increase in truck traffic along the North Huon Road and Lollara Road sections of the proposed transport route.

However, given the road upgrading program to be undertaken (described in section 4.5.4) to cater for the increased traffic flow and the wide ranging mitigation measures for noise, safety, vehicles and driver safety (described below), these increases are considered acceptable.

There will be no significant change in traffic flows along the Huon Highway the increase in truck traffic from the Wood Centre will be balanced by a corresponding decrease in log truck traffic.

As noted above, the extensive community consultation program already undertaken, will be continued to ensure community needs in terms of acceptable traffic impacts, are met.

Noise

Potential Impacts

The acceptability or otherwise of changes in noise levels tends to be subjective, and depends on factors such as:

- The level and nature of the current noise sources;
- The extent of the increase in the noise level over the current ambient level;
- Whether new noise sources are of an intermittent or a continuous nature;
- The pitch of the noise source; and
- The environment in which the new noise source is introduced (eg residential, industrial, etc).

Current Average Noise Levels

Day-time Noise Levels

Current average day-time noise levels were measured at a number of locations along the route from the Wood Centre to the Huon Highway. The results were as follows. The locations of the noise monitoring sites are shown on Figure 12.

Table 39 Measured Noise levels

Location	Date	Time	15 minutes dB(A)		
			L ₁₀	L ₉₀	L _{eq}
Denison Rd, 9.4km from Judbury	26/8/00	1830	39.8	36.5	38.3
Lonnvale Rd. /Denison Rd intersection	26/8/00	1900	58.3	54.0	56.3
Lonnvale Rd/Williscroft Rd	26/8/00	1745	42.0	32.3	47.4
Judbury Shop (15m from intersection)	26/8/00	1655	49.8	39.5	47.7
Judbury Shop (15m from intersection)	26/8/00	1710	53.3	39.0	50.9
North Huon Rd/Roockwood Rd (44m)	26/8/00	1545	47.8	40.0	47.5
Agnes St/Glen Rd (15m from intersection in Ranelagh)	26/8/00	1504	59.3	48.0	55.3

Further daytime (3 hour) noise measurements were made at Ranelagh on Thursday 21/12/00 and Wednesday 31/1/01. The results of these measurements and the equivalent 18 hour noise level estimated from these measurements are provided in Table 40

Table 40 Daytime Noise Level Measurement Results

Location	Date	Time	Mean dB(A)			
			L ₁₀ (3 hr)	L ₉₀ (3 hr)	L _{eq}	L ₁₀ (18 hr) ¹¹
Ranelagh (cnr North Huon Rd /Agnes St)	21/12/00	1000 -1300	56.7	42.0	53.6	55.7
Ranelagh (cnr North Huon Rd /Agnes St)	31/1/01	1300 -1600	58.4	38.8	57.2	57.4

Notes:

L₁₀ is the noise level that is exceeded for 10% of the time (eg if L₁₀ = 41 db(A) when measured over 10 minutes, then for 1.0 minute noise level would have been 41 db(A) or more).

Similarly, L₉₀ is the noise level that is exceeded for 90% of the time (eg if L₉₀ = 41 db(A) when measured over 10 minutes, then for 9 minutes noise level would have been 41 db(A) or more). L₉₀ is therefore a good descriptor of the background noise level.

L_{eq} is the equivalent "A" weighted noise level. For example, if L_{eq} = 38.8 db(A), then that noise level has the same acoustic energy as a steady noise of 38.8 db(A).

¹¹ Calculated by Pearu Terts, Noise Consultant

Night-time Noise Levels

Night-time noise measurements (two 15 minute samples and one 30 minute sample) were made at Ranelagh on 4 July 2001. The results of these measurements are provided in Table 41.

Additional night-time noise measurements were undertaken on Glen road in 1997. The results of these measurements have also been included in Table 41 to provide additional information on night-time noise levels in the Ranelagh area.

Table 41 Night-time Noise Level Measurement Results

Location	Date	Time	dB(A)			
			L1	L10	L90	Leq
Playground-Ranelagh	4/7/01	0053-0108	52.8	31.3	26.5	40.5
	4/7/01	0115-0130	32.3	29.0	26.3	27.5
	4/7/01	0140-0210	49.3	35.0	27.0	36.6
Glen Road (approx. 275m from Huon Hwy.)	22/7/97	2220-2250	53	46	29	46
	23/7/97	2225-2255	54	48	30	46
	23/7/97	0650-0720	57	51	42	49
	24/7/97	0520-0550	52	42	28	39
North Glen Road (near 61 North Glen Rd.)	23/7/97	2331-0001	50	44	31	40
	24/7/97	0650-0720	55	50	38	47

Notes:

L₁₀ is the noise level that is exceeded for 10% of the time (eg if L₁₀ = 41 db(A) when measured over 10 minutes, then for 1.0 minute noise level would have been 41 db(A) or more).

Similarly, L₉₀ is the noise level that is exceeded for 90% of the time (eg if L₉₀ = 41 db(A) when measured over 10 minutes, then for 9 minutes noise level would have been 41 db(A) or more). L₉₀ is therefore a good descriptor of the background noise level.

L_{eq} is the equivalent "A" weighted noise level. For example, if L_{eq} = 27.5 db(A), then that noise level has the same acoustic energy as a steady noise of 27.5 db(A).

The locations of the noise monitoring sites are shown in Figure 12.

The results from the Ranelagh playground vary from Leq 27.5 dB(A) with no traffic, Leq 36.6 dB(A) with a nearby log truck and Leq 40.5 dB(A) with a passing car.

Terts (2001) (Appendix N) reports the results of a number of noise surveys and analyses undertaken in rural areas of Tasmania over the past eighteen years. These results indicate night-time background noise levels of a mean of L₉₀ 32.3 dB(A) with a range (one standard deviation) from L₉₀ 26.6 dB(A) to L₉₀ 38 dB(A).

The results from the Ranelagh area reported above fall within this range and confirm the rural nature of the area in terms of background noise levels.

It should be noted that when assessing the noise impact of road traffic, it is the maximum noise levels generated, the increase in noise above the ambient noise level and the number of noise events, which all influence sleep disturbance (EPA 1999).

The assessment of noise impact from truck traffic is described in detail in Terts (2001)(Appendix N) and is summarised below.

Calculated Noise Levels from Truck Traffic

The level of noise from passing road traffic builds up to a peak and then falls away again. For noise assessment purposes it is useful to translate this transient "Sound Exposure Level" (SEL) noise energy into an equivalent Leq noise level value.

Using this approach, the SEL of a number log trucks operating at about 60 kph (which is the maximum speed likely to be achieved past residential areas along the traffic route) was measured in an open area, 15 metres from the trucks.

The average SEL was found to be 83.6 dB(A).

The proposal is for a wood fibre truck traffic flow of 48 movements per day. This means that there will be 48 truck movements in 24 hours, or an average of 2 truck movements per hour. However, truck arrivals and departures may not occur at regular intervals but are likely, on occasions, to be clustered. For example, there may be periods, such as school bus travel times, where truck traffic is restricted.

The equivalent 'A' weighted 1 hour sound level due to the wood fibre trucks can be determined as follows:

$$L_{eq} (1 h) = 10 \log [n \times 10^{SEL/10}] + 10 \log (1/T)$$

where n = number of trucks per hour

SEL = sound exposure level at 15 m = 83.6 dB(A)

T = time = 60 x 60 = 3600 seconds

therefore $L_{eq} (1 h) = 10 \log [2 \times 10^{8.36}] + 10 \log (1/3600)$
 $= 51.0 \text{ dB(A)}$

In addition to the wood fibre trucks, there will be 28 truck movements carrying other timber products between 0700 h and 1600 h. That is, 28 truck movements in 9 hours or 3.11 truck/hour. Therefore, the total trucks/hour between 0700h and 1600h will be $2 + 3.11 = 5.11$. The equivalent 'A' weighted 1 hour sound level due to both the wood fibre and timber product trucks can be determined as follows:

$$L_{eq} (1 h) = 10 \log [5.111 \times 10^{8.36}] + 10 \log (1/3600)$$
$$= 90.68 - 35.56$$
$$= 55.1 \text{ dB(A)}$$

Therefore, over a 24 hour period, the equivalent noise level due to the trucks consists of:

- 9 hours where $L_{eq} = 55.1 \text{ dB(A)}$; and
- 15 hours where $L_{eq} = 51.0 \text{ dB(A)}$.

Therefore, $L_{eq} (24 h) = 53 \text{ dB(A)}$.

For continuous traffic, empirical noise studies have shown the following relationship between L10(18 h) and Leq (24 h);

$$L10(18h) = Leq(24h) + 3.5$$

Therefore; the expected $L10(18h) = 53 + 3.5 = 56.5 \text{ dB(A)}$.

Noise Level Criteria

The most comprehensive Australian approach to road traffic noise assessment has been undertaken by the New South Wales Environment Protection Authority, in their guideline entitled, Environmental Criteria for Road Traffic Noise (EPA 1999). The approach and criteria suggested in this document have been used in the following assessment of the road traffic noise generated by the Wood Centre Development.

The EPA guideline notes that the assessment framework embodies a non-mandatory performance based approach, with the criteria applied as targets. It recognises that there will be situations where short-term solutions will not always be met, and that in

these cases longer term strategies that will minimise noise impacts over time will be required.

The criteria used are dependent on the category of road to be used. The EPA guideline states as follows:

“It is noted that some industries (such as mines and extractive industries) are, by necessity, in locations that are often not served by arterial roads. Heavy vehicles must be able to get to their bases of operations, and this may mean travelling on local roads. Good planning practice recognises that we must acknowledge this type of road use and develop ways of managing any adverse impacts. To this end, the concept of ‘principal haulage routes’ has been endorsed by the Department of Urban Affairs and Planning’s North Coast Extractive Industries Standing Committee. Ways of identifying ‘principal haulage routes’ and managing associated adverse impacts have not yet been fully defined. Where local authorities identify a ‘principal haulage route’ the noise criteria for the route should match those for collector roads, recognising the intent that they carry a different level and mix of traffic to local roads.”

In the case of the Wood Centre, the preferred transport route is defined as collector road with the associated noise criteria as follows:

Daytime (7 am to 10 pm) LAeq (1hr) 60 dB(A)

Night-time (10 pm to 7 am) LAeq (1 hr) 55 dB(A)

The criteria applicable in this case also notes the following:

- Where the criteria are already exceeded, that where reasonable and feasible, existing noise levels should be mitigated to meet these criteria; and
- Where existing road traffic noise levels lie within 2 dB(A) of the noise criteria, the 2 dB(A) allowance can be applied where all feasible and reasonable mitigation measures have been used. (ie the higher value is acceptable).

Noise Assessment

A summary of the noise criteria and the calculated noise levels from truck traffic are provided in Table 42.

Table 42 Noise Criteria and Calculated Noise Levels for Wood Centre Trucks

	Noise Criteria dB(A) Leq (1 hr)	Calculated Noise Levels dB(A) Leq (1 hr)
Day-time (7 am to 10 pm)	60	55.1
Night-time (10 pm to 7 am)	55	51

Based on the above assessment, the calculated noise levels from truck movements will comply with the respective noise criteria for both day-time and night-time.

However, it is evident that the movement of trucks during night-time conditions will be potentially the most sensitive for residents along the transport route. As the traffic movements to and from the Wood Centre (particularly at night) will be characterised by peak noise events rather than continuous noise, an assessment of these events has been undertaken, although it should be noted that there are no formal criteria in relation to peak noise levels from truck traffic.

Research on intermittent noise at night (Griefahn 1992) has suggested that one awakening at night will probably be evoked in not more than 10% of the exposed people under the following conditions:

- Two noise events with peak levels of 59.4 dB(A);
- Ten noise events of 54.1 dB(A); or
- Thirty noise events of 53.6 dB(A).

The mean outdoor to indoor attenuation of noise by house for peak noise events discussed above is 17.3 dB(A) with a window slightly open. In the case of the Wood Centre there will potentially be up to two truck movements per hour or 18 truck movements from 10 pm to 7 am. If we assume a worse case of 30 peak noise events described above by Griefahn, then outdoor peak noise level should not exceed 70.9 dB(A) ($53.6 + 17.3 = 70.9$).

This noise level may be exceeded for houses within 30 metres of the road alignment. However, whether the level is exceeded and the extent to which this occurs will be influenced by a number of factors including:

- weather conditions;
- vehicle type;
- truck speed;

- whether the truck is braking or accelerating;
- and whether there are any noise barriers (natural or man made) between the road and the house.

The NSW noise guideline referred to above (EPA 1999) has undertaken a review of the current level of knowledge that if the maximum internal noise levels are below 50-55 dB(A), then it is likely to cause awakening reactions, and further that one or two noise events per night with maximum internal noise levels of 65-70 dB(A), are not likely to affect health or well being significantly.

The general conclusions from the above assessment, are that in terms of the relevant noise criteria, the calculated noise levels for the truck movements during the day and night, these will be met. In terms of peak noise events during the night from truck movements, there may be occasions when the recommended guideline is exceeded depending on a number of factors, and the impact on residents is unclear.

Mitigation Measures

Irrespective of whether specific noise guidelines are met or not, it is recognised by Forestry Tasmania, that residents along the transport route may experience adverse impacts from time to time as a result of the transport operations. As such, they are committed to work closely with the community both before the operation commences and throughout the life of the Wood Centre operation. This commitment has been clearly demonstrated elsewhere in the DPEMP through such measures as the existing community consultation being undertaken, and the proposal to establish a Community Consultative Committee to discuss issues including road transport.

The NSW guidelines (EPA 1999) have identified a number of noise management strategies including the following:

- Control of engine noise;
- Use of low noise brake systems;
- Use of dedicated heavy vehicle routes; and
- Use of modern vehicles.

Each of these noise mitigation measures and a number of additional measures will be adopted for the Wood Centre as described below.

The principal avenue for noise mitigation is to limit the level of noise produced by the trucks. This could be further improved by measures such as the provision of acoustic barriers and shrubs between the roadway and the houses.

However, the mitigation of noise produced by trucks is difficult because:

- Trucks usually have high (3-4 m above ground level) exhaust stacks, required by law;

- Trucks often have a large number of wheels (up to 34), each of which is producing noise through contact with the roadway surface;
- Truck engines, engine-brakes, fan-belts and gear-boxes are all sources of noise, and it is difficult to attenuate the level of noise from these sources;

A number of specific mitigation and management measures which are detailed below, will be implemented to minimise potential noise impacts.

HPVs will be used for the transport of wood fibre if accepted by the community¹². The HPVs and other trucks used for product transport will be specifically designed to minimise noise generation¹³. For HPVs this will include such measures as additional ribbing on bins to reduce panel size (and hence the drumming effect when empty), coating the bins with special sound reducing materials and the installation of electromagnetic brake systems. Absorption materials may include soft foam, porous materials, fiberglass and rock wool. Damping compounds may include foam, rubber, soft wood, paint on compounds, which can be used inside bins and engine hoods. For HPVs and the other product transport vehicles this will include the installation of electromagnetic braking systems and air bag suspension.

The transport operation will be under the control of a central scheduler located at the Wood Centre. This person will be responsible for the timing of the movement of vehicles to and from the Wood Centre. This will enable key times during the day, such as school starting and leaving times and peak traffic flow periods, to be avoided¹⁴.

Operating hours are proposed for 24 hours per day. However, these are in the process of being negotiated with the community to ensure that transport noise impacts are minimised at agreed hours. The Community Consultative Committee will review impacts and in collaboration with the Site Manager determine other voluntary curfew times. The Central Scheduling and the Traffic Management Plan will enforce these curfews¹⁵. The Site Manager will be responsible for developing and enforcing the plan.

During the construction program traffic movements will generally be restricted to day light hours.

¹² Commitment: Utilise HPVs for wood fibre transport if accepted by the community.

¹³ Commitment: Design HPVs and other product transport vehicles to minimise noise generation.

¹⁴ Commitment: Schedule trucks to avoid school bus operating times.

¹⁵ Commitment: Schedule trucks in accordance with the limitations imposed by the Central Scheduling and Traffic Management Plan.

Speed restriction will be imposed in sensitive areas in consultation with the affected community¹⁶. There are already speed limit restrictions on all sections of the proposed transport route. However, where the community affected by the transport operations identifies a change to the speed limit which will further mitigate any adverse impacts of the transport operation, these will be introduced for the Wood Centre transport operation. Such additional restrictions would be enforced through the driver training and Traffic Management Plan referred to below. These restrictions will also be enforced during the construction program as far as practicable.

Braking and acceleration of vehicles will be reduced in sensitive areas¹⁷. The rapid acceleration and braking of heavy vehicles can significantly increase noise levels. By ensuring that this is minimised in sensitive areas these impacts will be minimised. This approach is common in mainland Australia, where specific road signs warn truck drivers of residential zones. In the case of the Wood Centre, this approach will be enforced through the driver training and Traffic Management Plan referred to below.

The size of the transport fleet will be kept to a minimum¹⁸. As the major transport operation will be under the control of one operator, maximum loading efficiencies will be achieved. This will minimise the size of the vehicle fleet required.

The use of trained drivers¹⁹. Drivers working on the transport route will undergo specific training prior to the commencement of operations. They will be advised of the location of sensitive areas along the transport route, the procedures to be used in these areas (eg; speed limits), and the specific protocols which will apply for the transport operation as a whole. This approach is common practice in modern transport fleets across Australia.

The operations will use modern, well-maintained vehicles²⁰. The transport vehicles to be used in this operation will be modern prime movers specifically selected for this task, and purpose built trailers to contain the product. In some instances the prime mover will have air bag suspension on the drive wheel and steering axle. In isolated instances, the steering will be spring suspension²¹. These are described in more detail in the 'safety (vehicles)' section below.

¹⁶ Commitment: Enforce speed restrictions in consultation with community.

¹⁷ Commitment: Reduce braking and acceleration of vehicles.

¹⁸ Commitment: Minimise size of transport fleet.

¹⁹ Commitment: Use of trained drivers.

²⁰ Commitment: Use modern well maintained vehicles.

²¹ Commitment: HPV and Log truck trailers will be provided with air-bag suspension systems.

To ensure that noise generation associated with transport operations is minimised a Traffic Management Plan will be prepared²². This plan will be developed in consultation with the community, Huon Valley Council, DPIWE and DIER. The plan will include details of the issues described above such as the location of sensitive areas, protocols to be followed, speed limits in certain areas, and a review mechanism to ensure the plan is being followed.

Appropriate road seal finishes²³. In order to minimise tyre-generated noise in residential areas, appropriate sealing finishes will be used on road surfaces.

Vibration

Potential Impacts

Traffic induced ground vibrations depend on the following factors:

- Vibrational behaviour of trucks;
- Mass of trucks;
- Speed of trucks;
- Tyre characteristics;
- Roughness of the road surface; and
- Subsoil properties.

Architects in the USA have identified 40 causes of cracking which are not related to vibration. These include the following;

- Structural overload;
- Shrinkage and swelling of wood framing;
- Uneven foundation settlement;
- Slamming of doors;
- Temperature variations;
- Bricks in weatherboard walls;
- Water leakage;
- Trees absorbing moisture and causing footings to settle; and
- Movement of trees in wind causing ground movements by roots.

The Australian Road Research Board conducted ground vibration tests at Richmond following the collapse of the Tasman Bridge, when traffic increased through the town by approximately 700%. The tests showed that the ground vibrations from the traffic

²² Commitment: Prepare Traffic Management Plan.

²³ Commitment: Apply appropriate sealing finishes near residential areas.

were safe when using the criteria of 2mm per second adjacent to historical buildings. Terts (reported in Terts 2001; Appendix N) also conducted vibration measurements at Richmond with the transducer set on a stone sill of a stone cottage, 5 metres from the kerb. Peak particle velocities recorded ranged from 1.0 mm per second for a truck in the far lane travelling at 30-60 kph, to 9.5 mm per second for a 6 tonne roller pulled by a tractor in the near lane.

Mitigation Measures

A report prepared by Chris Niewhof (reported in Terts 2001; Appendix N) concluded that there were no discernible vibration influences due to the high traffic volumes from the Tasman Highway, adjacent to the Royal Engineers Building.

Based on these tests, it is therefore considered unlikely that vibrations from log trucks or wood fibre trucks will cause damage to domestic buildings at distances of 10 meters (Terts; 2001; Appendix N). It is considered therefore that no mitigation measures are required.

Dust

Potential Impacts

Vehicle movements on unsealed roads will result in nuisance dust generation, particularly during dry conditions. The major problems that will arise from this are for residential areas close to the road alignment. This is a common occurrence in rural area subject to normal traffic usage, and may be exacerbated with an increase in truck traffic.

The generation of dust from the transport operation has the potential to cause nuisance problems, in those areas where residences are close to the transport route. Based on the road assessment summarised above, this impact will be on the unsealed sections of the Denison Road from the Lonnavale intersection to Judbury, and the unsealed sections of the North Huon Road.

Mitigation Measures

From the Wood Centre to Judbury section, there are only three houses on the gravel road sections. It is proposed to seal these sections of the road if dust is identified as a problem²⁴. On the unsealed section of the North Huon Road, there are some houses close to the road alignment, which may be adversely affected by an increase in road dust. The whole of North Huon Road will be sealed as part of the proposed road upgrading program²⁵.

Vehicular Emissions

Potential Impact

High traffic flows in urban areas may result in vehicle emissions reaching levels which could impact on the residential areas along the transport routes. This is much less likely to occur in rural areas where traffic flows are less congested and air circulation is generally much greater. The traffic flows associated with the Wood Centre are low when compared to major arterial roads. Emissions from truck movements will be highly diluted as on average there will be less than 6 trucks an hour. The movement along the route to the Huon Highway is unlikely to cause a nuisance. Elsewhere, the impact of truck exhaust will decrease as there are fewer truck movements forecast to move product compared with trucks currently moving logs.

An estimate of the emissions from trucks moving timber from the Southern Forest without the Wood Centre and with the Wood Centre is shown in Table 43 and Table 44 respectively.

The tables demonstrate that the Wood Centre will result in no change to overall road transport vehicle emissions once the Wood Centre is fully operational.

Mitigation Measures

As described above, the vehicles to be used for product transport, will be a modern and well-maintained fleet. This will include the requirement to undergo regular testing of exhaust emissions, to ensure the emission control equipment in place is operating efficiently.

As vehicles are replaced, new vehicle selection will take relative vehicle emission levels into account.

²⁴ Commitment: Seal sections of gravel road adjacent to residences if dust is identified as a problem.

²⁵ Commitment: Seal North Huon Road.

Table 43 Estimated emissions without the Wood Centre

	Annual Fuel KL	Annual Energy GJ	Emissions (Gg)								
			CO ₂	CH ₄	N ₂ O	NO _x	CO	SO ₂	NMVOC	Hot Soak	Running
Av Annual	1223	47238	3.29	0.0002	6.79E-05	0.04	0.02	0.005	0.007	0.007	0.0008

Table 44 Estimated emissions with the Wood Centre

Year	Annual Fuel KL	Annual Energy GJ	Emissions (Gg)								
			CO ₂	CH ₄	N ₂ O	NO _x	CO	SO ₂	NMVOC	Hot Soak	Running
2002	354	13656	0.95	5.08E-05	1.81E-05	0.01	0.01	0.002	0.002	0.002	0.0002
2003	708	27312	1.90	0.00010	3.63E-05	0.02	0.01	0.003	0.004	0.004	0.0004
2004	1223	47238	3.29	0.0002	6.79E-05	0.04	0.02	0.005	0.007	0.007	0.0008
2005	1223	47238	3.29	0.0002	6.79E-05	0.04	0.02	0.005	0.007	0.007	0.0008
2006	1223	47238	3.29	0.0002	6.79E-05	0.04	0.02	0.005	0.007	0.007	0.0008

Safety

Potential Impact

To accommodate the use of HPV wood-chip trucks, the roads to be used have been assessed (Indec 2001; Appendix Q) on the basis of the following criteria:

- Width of road pavement and shoulder;
- Method of construction of road pavement and shoulders;
- Need for left or right turn slip lanes at intersections;
- Sight distance at intersections; and
- Sight distances on the roadway.

The Standards used to assess the current suitability or otherwise of the roadways are:

- The Tasmanian Department of Infrastructure Energy and Resources (DIER) “Route Selection Criteria – Checklist Attachment C to Guidelines for B-doubles in Tasmania”;
- AUSTROADS “Rural Road Design – Guide to the Design of Rural Roads”;
and
- AUSTROADS Road Design Manual, Part 5 “Intersections at Grade – Guide to Traffic Engineering Practice”.

Based on this assessment, a series of recommended road upgrading actions have been made to upgrade the transport route to nationally accepted standards for road design and safety. A summary of the proposed upgrading program is provided above.

These improvements will be undertaken prior to the commencement of HPV transport on the roads²⁶.

Wood Centre traffic to and from the site may impact on existing community activities along the proposed transport route.

Although there are no schools located on the transport route, the following road sections are used by School buses:

- Lonnvale Road;
- North Huon Road;

²⁶ Commitment: Improve road route prior to commencement of HPV transport.

- Marguerite Street;
- Lollara Road; and
- Huon Highway.

Other sensitive uses along the transport route are residences, which are predominantly situated along Lonnavaile Road (near Judbury), North Huon Road, Marguerite Street and Lollara Road. These are summarised in Table 45 below.

In places, the road easement has been encroached by dwellings or farm sheds. The section of North Huon Road within the Ranelagh speed limit was developed as a narrower road easement (<6m). Houses that are closer than 5 m to the road impose restrictions on road improvement and are currently impacted adversely by traffic. Some of these houses may have to be acquired to allow a suitable road formation.

Table 45 Existing Road Safety Issues

Existing Road	Speed Limit	Number of Houses/side roads
Weld Road.	100 kph	Nil
Denison Rd. to Lonnavaile Rd. Intersection	100 kph	2 driveways, 1 house about 30 m from road 2 side roads
Lonnavaile Rd between Denison Rd intersection and Judbury	100 kph	22 driveways, 7 house > 20 m from road, 2 houses 10 –20m from road, 6 houses 6-10 m from road. 5 side roads
North Huon Rd from Judbury to Ranelagh	60kph (Judbury) 100 kph (Judbury to Ranelagh) 60kph (Ranelagh)	70 driveways, 13 houses> 20m from road, 17 houses 10-20m from road, 13 houses 5-10m from road, 9 houses<5m from road. 9 side roads
Through Ranelagh and linking to the Huon Highway.	60kph (Ranelagh) 80kph to 100kph (Ranelagh to Huon H'way)	53 driveways, 16 houses> 20m from road, 10 houses 10-20m from road, 5 houses 5-10m from road 6 side roads
Huon Hwy.	100kph	Not Assessed

Information has been drawn from the investigation by INDEC (Appendix Q) and Lupatec Pty Ltd (Appendix R) and Forestry Tasmania.

Mitigation Measures

To ensure that transport associated with the movement of wood products from the Wood Centre are operated in the safest manner possible, a wide range of measures will be implemented. These are detailed below in terms of road infrastructure, vehicles and drivers.

Road Infrastructure

As described above, all roads will be upgraded where necessary to comply with DIER's standards for the operation of HPVs in Tasmania. This includes ensuring that the construction and capacity of the roads and bridges are suitable in terms of:

- Roads have suitable turn-out lanes;
- Roads to have suitable centre and edge delineation;
- Line of sight is adequate; and
- Roads have adequate shoulders.

These measures will ensure that the standard of construction for the roads on which the HPVs and other trucks will operate will be comparable to the standards set for operation of HPVs anywhere in Australia.

A consultative process with residents who are impacted is continuing on road standard and HPV operational issues.

Where possible, road formations will be constructed to increase setbacks for houses that are closer than 5 m from the edge of the road. Where the road formation encroaches on properties that have set backs of less than 5 m discussions will be held with the owners and if agreed by the owners, those houses may be acquired.

Vehicles

All vehicles to be used for transport will:

- Carry an appropriate notice stating that the vehicle has been approved under the relevant State Road Traffic Act Regulation and the National Heavy Vehicle Accreditation Scheme (HVAS) for operation on the route²⁷;
- Be maintained in good mechanical condition, as mentioned above. This includes regular inspection and testing of:

Brakes;

²⁷ Commitment: Vehicles will carry appropriate State Road Traffic Act Regulation and National HVAS notice.

Exhaust emission; and
Noise emission.

- Be fitted with “Road Friendly Suspension” systems, and carry the Certificate that acknowledges this²⁸; and be fitted with noise reduction treatment on the bins.

In addition, it is anticipated that the vehicles will have “Alternative Compliance” under the road-truck industries own self-regulation scheme. Alternative Compliance is a nationally accredited scheme with the purpose of enabling efficiency improvements in road transport by placing the onus on operators to develop management and operating systems that can be audited to assure authorities of compliance with the relevant aspects of road transport law. The National Heavy Vehicle Accreditation Scheme is the governing body of the different alternative compliance schemes, which governs the schemes in accordance with the Australian Transport Council Rules.

Examples of approvals under the alternative compliance schemes include;

- Fatigue management ;
- Mass management ; and
- Maintenance management.

These measures will ensure that the vehicles comply with the current best practice conditions operating throughout Australia.

Drivers

All drivers will:

Be given specific training with respect to operation on the route, as mentioned above;

Be dedicated to the operation²⁹;

Take special precaution on sections of road where the line of sight is limited³⁰; and

Be particularly careful when operating in the vicinity of school bus routes³¹ (scheduling of operation should be such that operation on school bus routes during school start and finish times is avoided).

²⁸ Commitment: Fit vehicles with Road Friendly Suspension and carry appropriate certification.

²⁹ Commitment: Drivers will be dedicated to the operation.

³⁰ Commitment: Drivers will take special precaution on road sections where the line of sight is limited.

³¹ Commitment: Drivers will take particular care in the vicinity of school bus routes.

The above measures are intended to ensure that the safety of operation of the HPV's on the route will be equal to the best practices for similar situations anywhere in Australia. These measures will also be implemented during the construction phase as far as practicable.

This combination of mitigation measures is expected to establish safe conditions and promote compatibility between everyday road use and industrial road use. Upgrading of the road infrastructure will benefit all road users ensuring safe conditions.

Social / Cultural

Potential Impact

Increased traffic on any route has the potential to induce social disruption. The key social impacts are:

- Recreational uses of the road
- Community activities

The road provides an important recreational function, walking, cycling and horse riding are all potential recreational activities that occur on the road. The primary consideration is safety. Trucks have the potential to create suction that can unbalance cyclists and noise that may unsettle horses.

The route passes the Showgrounds and new road works will displace the existing Ranelagh playground. The Huon Valley Show is an important cultural event held in November, and the playground provides an important focus for many members of the community who have contributed to its establishment.

Mitigation Measures

Improvements to the road will ensure better lines of sight, lane and edge delineation and road widths are provided so that other road users are seen earlier and there is adequate road width to permit safe separation of uses.

Concern has been expressed by some sections of the community about trucks operating during the Huon Valley Show, which as indicated, is an important cultural event in the Huon. Truck operations will be suspended or an alternative route will be used during the Huon Valley Show³².

The current playground is on Council land at the end of North Huon Road. The planned extension of North Huon Road will pass through the playground.

³² Commitment: Trucks will not operate past the Showground on Huon Valley Show Day.

Development of a new playground in consultation with the community at a location agreed with the community will be undertaken. The new playground will be developed to meet all Australian Standards³³.

Increased Roadkill

Potential Impacts

As discussed in Sections 4.3.2 and 4.4.2, there is the potential for increased roadkill with the increase in road traffic.

Mitigation Measures

As discussed in Sections 4.3.3 and 4.4.3, a survey of roadkill ‘hotspots’ prior to construction will identify initial hotspots immediately and a further survey conducted during the first two years of the Wood Centre operation will identify potential changes in hotspots. Mitigation measures that will be applied where hotspots are identified may include:

- culverts for movement of wildlife
- education of drivers regarding roadkill hotspots;
- reduced traffic speed through ‘danger’ zones (particularly at night); and
- signage to warn drivers of wildlife on road.

Stormwater Contamination

Potential Impacts

The potential impacts of transport operations on stormwater contamination are largely associated with road construction and the potential release of sediment into water courses. The other potential impacts such as hydrocarbon contamination from truck movements are considered minor, and no more significant than any other vehicle movements along existing roads. As noted above, the transport fleet to be used at the Wood Centre will be modern and well maintained thereby reducing further potential impacts.

³³ Commitment: Develop a new playground to meet Australian Standards at a location agreed with the community.

Mitigation Measures

The control of sedimentation in road construction operations is now accepted practice throughout Australia. Erosion control measures including conservation of top-soil, provision of drainage, sediment control measures and revegetation are standard practice in the road construction industry.

To ensure the road upgrading program planned for this project addresses the issue of stormwater contamination from sediment, the erosion control measures in accordance with BPEM for road works will be implemented³⁴.

4.5.6 Monitoring

The noise associated with transport of material from the site will be monitored at representative monitoring locations that have been approved by DPIWE. This monitoring will occur after 12 months of operation and when the maximum predicted traffic volumes have been achieved or as determined to be necessary. A report will be prepared on this monitoring and provided to DPIWE for review³⁵.

4.6 Summary and Conclusions

4.6.1 Transport During Construction of the Wood Centre

Construction will be undertaken by a prime contractor with local subcontractors providing the various trades as required. There are anticipated to be two peaks in heavy vehicle movements to the site. The first is likely to be 3 months after the commencement of construction, when concrete and structural materials are moved to the site, and the second approximately 8 months after commencement when the processing equipment is moved to the site.

The main access routes to the Wood Centre during the construction periods will be from Huonville along the Glen Huon Road and Denison Road, and from Geeveston along the Arve and Lidgerwood Roads.

The potential impacts of construction traffic include noise, vibration, dust, vehicular emissions, safety and stormwater contamination. In general, the traffic volumes during construction are considerably less than during the operational phase, are largely restricted to day light hours and are only of a limited duration. As such the potential impacts are proportionally less, and considered to be minor

³⁴ Commitment: Implement erosion control measures for road works in accordance with the Forest Practices Code.

³⁵ Commitment: Monitor transport at representative locations after 12 months operation, and provision of a report to DPIWE.

4.6.2 Transport of Raw Material to the Wood Centre

The location of the Wood Centre will lower the amount of log movement through most townships in the Huon Valley, and will largely be on roads operated and maintained by Forestry Tasmania. On roads used by the general public, there will be a significant reduction in truck traffic along the Arve Road owned by the Huon Valley Council, the Huon Highway at Geeveston and Huonville and Glen Huon Road, all managed by DIER. The only increases in truck traffic will occur on the Huon Highway south of Geeveston (minor increase only), and the Denison Road. The latter is in the process of a major upgrading program to ensure appropriate road safety considerations are addressed, and as such the potential impact is low.

4.6.3 Transport of Product from the Wood Centre

The material transported from the Wood Centre will consist of:

export wood fibre (300,000 tpa);
local wood fibre (40,000 tpa);
sawlogs and sawn timber (64,000 tpa); and
rotarty peeled veneer (57,000 tpa).

After a consideration of alternative transport options and road routes, road transport has been selected as the preferable transport mechanism. The preferred transport route for the majority of products is from the Wood Centre to Judbury, Ranelagh and then to Hobart. This transport route will be the subject of a significant upgrading program to enable the safe operation of the transport vehicles to be used. On-going consultation with the community will occur.

Some product may use the Derwent Valley link to a railhead at one of Karanja, Plenty or Boyer. The final selection of railhead will be undertaken based on traffic volume and capital cost.

The potential impacts from road transport have been assessed in terms of indirect costs, vehicle numbers, noise, vibration, dust, vehicle emissions, safety issues, social and cultural impacts, increased road kill and stormwater contamination. It is considered that with the implementation of the wide range of mitigation measures proposed, that any adverse impacts will be acceptable to the community. Further, with the proposed program of on-going consultation with the community and monitoring of the transport operation, that any issues, which do arise can be quickly and effectively addressed.

CHAPTER 5 WOOD CENTRE SITE-WIDE ISSUES

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5. WOOD CENTRE (SITE-WIDE) ISSUES - ENVIRONMENTAL MANAGEMENT PLAN

5.1 Introduction

Due to the multifaceted nature of this proposed development, the potential impacts and management measures associated with site-wide issues have been discussed in this chapter in an attempt to minimise duplication and to aggregate descriptions of the potential site-wide impacts.

Detailed environmental management plans for the Merchandising Yard, Sawmill, Rotary Peeled Veneer Plant, Wood Fibre Plant, and Power Station are provided in Chapters 6, 7, 8, 9 and 10, respectively.

At the beginning of this chapter, a description of the following operations is provided, including equipment to be used, proposed location and layout, source of raw materials and products generated:

- General site-wide construction issues;
- Infrastructure and Services (involving vehicle and load washdown);
- Water Supply; and
- Communal wastewater treatment and reuse systems.

The potential impacts and management measures associated with these issues and the more general impacts of the proposed development as a whole are then considered with respect to the following environmental elements:

- Terrestrial;
- Atmospheric emissions;
- Water supply;
- Wastewater emissions;
- Noise emissions;
- Solid waste generation and disposal;
- Hazardous materials;

- Flora;
- Fauna;
- Archaeology and cultural heritage;
- Visual;
- Decommissioning and rehabilitation; and
- Monitoring, reporting and review.

A conceptual layout for the site is shown in Figure 5.

5.2 Construction Issues For All Developments On-Site

5.2.1 Construction Boundaries and Buffers

Excavations during the construction of the development will be minimised by developing a highly visible construction boundary at the perimeter of the proposed works and all construction machinery, equipment, material storage, topsoil and excavated stockpiles will be contained within the designated boundary. Boundary markers will surround significant features within the project area, such as large trees or vegetation to be retained, in order to prevent damage during development. These markers may be orange safety fencing, delineator rope or normal fence construction. The boundary will be identified during detailed plan preparation. This will also help to minimise tracking of sediment by vehicles onto roadways¹.

Prior to construction the site drainage pattern will be determined and earthen drains and storage ponds will be constructed. In order to prevent excessive sediment transport to the storage ponds sediment control fences will be erected around the construction site according to the site drainage pattern to prevent debris escaping into natural drainage systems and to contain the sediment to the designated construction area². The fences will be inspected daily to ensure their effective operation³. Uncontaminated run-off will also be diverted around cleared or disturbed areas and will drain via earthen drainage lines that feed into previously constructed storage

¹ Commitment: Establish a temporary boundary prior to construction to limit construction disturbance.

² Commitment: Erect sediment control fences to contain sediment to designated areas.

³ Commitment: Monitor soil retaining measures daily.

ponds⁴.

A Port-a-Loo service will be contracted to provide facilities and remove sewage as appropriate during construction until the sewage treatment plant is operational and the irrigation areas are established. Once the treatment plant is in operation, sewage will be routed to the plant.⁵

A Construction Environmental Management Plan (CEMP) will be prepared including the measures described above to control soil disturbance during construction.⁶

5.2.2 *Soil Disturbance and Rehabilitation*

As indicated above, the construction boundary will be established to minimise disturbance of areas surrounding the development area and hence the need for rehabilitation works.

Due to the erosion potential of quartz erodible soil on-site (particularly to erosion by surface run-off), the rapid implementation of rehabilitation and/or stabilisation works will be a priority and will result in a reduction of surface run-off.⁷ These works will include the following techniques:

- Appropriate method of stripping and storing soil;
- Returning topsoil as soon as practical;
- Progressive revegetation; and
- The long-term establishment of native plant species. Species will be sourced from soil and/or vegetation stored seed in the local area.

Additional measures that may be utilised in some areas include:

- Use of geotextiles, such as "Jute Soil Saver" on erosion prone areas and slopes;
- Use of previously cleared vegetation as slash and wind breaks; and

⁴Commitment: Divert uncontaminated run-off to storage ponds via earthen drainages during construction.

⁵ Commitment: Provide an effective system for managing sewage during construction.

⁶ Commitment: Develop a Construction Environmental Management Plan to control soil disturbance during the construction phase.

⁷ Commitment: Implement rehabilitation and/or stabilisation works during construction to limit erosion.

- The short-term establishment of stabilising vegetation (cover crop) in the appropriate season.

These measures will ensure compliance with industry best practice. The potential impacts and proposed management measures are described in Section 5.7.

5.2.3 *Dust Generation*

Construction (including ground excavation, cut and fill operations) is a source of dust emissions that may have a temporary impact on local air quality. Dust emissions often vary substantially from day-to-day, depending on the level of activity, the specific operations, and the prevailing meteorological conditions. A large portion of the emissions result from equipment traffic over temporary roads at the construction site.

The temporary nature of construction differentiates it from other fugitive dust sources in estimation and control of emissions. The emissions from any single construction site can be expected to have a definable beginning and an end and to vary substantially over different phases of the construction process.

The quantity of dust emissions from construction operations depends on weather conditions and is proportional to the area of land being worked and to the level of construction activity. Emissions from construction operations will be largely dependent on the soil moisture content, the silt content of the soil (that is, particles having a diameter smaller than 75 micrometers), the speed and weight of vehicles and the number of vehicle passes.

Measures that will be used to suppress dust during the construction phase of the project include the following industry environmental practices for construction sites:

- Covering stockpiles of dusty construction material (e.g. cement and fine sands in bays or ready mix trucks) by tarpaulins;
- Watering of highly trafficked areas as determined necessary;
- Covering truck cargoes of dusty materials with tarpaulins;
- Minimising areas of exposed excavation; and
- Planting and mulching exposed soil as soon as practicable.

Due to the relatively short-term nature of construction activities, some control measures are more cost effective than others. Wet suppression and wind speed reduction (e.g. barriers) are two common methods used to control open dust sources at construction sites. However, several other forms of dust control are available. Table 46 displays each of the preferred control measures for each dust source.

A dust minimisation strategy will be prepared for the construction phase involving

some of the aforementioned control practices.⁸ To ensure the level of control is adequate for the level of construction activity, a monitoring program will be incorporated into the minimisation strategy.⁹ Once the strategy is developed it is then equally important that this strategy be enforced. It is expected that with adequate dust suppression, emissions will be minor. The Site Manager will monitor and enforce dust suppression measures. These measures will ensure that no visible dust will leave the site¹⁰. Where necessary the Site Manager will use multiple techniques to minimise visually detectable dust leaving the site.

Table 46 Dust (PM-10^a) Control Options for Open Sources During General Construction

EMISSION SOURCES	RECOMMENDED CONTROL METHOD(S)
Debris handling	Wind speed reduction Wet suppression ^b
Truck transport ^c	Wet suppression Paving Chemical stabilisation ^d
Bulldozers	Wet suppression ^c
Pan scrapers	Wet suppression of transport routes
Cut/fill material handling	Wind speed reduction Wet suppression
Cut/fill haulage	Wet suppression Paving Chemical stabilisation
General construction	Wind speed reduction Wet suppression Early paving of permanent roads

Legend

- a US EPA - AP42, 1995 *Compilation of Air Pollutant Emission Factors, Volume 1, Stationary Sources, Fifth Edition.*
- b Dust control plans should contain precautions against watering programs that confound trackout problems.
- c Loads could be covered to avoid loss of material in transport, especially if material is

⁸ Commitment: Prepare a dust minimisation strategy for the construction phase.

⁹ Commitment: Monitor dust generation daily, and implement suppression measures as required.

¹⁰ Commitment: Ensure visible dust is effectively suppressed so that none leaves the site during construction.

- transported off-site.
- d Chemical stabilisation is usually cost-effective for relatively long-term or semi permanent unpaved roads.

5.2.4 Noise Emissions

Noise emissions will be generated during the construction program from earthmoving equipment, site development and from construction equipment as facilities are built on-site. However, as the site is in excess of 6 kilometres from the nearest residence, no adverse noise impacts are anticipated. Recent major road and bridge works conducted in the area did not produce any reaction to construction activity noise from properties adjoining State Forest.

5.2.5 Traffic Issues

A relatively small increase in transport operations will occur as a result of the Wood Centre during construction activities. In order to mitigate the environmental impact along the transport route management measures will be applied. These are detailed in Chapter 4 along with details of increase in traffic numbers and other potential impacts.

5.3 Site-Wide Infrastructure and Services

5.3.1 Vehicle and Load Washdown

Description of Operation and Equipment

Trucks entering the site may pass through a truck washdown facility before proceeding to be weighed. The truck wash will only be used during inclement weather and as directed by personnel in the gatehouse.

The washdown area will comprise a concrete pad with perimeter gutters. A fixed arm medium pressure portal spray system will hold a series of nozzles that will wash the sides and top of the truck and its load. The driver will activate the system and slowly drive through the spray. Trucks will be required to move to a drainage ramp before passing over the weighbridge.

Water collected in the perimeter drain will flow to a silt trap with an oil/water separator. The water will flow through the trap to enable removal of sediments and gravels and return to a sump. Make-up water will be added to the sump to make up for evaporative and fugitive losses. The sump captures water from a process that is suitable for recycling.

A pump operating at about 32 L/s will draw water from the sump and provide the spray system.

Sediments and gravels collected in the silt trap will be removed by a bobcat (or similar) as required. The details of management measures for the truck wash silt trap are described further in Section 5.7.6.

The extent of solid and wastewater generation is expected to be significantly greater during winter months when rainfall is markedly higher. It is anticipated that up to 150 kg of sediment per truck washing could be generated during winter months.

Assuming a daily truck delivery rate of 95 trucks, and each truck requiring up to 4.5 kL per wash, it is envisaged that total daily water requirements for truck washing activities could amount to 0.43 ML/day. It is anticipated that 90% of this water will be recycled and re-used through the sump system described above.

Emission Sources

The main emission sources will be as follows:

- Washdown water containing solids, primarily soil and wood fibre;
- Solids from the sump and interceptor facility, primarily soil, wood fibre and rocks;
- Minor quantities of oil; and
- Potential short-term, localised spray drift on windy days during washdown operations.

The potential impacts and the proposed management measures for wastewater are described in Section 5.7.4 and for solid waste in Section 5.7.6.

5.3.2 Firefighting, Fire Management and Emergency Services

Fire Hazard Issues

The temporary storage and processing of stockpiles of wood material within the Wood Centre is a significant and potential source of fuel in the event of a fire. Other potential fire hazards include the:

- Storage of fuels for loaders and equipment used on-site;
- Conducting of vehicle and equipment maintenance, and possibly oxy-acetylene activities within workshop areas; and
- Location of the site within bushland.

Fire Fighting Services and Preventative Measures

As a precaution, the following management measures will be implemented on-site:

- Fuels will be stored in approved facilities and wood materials will be not stored in close proximity to them;
- Buildings will typically be constructed with cladding exteriors; and
- All vehicle and equipment maintenance, and oxy-acetylene activities will be undertaken within confined areas with appropriate separation from stored flammable materials (e.g. workshop areas).¹¹

A single water reticulation network serving both process and fire service demands will be installed around the site and connected to a single connection point at the site boundary. Huon River quality water will be suitable for this application. Hydrants, hose reels, extinguishers and fire blankets will be installed around the site in accordance with:

- AS 2441 - 1998 '*Installation of fire hose reels*',
- Tasmania Fire Service Fire Safety Division '*Guidelines for the selection and location of portable fire extinguishers and fire blankets*', 1996; and
- AS 2419 - 1994 '*Fire hydrant installations*'.

A ring main will be installed around the perimeter of the buildings to provide water for hydrants, which must be located so that hydrant fire hoses can reach all parts of the facility.¹² AS 2419 requires that up to six hydrants may be required to operate simultaneously (depending upon the size of the buildings and timber yards) at a minimum duty of 10 L/s and 400 kPa residual pressure. Ring mains will be sized to achieve the requirements of AS 2419.

Any covered timber storage area (e.g. warehouses) will require sprinklers to be installed in accordance with the Building Code of Australia.

As part of its normal land management responsibilities FT will maintain fire breaks around the site, conduct vegetation reduction management and maintain fire trails, as

¹¹ Commitment: Implement management measures to minimise fire hazards on-site.

¹² Commitment: Install a suitable ring main and adequate fire hydrants.

agreed with the Tasmania Fire Service, South West District.¹³

Fire Water

A water storage of at least 1 ML will be maintained in the storage system on-site at all times to meet this fire water requirement. This is equal to at least 4 hours at 60 L/s flow. A back-up pump, or an independent power supply (e.g. diesel pump) will also be maintained on-site in order to meet the relevant Australian Standards.

If fire events occur on-site the stormwater management system will collect potentially contaminated water from fire fighting operations and it will be treated by the normal wastewater management system. If sampling determines that alternative measures will be required to the typical reuse operations, then DPIWE approval for the proposed treatment method will be sought.

Fire Management Plan

A general fire management and emergency preparedness plan will be developed for the site by the Site Manager to meet the requirements of the Tasmania Fire Service, which will contain more specific plans developed by Proponents for the respective facilities upon their identification and development of the site. The plans will include:

- A figure showing the location of the fire fighting and management system;
- Description of the maintenance of this system (ie. regular site inspections and equipment checks);
- A procedure for incident reporting, with contact numbers for Tasmania Fire Service, Forestry Tasmania and the local brigade;
- Reference to Forestry Tasmania's current Fire Management Manual;
- The requirements of Tasmania Fire Service;
- Contact details for the District Fire Brigade (Huon);
- Assessment of potential fire behaviour in the vicinity of the site;
- Identification of potential fire hazards that will exist on-site and may require specific fire management controls;

¹³ Commitment: Maintain fire breaks around the site.

- Contingencies for both wildfire, and planned fuel reduction burns (if they are required in areas immediately surrounding the development site);
- Establishment and maintenance of emergency preparedness and fire suppression measures;
- Training programs for fire awareness, suppression, general fire management and environmental considerations including clean-up after fire; and
- A general Emergency Response Plan for the whole site will be prepared and documented in collaboration with local emergency response bodies¹⁴.

Emergency Services

Each facility will be required to provide Standard Operating Procedures and receive approval from the Wood Centre Site Manager prior to occupation of the site.

5.3.3 Site-Wide Power

Supply of Power

The Site Manager will participate, if necessary, in the process of negotiating with the power plant developers for the provision of power from the Power Station that is to be established on-site. This development will also be a supplier to the State Grid.

Alternatively, Aurora could supply power at scheduled rates through construction of power lines to the site. This supply will be either 33kV or 66kV depending upon demand, with a centralised substation provided on-site. Individual developments will connect to power at this substation that will provide its own switchgear and site power reticulation. All site reticulation will be underground.

Refer to Chapter 10 for further discussion regarding the Wood-Fired Power Station.

Other power requirements of each of the wood processing facilities will typically be sourced from fuels such as diesel, LPG and possibly petrol.

5.3.4 Communications

The Site Manager will provide (or arrange for provision by others, e.g. Telstra) appropriate connections to a telephone landline at the site boundary for each

¹⁴ Commitment: Develop and implement an emergency response plan.

development area on-site, as well as a mobile phone base station that covers the entire Wood Centre and surrounding area.

5.3.5 Security

The Site Manager will provide security fencing around the perimeter of the whole of the Wood Centre.

A 24 hour security presence will be maintained at the site, including a staffed gatehouse at the entry point [staffed during normal daylight operations and with appropriate systems for after hours access (e.g. a call button to security office)]. In addition, some individual developments may erect security fencing around their operations as determined necessary.

An access permit system will be used for service vehicles to the site. For safety reasons, the public will not be permitted to self-drive on the site.

Weld Road will be diverted around the site.

5.3.6 Site Lighting

Fixed security lighting will be provided at the entrance to the site and around infrastructure that is managed by the Site Manager as determined necessary. An illumination level of 20 lux (average) has been allowed for, which is a minimum requirement for car parks and work areas.

Floodlighting will be provided in areas likely to require night-time activity e.g. boiler plant loading bays, walkways between the office and the plant and log unloading and handling areas.

5.3.7 Main Gate

The main gate will feature a gatehouse between an entry and exit boom gate. The gatehouse will be glass fronted and approximately 4 m wide by 6 m long. It will include a recording station for the weighbridge, site security cameras and amenities. Construction of the gatehouse will be in fibre cement board or tilt-slab concrete walls to the eaves, with a colourbond trimdeck roof. Landscaping in accordance with the landscape master plan will be provided for the building and the car parking area.

An electronic weighbridge of sufficient length to manage a high productivity vehicle (HPV) will be provided and controlled from the gatehouse.

5.3.8 *Site Roads*

On entering the site through a single entrance at the southern end, traffic will pass to the weighbridge. In wet weather, log trucks will report to the truck wash to ensure mud is removed before proceeding onto the site.

A one way loop road system will service the site. Access to each of the processing facilities will be gained from the loop road.

Once loaded, or unloaded, at their respective facilities, trucks will move over the weighbridge to be weighed before leaving the site. Emergency gates from various processing facilities will provide direct access to Weld Road.

5.3.9 *Visitor Centre*

A visitor information centre is to be located near the main gate. This building will be of similar construction to the gatehouse. The visitor information building will be approximately 150 m² and comprise a site information display, gift shop conference room and visitor amenities. A visitor car park will be constructed next to the information centre. The area around the building and the carpark will be landscaped using a variety of plants and native vegetation.

Visitors to the site will be taken on guided tours using a mini-bus. There will be vantage points at various locations and prescribed visitor viewing galleries in the processing buildings.

5.4 **Site-Wide Energy Use**

5.4.1 *Description of Energy Consumption*

Electrical Power

As described in Section 5.3.3 power to the site will be provided by the Power Station on-site. Alternatively, power lines will be extended to the site from the State Grid, generally within the Arve Road and Lidgerwood Road road reserve.

Power demand for the site is estimated to be up to 10 MW. The major equipment consuming this power is summarised below with the approximate power requirements for each facility shown in Table 47.

Merchandising Yard

- Infeed deck; and
- Conveyors.

Sawmill

- Infeed live deck;
- Log wash;
- Head rig;
- Saws;
- Conveyors;
- Moulders; and
- Dust extraction and filtration systems.

Rotary Peel Veneer Mill

- Heat plant (fans and pumps);
- Block receival;
- Peeling system;
- Dryer;
- Composing;
- Finished product handling; and
- Waste conversion.

Wood Fibre Processing Mill

- Wood Fibre Mill drive motors;
- Conveyors;
- 20 hp air compressor; and
- Flat screen;

Power Station

- Conveyors;
- Induced draft and force draft fans; and

- Turbine pumps.

Thermal Power

In addition to electrical power, the Rotary Peel Veneer (RPV) mill and Sawmill will require thermal power for drying and conditioning. In the event that the Power Station is not ready to provide steam for the Sawmill and RPV Mill upon commissioning, heat plants will be constructed to provide process steam and heat. Alternatively, steam and heat will be obtained from the power station.

Table 47 Total Annual Energy Consumption by Facility

Facility	Maximum Power Demand (MWe pa)	Thermal Consumption (MWt pa)
Merchandising Yard	0.5	
Sawmill	1.0	15
Rotary Peel Veneer Mill	3.0 to 4.0	30
Wood Fibre Processing Mill	2.5	
Power Station	3.5 to 4.0	120
Total	10.5 to 12.0	165

5.4.2 Energy Management

Energy Management

The establishment of the wood-fired power station for power and thermal generation on the site results in the site being a net exporter of energy. Nevertheless, the following management measures will be implemented to ensure compliance with the current best practice environmental management conditions operating throughout Australia¹⁵:

- Overall energy use will be minimised by selecting where possible motors, lighting and drying equipment that is efficient with respect to power usage.

¹⁵ Commitment: Implement energy management measures to comply with BPEM conditions.

The process plants will utilise, wherever economical, variable speed drives as an energy conservation measure to reduce losses and improve the power factor on pumps and fans.

- Due to low pressure steam being available from the Power Station, thermal energy used on-site for space heating and process heating will be obtainable from this source rather than from intrinsically higher value sources such as electricity or hydrocarbon fuels. Waste heat from the Power Station will be rejected at typical atmospheric dewpoints in the range 5°C to 25°C, at the highest possible entropy and least useable form.
- The heat plants will include flue gas economisers for heat recovery.
- Energy used in mobile plants will be managed by limiting excessive idling.
- Electrically powered hoisting will be selected in preference to mobile equipment where practical and economic to do so.

5.5 Site-Wide Water Supply

5.5.1 Description of Operation and Equipment

The proposed development will draw water from the Huon River for use within the operation. A water pumping station will be constructed adjacent to the bridge site on the Huon River.

Dual intake pipes about 1.2 m in diameter and fitted with trash racks will be buried in the shingle bank and extended into the main channel. A rock-lined cavity will be formed within the existing riverbed to form a sump from which water can be extracted. It will be necessary to periodically clean out this sump from river rocks and debris.

Erosion will be controlled during construction by diverting water around the excavated area, and through the use of a siltation fence located downstream of the works. Construction works will be carried out during periods of low water levels within the river to minimise erosion and disturbance to the riverbed.

The pumping station will be located above the sump, adjacent to the bridge, and well out of the normal course of the river. The design of the pump station will be suitable to cope with 1 in 100 year flood events. The construction of the pumping station will be either cast *in situ* or precast concrete walls and a concrete roof. Building access and the main electrical control panel will be located at the upper level of the pump station (bridge deck height). An internal ladder fitted with appropriate safety enclosure will provide access to the pumps in the sump. A suitable lifting beam will

be provided to allow the pumps and any debris that collects in the sump to be lifted to the access door.

Dual electrical submersible turbine pumps working in a wet sump will pump water to the storage system at the site. The pumps will operate on a demand switch at the storage ponds. Each pump will be capable of pumping up to 90 L/s at the system rated head working on a duty and stand-by basis.

A steel rising main, with a diameter of 200 mm, will also be installed from the pump station to the water storage tank. The exact location of the tank has not yet been selected, but for operational efficiency is likely to be close to the Huon River.

Maximum water required from the river for the site, once all future stages are completed, is estimated to be up to 5 ML/day (Stage 1 is estimated to have a maximum draw of approximately 3.3 ML/day). Of this, the majority is cooling tower make-up water for the Power Station and the remainder is make-up water for process requirements. The site's potable water (amenities) requirement is expected to be approximately 32 kL/day assuming the use of 0.15 kL of water per person per day. An application for a licence to draw water from the river for up to 5 ML/day is being made separately from this DPEMP as indicated in Chapter 1.

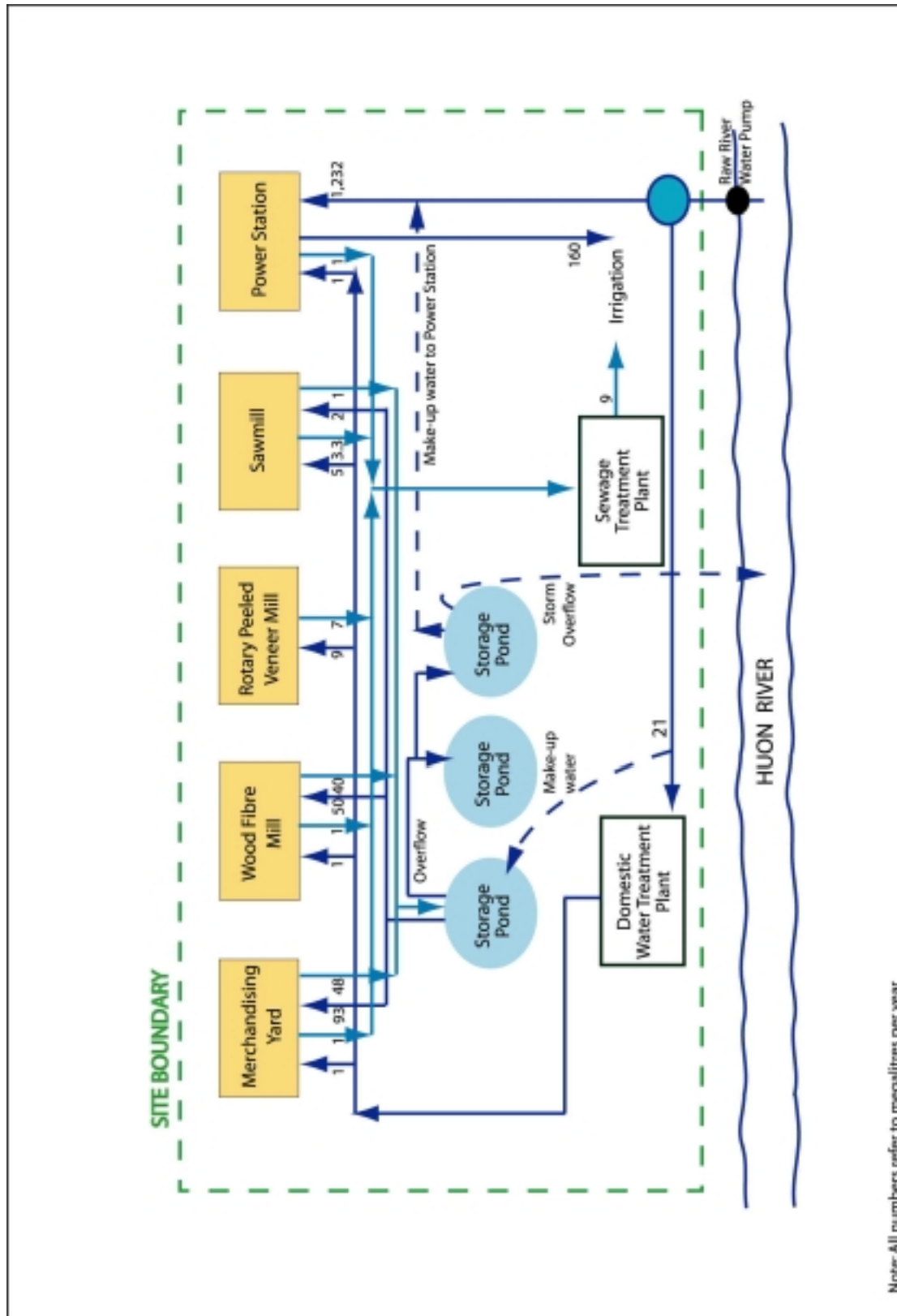
While Huon River water will be suitable for some process use, some treatment may be required in order that it meets the ANZECC drinking water standards and the requirements for use in the power station boiler and other heat plant boilers. This may include in-line dosing for pH adjustment, sand filtration, ion exchange and disinfection. Water for the boilers will be drawn from the domestic water storage and treated as determined necessary.

A schematic diagram showing the proposed water circuit is provided in Figure 20.

5.5.2 Location and Layout

The water storage tank and treatment facility will be situated at a high point on the site most likely adjacent to the wood fired power station (Figure 5) and close to the river. As noted above and shown in Figure 20, the raw river water will be treated for domestic use, and if necessary further treated in line prior to use in the boilers on-site. The water storage will be capable of retaining one to two days water requirements. The storage ponds identified on Figure 5 will be located at low points around the site in order to capture stormwater. This water has the potential to be contaminated and therefore cannot be used for domestic use.

Figure 20 Preliminary Site-wide Water Circuit (Schematic)



One of the storage ponds will be specifically designated to receive bleed stream from log and truck washing processes and will only be recycled to those activities. This will assist with recycling water quality management due to the higher potential for contamination from these activities.

5.5.3 *Quantity and Quality of Water*

The predicted annual water requirements for each facility and Stage 1 of the site as a whole is provided in Table 48.

Apart from the power station requirements the principal uses of water are for log washing prior to processing. All of the water in these uses is re-circulated, other than that lost due to evaporation and spray drift. Log washes will operate on an ad hoc basis, depending on the cleanliness of logs and are discussed for relevant facilities in the appropriate chapters.

As mentioned above 32 kL/day of water will be required for amenities.

Water systems are designed to maximise use of stormwater collected on the site and to recycle used water to the maximum practicable extent. Accordingly major washing processes such as the truck wash and the log wash will be closed systems recirculating the water many times with makeup of losses only. The makeup water for these recirculating wash systems will itself be the lower grade of stored stormwater. Subject only to availability and a minimal TDS standard, cooling tower makeup water, which is the dominant water consumer on the whole site, will also be recycled stormwater.

Table 48 Predicted Facility and Site-Wide Water Requirements

Facility	Fresh Water Makeup (ML pa)
Merchandising Yard (including log and truck wash)	1.0
Sawmill (including log wash)	5.0
Rotary Peeled Veneer Mill	9.0
Wood Fibre Mill (including log wash)	1.0
Wood Fired Power Station	1,233.0
Total*	1,249.0

- Includes 5 ML/yr for amenities

After all these measures, the average summer requirement for river water is expected to be less than 4ML/day, rising to approximately 4ML/day when stored stormwater supplies are unavailable and the power station is at full load.

The Site Manager will consult with DPIWE on management measures for extracting water during periods of low flow.¹⁶

5.5.4 Emission Sources

The only emission that is likely to result from the water abstraction and treatment operation is the generation of sludge in the water treatment facility. The quantities generated are anticipated to be relatively small, and will depend on the Huon River water quality from time to time during the year and the effectiveness of the treatment system. At this stage the quantity and chemical composition of potential water treatment plant sludge cannot be identified. However, prior to construction it will be assessed.

5.5.5 Projected Hours of Operation and Employment

The water pumping and treatment system will be largely automated with the responsibility for effective operation resting with the Site Manager.

The potential impacts and the proposed management measures are described in Section 5.7.

5.6 Site-Wide Process Wastewater Management

5.6.1 Description of Operation and Equipment

Process Wastewater and Stormwater

An integrated wastewater management strategy will be developed for the whole of the site. Stormwater and process wastewater collection systems will be established on each processing site and directed to a communal system operated and managed by the Site Manager. A schematic diagram showing the total water circuit is provided in Figure 20 and Appendix X which explains and schematic diagrams for each facility are provided in the respective chapters of the DPEMP. Appendix X provides a fairly detailed description of water and wastewater on the Wood Centre site.

¹⁶ Commitment: Liaise with DPIWE to develop management measures for water extraction during periods of low water flow.

Criteria for acceptance

Each processor will be responsible for all wastewater generated on-site until crossing their respective site boundaries. Wastewater (comprising contaminated stormwater from developed areas and process wastewater) will be required to meet the pre-treatment requirements at each facility's site boundary before it will be accepted into the site-wide collection system. The *Guidelines for the Acceptance of Liquid Waste to Sewer* (DELM 1994) will be used as a guide for the design of the acceptance criteria for this system, but some criteria will be more stringent (Appendix X). Preventative requirements will be modelled upon those found in a normal local government trade waste agreement. Allowable levels of specific contaminants will be established to maximise the amount of water, which can be reused on-site and thus minimising the river water draw. General settling will be required to remove filterable solids prior to discharge, and to avoid any significant addition of dissolved solids. These trade waste standards are designed to apply the responsibility for a high level of housekeeping and careful attention to the design of stormwater management systems on the site to the individual facilities. A description of the type of wastewater treatment system that each facility will install is provided in the respective EMP (Chapters 6, 7, 8, 9 and 10).

Storage Ponds

Wastewater from each facility will pass through the facility treatment system and will then be directed to one of the three storage ponds to be located on-site. These storage ponds will be established at key low points, to which stormwater and process wastewater will be directed (Figure 5). One of these ponds will be selected to only receive and store relatively uncontaminated stormwater, such as from areas of the site where there are no active operations (30% of site), building roof areas and from the other two ponds when water quality is sufficiently good. This water will be used as make-up water for the Power Station (Figure 20) which reduces the quantity of water that will need to be extracted from the Huon River. A total of about 4.1 ha of pond will be required, depending on the on-ground depths available. The storage pond capacities have been estimated by calculation of the likely stormwater run-off during a 72 hour, 1 in 10 year rainfall event plus allowances for process wastewater, fire water storage and silt as described below. The storage area has been estimated based on the average depth available at each pond location.

The storage ponds will be lined with a 500 mm layer of clay rich material. The liner will have a permeability of 10^{-3} m/day to ensure no impact on groundwater. The design of the storage ponds will ensure that the structural integrity of the ponds will not be impacted by a rainfall event in excess of a 1 in 10 year event although water may overtop. In the case of a 1 in 50 year rainfall event, no catastrophic damage will occur to the pond integrity. It is considered that a 1 in 10 year return period provides a suitable environmental mitigation response to the effects of a stormwater release from the storage ponds. This is considered conservative in this instance because the main

water contaminants will be: substances that are naturally generated or occurring within the southern forest region (i.e. soil, bark, unprocessed timber particles etc.) and small quantities of TPHCs, oils. The water quality will always meet the requirements of the trade waste agreement.

Storage volume of the ponds will allow for:

- Approximately 45 days process storage (approximately 20 ML);
- Sufficient volume to collect run-off from a 72-hour, 1 in 10 year rainfall event (approximately 65 ML);
- Fire service water storage (1 ML); and
- An allowance for silt retention.

A water budget will be developed once technical specifications are available¹⁷. The level of water within the storage ponds will be maintained by using pumps with level indicators, such that at least 65 ML of storage space is available to capture run-off from storm events. The 65 ML capacity corresponds to a conservative assessment of the run-off emanating from a 1 in 10 year 72-hour storm. The storage volume in the ponds for this storm event will be preserved by use of the pumps to maintain water level in the ponds. The ponds will be connected via pipelines to enable transfer of wastewater between them to assist with the control of water levels.

The processed wastewater flows into and out of the storage ponds is as follows (refer to Figure 20 and Appendix X):

- Wastewater flow to the ponds – 89 ML/year;
- Wastewater extracted from the ponds for reuse in the facilities (other than the power station) – 145 ML/year.

As such the make-up water requirements are 56 ML per year (or 0.15 ML per day) which will be sourced from either the Huon River or run-off from rainfall events, with the latter, the preferred alternative.

As illustrated in Figure 20, water from the storage ponds will be used to meet the Power Station water requirements when water is available due to rainwater collection. River water will be used to supplement this source.

¹⁷ Commitment: Develop a water budget once technical specifications are available.

Based on an annual average rainfall of 880 mm, and assuming 70% run-off from 75% of the site, approximately 415 ML per year is potentially available on the site. The site will be designed such that at least 50% will be directed either to the storage pond designated for relatively uncontaminated stormwater, or away from the other two storage ponds. As a result there will be approximately 207 ML directed to the other two storage ponds.

Based on the available ‘reserve’ storage volume of 65 ML (for 72 hour, 1 in 10 year storm event), the storage ponds have the capacity for continuous average rainfall for 60 days before an overflow event could potentially occur under non-storm conditions. However, it should be noted that the 65 ML capacity will be kept free as reserve capacity at all times¹⁸. While the power station water demand (1,232 ML/yr) will be met by pumping from the relatively uncontaminated stormwater storage pond to the water pre-treatment plant or in times of low rainfall water will be pumped from the Huon River. The use of stormwater will decrease the demand for river water from the Huon River and minimise the potential for overflow from all ponds that could otherwise occur after 60 days due to accumulating rainwater run-off in the storage ponds.

It should also be noted that the run-off calculations described above do not take into account any losses due to evaporation from the site and as such are considered conservative.

In the event of a storm of greater impact than a 1 in 10 year, 72-hour duration storm, stormwater may overflow from the storage ponds. In these situations, water will be discharged to the natural drainage lines, Kings Creek and the Huon River, depending on the pond location. However, the overflow will have been significantly diluted in addition the Huon River will be in flood, carrying several orders of magnitude of similar forest and soil material from natural sources. Thus the impact is unlikely to be noticeable.

If significant contamination of an individual facility wastewater stream is known to have occurred on that site, the contaminated wastewater will be retained within the on-site sump(s) and pumped out by a licensed waste contractor. The material will then be disposed of in an approved manner. Refer also to Section 5.8.2 regarding monitoring of wastewater discharged to the site-wide system. Stormwater, for which collection to the storage ponds is impracticable from undeveloped areas of the Wood Centre, may continue to use natural drainage lines, as presently occurs.

¹⁸ Commitment: A capacity of 65 ML will be maintained at all times for a 72 hour, 1 in 10 year storm event.

A detailed assessment of the storage dam capacities will be undertaken as part of the detailed design stage of the development¹⁹.

Fire Service Water

Fire service water will be stored in the storage pond supplied with makeup water from the Huon River. Process water off-takes will be located so that fire service water is reserved in the storage pond. Pumping from the river will be possible if the level of the fire water storage drops due for example, to evaporation. Fire service water storage will be approximately 1 ML.

A reticulation system for process water will be combined with the fire service reticulation to avoid the need for duplicate reticulation system.

Wastewater Irrigation

A description of storage, location, irrigation system, monitoring and water quality are provided below in relation to wastewater irrigation. The potential impacts and mitigation measures of irrigation are given in Section 5.7.4.

Irrigation is used for two key purposes only:

- To dispose of water for which the TDS is too high for on-site recycling of wastewater and for which there is no practicable treatment; and
- To dispose of treated effluent from the sewage treatment plant as is normal practice.

The predominant dissolved solids in the high TDS stream are those present in the Huon River water taken onto the site: chlorides, sulphates and nitrates. None of these are removable by conventional settling, filtration or flocculation techniques. The major source of this flow is the bleed stream from the power station cooling tower. Minor flows are the boiler blowdown and the boiler water treatment bleed stream in the power station.

Similar minor flows (boiler blowdown and the boiler water treatment bleed stream) at the sawmill and veneer mill heat plants will be accepted into the sewage treatment plant on the basis that they are not biologically active and in no way affect the efficiency of the sewage treatment plant. The TDS load that these flows introduce to the sewage treatment plant will simply be passed without effect to the effluent and

¹⁹ Commitment: Assess storage dam capacities as component of detailed design stage of the development.

proceed to irrigation. Effects on the irrigated areas will be assessed as part of the irrigation design and management plan.

Storage

Wastewater from the sewage treatment plant will be pumped from the polishing pond to a storage pond which will be lined with 500 mm thick clay rich material and have a permeability of 10^{-3} m/day to ensure no impact on groundwater. The storage pond will be constructed at a suitably high point above the intended area of irrigation to facilitate a gravity fed, portable piped irrigation system extending over the area to be irrigated. The irrigation system will allow for controlled distribution of wastewater across the site being irrigated. The regulated irrigation of wastewater onto the site will afford control over the distribution of total water onto the site during periods of peak water run-off as a result of heavy rainfall or other forms of precipitation.

Site Location

Potential irrigation area(s) close to the site have been identified. There are several potential plantation irrigation sites available within a short distance of the Wood Centre (Figure 21). The decision on how extensive an area will be irrigated depends in part on the additional value that is added through improved plantation growth rates. The additional value will have to cover the associated costs of irrigating at greater distance from the Wood Centre.

The primary wastewater irrigation area, will be situated approximately 0.5 km north-west of the Wood Centre and is comprised of primarily *Eucalyptus globulus* plantation and provides up to 400 ha of plantation for the disposal of wastewater. The plantations have been established on forest coupes within the Barnback block of the Huon District.

Site Description

The primary wastewater irrigation area has a southeast aspect and is moderate to gentle in slope. Soil classification surveys conducted on the site have revealed parent material of a predominantly Jurassic dolerite, with a well structured, well to moderately well drained soil profile with traces of dispersed mottled sandstone and mudstone.

In terms of soil degradation potential, *Forest Soils of Tasmania* (Grant et. al. 1995) indicates that this soil type has a low erodibility factor, with flooding being recorded as negligible.

An opportunity to disperse wastewater through irrigation also exists on plantations planned for sites to the south of the Wood Centre. These sites will however, act as a stand-by area for future irrigation if warranted.

Irrigation System

A system of irrigation lines consisting of perforated “Ag pipes” will be spread across the extent of the area at 45-degree angles to the contour. This measure facilitates a consistent flow of water across the site and prevents “puddling” and excessive water build up on any given area of the site.

If access control to the irrigation area is required, measures will be implemented along with the necessary signage requirements. The area would be fenced and roads gated to prevent access to the site during irrigation.

Monitoring

Daily irrigation flow will be recorded on an integrated flow meter placed on the irrigation mainline. If necessary the water volume will be irrigated in a number of shifts and not necessarily on a consistent basis. Soil moisture content will be monitored to determine timing and suitability of irrigation. Irrigation volume recordings can be undertaken either manually or electronically.

Integrated records of the daily flow of wastewater through the irrigation system will be maintained. It is anticipated that an estimated daily volume of 100 kilolitres will be irrigated onto the sites from the sewage treatment plant.

Impacts and mitigation measures on the environment are considered in Section 5.7.4.

Water quality

Wastewater to be dispersed through the irrigation program will be monitored within the process wastewater monitoring operations conducted at the Wood Centre. Section 5.8.2 provides a detailed description of the wastewater monitoring initiatives prior to wastewater being irrigated onto plantations.

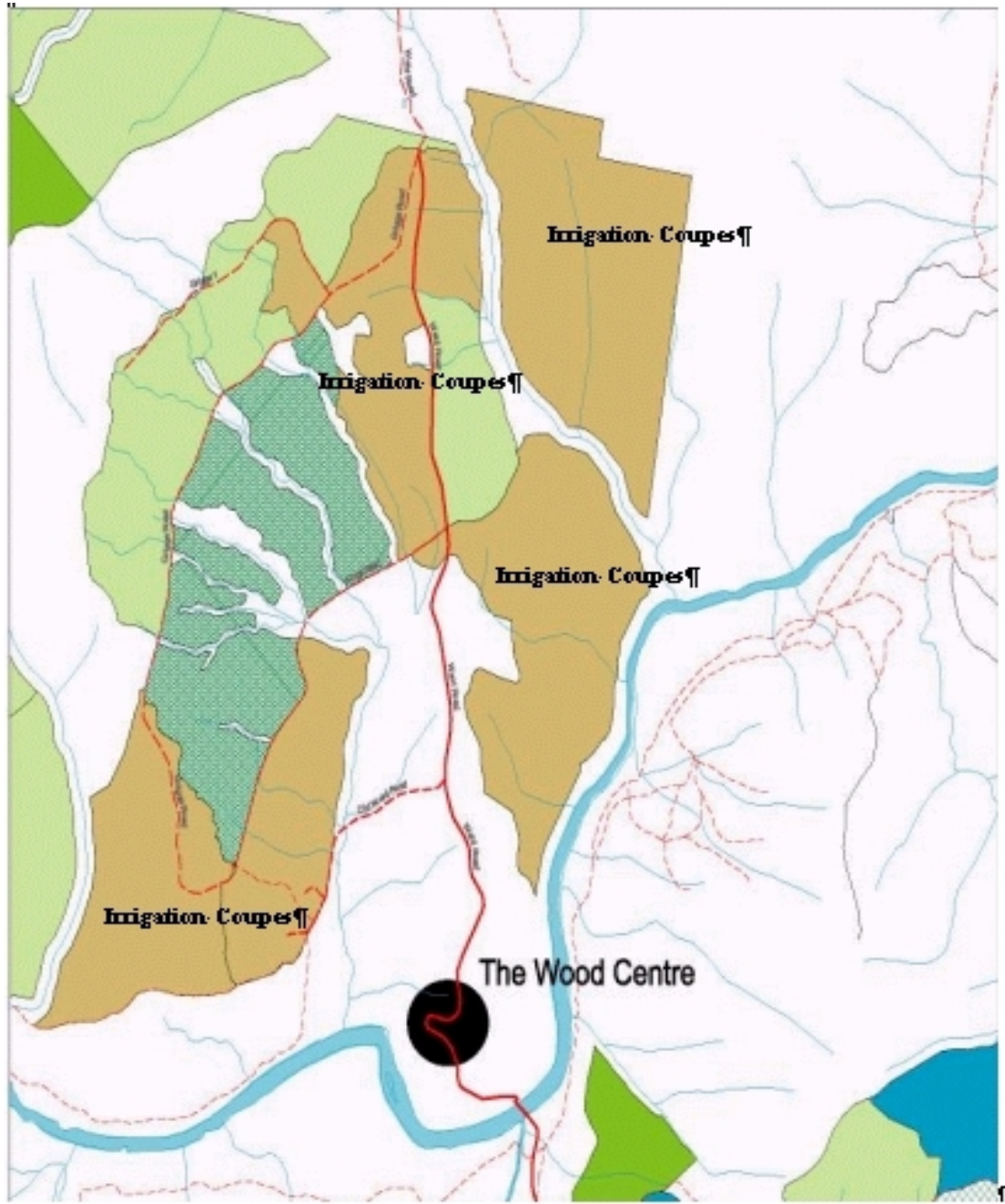


Figure 21 Irrigation Site Location Plan

Domestic Wastewater

Domestic wastewater will be collected by a reticulated sewerage scheme and treated in a mechanical treatment plant that will be supplied and installed under a performance based contract specifying that treatment standards must comply with DPIWE regulations, as provided in Table 50. The plant will provide biological treatment by aeration and storage of sludge. Sludge will periodically be disposed of off-site, either by beneficial reuse or, if this is not feasible, by disposal to a landfill site approved for this purpose. Wastewater from the plant will be directed to a storage pond and then to irrigation. The sewage treatment plant and polishing lagoon will be located in the sewage treatment plant area shown in Figure 5.

Pump stations and pressure mains will transfer sewage from the various amenities established at the wood processing facilities on-site to the sewage treatment plant. The final development is expected to require 5 pump stations, approximately 1 km of sewer and approximately 1 km of pressure main. The pump stations will be designed in accordance with DPIWE guidelines.

If required, additional treatment would be provided by sand filtration, additional aeration and/or chemical precipitation.

Sewage treatment plant water will then be applied to an approved area of land that is situated close to the site by irrigation as described above.

5.6.2 Quantity and Quality of Site-Wide Wastewater

Process Wastewater

The typical quantities of wastewater generated from the various facilities that will be directed to communal storage ponds are shown in Table 49.

Domestic Wastewater

Up to 32 kL/day (assuming 0.15 kL of water used per person/day) of domestic wastewater is predicted to be generated site-wide. In addition, some boiler water treatment bleed stream and blowdown from the heat plants will be directed to the sewage treatment plant. All of this wastewater will be collected separately and directed to the sewage treatment plant. The sewage treatment plant will be designed specifically to manage the combination of sewage and minor quantities of chemicals involved in the boiler water treatment.

Table 49 Typical Quantities of Wastewater including Stormwater to be Directed to the Communal Storage Ponds System

Facility	Wastewater Discharge (ML/yr)	Comments
Merchandising Yard including truck wash	48.0	<ul style="list-style-type: none"> Collection of log irrigation and log wash run-off and reuse for log irrigation. Recycle and top up system for truck wash. Top up as necessary. Discharge during rainfall events and/or if water becomes high in suspended solids.
Sawmill	1.0	<ul style="list-style-type: none"> Log wash recycling.
Wood Fibre Mill	40.0	<ul style="list-style-type: none"> Log wash recycle and top up.
Rotary Peeled Veneer Mill	0.0	
Power Station	0.0	
Total	89.0	

Table 50 Sewage Treatment Plant Water Quality Performance Requirements

Parameter	Guidelines for the Use of Recycled Water in Tasmania (DPIWE, 2000)
Biochemical Oxygen Demand (5 day)	20 mg/L
Non-Filterable Residue	50 mg/L
Oil and Grease	-
Faecal coliforms (E.Coli)	<10,000 thermotolerant coliforms/100mL
Nitrogen (Ammonia)	<100kg N/ha/yr for an all year round operation, and/or calculated to meet plant uptake requirements.
Nitrogen (Nitrate or Nitrite)	As above
Phosphorous	To be calculated to meet plant uptake requirements.
Total Dissolved Salts (TDS)	< 1000 mg/L
pH	5-7

5.6.3 *Emission Sources*

Air and Odour Emissions

Wastewater storage and treatment on-site constitutes a potential source of odour if not managed appropriately due to the release of methane and hydrogen sulphide gases.

Similarly, wastewater reuse operations off-site have potential to generate nuisance odour if not managed appropriately.

Water Emissions

Two types of wastewater will be managed on a site-wide basis:

- Process wastewater from facilities (including both stormwater and wastewater which has undergone primary treatment); and
- Domestic wastewater.

The predicted quantities of wastewater to be discharged from each facility and directed to the storage ponds for treatment are detailed in Section 5.5.3 above.

The wastewater that is discharged from the proposed timber processing facilities and collected in the storage ponds will predominantly contain the following contaminants:

- Tannins (give water distinctive coloration);
- Suspended solids (e.g. wood fibres and soil);
- Biochemical oxygen demand;
- Nutrients (e.g. nitrogen and phosphorous);
- Weed seeds;
- Soil and plant pathogens; and

(Note: hydrocarbons and coarse solids will have been reduced by treatment systems established at each of the respective facilities).

It should be noted that process wastewater will not be discharged from the Wood Centre site as the storage ponds are located within the Wood Centre itself (Figure 5). Discharge will only occur during high rainfall events as described in Section 5.6.1.

Domestic wastewater will comprise sewage from amenities established site-wide and small contributions from the boiler water treatment bleed stream and heat plant

blowdown. This wastewater is likely to be high in suspended solids, BOD, nutrients and pathogens and may contain minor amounts of treatment chemicals.

Noise Emissions

The only components of the communal wastewater treatment system that will have potential to generate noise which could be cause for nuisance is the pumping facilities for directing wastewater from the storage ponds to the on-site facilities or from the sewage treatment plant to the irrigation area for reuse.

The irrigators for application of treated wastewater to land have potential to generate low level short term noise but this is considered negligible.

Solid Waste

The wastewater treatment system will generate both screenings (comprising mainly wood fibre, leaves, soil and rocks), and sludge from the ponds. It is not possible to predict the quantity of sludge and/or screenings that will be generated by the communal system, as it will depend on the separation efficiency of the systems in place, both communally and at each facility and the adequacy of the management of each facility.

Similarly, screenings and sludge will be generated within the communal sewage treatment system.

Greenhouse Gas Emission

Wastewater storage and treatment on-site constitutes a potential source of greenhouse gas emissions due to the release of methane and hydrogen sulphide gases.

5.6.4 Projected Hours of Operation and Employment

Both of the wastewater treatment facilities (process and sewage) will operate 24 hours per day, all year round, with the pumping operations being intermittent and automated.

The wastewater reuse operation will have potential to operate up to 24 hours per day on an as-needed basis.

The potential impacts and proposed management measures are described in Section 5.7 below.

5.7 Site-Wide Potential Impacts and Management Measures

The potential environmental impacts of the above site-wide operations and activities and the proposed management measures to mitigate these impacts are described in the following chapters. The hazardous materials stores and potential sources of emissions are illustrated in Figure 22.

5.7.1 *Terrestrial*

Potential Impact

Geotechnical investigations determined that materials on-site were of suitable load bearing capacity for the proposed development. Development of the site will require some levelling of the landform and will impact on the glacio-fluvial terraces that have potential geoconservation values. Quarrying operations in some areas have already impacted on these terraces.

Disturbance of the glacio-fluvial terraces and the erodible quartz soils that comprise them has potential to result in soil erosion if not managed appropriately during both construction and operation of the facilities developed on-site.

No contamination is known to exist on-site and no assessment of potential contamination is considered necessary due to the limited human activity on-site.

Management Measures

Where disturbance of the glacio-fluvial terrace is unavoidable, the soil profiles will be documented and recorded²⁰. These records will be made available upon request.

As noted in Section 5.2.1, unnecessary ground disturbance will be minimised through the installation of a highly visible construction boundary at the perimeter of the proposed works. During development construction machines will not cross the construction boundary.

Similarly, the extent of acceptable vehicular movement will be defined for vehicles and activities during operation of the site²¹.

²⁰ Commitment: Document and record the glacio-fluvial terrace system where it is to be disturbed.

²¹ Commitment: Establish boundaries during construction and operation to limit surface disturbance by vehicular activities.

Due to the erosion potential of soil on the site the following measures will be implemented:

- Establishment of sediment retention measures during construction to minimise potential sedimentation of surrounding areas as described in Section 5.2.1;
- Slope of cut and fill batters will be less than a ratio of 1.5 horizontal to 1 vertical²²;
- Rapid implementation of rehabilitation and/or stabilisation (e.g.. use of geotextiles, use of previously cleared vegetation as slash) works will be a priority;
- During construction, areas exposed to excavation will be minimised²³;
- Plant and mulch areas as soon as possible²⁴; and
- Establishment of sediment retention measures during construction to minimise potential sedimentation of surrounding areas.

The stormwater management system as described above will be constructed for use during operation of the site²⁵. This system will collect all stormwater from the site,

²² Commitment: Cut and fill batters will be less than 1.5 horizontal to vertical

²³ Commitment: Minimise areas exposed to excavation.

²⁴ Commitment: Plant and mulch areas as soon as possible.

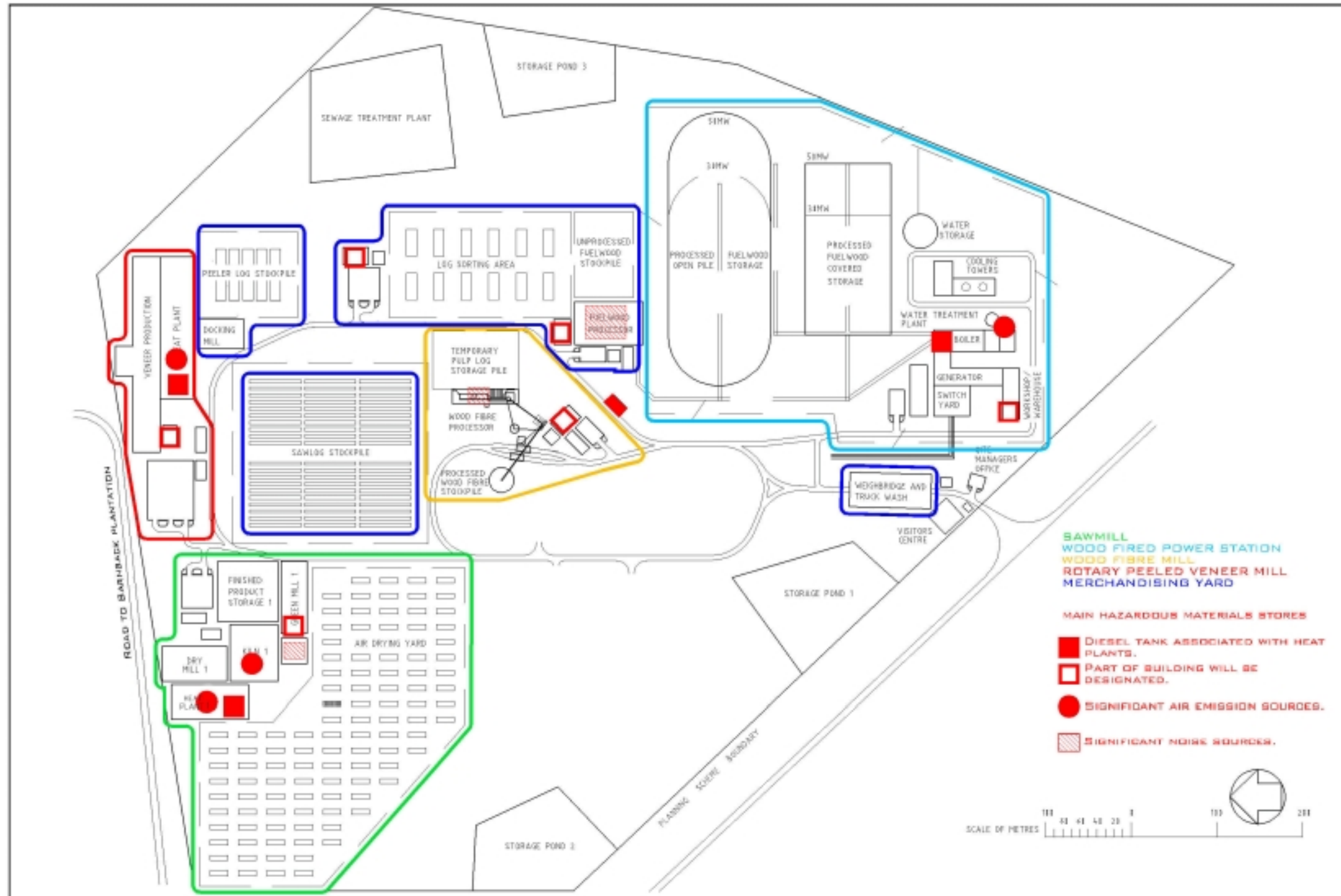
²⁵ Commitment: Construct a stormwater management system during the construction period to prevent erosion.

and store and treat it as determined appropriate for reuse to minimise potential erosion or sedimentation of the surrounding environment²⁶.

These measures will ensure compliance with the current best practice environmental management conditions operating throughout Australia.

²⁶ Commitment: Collect and treat all stormwater from the site during construction.

Figure 22 Hazardous Materials Stores and Potential Emission Sources



5.7.2 *Atmospheric Emissions and the Greenhouse Effect*

Potential Impact

The main potential impacts on air quality as a result of the site-wide operations will be associated with the generation of:

- Dust from the internal road network;
- Greenhouse gas emissions from vehicle exhaust;
- Greenhouse gas emissions from the sawmill, Rotary Peeled Veneer mill and power station;
- Wood fines from fugitive escapes from fuelwood storage piles and wood fibre processing equipment;
- Odour from the storage ponds;
- Odour from the sewage treatment plant; and
- Odour from the wastewater irrigation areas.

Dust Generation

Vehicles have the potential to bring dust soil and dirt from elsewhere onto the site. In addition, disturbed areas of the site have the potential to generate windblown dust and soil.

During construction soil stockpiles have the potential to contribute to site-wide dust generation.

Greenhouse Gas Emissions

The Federal Government has prepared the National Greenhouse Strategy to address the issue of global warming from the greenhouse effect. This is part of an international effort coordinated between national governments.

The greenhouse effects of the Wood Centre project are considered together with the associated forestry activity, although that forestry activity is outside the scope of this DPEMP application. The Regional Forest Agreement controls forest use, which includes the economic use of the southern forests.

Forest growth, harvesting and regeneration over a constant land area are part of a carbon cycle that is greenhouse gas neutral. New forests on previously cleared land

will sequester carbon.

In general terms the forest harvesting activity removes a carbon sink and converts some into products which can also be sinks (eg sawn timber), while at the same time releasing CO₂ to the atmosphere by the combustion of harvesting residue on the forest floor and by the eventual decomposition of wood fibre used in paper and timber production. However, replanting and growing new forest locks up and re-absorbs carbon over time. The management of a fixed area of State Forest is such a continuum. A power station will burn significant amounts of wood by-product leading to the production of CO₂ from the combustion process. When each activity is considered in isolation there is an apparent increase in CO₂ released to the atmosphere together with the loss of a significant carbon sink. When considered together a different picture emerges.

Wood Centre and CO₂ released from combustion

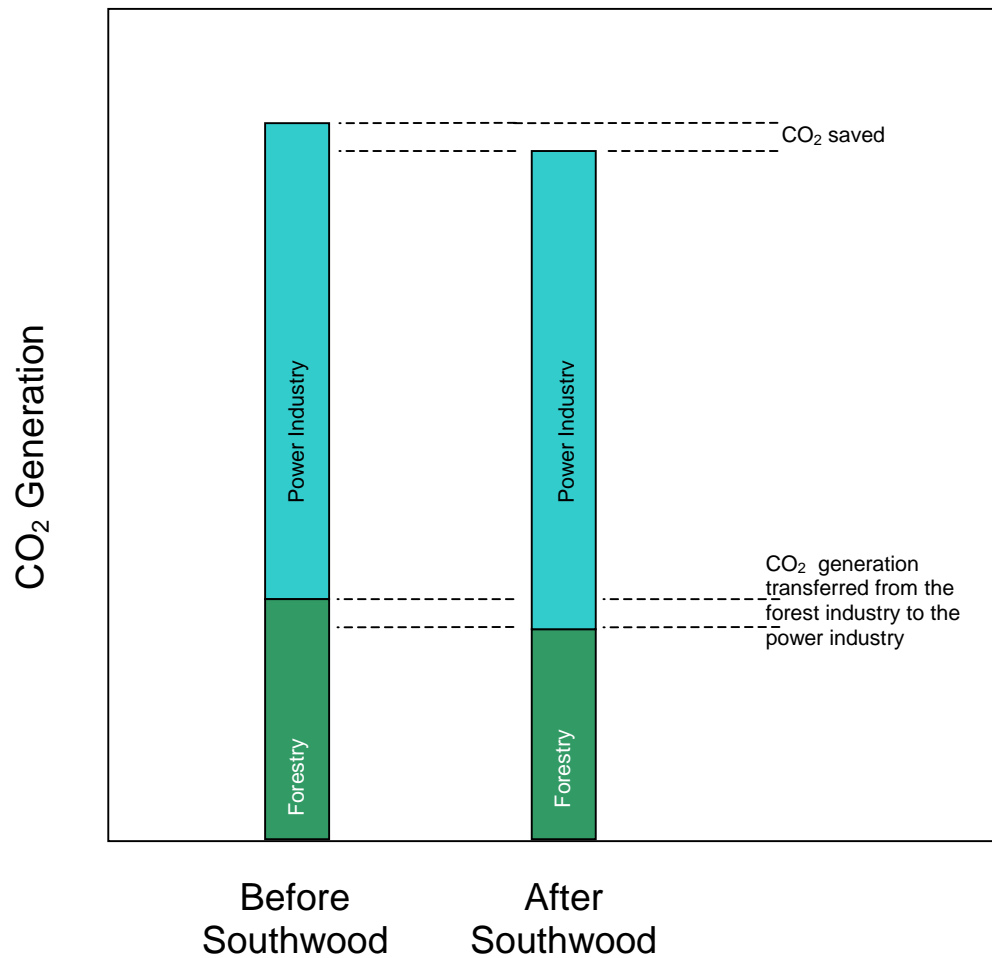
When considered more closely the Wood Centre, which integrates a number of wood fibre activities together, actually reduces the generation of greenhouse gases in Australia. Tasmania is about to join the National Energy Grid with the construction of the ‘Basslink’ power cable linking Tasmania to the national electricity grid. Power generated in Tasmania can be transmitted to Victoria and in a similar manner, power from Victoria can be transmitted to Tasmania. With Tasmania part of the National Energy Grid the greenhouse effects of the Wood Centre can be considered on a national basis.

Current forest practice requires that residue left in the forest is burnt. The reasons for this are two-fold. The native forest regeneration requires a clean mineral soil for seeds to re-establish. Regeneration burns ensure that fuel loads are reduced assisting with protection from wildfire. Plantations use a windrow technique to reduce the area of land that is lost to re-planting and to facilitate cultivation and other plantation establishment processes. In either case the residue left on the forest floor is burnt releasing the sequestered carbon as CO₂. With the Wood Centre, forest residues are collected, taken to the central point, comminuted, dried and burnt in a power station. When considered in the Tasmanian context, the release of CO₂ effectively remains the same. The CO₂ released will be the same whether it comes from the open forest burning or combustion within the power station.

When the Wood Centre is considered on a national basis the picture is different. Firstly, the power generated by the Wood Centre power station will not lead to an increase in the use of electricity, therefore the power generated at the Wood Centre will displace power generated by combustion elsewhere in the national grid. This point is illustrated in the ‘Power Industry’ portion of Graph 1. CO₂ released from the power station simply offsets the CO₂ produced elsewhere in the national grid from combustion of coal or natural gas, both fixed non-resequesterable carbon sources.

The CO₂ that was produced in the forestry industry is now transferred to the power industry, as shown in the 'Forestry Industry' portion of Graph 1. This therefore leads to an actual reduction of CO₂ production on a national basis. The CO₂ production from the power industry remains the same while the CO₂ produced by forestry is reduced.

Graph 1 Comparison of CO₂ release from both the power generation and forestry industries



Wood Centre and CO₂ sequestering

The removal of the existing forest represents the loss of a carbon sink in the form of trees. The use of the wood will be for timber (sawmill and rotary peeler veneer mill) and for paper production (wood fibre mill). Both the timber and paper products will act as temporary carbon sinks for the carbon contained in the tree. The Australian Greenhouse Office (AGO, 1998a) has assigned four decay categories for forestry products depending on the final use of the wood fibre. These are outlined Table 51.

Table 51 Categories of Forestry Product Decay Rates

Term	Years to Decay	Product
Short term	Decay in the year of harvest	Paper
Short-medium term	Decaying over 10 years	Panel products such as fibreboard
Medium-long term	Decaying over 25 years	Sawn timber, furniture & packing crates
Long term	Decaying over 50 years	Building construction & fence posts

(AGO 1998a)

Paper products will in fact have a life greater than 1 year when taking into account long lived paper products such as book production.

While the wood products represent a temporary carbon sink, new forests are usually developed within 1 year of the harvesting of the original forest. These forests will replace the original forest as a carbon sink. However the original forest will have developed a balance between carbon stored in the form of standing forest, and carbon released in the form of decaying trees. A new forest will eventually sequester more carbon per year than a mature forest. This will continue until the new forest reaches maturity and a balance between carbon sequestered through plant growth and carbon lost through plant decay. Some parts are not replanted such as road easements etc. However, new plantation areas are also created on land that was not previously forest. At present, more forest is being created in Tasmania than is being harvested on balance.

In an actively managed forest regime where carbon is removed to forest product sinks such as construction timber and atmospheric carbon is sequestered into actively growing forest trees the amount of carbon removed from the atmosphere will steadily increase.

Odour – Storage Ponds

The build-up of sediment in the storage ponds may result in the generation of odours if not managed appropriately. Odour control of the storage ponds is discussed under management measures in this section.

Odour – Sewage Treatment Plant

Odour sources associated with the operation of the sewage treatment plant should be minimal if it is operated effectively. Odour control of the sewage treatment plant is

discussed under management measures in this section.

Odour – Irrigation

Similarly, odour associated with the irrigation of water from the sewage treatment plant should be minimal with careful planning and application of management measures. The likely reasons for odour generation from wastewater irrigation is overloading with organic matter contained in the effluent. BOD concentration of the effluent, volume applied and soil characteristics are key factors in this regard. Odour control at the irrigation site is discussed under management measures in this section.

Potential odour generation associated with the irrigation of wastewater from the wood processing operations should not be too offensive in nature as it will be of a wood type odour, with irrigation occurring at a distance from operational areas of the Wood Centre.

Management Measures

Dust Generation

Dust generation will be minimised by sealing all major roads on the site²⁷.

Good housekeeping practices (including road sweeping or watering where required) will be undertaken to prevent a build up of soil, woodchips and dust on the road surfaces²⁸. In addition, the areas of the site that are disturbed will be revegetated to prevent the generation of windblown soil and dust²⁹.

Tarpaulins will cover stockpiles of dusty construction material (e.g. cement and fine sands in bays or ready mix trucks) to minimise dust generation³⁰.

Conveyor systems will be covered to minimise dust generation during wood fibre transfer.

²⁷ Commitment: Seal the internal ring road.

²⁸ Commitment: Undertake good housekeeping to prevent build up of soil, woodchips and dust on roads.

²⁹ Commitment: Revegetate disturbed areas to prevent generation of windblown soil and dust.

³⁰ Commitment: Cover stockpiles and truck cargoes with tarpaulins during construction.

Greenhouse Gas Emissions

Specific management measures for greenhouse gas emissions are discussed in the relevant Chapters dealing with individual operations on the site. No site-wide measures are applicable.

Atmospheric Conditions

A weather station will be installed in the vicinity of the site to gather meteorological data for modelling and to develop subsequent additional mitigation measures for air pollution³¹.

Odour Control

The regular removal of sludge from the storage ponds and the sewage treatment plant will ensure potential odours are managed properly.

In addition to sludge management, the following measures will be used to prevent odour emissions³².

- Careful planning;
- Proper operation;
- Maintenance;
- Personnel training;
- Comprehensive operations manual;
- Avoidance of shock and toxic loadings; and
- Contingency measures to deal with malfunctions.

The operation of the irrigation area in accordance with a management plan (refer to Section 5.7.4) will ensure that odour emissions are minimal. Careful planning, even spreading of effluent and frequent inspections are measures that will be included in the management plan for preventing nuisance odours from effluent irrigation. In

³¹ Commitment: Install and monitor weather station on the site to provide data for air quality modelling prior to commissioning.

³² Commitment: Implement management measures to reduce the potential for nuisance odour generation.

addition, the isolated location of the storage ponds, sewage treatment plant and the irrigation area will prevent any adverse impacts. The six measures listed above will be applied to the odour control for the sewage treatment plant.

Signage will be erected at the site providing a contact telephone number if problems eventuate that require attention³³. Any odour problems will be investigated as soon as practicable. In addition, a logbook will be kept by the Site Manager to record any odour complaints³⁴ (Refer to Section 5.11.2). The Site Manager will initiate such actions as are necessary to eliminate the odour problem.

5.7.3 *Water Supply*

Potential Impact

As noted above, the proposed development will draw water from the Huon River for use within the operation. The estimated quantity of water required is likely to be less than 3.3 ML/day.

The abstraction of water from the Huon River in excess of that required for maintaining environmental flows would have potential to result in an adverse impact on the health of the aquatic ecosystem of the river. Although an environmental flow has not been developed for the river, long term monitoring of flows in the Huon River (as noted in Chapter 3) indicate that the proposed maximum water abstraction of 5 ML per day should not adversely impact on the health of this aquatic ecosystem.

This is based on the typical calculated lowest flow (recorded in the last 30 years) for the Huon River near the site being 497 ML per day, with an average flow over this period of 6,690 ML/day.

It is considered that extraction of water at a maximum 1% of the total river flow will make only a minor difference on the total river flow. Some work on establishing minimum environmental flows in various rivers is currently proposed. If, once a minimum environmental flow is established, an impact is identified, additional water storage can be provided on-site to reduce the volume of water extracted during periods of low flow³⁵.

³³ Commitment: Erect and maintain signage with a contact number for notification of problems.

³⁴ Commitment: Investigate and record odour complaints.

³⁵ Commitment: Create additional water storage on-site if water extraction from the Huon River during low flow periods has to be reduced.

The size of the pump required to meet the desired pump rates may involve disturbance to the riverbank and water quality. The bank will be subject to potential erosion as a result of constructing a foreign structure into the river channel. The additional in-stream structure may potentially affect streamflow and redirect the erosive forces of water. The power supply for the pump requires high voltage reticulation and a transformer in most cases. There is a potential for the transformer to leak oil on land and/or into the river.

Management Measures

As a precaution, management measures will be implemented to minimise the potential for large volume abstraction during low flow periods. This will include:

- Reference to ongoing data from the DPIWE monitoring station to predict the optimal times for abstraction operations³⁶;
- Ensuring optimal use of recycled water to minimise extraction requirements³⁷.

Construction of the intake pipes in the Huon River will be undertaken during low flow in order to prevent excessive erosion. Some siltation of river water will occur but will be minimised by use of a weir structure to divert water around the construction area and installation of silt fencing downstream of the construction site. Once in place, the water extraction structure will not cause erosion or silting in the riverbed.

Scouring of the riverbed at the river water intakes will be prevented by replacing the shingle in front of the intake pipes to act as a filter and using a conservative intake design velocity even at low river levels.

The power supply will be obtained from the site reticulation system and a pole mounted transformer will be used if necessary.

5.7.4 Wastewater Emissions

Potential Impact

Stormwater

Uncontrolled release of uncontaminated stormwater has potential to result in erosion and sedimentation of surrounding areas if not managed appropriately. There is the

³⁶ Commitment: Predict optimal abstraction timing using DPIWE ongoing monitoring data.

³⁷ Commitment: Ensure optimal use of water.

potential for entrainment of sediment in surface run-off that would cause soil disturbance.

Process Wastewater

A large proportion of hydrocarbons and coarse solids will have been removed by treatment systems established at each of the respective facilities prior to entering the communal process wastewater treatment system.

The process wastewater treatment system will provide further settlement and polishing of the primary treated wastewater from each facility. The treated wastewater is likely to have low level:

- Suspended solids (e.g. wood fibres and soil);
- Biochemical oxygen demand;
- Nutrients (e.g. nitrogen and phosphorous);
- Chemical residues after treatment; and
- Soil and plant pathogens.

In addition, oil and grease could be found in the wastewater if general housekeeping is not conducted well. If untreated and emitted to the environment, in particular where it is allowed to enter watercourses or groundwater, these contaminants have the potential to degrade the receiving environment (e.g. reduced health of aquatic habitats or sedimentation of vegetation).

As well as surface waters, there is a potential for impact on groundwater of the processing site and the irrigation sites.

Groundwater contamination at the processing site could be a result of:

- Leakage of wastewater from the storage ponds;
- Leakage of wastewater from the pipe system between each facility and the storage ponds; and
- Leakage from the hazardous materials storage areas.

Groundwater contamination at the irrigation sites could be as a result of inadequate management of the irrigation system.

There is a low potential for the further spread of *Phytophthora cinnamomi* associated with vehicle washdown and wastewater irrigation operations to be conducted on-site, as there are already records of widespread infestations within the south east region.

It is likely that even after treatment, the wastewater will still contain some tannins, giving it a distinctive red-brown coloration.

Domestic Wastewater

Domestic wastewater will be collected and treated to a standard to enable reuse by irrigation. If the sewage treatment plant and the irrigation system are not managed appropriately, wastewater of unacceptable quality may be generated and run-off to natural drainage lines may occur.

Application of large volumes of wastewater to land could result in soil erosion and subsequent sedimentation of surrounding areas, if adequate vegetative cover is not maintained. In addition, irrigation during the winter may potentially result in super saturation of the irrigated soils.

Other potential impacts of irrigation include:

- Run-off into surface waters;
- Groundwater contamination;
- Public and occupational health;
- Degradation of soil structure;
- Generation nuisance odours; and
- Adverse impacts on fauna, flora, aboriginal and historical values during construction and operation of the scheme.

Management Measures

Stormwater

As described in Section 5.2.1 the site drainage pattern will be determined and drains and storage ponds will be constructed prior to facility construction. During construction potential entrainment of sediment in surface run-off will be minimised through the establishment of construction boundaries to limit soil disturbance, and sediment retention fences will be used as appropriate.

During operation of the site, highly trafficked areas will be paved and/or be constructed of compacted material to minimise sediment entrainment in surface run-off. Surface run-off from all areas with potential for sediment entrainment, or other contamination, will be collected, directed to the communal storage ponds for treatment and reuse.

Water collected from roof areas will be collected in guttering and downpipes and piped to the storage pond designated for relatively uncontaminated stormwater where practical³⁸.

Water from undeveloped areas will continue to flow in natural drainage lines³⁹.

Process Wastewater

Process wastewater (including stormwater from developed areas) will be collected from each of the proposed facilities and directed to one of three storage ponds. On-site treatment at each facility will be provided⁴⁰ and will:

- Remove solids by screening (fine and coarse screening); and
- Contain potential spills of hazardous materials requiring further remediation or removal for alternative approved disposal.

If the wastewater collected in the storage ponds exceeds the requirements of activities on-site for reuse (e.g. during storm events, 1 in 10 year 72 hour event), then wastewater may overflow from the storage ponds as discussed in Section 5.6.1. This is determined to be a suitable approach to wastewater management during flood conditions because the Huon River will be in flood and will be carrying several orders of magnitude of similar forest and soil material.

Overflow from the storage ponds in non-storm events will be minimised by the management of stormwater on-site⁴¹. These measures will include:

³⁸ Commitment: Direct stormwater from rooves to screening/interceptor system and onto site-wide clean storage pond where practical.

³⁹ Commitment: Drainage from undeveloped areas will continue to flow in natural drainage lines.

⁴⁰ Commitment: Provide on-site wastewater treatment at each facility.

⁴¹ Commitment: Manage stormwater on-site.

-
- Maintenance of one storage pond designated for relatively uncontaminated stormwater;
 - Use of storage pond stormwater in the Power Station;
 - Pumping of water between ponds to maintain the 65 ML reserve capacity; and
 - Direction of relatively uncontaminated stormwater to the designated storage pond and away from the remaining two storage ponds.

The stormwater management will ensure no overflow during non-storm conditions⁴².

The treatment of wastewater by screening and settlement (i.e. removal of potentially contaminated soil and plant material) should significantly reduce the potential for the introduction and/or spread of *Phytophthora cinnamomi* associated with wastewater management on-site.

The *Eucalyptus globulus* plantations are *Phytophthora cinnamomi* resistant so irrigation will not cause problems to those areas.

Vegetation within the reuse and immediately adjacent areas will be monitored for *Phytophthora cinnamomi* after irrigation⁴³ (Refer to Section 5.8.2).

Sludge in the stormwater/wastewater storage ponds will be checked annually and samples for analysis taken. Based on the results of these tests a suitable disposal site will be selected and the sludge removed when it has reached 10% of the total storage (which will be allowed for in pond design). A sludge maintenance program and desludging protocol will be developed and implemented within 12 months of operation⁴⁴.

The Sewage Treatment Plant will be designed to ensure that bleed stream from the boiler water treatment system can be effectively managed by the sewage treatment

⁴² Commitment: No stormwater overflow will occur during non-storm conditions.

⁴³ Commitment: Monitor vegetation sprayed with treated water for signs of contamination or damage due to application.

⁴⁴ Commitment: Remove sludge from stormwater settling ponds when it has reached 10% of the total storage or as determined necessary, and beneficially reuse where possible. The sludge maintenance program and desludging protocol will be implemented within 12 months of operation.

plant process⁴⁵. This may involve the introduction of a buffer system to meet the sewage treatment plant requirements.

Domestic Wastewater

Domestic wastewater (including sewage and greywater) will be collected from all facilities on-site and directed to the sewage treatment plant⁴⁶. During construction port-a-loos will be provided by a contractor along with regular disposal⁴⁷.

As detailed in Section 5.6, the treatment plant will be designed to meet prescribed wastewater quality requirements as specified in regulations and agreed to with DPIWE and suitably manage concentrations of water treatment chemicals⁴⁸.

A water quality-monitoring program will be developed and implemented as detailed in Section 5.8.2 to assess the effectiveness of treatment and reuse systems.⁴⁹ If performance monitoring of this system finds solids removal to be inadequate, additional treatment will be investigated and implemented (e.g. flocculation).

The preliminary hydrogeological review undertaken by Weldon, 2000 (Appendix W) suggests that the development site, on a ridge, should be a re-charge area of groundwater. However, engineering logs indicate that there are natural materials in the soil profile that act as a barrier to infiltration. It is expected that most infiltration will move along the top of the natural barrier materials, which may not be continuous. Springs have not been observed around the outer slopes of the ridge but an inspection of the escarpment was undertaken only in the south where a road was constructed recently to provide access to the Huon River bridge crossing. The groundwater table beneath the ridge is expected to be relatively flat and, because of the presence of the Huon River, it is unlikely to be highly elevated. The vulnerability of the groundwater to pollution through infiltration is assessed as low due to due to the limited

⁴⁵ Commitment: Ensure the sewage treatment plant is designed to manage boiler water treatment chemicals.

⁴⁶ Commitment: Direct all sewage from all facilities to the on-site sewage treatment plant.

⁴⁷ Commitment: Utilise portable toilets during construction with regular disposal by contractor.

⁴⁸ Commitment: Collect and direct domestic wastewater to appropriately designed on-site treatment plant.

⁴⁹ Commitment: Monitor water quality to determine if other methods of treatment need to be implemented.

contamination generating activities undertaken, and the management measures which will be in place. These measures are as follows:

- The storage ponds will be lined with an impermeable clay liner⁵⁰;
- The pipe system reticulating the wastewater will be designed, constructed and maintained in accordance with industry best practice⁵¹;
- The quantities and types of hazardous material stored on-site is limited, and where these are stored on-site, this storage will be in accordance with Australian Standards (refer to Section 5.7).

The potential for groundwater contamination at the irrigation site will be addressed in detail in the Irrigation Management Plan, which will be developed prior to the implementation of the irrigation program⁵².

The Irrigation Management Plan will be prepared in accordance with the DPIWE draft “Guidelines for the Use of Recycled Water in Tasmania”, and will include a consideration of;

- Storage and irrigation design;
- Water balance;
- Total land area requirement;
- Irrigation methods;
- Irrigation scheduling;
- Leaching;
- Groundwater;
- Drainage;

⁵⁰ Commitment: Line storage ponds with impermeable clay liner.

⁵¹ Commitment: Design, construct and maintain wastewater reticulation piping in accordance with industry best practice.

⁵² Commitment: Develop Irrigation Management Plan prior to irrigation program implementation. Address the potential for groundwater contamination at the irrigation site in the plan.

- Vegetation; and
- Security.

Wastewater from the sewage treatment plant will be reused for irrigation in accordance with an approved irrigation management plan developed for the site.

Contingency Measures

The proposed wastewater management system described above provides a number of levels of protection for environmental impact on ambient surface and ground water quality.

Firstly, each facility will have a sump and separator/screening system to collect all wastewater from the facility, which will be reused on-site (primary containment).

Secondly, any wastewater not reused within the facility will be pumped to the storage ponds where it will in turn be reused on the site (secondary containment).

In addition, if the wastewater from the particular facility does not meet the site-wide storage pond standards the manager of that facility will be required to treat or dispose of the water from the sump in such a manner to avoid environmental harm. This will require each facility to closely manage their respective site operations to ensure that no problems with wastewater quality arise. In this way, the storage ponds will receive no unacceptably contaminated wastewater, and the opportunity for release of contaminated wastewater off-site is minimised.

5.7.5 Noise Emissions

Potential Impact

In assessing the potential noise impacts of the Wood Centre operations, Terts (2001) has taken into consideration the following matters:

- The existing noise climate at the Wood Centre site;
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- Possible DPIWE permit conditions for noise;
- Assessment of the predicted noise levels against possible DPIWE noise limits; and
- Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres as described below (Terts 2001, Appendix N).

Distant noise level data was obtained for existing operations similar to those proposed for the Wood Centre.

The following formula was then used to determine the attenuation of sound over flat and gently undulating ground.

Attenuation, dB(A)=6dB(A)/dd+ 3dB(A)/km

Where dd=doubling of distance.

Noise levels obtained from actual facilities at distances of 45 m, 370 m, 450 m, 1000 m and 4,100 m were used to calculate the noise levels at 6,000 m. It should be noted that the calculations obtained by using this model, do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;
- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components;
- Whether the noise is regretfully inflicted or mindlessly caused; and
- The time of day or night the noise occurs.

The main noise sources on the site will be associated with timber processing equipment and transport. These noise sources will be discussed in detail for each of the proposed facilities in Chapters 6, 7, 8, 9 and 10. The potential noise generation associated with site-wide facilities and services are as follows:

- Log and forest residue deliveries;
- Water supply pumps; and

- Wastewater system pumps.

The noise generated by these sources are minor only and it is considered unlikely to cause a noise problem off-site due to the isolation of the site.

A noise assessment was undertaken for an operating large metropolitan sewage treatment plant (44,000 equivalent persons, 9 ML/day) capable of tertiary treatment and occupying about 3 ha. The following noise levels were generated, when measured at a line of sight of 370 m (Terts, 2001):

Leq= 33.5 dB(A); and

L90=31 dB(A).

Based on this sound output, the calculated noise level at 6 kilometres is an Leq of 9.3 dB(A) which will not be heard by the nearest residence. It should also be noted that the sewage treatment plant assessed above had an EP (equivalent person; or size of plant) of 44,000, compared to the plant proposed for the Wood Centre of approximately 250 EP.

Management Measures

Although the noise assessment has demonstrated that noise emissions from the sewage treatment plant are unlikely to be heard at the nearest residence a number of management measures will be implemented, to ensure environmental best practice is achieved.

All equipment will be selected and maintained to minimise noise emissions⁵³. The operation of this equipment and vehicles will be undertaken in a manner that complies with appropriate occupational health and safety requirements. In addition:

- Prior to commissioning, the operations on the site will be subject to a noise survey, to verify the noise level calculations described above⁵⁴.
- If received, all noise complaints will be recorded and investigated⁵⁵. In general, major noise sources will be managed by individual proponents operating timber processing facilities on-site.

⁵³ Commitment: Select and maintain machinery to minimise noise emissions.

⁵⁴ Commitment: A noise level survey will be undertaken prior site commissioning.

⁵⁵ Commitment: Investigate and record noise complaints.

- For security and noise minimisation purposes, the water supply pumps and wastewater system pumps will be housed within a building⁵⁶.

5.7.6 *Solid Waste Generation and Disposal*

Potential Impact

The main sources of potential solid waste generation on the site are described in Chapters 6, 7, 8, 9 and 10 describing each facility. The following list includes the main sources of solid waste generated on-site as part of site-wide operations and activities:

- Sludge from the truck washing system;
- Sludge and screenings from the sewage treatment plant;
- Sludge and screenings from the water treatment system; and
- General refuse from facilities such as the gatehouse and information visitor centre (e.g. paper, plastics, etc.).

Management Measures

Sludge and screenings will be removed manually (as necessary) and stored in leak proof bins, and/or collected by waste contractor for approved reuse in the forest, or disposal at an approved location⁵⁷.

General refuse will be collected and temporarily stored on-site externally in bins with lids until collected by waste contractor for disposal to landfill⁵⁸.

5.7.7 *Hazardous Materials*

Potential Impact

With respect to the management of hazardous materials, relatively small quantities of hazardous materials (as detailed in Table 52) will be used and stored on-site for the

⁵⁶ Commitment: House water supply pump station in building with soundproofing.

⁵⁷ Commitment: Regular removal of sludge and screenings from the site-wide wastewater management system.

⁵⁸ Commitment: Store solid waste in a lidded hopper and disposed of by a licensed waste contractor.

management of site-wide facilities and operations. These facilities and operations are likely to be associated with the management of the communal water and wastewater treatment facilities, general maintenance of equipment and services provided on-site, and management of weeds in communal use areas of the Wood Centre.

An exception to the storage of minor quantities of hazardous materials will be the storage of diesel for site-wide purposes.

The hazardous materials storage locations on-site are shown in Figure 22.

Table 52 Hazardous Materials Stored/Used On-Site – Site-Wide Facilities

Hazardous Materials	Active Ingredient	Dang. Goods Class & Subsidiary Risk (as appropriate)	Hazchem Code	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Location
Oils and grease	Hydrocarbons	3[Y]	EPG	II	20 L	60 L	Chemical Store (Gatehouse locked store)
Diesel	Petroleum Distillate	3[Y]E	3A1	I, II, or III	45,000 L	45,000 L	Above ground bunded storage tank (communal fuel supply in merchandising yard)
Petrol	Petroleum	3[Y]E	EPG	II	5,000 L	5,000 L	Above ground bunded storage tank (communal fuel supply in merchandising yard)
LPG (Liquid petroleum gas)	Liquid petroleum	2.1	-	-	45 kg	1800 kg	Above ground storage cylinder for forklift (communal fuel supply in merchandising yard)
Water and wastewater treatment reagents (if required)							Wastewater & Water Treatment Plants Storage within secure area, bunded where necessary to meet Australian Standards.
Caustic Soda (approx 40%)	Sodium Hydroxide Solution	8	2R	II	1 M ³ bulk a bin &/or 20 L drums	2 T	As above
Hydrochloric Acid (approx. 10%)	Hydrochloric Acid	8	2R	II or III	1 M ³ bulk a bin	2 T	As above
Polymers	Polymers	NA	NA	NA	25 kg bag	5 T	As above
Alum or lime	Alum or lime	NA	NA	NA	25 kg bag	5 T	As above
Chlorine Dioxide	Chlorine Dioxide	2.2	2TE	-	0.5 T	1 T	As above
Weed management chemicals (e.g. herbicide such as Round-up)	Glyphosate						Gatehouse locked store

There is a potential fire risk associated with the storage of the above hazardous products. In addition, leakage of hazardous products into the environment can cause significant short and long-term contamination of soils, groundwater and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

Management Measures

In order to limit diesel storage on each site diesel will be stored in the communal diesel store (45,000 L) located in the Merchandising Yard and operated by the Site Manager⁵⁹. The primary use of this diesel will be for refuelling vehicles. The refuelling area will be graded to ensure that any rainwater falling on the vehicle refuelling area will flow through a screening/interceptor that will separate any coarse suspended solids, oils and grease from water that will then proceed to the storage pond.

To reduce the risk of release to the environment or the potential for fire, all hazardous substances listed in Table 52 will be stored with signage and fire control measures according to the Dangerous Goods Act and Regulations and the Australian Standards (AS-1940) and in accordance with Workplace Safety Authority requirements⁶⁰.

All areas for unloading and storage of these materials will be secure fully bunded hazardous materials stores. The buildings will be of the same structure and cladding as other buildings on-site and will have a concrete floor.

Relocatable bunds will also be used for the storage of minor chemicals, and the containment of potential spills. Material safety data sheets will be displayed where hazardous materials are stored; and appropriate occupational health and safety equipment will be provided to meet appropriate standards and regulatory requirements⁶¹.

In addition, spill kits will be maintained at appropriate locations for containment and clean-up of materials in the event of spillage⁶². Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds⁶³.

⁵⁹ Commitment: Site Manager will ensure safe operation of communal diesel facility.

⁶⁰ Commitment: Store hazardous substances in accordance with AS-1940.

⁶¹ Commitment: Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.

⁶² Commitment: Maintain a spill-kits on-site and contain spills.

⁶³ Commitment: Employ licensed clean-up crew when required.

An inventory will be kept of any hazardous materials stored and handled on-site, including the location of storage, their quantities, and their material safety data sheets⁶⁴.

All facilities will have Emergency Spill Response procedures in place and staff trained in applying the procedures⁶⁵.

All significant hazardous material incidents that have the potential to cause environmental harm will be reported to DPIWE⁶⁶.

5.7.8 Flora

Potential Impact

The proposed development will result in the loss of most of the heathland and some loss of the scattered copses of *Eucalyptus amygdalina* woodland and *E. obliqua* forest communities. During construction of the new bridge across the Huon River, *Westringia angustifolia* was identified. This is a rare listed species occurring mainly in the riparian zone.

Management Measures

Although no significant flora has been identified on the site that requires specific management, the following management measures will be implemented to minimise potential impacts of the proposed development during both construction and operation on the receiving environment:

- Establishment of a construction boundary to minimise soil disturbance and clearing of vegetation;
- As described in 5.2.1, boundary markers will surround significant features within the project area, such as large trees or vegetation to be retained. This measure will prevent damage during development. The markers may be orange safety fencing, delineator rope or normal fence construction;
- Minimisation of soil disturbance to reduce potential for soil erosion and sedimentation of stormwater;

⁶⁴ Commitment: Maintain an inventory of hazardous substances on-site.

⁶⁵ Commitment: Emergency spill response procedures and staff training to be implemented at each facility

⁶⁶ Commitment: Report all significant hazardous material incidents that have the potential to cause environmental harm to DPIWE within 24 hours.

- Implementation of approved hazardous materials management measures to minimise potential spillage and contamination of surface waters that may impact on the receiving environment; and
- Collection and treatment of wastewater, and potentially contaminated stormwater, prior to the reuse.

These management measures are described in greater detail in relevant chapters of this EMP.

Prior to conducting any activities which have a potential to disturb vegetation in the riparian zone (e.g. construction of water supply infrastructure) the riparian zone will be surveyed with a view to locate *W. angustifolia*⁶⁷.

5.7.9 Fauna

Potential Impact

The proposed development will necessitate the clearing of an area of moorland habitat and will encroach on some areas of wet *Eucalyptus obliqua* forest vegetation situated around the periphery of the site. This clearing will impact on common faunal populations that are present on the site by displacement of mobile species into areas already inhabited by populations and elimination of non-mobile individuals. Where density is too great competition will occur however no habitat or fauna species existing on the site are threatened or endangered. It is considered that the displacement will not have a significant impact.

Of the species of conservation significance identified as known, or likely, to be present in the area, only two are considered to have potential to be impacted by the proposed development; the Mt Mangana stag beetle (*Lissotes menalcas*) and Australian Grayling (*Prototroctes maraena*).

The Mt Mangana stag beetle typically inhabits rotting logs on the floor of wet forests (dominated by *E. obliqua*, *E. regnans* and *E. globulus*), along drainage lines. Clearing of wet forest is considered to pose a significant threat to the species. Although a coupe that has been cleared near the site showed no evidence of presence of the Mt Mangana stag beetle, the beetle has potential to be present within the wet *E. obliqua* forest around the periphery of the site.

Similarly, the Australian Grayling may inhabit the Huon River or watercourses draining to the Huon River. However, as the proposed development is to be contained predominantly within the moorland zone with a minimum 120 m riparian buffer, impact on this species is considered unlikely to occur.

⁶⁷ Commitment: Conduct survey of riparian zone for *Westringia angustifolia* prior to conducting activities which have potential to disturb vegetation in the riparian zone.

Indirect impacts on fauna in surrounding areas may result if stormwater run-off contaminated with pollutants such as sediment, tannins, lignins, oil and fuel is permitted to discharge untreated to adjacent areas.

Similarly, there is potential for a loss of faunal habitat due to soil erosion if increased surface run-off is permitted to discharge untreated to adjacent areas.

Management Measures

A further survey of the areas of wet *E. obliqua* forest will be undertaken prior to the development proceeding to determine if the Mt Mangana stag beetle is present in these areas. If the beetle is found to inhabit areas of the site, where possible, the protection of these areas will be achieved by delineation. Where this is not possible, a permit for the relocation due to damage to the area will be sought from DPIWE⁶⁸.

Although direct impact on the Australian Grayling is considered unlikely, indirect impacts will be managed through the collection and treatment of contaminated stormwater as described in earlier chapters of this EMP.

5.7.10 Archaeology and Cultural Heritage

Potential Impact

Aboriginal Cultural Heritage

In general, Aboriginal activities tend to be concentrated around water sources, so the elevated site was more likely to have been used for more transient purposes, such as hunting, rather than for use as a camp.

No Aboriginal sites have been discovered during the two site investigations that were undertaken (Forest Practices Board 2000; Scottney 2001). However, as a result of less than 5% visibility over the majority of vegetated areas of the site, the construction of the development has potential, to uncover and/or damage Aboriginal sites that may be present.

European Cultural Heritage

No European cultural heritage features are present on-site or in close proximity to the site.

The closest heritage features, two McMullen sawmills and associated tramway, are recorded as being of low to medium heritage significance and will not be impacted upon by this proposed development. On this basis, European heritage will not be considered further in this report.

⁶⁸ Commitment: Investigate the possible existence of the Mt Mangana Stag Beetle within wet *E. obliqua* forest and delineate or relocate appropriately.

Management Measures

The reporting of Aboriginal sites is mandatory under the *Aboriginal Relics Act 1975*. Sites are reported to the Department of Primary Industries, Water and Environment and must not be knowingly disturbed without an official permit. Sites located by Forestry Tasmania are reported initially to the Forest Practices Board (FPB) and then forwarded by FPB to DPWIE. Once known, management of Aboriginal sites often involves the establishment of a Special Management Zone.

An Aboriginal Heritage Officer (AHO) will be present during vegetation clearing or will conduct another site survey upon completion of vegetation clearing activities to determine if any Aboriginal sites are present⁶⁹.

If sites area identified, they will be temporarily delineated to protect them from further construction activities⁷⁰. In accordance with standard procedure:

- Works within the immediate area will cease if a possible aboriginal site is encountered during excavations until an Aboriginal heritage officer or DPWIE Aboriginal Heritage Unit Officer can assess the site;
- Permission will be sought if impact cannot be avoided such that the site can be relocated to an agreed location, and/or destroyed; and
- The location of Aboriginal sites will be recorded and provided to DPIWE and TALC.

5.7.11 Visual

Potential Impact

The site will have limited impacts on visual aesthetics from all public roads and scenic lookouts points (Figure 10). The areas that may potentially overlook the site are described in Chapter 3.

In general, public viewing areas of the site are limited.

Management Measures

A minimum riparian buffer of 120 m will be maintained between any site clearing and the Huon River, with the tree line at hill-top level as viewed from the river maintained⁷¹.

⁶⁹ Commitment: Undertake an Aboriginal heritage survey upon clearing the site in preparation for development.

⁷⁰ Commitment: Aboriginal sites encountered will be protected and/or managed in an approved manner.

The overall site architecture will be developed to ensure the buildings have consistent visual elements to provide a uniform look. Building walls and roof colours will be chosen to harmonise with the surrounding vegetation colour.

An overall landscape master plan will be developed for the Wood Centre⁷². Any landscaping performed will be in keeping with the forested nature of the local landscape. The landscape master plan will generally:

- Provide a native revegetation plan for disturbed areas;
- Suitably assist in reducing airborne dust and sediment levels in stormwater run-off;
- Provide visual amenity to the site for both staff and visitors (e.g. screening of plant and equipment where possible, enhancing eating and recreation areas for staff); and
- Provide appropriate fire protection (e.g. fire breaks around the perimeter, cleared emergency gathering points).

Landscaping to provide a professional image and improve the aesthetic appeal will tend to be concentrated around areas in the vicinity of the site entrance, office, visitors information centre. Native trees and shrubs will be predominantly used for landscaping.

Native vegetation will be retained within the 10 metre prescribed planning set back from the site boundary adjacent to Weld Road and supplemented with other native species to provide additional screening⁷³.

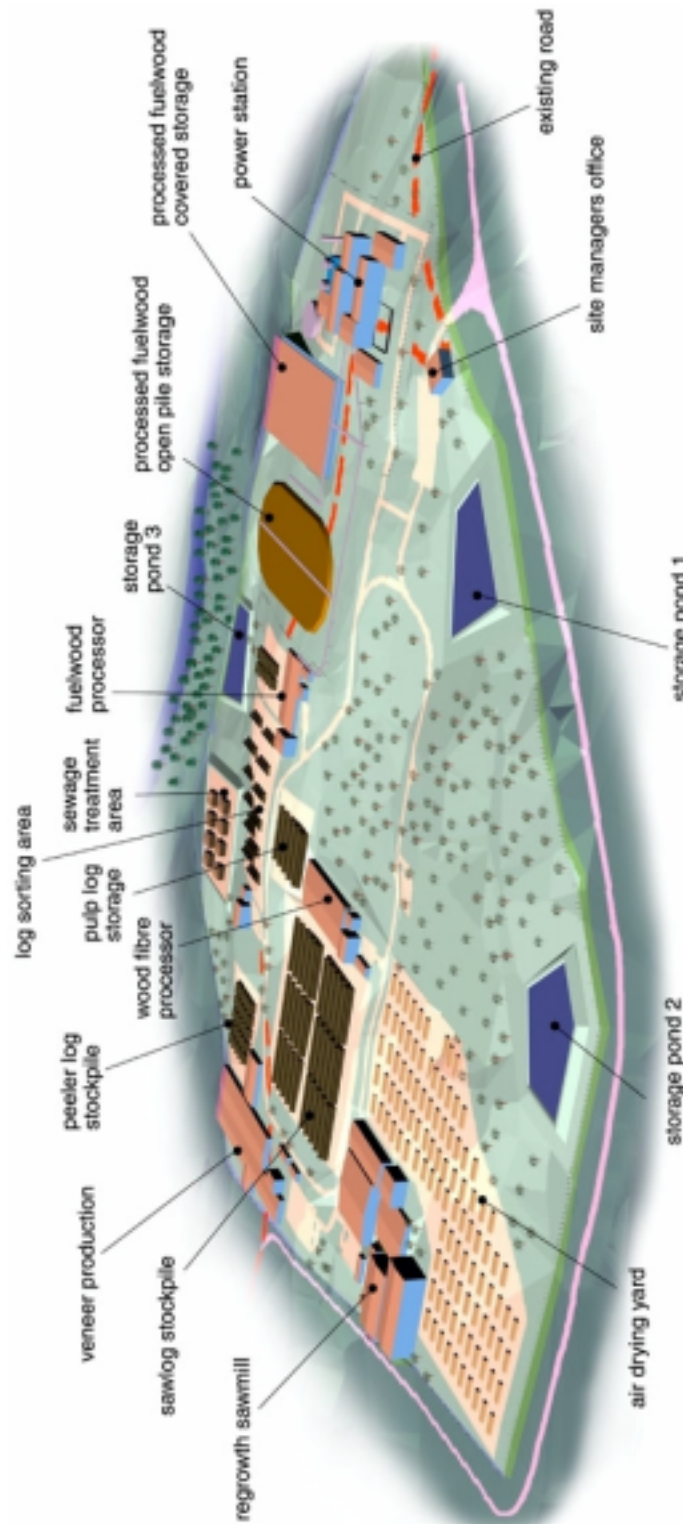
The overall site architecture will be developed to ensure the buildings have consistent visual elements to provide a uniform look. Building walls and roof colours will be chosen to harmonise with the surrounding vegetation colour (Figure 23 Conceptual Visual Impression).

⁷¹ Commitment: Maintain a riparian buffer of 120 m between the Wood Centre and the Huon River.

⁷² Commitment: Develop and adhere to a landscaping master plan.

⁷³ Commitment: Retain native vegetation within the 10 metre prescribed planning set back from the site boundary adjacent to Weld Road.

Figure 23 Conceptual Visual Impression



5.7.12 Decommissioning and Rehabilitation

In the event of permanent closure of some, or all, of the proposed development a detailed closure plan will be developed and submitted to DPIWE for approval⁷⁴. The plan would include commitments to:

- Remove and/or demolish built structures (including paving);
- Revegetate disturbed areas with plants that are native to the area; and
- Monitor and maintain areas of revegetation for an agreed time.

5.8 Site-Wide Monitoring, Reporting and Review

The monitoring program for the construction period and for the site-wide operations is described below. The monitoring programs specific to each of the main facilities on the site are described in Chapters 6, 7, 8, 9 and 10. The transport monitoring program is discussed in Chapter 4.

5.8.1 Site-Wide Management

As discussed in Chapter 1, FT will appoint a Site Manager for the establishment and ongoing management of common use services such as roads, gatehouse, vehicle and load washdown, stormwater, wastewater and potable water supply⁷⁵.

An Environmental Committee will be created for the establishment of site-wide environmental management strategies, their implementation and monitoring (e.g. wastewater and solid waste management). The committee will comprise representatives from Forestry Tasmania, the Site Manager, and a representative from each of the wood processing facilities⁷⁶.

⁷⁴ Commitment: Submit a decommissioning and rehabilitation plan to DPIWE in the event of closure.

⁷⁵ Commitment: Appoint a Site Manager with responsibility for common use services.

⁷⁶ Commitment: Establish an environment committee for the implementation and management of site-wide environmental issues.

5.8.2 *Site-Wide Monitoring*

Monitoring During Construction

Buffers and Boundaries

The Site Wide Manager will ensure that construction delineation fences are erected to limit disturbance and protect sensitive features, and will regularly monitor them to ensure that these are being maintained⁷⁷.

Dust

The Site Manager will visually monitor dust generation during construction and operation activities in order to minimise nuisance, and will organise watering as appropriate⁷⁸.

Rehabilitation

Monitoring of rehabilitation works will be undertaken to establish their success, and to facilitate the implementation of any follow up maintenance that may be required⁷⁹. As determined appropriate, photographic points will be established to assist in tracking the progress of site rehabilitation.

Monitoring will involve:

- Internal on-site inspection of all aspects of the rehabilitation works during and after implementation; and
- The parameters that will be used for the assessment will be based on species richness, plant density and canopy cover.

Maintenance may include:

- Replanting/reseeding areas which have failed to revegetate;
- Fertiliser application to maintain the plant nutritional needs in some areas; and
- Erosion control and stability in those areas that are impacting on water quality and site stability in order to avoid smothering flora and fauna.

Monitoring During Operation

⁷⁷ Commitment: Site Manager will ensure disturbance does not exceed site boundaries.

⁷⁸ Commitment: Site Manager will ensure dust suppression.

⁷⁹ Commitment: Site Manager will ensure success of rehabilitation treatment.

Huon River Flow Data

A log of water abstraction quantities will be maintained and assessed monthly against Huon River flow data (as recorded by DPIWE at Judbury bridge) for at least the first year of Stage 1 and Stage 2 operations to determine if any noticeable impact of abstraction operations has occurred⁸⁰.

Process Wastewater Treatment

For internal management purposes, the Site Manager will:

- Monitor the quality of treated wastewater from the communal storage ponds and undertake such actions as are required to ensure that quality is maintained within specification⁸¹. (This information will provide a measure of the effectiveness of the treatment system and will be published on a public web page as it becomes available); and
- Receive and maintain copies of wastewater quality from each facility (e.g. Sawmill, Rotary Peeled Veneer Mill) established on-site to ensure that discharge limits agreed to with the Site Manager are met ⁸².

Samples will be collected from storage ponds on a weekly basis for the first 6 months for internal management purposes⁸³. This is to establish a greater knowledge of wastewater quality with respect to its suitability for reuse within wood processing operations on-site, and for improved operational control of the wastewater treatment system. All results will be made public on the Wood Centre website.

As described for each facility in Chapters 6, 7, 8, 9 and 10, facility operators will ensure regular monitoring is undertaken for TPHC, TSS and BOD in accordance with standard industry practice. Continuous flow rate from the sites will also be monitored to affect efficient use of water. In addition, the efficacy of biocide treatment will be monitored at the power station biodegradation unit outlet (refer to Chapter 10).

⁸⁰ Commitment: Log and monitor river water abstraction rates.

⁸¹ Commitment: Monitor water quality from the storage ponds.

⁸² Commitment: Receive and maintain copies of wastewater quality from each facility.

⁸³ Commitment: Sample at storage ponds on a weekly basis for the first 6 months for internal management purposes and provide results on the Wood Centre website.

This information will be provided to DPIWE on a quarterly basis for the first 12 months of operation and then annually thereafter if no significant operational problems have been encountered⁸⁴.

The storage pond water will be recycled as process water on-site therefore samples will be analysed for the following parameters:

- pH;
- Biochemical oxygen demand;
- Total suspended solids;
- Total nitrogen;
- Total Kjeldahl nitrogen;
- Total phosphorous;
- Total Petroleum Hydrocarbons (TPHC);
- Total dissolved solids;
- Breakdown chemicals;
- Colour; and
- Pesticides.

Sampling will be conducted weekly for 12 months to determine seasonal affects. The frequency of sampling and analysis will be reviewed 12 months after all facilities are commissioned and modified as determined appropriate in consultation with DPIWE⁸⁵. The Site Manager will identify any changes in facilities treatments and ensure these are implemented to achieve the agreed pond operating parameters.

⁸⁴ Commitment: Report water quality data for the process wastewater storage ponds to DPIWE quarterly for the first 12 months of operation.

⁸⁵ Commitment: Review frequency of sampling and analysis after 12 months and modify as appropriate.

Sewage Treatment Plant Water and Reuse

The dissolved oxygen and pH of the wastewater within the sewage treatment plant will be monitored on a continuous basis for operational purposes⁸⁶.

The quality of wastewater will be sampled at the outlet of the sewage treatment plant on a monthly basis⁸⁷. The samples will be analysed for the following parameters:

- Biochemical Oxygen Demand (5 day);
- Non-filtrable Residue;
- Faecal Coliforms;
- Total Nitrogen;
- Nitrogen (Ammonia);
- Nitrogen (Nitrate);
- Nitrite;
- Total Phosphorus;
- Total dissolved solids (TDS); and
- Electrical conductivity.

This sampling will ensure that the design of the sewage treatment plant is effectively managing the minor quantities of chemicals used in boiler water treatment.

In addition, the following water quality parameters will be tested after the commissioning of the sewage treatment plant to monitor the sustainability of the irrigation program⁸⁸. Testing for these parameters will be conducted 6 monthly during the first year and then the frequency and parameters will be reviewed. The parameters include:

- Sodium, magnesium and calcium;
- Hydrocarbons;
- Chloride;

⁸⁶ Commitment: Undertake ongoing monitoring of wastewater quality within the WWTP for internal operational purposes.

⁸⁷ Commitment: Monitor domestic wastewater quality at the sewage treatment plant outlet monthly.

⁸⁸ Commitment: Ensure sustainability of the irrigation program by testing water quality parameters after the sewage treatment plant commissioning.

- SAR (Sodium Adsorption Ratio); and
- Heavy metal screen (As, Cd, Cu, Pd, Hg, Mn, Ni, Se and Zn)

The results will be forwarded to DPIWE on a 6 monthly basis⁸⁹. The results of the monitoring program will be reviewed after 1 year and the program sampling parameters and frequencies modified accordingly.

Groundwater

It is anticipated that establishing three groundwater monitoring bores at agreed representative locations approved by DPIWE around the irrigation site, to assess any impacts due to the development will be satisfactory⁹⁰. If unsatisfactory, the number of bores will be adapted appropriately.

The following physical and chemical parameters will be monitored at each bore on a quarterly basis:

- Depth of water;
- pH (at bore head);
- Electrical conductivity (at bore head);
- Faecal Coliforms;
- Faecal streptococci;
- Hydrocarbons;
- Chloride;
- Sodium;
- Total Nitrogen; and
- Total Phosphorus.

The initial sampling will be undertaken prior to any irrigation program in order to establish the background groundwater quality. The frequency of groundwater monitoring will be reviewed after 12 months of operation⁹¹.

⁸⁹ Commitment: Forward results of water quality tests to DPIWE every 6 months.

⁹⁰ Commitment: Establish groundwater monitoring bores at the irrigation sites.

⁹¹ Commitment: Monitor groundwater quarterly for the first year and six monthly or yearly thereafter depending on the results.

Huon River and Kings Creek Monitoring

The Huon River and Kings Creek will be monitored downstream from the processing and irrigation sites at agreed locations approved by DPIWE. This will start prior to the commencement of works at the site and will include monitoring of surface waters in the vicinity of the wastewater irrigation site(s).

The following physical and chemical parameters will be monitored on a monthly basis:

- Biochemical Oxygen Demand (5 day);
- Non-filtrable Residue;
- Faecal Coliforms;
- Faecal streptococci;
- Hydrocarbons;
- Chloride;
- Sodium;
- Total Nitrogen;
- Electrical conductivity;
- TDS; and
- Total Phosphorus.

An appropriate biomonitoring program will also be developed in conjunction with DPIWE.

It is recommended that if results from the first year of monitoring show little or no impact on the river, then the frequency of monitoring should be extended to quarterly or six monthly.

All surface water and ground water sampling results will be made available via the Wood Centre's public website that is regularly updated.⁹²

Soil

Soil monitoring will be determined on the basis of a comprehensive irrigation management plan that will be in accordance with the Draft DPIWE Guidelines for the use of Recycled Water in Tasmania (DPIWE, 2000). Representative soil samples will

⁹² Commitment: Make water sampling results publicly available through a regularly updated web site.

be collected prior to irrigation and annually from each of the wastewater application areas to monitor the sustainability of the operation⁹³. The soil samples will be analysed for the following parameters:

- pH;
- Electrical Conductivity;
- Total Dissolved Solids;
- Total Nitrogen;
- Total Phosphorous; and
- SAR (Ca, Mg, Na).

Based on the results of the wastewater monitoring program, testing a heavy metal screen (As, Cd, Cu, Pd, Hg, Mn, Ni, Se and Zn) will be undertaken as necessary⁹⁴.

Soil analysis results will be provided to DPIWE annually, together with the analysis results for wastewater reuse as detailed above⁹⁵.

Sewage and Storage Pond Sludge

Log books will be kept to record the quantity, removal, disposal method and site location for sewage and storage pond sludge⁹⁶. This log will be made available to DPIWE upon request.

Vegetation Within Reuse Areas

As a precaution, where treated wastewater is applied to land, vegetation within the reuse and immediate adjacent areas will be monitored visually on a 6 monthly basis initially for potential *Phytophthora cinnamomi* symptoms (e.g. foliage discolouration) on indicator species⁹⁷.

⁹³ Commitment: Collect representative soil samples from each reuse area prior to irrigation and monitor on an annual basis.

⁹⁴ Commitment: Test soil samples for heavy metals.

⁹⁵ Commitment: Report soil sample results to DPIWE annually and publish on web page.

⁹⁶ Commitment: Maintain a log of sludge removed from the sewage treatment plant and stormwater dams for disposal, including information regarding the method and site of disposal.

⁹⁷ Commitment: Monitor (visually) vegetation within reuse areas for *Phytophthora cinnamomi* infection symptoms.

Noise monitoring

Ambient noise monitoring will be conducted to ensure statutory requirements and environmental management commitments are being met⁹⁸. Noise emissions associated with noisy equipment will be recorded as necessary.

Air monitoring

Obscuration monitoring of combustion plant discharges will be conducted to ensure statutory requirements and environmental management commitments are being met⁹⁹.

Complaints Register

Any complaints received regarding general site management issues including air emissions (dust and particulates), noise emissions, nuisance odours and operation of the wastewater irrigation area will be investigated and the outcomes recorded in a logbook¹⁰⁰.

Hazardous Materials

A Site-wide Contingency Plan for the management of hazardous materials will be prepared by the Environmental Committee¹⁰¹. This will include a training program for the use of hazardous materials and the management of any on-site spills and incidents.

Quantity of Raw Materials

Each facility will maintain records of raw materials used and will provide them to the Site Wide Manager.

General

A general incident response and notification protocol will be developed along with

⁹⁸ Commitment: Noise monitoring will be conducted to ensure statutory requirements and commitments are met.

⁹⁹ Commitment: Obscuration monitoring of combustion plant discharge will be conducted and reported to the Site Wide Manager.

¹⁰⁰ Commitment: Maintain a log of complaints regarding general site issues and record outcomes of the investigation(s).

¹⁰¹ Commitment: Environmental Committee will create a Site-wide Management Plan for hazardous materials.

reporting procedures for the Wood Centre¹⁰². The Site-wide Manager will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. This will comprise the incident reporting protocol for the site-wide facilities (not covered by individual facility protocols described in Chapters 6, 7, 8, 9 and 10). This will allow the Site-wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm.

The following outlines the suggested considerations to be included in the Site-wide Managers Incident Reporting Protocol.

Actions to be taken in case any environmental incident including but not limited to:

- Hazardous materials spill;
- Fire;
- Civil disorder; and
- Bomb threat.

The actions will include what to do upon becoming aware of an incident, evacuation procedures and responsibilities of fire fighters and wardens.

5.8.3 Reporting

The Site Manager will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. As well as maintaining reports for the site-wide issues, the Site Manager is responsible for overseeing the environmental management of the site as a whole. This will comprise the incident reporting protocol and will allow the Site Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The Site Manager and Environmental Committee will receive all reports;

¹⁰² Commitment: Develop an incident response and notification protocol for site-wide issues.

-
- For site-wide issues the Site Manager is responsible to summon support from the relevant emergency service(s); and
 - The Site Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to the Director of Environmental Management as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the notice of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

- The Site Manager's responsibilities include but are not limited to:
 - Develop and implement Environmental Action Plans (EAPs);
 - Develop clear communication arrangements, taking into account after hours and holiday periods;
 - Ensure that all facilities on-site undertake a coordinated approach to achieving the environmental objectives of the site;
 - Roles and responsibilities are clearly defined;
 - Maintain, modify, review and analyse all site-wide monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
 - Initiate additional monitoring or testing to confirm or negate the original recordings where there is doubt;
 - Determine if EAPs or amendments to Operating Procedures are required to manage site-wide issues;

- Ensure the maintenance and calibration of monitoring equipment used for monitoring site-wide issues; and
- Develop and implement a media liaison protocol.
- Monitoring, defined in EAPs, will address:
 - Water quality and quantity;
 - Visual observations;
 - Noise; and
 - Hazardous materials handling.
- EAPs will also address:
 - Triggers for implementing monitoring;
 - Sampling and analysis;
 - Interpretation and corrective action;
 - Recording and maintaining monitoring data;
 - Monitoring reviews;
 - Control actions as a result of monitoring;
 - Selecting monitoring equipment;
 - Maintenance and calibration of monitoring equipment; and
 - Calibration records.

By effectively implementing the Incident Reporting Protocol the facility may be able to decrease its impact on the environment.

5.8.4 Review

Community Consultative Committee

Forestry Tasmania recognises that the local community have a keen interest in the proposed Wood Centre development and should be involved in provision of on-going advice on management of impacts by the development on the community. To facilitate this, a Community Consultative Committee will be established before commencement of construction activities on the site. The committee will be made up of representatives from the:

-
- Site occupants;
 - Community members with a direct interest in the proposed development; and
 - Huon Valley Council.

The initial composition of the committee will be decided on the recommendation of the Southwood Community Advisory Group. ¹⁰³

Results of all monitoring on-site will be made available to the Community Consultative Committee by the Site Manager. Meetings will be called by the Site Manager and will provide a regular forum for issues to be discussed and problems to be resolved.¹⁰⁴ Issues will include effects that are potential impacts on neighbouring communities:

- Traffic;
- Changes in the noise environment;
- Air Quality;
- Water Quality; and
- General effect on community fabric.

Issues raised will be minuted and made available through a regularly updated web page¹⁰⁵. The committee will work towards achieving mutually acceptable outcomes for all issues. Results of the consultative process will be integrated into the EMP review described below.

Environmental Management

This EMP will be reviewed within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE¹⁰⁶.

The EMP review will update information concerning the:

¹⁰³ Commitment: Establish a Community Consultative Committee.

¹⁰⁴ Commitment: The Site Manager will convene regular meetings of the Community Consultative Committee.

¹⁰⁵ Commitment: The Site Manager will place minutes of meetings on a regularly updated web page.

¹⁰⁶ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

- Overall operation of site-wide operations;
- Procedures used; and
- Management of environmental issues associated with the operation.

In addition, it will include a review of monitoring results to determine the effectiveness of management measures implemented. The review report will be submitted to DPIWE within three months of completion.

CHAPTER 6 MERCHANDISING YARD AND FUELWOOD PROCESSOR

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6. MERCHANDISING YARD AND FUELWOOD PROCESSOR - ENVIRONMENTAL MANAGEMENT PLAN

6.1 Merchandising Yard and Fuelwood Processor Description

The Merchandising Yard is located in the north-eastern region of the site (refer to Figure 5), with direct access to the internal loop road. Refer to Figure 24 for the schematic process flow diagram of the proposed operation. The activities conducted in the Merchandising Yard will comply with the current best practice environmental management conditions operating throughout Australia.

6.1.1 Description of Operation and Equipment

The Merchandising Yard will have a developed area of between 5 and 10 ha. Wood will arrive on the site as mixed loads (sawlogs, veneer and pulpwood).

Two main operations will occur on the Merchandising Yard site:

- General Merchandising Yard operations including grading, preparation, segregating, sorting and stockpiling of logs and wood materials; and
- Fuelwood processing operations (ie. the processing of forest residue to feed into the power station facility and heat plants).

The general operations will occur outdoors in the open while some fuelwood processing activities will be conducted in an enclosed building.

Figure 25 illustrates the quantities of wood flow in the Merchandising Yard.

Merchandising Yard Operations

Some selection of timber may be made at the forest landing. The key types of load will include: pure sawlogs; pure pulpwood, forest residues; and mixed loads. Transport of wood from State Forest may be on a 24 hour basis.

Vehicles will enter the site through the main gatehouse, and will be washed (generally only in wet weather) and weighed prior to proceeding to the Merchandising Yard (refer to Chapter 5 for description of the vehicle and load washing facility). The unloading and handling of the wood will depend on the load type.

Sawlog loads will be directed to the sawlog sorting area where the logs will be off-loaded, graded, cross cut and sorted according to customer needs and requirements.

Loads consisting only of sawlogs will be directed to stockpiles in the middle of the ring

road.

Vehicles carrying pulpwood logs only (i.e. logs with a large number of knots or other defects incapable of yielding sawlog or veneer products) will go directly to the wood fibre mill and will not pass through the Merchandising Yard.

Forest residue will not pass through the Merchandising Yard, but will be trucked directly to the fuelwood processor and the processed fuel will then be sent to the power station or to heat plants that require supplementary fuelwood.

Mixed loads will comprise logs identified as having more than one grade in them e.g. Cat 1 and Cat 2 sawlogs, peeler billets and pulpwood (Cat 1 and 2 are categories of Eucalypt sawlog with defined acceptable levels of the following parameters; log dimensions, limbs, bumps, spiral grain, scars, split logs, sun cracks etc.) These logs, once unloaded, will be laid out to allow classification as sawlog, veneer or pulpwood in the segregation area. The laying out and classification process is consistent with the project objectives of ensuring maximum value recovery from wood supply.

A typical Merchandising Yard operation is shown on Plate 3.

Plate 3 Merchandising Yard Log Segregation Area



Sawlogs will be moved to the sawlog stockpile area in the Merchandising Yard from where they will be directed to off-site sawmills or for processing in the regrowth sawmill on-site. Peeler blocks and pulpwood from mixed loads will be temporarily stored at the Merchandising Yard before transfer to the RPV mill and Wood Fibre mill respectively. All high value sawlogs, where necessary (and particularly in the summer months), will be stored under a water spray. Sawlogs not processed on-site (normally large diameter mature logs) will be sold to off-site sawmills and transported by conventional log trucks. Up to 38,000 m³ may be moved in this manner each year.

The Merchandising Yard will ensure that all millable timber will be recovered and sold to either external sawmills or the on-site regrowth mill.

The possibility of mechanising the log grading, preparation and segregation process will be investigated in the future. A mechanised approach is anticipated to reduce manual handling of logs whilst ensuring maximum value recovery, which is consistent and in line with the overall project objectives.

Logyard debris such as associated dirt, rot, bark and slivers will be temporarily stockpiled on-site during daily operations and transferred to the adjacent composting area off-site for reuse or to an approved reuse or disposal site.

Segregation area

At the Merchandising Yard segregation area, the classifier examines each stem and marks the various product types. The stem is then cross-cut with a chain saw to extract the products identified. A small loader or conveyor will be used to move the short/prepared log lengths to the RPV mill or shorts stockpiles. From the shorts stockpile wood will be transferred by rubber tyred loader to the timber processing by-product infeed deck of the wood fibre mill or the fuelwood processor.

Fuelwood Processor

Forest residues and reject material from other processes on site are transferred to the fuelwood processor, which is situated within the confines of the Merchandising Yard. Unprocessed fuelwood material is stockpiled adjacent to the fuelwood processor infeed deck (Figure 5). A fuelwood washer may be installed and will be run when deemed necessary by the operator. Special species timbers with a craft or sawlog value will be diverted from the infeed deck to a stockpile. The volume extracted will vary depending on market demand and the particular quality of the wood demanded. An annex of Island Speciality Timbers will be operated on-site to dispose of the wood to sawmills or craft workers.

Fuelwood material is loaded onto a conveyor facility (log deck) and conveyed to the fuelwood processing equipment for conversion into boiler fuel, normally wood pieces that pass a 50 mm screen. The processing equipment is likely to comprise a tub grinder (for smaller material) and/or a wood hogger for larger logs.

A typical tub grinder has a rotor diameter of up to 105.4 cm, with approximately 28 fixed hammers and two side based cutting bits. This type of grinder has an 800 hp motor, with an output capacity of up to 88 tonnes of green waste per hour and a hydraulically driven feed deck.

A typical wood hogger has an 800 hp driven motor, with a processing drum of up to 170 cm in diameter. The boiler fuel generated for use in the power station would typically be 50 mm in size, with 25 to 50% moisture content. Blending of fuels of different moisture content will be undertaken to achieve a consistent moisture value. A typical wood hogger is shown in Plate 4.

Plate 4 Fuelwood Hogger



The comminuted wood from the fuelwood processor will be collected by a conveyor and passed through a flat screen. Material passing through the screen is boiler fuel, larger material is returned by conveyor to the tub grinder for further processing.

An automatic moisture meter takes a moisture reading of the boiler fuel, and if necessary blending with drier material will be undertaken. Blending will take place on the conveyor belt using an overhead hopper for drier fuel.

Periodically, sampling the fuelwood will provide moisture readings. The sample will be weighed, and dried at 99°C and subsequently redried. From the weight measurements the water loss and moisture content are calculated. This will check the calibration of the meter.

The fuelwood from the fuelwood processor is transferred by loader, or conveyor belt system, to one of the following locations:

- The fuel supply conveyor for direct firing of the power station boiler;
- A stockpile on the power station site for temporary storage and/or further processing; or
- Heat plant stockpiles of facilities on-site that require additional fuelwood.

Some fine material maybe generated which will not be entrained in the fuelwood stream.

Principal Items of Equipment and Operation

The principal items of equipment to be used in the Merchandising Yard and the likely

hours of operation are summarised in Table 53.

Table 53 Details of the Merchandising Operations Equipment

Equipment	Function	Power/Fuel	Hrs used/day
Loader (large)	Green log unloading	Diesel	24 hrs
Loader or excavator (small)	Small log sorting/moving	Diesel	12 hrs
Chain saws	Cross-cutting	Petrol	12 hrs
Infeed deck	Loading of logs	Electricity	Up to 24 hrs
Log wash	Washing of logs	Electricity	Up to 24 hrs
Tub grinder	Breakdown of fine wood materials	Electricity/Diesel	Up to 24 hrs
Wood fibre processor	Hogging of wood	Electricity	Up to 24 hrs
Conveyors	Transfer of wood	Electricity	Up to 24 hrs

6.1.2 Description of Buildings & Associated Infrastructure

Principal Buildings

The major buildings on the Merchandising Yard are identified on the site plan (Figure 5) and include:

- Two workshops;
- Two offices;
- Amenities; and
- Refuelling station.

The details of the building dimensions and construction materials for the preceding buildings are provided in Table 54.

Table 54 Building Dimensions and Construction Materials

Building	Area m ²	Height (m)	Construction Materials		
			Floor	Walls	Roof
Workshops	200	8	Concrete	Tilt Slab /Cliplock	Cliplock
Offices	100	3	Concrete	Tilt Slab /Cliplock	Cliplock
Amentities	30	3	Concrete	Tilt Slab /Cliplock	Cliplock
Refuel Station	250	5	Concrete	Open side	Cliplock

In all instances cliplock colourbond roofing will be used. The colour of the buildings will be chosen to blend with the local environment. The materials for construction of the buildings include concrete slab floors and either pre-cast steel sheet, tilt up concrete panels or aluminium sandwich panels.

Administration Office and Amenities Buildings

An administration building will have a concrete slab ground construction with an area of approximately 400 m² and will be located adjacent to the Merchandising Yard. The building will be either tilt-up concrete panels, or fibre cement construction, painted to suit its environs with a colourbond roof.

The administration building will house computing, accounting and sales staff, as well as the Site Wide Manager.

Amenities for the Merchandising Yard will be provided in a separate but similarly constructed building adjacent to the fuelwood processor and in accordance with the Building Code of Australia. Amenities will comprise a lunchroom, showers and toilets.

The two buildings will be heated either from a reticulated steam system, or by an electric heating system.

Unprocessed Fuelwood Stockpile Area

Unprocessed fuelwood material will be stockpiled in preparation for processing in the fuelwood processor.

Refuelling Station

A central Wood Centre refuelling station will be provided within the Merchandising Yard site. It will comprise one 45 kL above ground diesel storage tank and other minor storage

facilities. The vehicle refuelling area will be sealed and graded back to the bunded area to ensure that potential spills are contained. The tank will be mounted on a concrete pad with concrete bund walls and a colourbond roof. The total bund volume will be a minimum of 51 kL. A valve outflow will be provided in the bund for directing uncontaminated stormwater under manually controlled conditions, to the site interceptor system. The refuelling station will meet AS-1940 requirements. For a description of the contents of the other tanks, drums and containers refer to Section 6.6.

Workshops

The workshop buildings will be constructed on a concrete slab, with colourbond walls and roof. One workshop will be located adjacent to the office and a second will be located adjacent to the fuelwood processor. The buildings will be approximately 8 metres high and 600 m² in area. They will provide undercover garaging for loaders and fire fighting appliances as well as a small engine servicing workshop in one of the buildings.

Minor quantities of oils and lubricants and possibly pesticides will be stored within the workshop over AS1940 approved mobile bunds, or within a secure store with floor bund.

Car Parking

A hard stand car park will be provided for 50 employee, service, and visitor vehicles adjacent to the log sorting area. A second hard stand car park for 12 vehicles will be located adjacent to the fuelwood processor.

6.1.3 Source of Wood and Quantity of Production

The source of wood for the Wood Centre is described in Chapter 2. Wood, for the various timber related operations to be developed as part of the Wood Centre, will be sourced from the Merchandising Yard. Figure 25 illustrates the flow of wood and annual production rates from the different parts of the Merchandising Yard. From the log sorting area 261,000 T/yr of hardwood will be diverted directly to the Wood Fibre Mill for pulpwood production and 256,000 T/yr will be directed directly to the fuelwood processor. The remaining 283,000 T will be sorted manually. Approximately 38,000 T/yr of hardwood from the Log Sorting Area will be sawlogs directed to Sawmills beyond the Wood Centre limits. Annual quantities of wood directed to the Rotary Peeled Veneer Mill, Sawmill and Wood Fibre Mill at the Wood Centre will be 150,000 T; 50,000 T; and 83,000 T, respectively.

In addition, approximately 9,000 T/yr of yard waste from all sites of the Wood Centre will be processed in the Fuelwood Processor for use in the Power Station or Heat Plants. Sawmill and Wood Fibre Mill excess fines (approximately 31,000 T/yr) will be added to the Fuelwood Processor product.

Figure 24 Merchandising Yard Process Flow Diagram

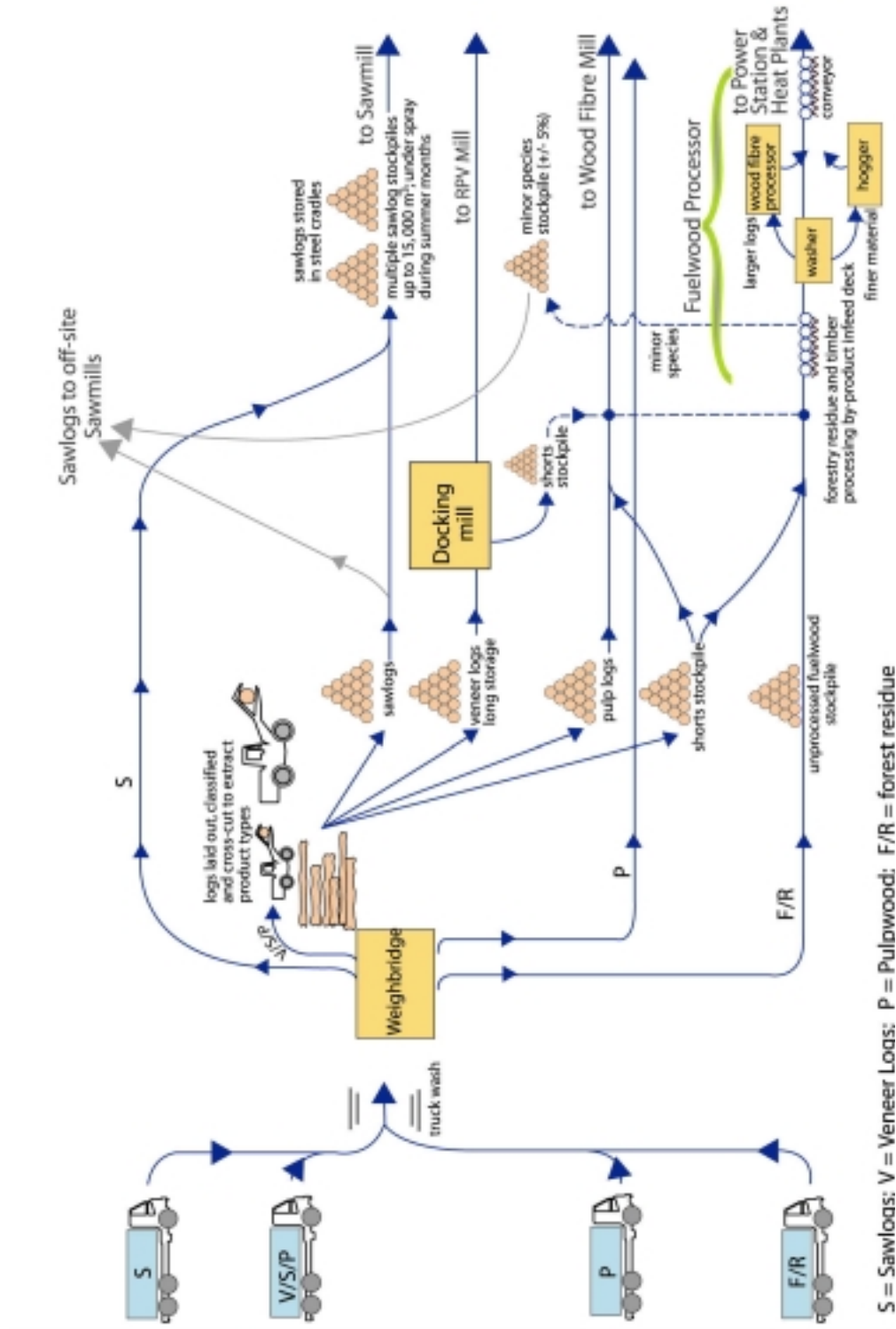
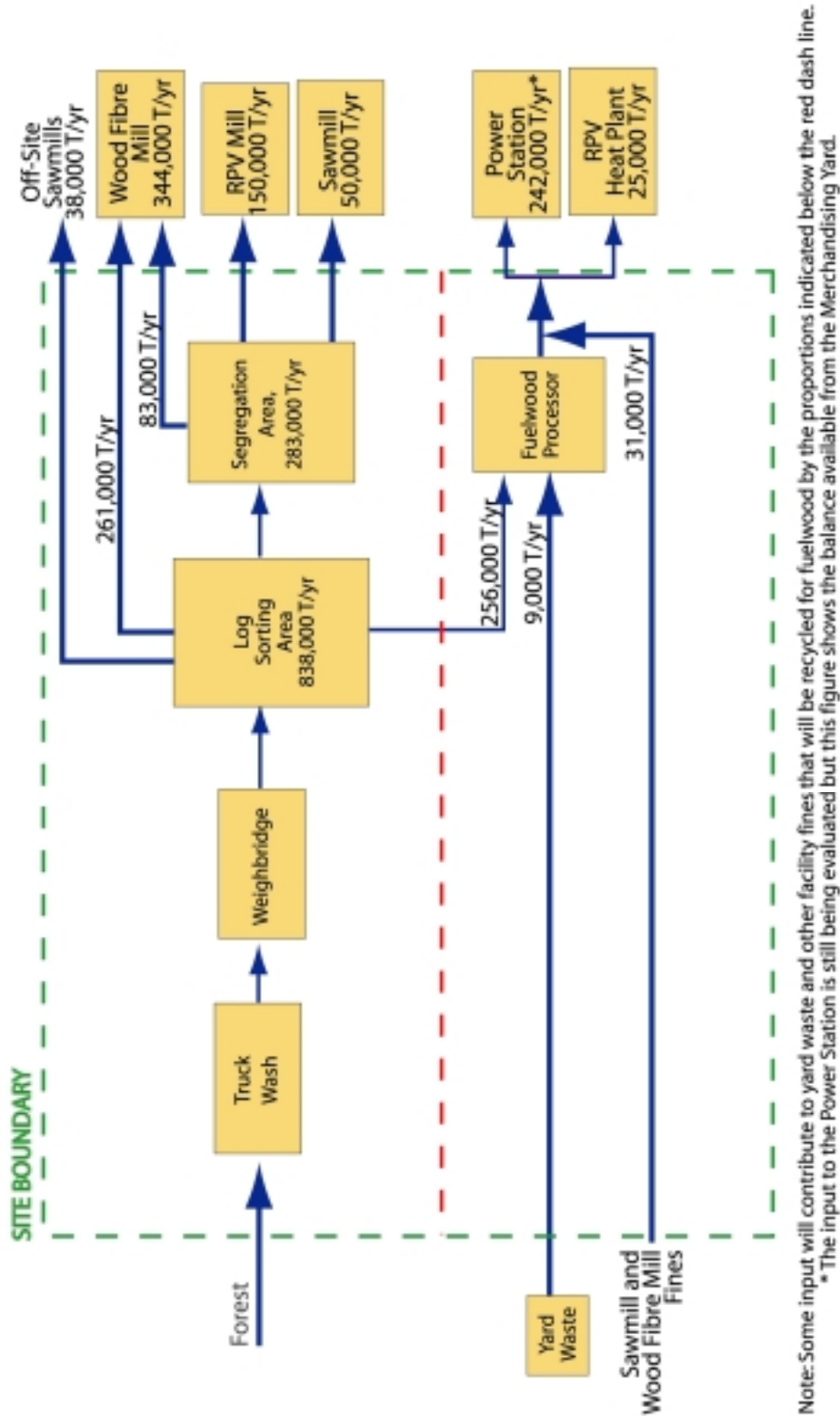


Figure 25 Merchandising Yard Wood Flow Diagram



6.1.4 *Emission Sources*

Air Emissions

The major potential air emissions associated with the Merchandising Yard operations arise from:

- Point source transport vehicle exhaust emissions associated with deliveries to and from the site (most engines are powered by diesel);
- Point source on-site vehicle exhaust emissions (truck, forklift, log loader);
- Dust from vehicle movements and general site activities; and
- Diffuse, fugitive sawdust and wood fibre particles associated with log cutting activities, fuelwood processor, and vehicular movements in the yard.

Water Emissions

Three types of wastewater will be generated during the operation of the Merchandising Yard: stormwater, process wastewater, and domestic wastewater. Figure 26 illustrates the water flow for the site. The estimated quantities resulting from evaporation are not accounted for. A further discussion of wastewater emissions is provided in Section 6.3 and Appendix X.

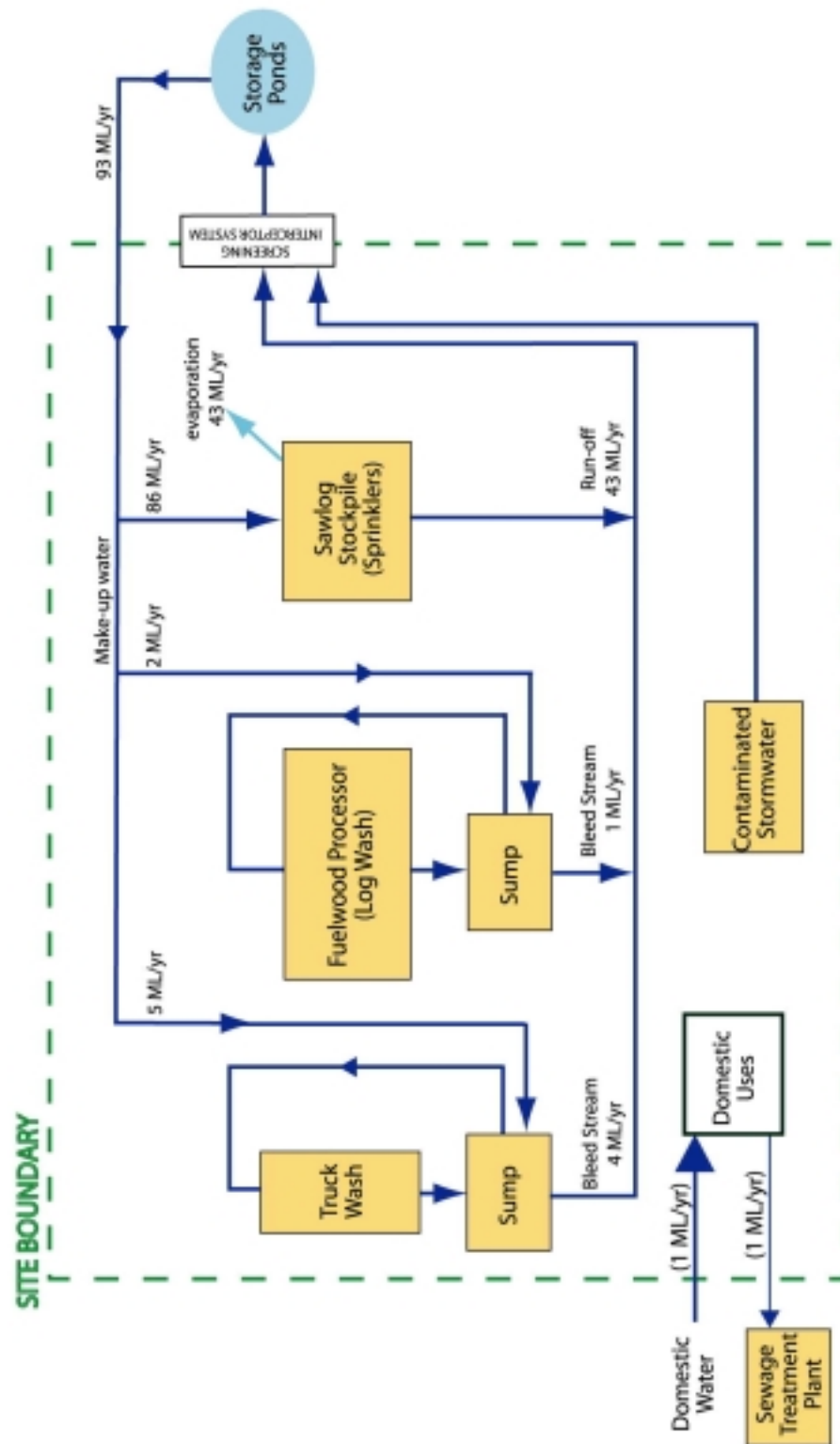
Stormwater

Contaminated stormwater from working areas that include the sawlog stockpile, log sorting area and unprocessed fuelwood stockpile, is likely to contain sediment and wood particles.

The stormwater contaminants are likely to include:

- Suspended wood fibre solids (e.g. cellulosic and lignin materials);
- Suspended sediment;
- Tannins (provide distinctive water coloration);
- Biochemical oxygen demand;
- Oil and grease; and
- Nutrients (e.g. nitrogen and phosphorous).

Figure 26 Merchandising Yard Water Flow Diagram.



All contaminated stormwater from the Merchandising Yard areas will be transmitted via concrete or earthen stormwater drains from paved and hardstand areas, respectively. The water will be filtered through the screening/interceptor system before proceeding to a site-wide storage pond.

Process Wastewater

Process wastewater will be generated from the truck and log washing operation bleed streams producing a combined 5 ML/yr. It is estimated that approximately 48 ML/yr of process wastewater will be generated within the Merchandising Yard discharged to a storage pond and recirculated through the storage pond. An evaporation rate of 43 ML/yr is expected (mostly from the sawlog sprinkling). Therefore a total of 93 ML/yr will be pumped from a storage pond as make-up water (Figure 26).

Two sumps will act as water tanks for the Merchandising Yard activities. Water will be regularly pumped from the truck wash sump for the purpose of cleaning dirt from trucks during wet weather therefore the truck wash will not operate on a daily basis. Water will also be recycled through the fuelwood processor log wash and sump to ensure logs are cleaned prior to the production of fuelwood for the power station and heat plants. Finally, water will be recycled from the storage pond for irrigation of the sawlog stockpile. The truck wash and log wash sumps will be regularly cleared of settled sediment.

Evaporation of process wastewater from the sawlog stockpile irrigation and minor quantities from other areas on-site will occur (1 ML/yr from log wash and 1 ML/yr from truck wash). Make-up water will be supplied from the site-wide storage ponds at a rate of 93 ML/yr (Figure 26). It is noted that, 86 ML/yr of the total 93ML/yr will be used for stockpile sprinkling over about 6 (dry) months rather than 12 months of the year.

It is anticipated that process wastewater will comprise contaminants much the same as for contaminated stormwater but, potentially, in greater concentration.

Domestic Wastewater

Domestic wastewater includes the generation of sewage and grey water by site personnel. Based on the assumed generation of 150 L/day per person and up to 30 employees, it is estimated that approximately 4.5 kL/day (or 1.6 ML/yr) of domestic wastewater will be generated as part of the Merchandising Yard operation.

Domestic wastewater contains high biochemical oxygen demand, high solids, high nutrients, and high bacteriological counts when untreated.

The water supply for the offices and amenities will be sourced from the site-wide domestic water reticulation system (Figure 18). Domestic wastewater will be directed to the site-wide sewage treatment plant.

Noise Emissions

The major source of noise in the Merchandising Yard will be associated with the loading, unloading, preparing of logs and forest residues, and fuelwood processing. These activities will include:

- Log unloading, loading, lay down, conveying, and relocation;
- Chain saws and cross cutting;
- Fuelwood production for power station and heat plants (as part of the fuelwood processing operation); and
- The dropping of logs in the yard.

Solid Waste

Solid wastes generated during log merchandising and fuelwood processing operations include woodfines, sawdust, off-cuts, dockings, mud, slivers, bark, rocks, and out of specification wood.

Based on the annual “through flow” of 838,000 T of wood six days per week and 28 tonnes per delivery, the predicted generation of wood by-product (e.g. fines, off-cuts, slivers, bark and out of specification wood) is 6,000 T from the Merchandising Yard per year. Another 3,000 T of yard waste will come from other facilities at the Wood Centre. The total of 9,000 T will be processed for fuelwood to be used in the Power Station of heat plant. This will be cycled through the fuelwood processor before proceeding to the Power Station or RPV Mill heat plant. Material not suitable for fuel will be sent to the composting plant adjacent to the Wood Centre or for approved reuse or disposal off-site.

Other non-wood wastes that may be generated as part of the merchandising operation include:

- Rocks and muddy material generated by housekeeping practices undertaken within sorting and storage areas;
- Solids collected in the screening/interceptor system in the wastewater system;
- Some grease, oil and petrol from vehicles collected in the screening/interceptor system; and
- General refuse from administration and workshop areas.

In total this is estimated to be less than 500 T/yr.

Of the total wood that is processed at the Merchandising Yard each year, approximately 0.5% will become yard waste mixed with rock and dirt on-site. This amount is not accounted for in the wood balance but is estimated at approximately 4,000 T/yr.

6.1.5 Projected Hours of Operation and Employment

The Merchandising Yard will be capable of receiving wood on a 24 hour 7 day a week cycle. Sorting and cross-cutting of wood will occur mainly during daylight hours.

It is predicted that 20 to 30 people will be employed in the operation of the Merchandising Yard.

6.2 Atmospheric Emissions

6.2.1 Potential Impact

As described in Section 6.1.4, emissions to the atmosphere may arise from various sources in the Merchandising Yard. The emissions will be in the form of wood fibre, dust from wood fibre handling, dust from vehicular movements and windblown fibre from conveyor woodchips and dust. In addition, greenhouse gas emissions relevant to the Merchandising Yard are discussed below.

Point Source Transport and On-Site Vehicle Exhaust Emissions

Greenhouse gases are known to contribute to global warming and, as mentioned in Chapter 1, Australia has an obligation to reduce greenhouse gas emissions as a result of the Kyoto Protocol. Greenhouse gas emissions for Merchandising Yard loaders and transport vehicles are provided in Table 55. The typical rate of generation of gas emissions from the Merchandising Yard equipment is provided in Table 55. The total greenhouse gas production level of the Merchandising Yard is estimated at 1,098,700 T/yr (1,046,000 m³/yr) as a result of 39,239 truck movements.

The exhaust emission rates of the equipment will meet the federal and state regulations. By providing new equipment and regular maintenance, equipment emissions will be maintained at the required levels. The air emission generation values are based on estimated vehicle kilometres travelled (VKT) and converted to kg/year.

Fugitive Sawdust and Wood Fibre Particles From Cutting, Hogging and Transporting

The tub grinder and hogger (components of the fuelwood processor) will produce fugitive sawdust and wood fibre particles prior to conveyance of material to the power station. Conveyors have the potential for windblown fibre and sawdust to become fugitive.

Fugitive wood fibre and dust from vehicular movements

Vehicle movements in the yard will generate dust during dry periods from the wheel action on unpaved area of the log segregation yard.

Dust generation is a concern because it is both an environmental and occupational health and safety issue. As discussed in Chapter 3, the prevailing wind direction and speed for the site have not been specifically determined around the Wood Centre. A health and safety concern will exist if the winds tend to direct dust from the Merchandising Yard onto other areas of the industrial site. However, as the likely prevailing direction is between north west and south west, dust generated will mainly be blown away from other areas.

Due to the distance between the proposed site and the nearest residences dust from the operation and vehicular movement at the site during the construction phase should not cause a nuisance.

Table 55 Air Emission Generation From Merchandising Yard Equipment (AGO 1998a)

Air Emission and Equipment Source	Typical Emission Rate	Emission Factor	Total Emission (kg/year)
Carbon dioxide (CO ₂) from diesel engines on loaders and trucks operating on the site.	2690 g/L	1	441,000
Methane (CH ₄) from diesel engines	0.156 g/L	2.015	26
Nitrous Oxide (N ₂ O) from diesel engines	0.056 g/L	0.025	9
Nitrogen Oxides (NO _x) from diesel engines	33.97 g/L	15.290	5,500
Carbon Monoxide (CO) from diesel engines	17.467g/L	7.860	2,860
Non-methane volatile organics (NMVOC) from diesel engines	6.178 g/L	2.780	1,010
Hot Soak/ Diurnal from diesel engines	6.111 g/L	1	1,002
Running losses from diesel engines	0.644 g/L	1	106
Sulphur Dioxide (SO ₂) from diesel engines	8.085 g/L	0.025	730
PM10		0.016	4,930
TSP		0.089	26,800

6.2.2 *Management Measures*

Point Source Transport and On-Site Vehicle Exhaust Emissions

The release of combustion particulate and gases will be minimised through the selection of late model diesel engines and normal vehicle maintenance. The generation of nitrogen and sulphur oxides and carbon monoxide will be minimised through the use of modern combustion equipment providing a suitable balance of air-to-fuel at an appropriate combustion temperature¹.

Fugitive Sawdust and Wood Fibre Particles From Cutting, Hogging and Transporting

Periodic sweeping of areas where fines accumulate around fuel processing equipment will be undertaken to minimise fugitive dust.

Fugitive sawdust and wood fibre particles from cutting and hogging in the log sorting area and fuelwood processor respectively will be controlled by regular sweeping².

Conveyors will be covered to minimise wind blown fines during conveying boiler fuel on windy days³.

Fugitive wood fibre and dust from vehicular movements

Highly trafficked areas of the Merchandising Yard will be asphalt sealed. Fugitive emissions of wood fibre and sawdust that have settled on the sealed surfaces of the site such as roadways and hardstands will be collected using a vacuum-equipped street sweeper⁴. If the material collected by the street sweeper contains a substantial amount of grit, it will be disposed of with other solid waste, rather than being used as fuel.

Most of the timber racking areas will be grassed and the roadways within the premises will be gravelled, so dusting will rarely be a problem in these areas. Water trucks will be available for dust suppression when it is deemed necessary⁵. The necessity for an

¹ Commitment: Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.

² Commitment: Sweep log sorting and fuelwood processor areas regularly to control fugitive sawdust and wood fibre.

³ Commitment: Use covered conveyors.

⁴ Commitment: Seal high traffic areas of the Merchandising Yard and use street sweeper to clean up wood fibre and sawdust if watering is an inadequate dust control measure.

⁵ Commitment: Dust suppression of highly trafficked unpaved areas will be achieved by watering.

alternative to water as dust suppressant will be assessed once site specific wind speed and direction are determined.

6.3 Wastewater Emissions

Wastewater emissions from each of the facilities at the Wood Centre will be collected, treated and reused in a combined system for the site as a whole. This system is described in detail in Chapter 5. In the following section, the wastewater generated in the Merchandising Yard is briefly described.

6.3.1 Potential Impact

Process Wastewater and Contaminated Stormwater

Activities to be undertaken within the Merchandising Yard, which have potential to result in stormwater contamination and/or the generation of contaminated process wastewater include:

- Vehicular and log movements;
- Log storage, and temporary wood waste and fuelwood product storage;
- Log irrigation;
- Log cutting and docking; and
- Fuelwood processing.

As described in Section 6.1.4, this wastewater has the potential to contain contaminants associated with wood processing and vehicular activities on-site. If untreated and emitted to the environment this contamination has the potential to degrade the receiving environment (e.g. result in reduced health of aquatic habitats if discharged to water course, or sedimentation of vegetation).

The wastewater from the truck washing operations is anticipated to contain a significant amount of soil particles. Assuming that 150 kg of dirt is washed from each vehicle as a worst case scenario (since there will be reduced need for truck washing during the summer) approximately 7,500 kg of finely divided solids may enter the wastewater stream arising from the truck cleaning process.

Levels of suspended particles carried forward by Merchandising Yard wastewater are based on an average concentration of 100 mg/L of soil particles after screening. Assuming an annual volume of 1 ML/yr of water from the fuelwood processor logwash, the additional solids load on the water cleaning/purification systems/infrastructure will be approximately 100,000 g/year.

Domestic Wastewater

The high biochemical oxygen demand, high solids, nutrients and bacteriological contamination of domestic wastewater has potential to adversely impact on the environment if not treated appropriately prior to discharge.

Domestic sewer and grey water from the office and amenities facilities will be directed to an on-site communal sewage treatment system and will therefore not be considered further in this section. Refer to Chapter 5.

6.3.2 Management Measures

Process Wastewater

Treated wastewater will be drawn from the storage pond system⁶ for the irrigation of:

- Logs within the Merchandising Yard;
- Log wash;
- Truck wash; and
- Fuelwood processor blades.

Reticulated domestic water will be utilised within administration and workshop areas, but little or no domestic water will be required for use within process areas.

Process wastewater, log irrigation and contaminated stormwater will be collected by earthen and concrete stormwater drains from hardstand and paved areas respectively, into two independent sumps. The sediment that collects in the sumps will be removed regularly as discussed further in Section 6.5.

A bleed stream from each sump will divert water to the on-site screening/interceptor system⁷. This system will provide initial removal of coarse suspended solids (e.g. soil and wood fibre) as well as some oil and grease that have been entrained in the wastewater stream. The water quality will meet performance criteria for TSS and BOD set by the site manager prior to discharge from the screening interceptor system to the site-wide storage ponds for reuse. The monitoring system is detailed in Section 6.7.1. Where TSS

⁶ Commitment: Treated wastewater will be used for appropriate purposes in the Merchandising Yard.

⁷ Commitment: Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site-wide storage ponds.

and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures). Water from the site-wide storage ponds will be pumped to the Merchandising Yard sumps for reuse. In this way, water recycling is maximised.

If, despite additional treatment, compliance with the benchmark standards cannot be achieved, the contaminated wastewater will be contained, pumped out and disposed of at an approved location.

Water Collected in External Hazardous Materials Bunds

Hazardous materials stored externally in bunds will be roofed to minimise stormwater collection within the bund. Any water collected in bunds, as a result of windblown rain, will be visually inspected prior to discharge in a stormwater drain to ensure that it is suitable for discharge⁸.

Where bund water is considered likely to be unsuitable for discharge, testing will be undertaken and a licensed waste contractor organised to collect and dispose of the wastewater. Records will be maintained for internal management purposes⁹.

6.4 Noise Emissions

6.4.1 Potential Impact

In assessing the potential noise impacts of the Wood Centre operations, Terts (2001, Appendix N) has taken into consideration the following matters:

- The existing noise climate in the Wood Centre;
- The weather conditions at the time of measurement (i.e. no rain and little or no wind);
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- Possible DPIWE permit conditions for noise;
- Assessment of the predicted noise levels against possible DPIWE noise limits; and

⁸ Commitment: Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.

⁹ Commitment: Test potentially contaminated bund water, organise for its approved disposal and maintain records.

- Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres was as follows (Terts 2001).

Distant noise level data was obtained for an existing Merchandising Yard located in Tasmania.

The following model was then used to determine the attenuation of sound over flat and gently undulating ground.

Attenuation, dB(A)=6dB(A)/dd+ 3dB(A)/km

Where dd=doubling of distance.

It should be noted that the calculations obtained by using this model do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels were then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;
- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components;
- Whether the noise is regrettably inflicted or mindlessly caused; and
- The time of day or night the noise occurs.

As noted in Section 6.1.4, the main operations to be undertaken in the Merchandising Yard that have potential to generate noise nuisance include:

- Log unloading, loading, lay down, conveying, and relocation;
- Chain saws and cross cutting;
- Fuelwood production for power station (as part of the fuelwood processing operation); and
- The dropping of logs in the yard.

Log Loader

A CAT 988 log grabber is typical of the equipment which will be used at this site, and this generates 91 dB(A) at 7 m. At 6 kilometres the noise level is likely to be 14.3 dB(A), which is unlikely to be heard above the ambient level (Terts 2001).

Chain Saws and Cross Cutting

The noise generated by a typical chain saw to be used in the Merchandising Yard is shown in Table 56.

Table 56 Noise Generated by a Chain Saw

Distance from Source (m)	L _N dB(A)	L ₄₀ dB(A)	L ₉₀ dB(A)	L _{eq} dB(A)
15	81.8	78.8	36.3	73.7
500				47
6000				8.9

The chain saws will generate noise on the Wood Centre site, but will not be heard from 6 kilometres (Terts 2001).

Fuelwood Processor

A portable heavy duty wood recycler which is typical of the equipment to be used at the Wood Centre has been measured as generating 77 dB(A) at 61 m during field operations (Terts 2001). At 6 kilometres the estimated noise level is 19.1 dB(A). This level is below the likely day time background noise level L₉₀ of 36.5 dB(A) or 20 dB(A) on a still evening and so is unlikely to be heard (Terts 2001; Appendix N).

Dropping of Logs

The dropping of logs has been measured in an existing Merchandising Yard in direct line of sight of the yard (Terts 2001). Table 57 outlines the level of noise measured at 450 m and 1000 m from the existing site and the estimated noise level at 6 kilometres from the Wood Centre.

Table 57 Noise Generated by Log Stacking Operations

Distance from Source (m)	Mean L _{max} (dB(A))	Standard Deviation (dB(A))
450	58	2.92
1000	50.2	2.54
6000	19.6	2.5 to 2.9

Although unlikely, the noise from dropping logs may on occasions be heard from 6 kilometres away during very still nights. However, as a bedroom with a 20% open window offers about 11 dB(A) noise reduction, and as the above calculation represents the worst case, awakening reactions are considered unlikely.

6.4.2 *Management Measures*

Noise associated with log truck deliveries to the Merchandising Yard are discussed in Chapter 5 with respect to site-wide issues.

Although the noise assessment has demonstrated that noise emissions from the Merchandising Yard are unlikely to be heard at the nearest residence a number of management measures will be implemented, to ensure environmental best practice is achieved.

- All equipment will be selected and maintained to minimise noise emissions¹⁰.
- The log trucks, chain saws, and mobile log loaders will all be fitted with standard noise control equipment¹¹. The operation of this equipment and vehicles will be undertaken in a manner that complies with appropriate occupational health and safety requirements. For safety purposes, reversing alarms and/or flashing lights will be used on forklifts and log loaders. Due to the nature of surrounding site, it is considered unlikely that the sound level of the alarms would be cause for complaint, provision will however be made for sound level modification if found to be a cause of nuisance¹².
- Control mechanisms for sound intensity of PA system speakers and shift sirens will enable adequate noise management¹³.
- All buildings will be oriented so that openings face the south or west away from the nearest residence. Some buildings, including the fuelwood processor, will be built with noise absorbent insulation in the walls and roof¹⁴.

¹⁰ Commitment: Select and maintain machinery to minimise noise emissions.

¹¹ Commitment: Ensure forklifts and loaders are fitted with standard noise control equipment.

¹² Commitment: Modify sound levels of alarms if found to be a cause of nuisance.

¹³ Commitment: Control sound intensity of PA system speakers and shift sirens.

¹⁴ Commitment: Orientate building openings away from nearest residence and utilise noise absorbent insulation in the roof and walls of buildings containing noisy machinery.

- The fuelwood processor will be located behind buildings associated with the Merchandising Yard in order to provide a noise barrier in the direction of the closest residence (6 km)¹⁵.
- When the technical specifications for key items of equipment in the Merchandising Yard have are available an assessment of the noise impact will be undertaken to verify the predicted noise levels.¹⁶
- As discussed in 6.7, if received, all noise complaints will be recorded and investigated.

6.5 Solid Waste Generation

6.5.1 Potential Impact

If not managed appropriately the accumulation of wood wastes and other solid wastes within the Merchandising Yard have the potential to be a source of contaminated stormwater and reduced aesthetics. Refer to Figure 25 for description of the main wood flows in the Merchandising Yard.

6.5.2 Management Measures

Wood Waste Recovery and Reuse

The focus of the Merchandising Yard is the classification of logs to ensure maximum recovery, and beneficial reuse of the resource by value adding in other facilities on-site (i.e. forwarding to the sawmill, RPV mill, wood fibre mill).

Where logs cannot be value added, they will be processed as fuelwood and utilised in the power station for the generation of steam and electricity. This wood waste will be temporarily stored in a small stockpile on-site and conveyed by loader to the Power Station or heat plants as quantities dictate during each day. Similarly, wood fines generated during fuelwood production will be directed to the Power Station for use as fuel¹⁷.

¹⁵ Commitment: Locate the fuelwood processor adjacent to buildings that will provide a noise barrier.

¹⁶ Commitment: A noise assessment will be undertaken following selection of equipment and provision of technical specifications.

¹⁷ Commitment: Maximise use of all wood waste for power generation.

Muddy wood waste and rocks will be generated and swept up as part of Merchandising Yard operations. The material will be combined with yard waste from the other Wood Centre facilities and processed in the hogger prior to return to the forest floor where it will be spread over the ground if it is uncontaminated. If the material is determined to be contaminated, then it will be disposed of to an approved landfill. Every effort will be made to ensure that waste management is undertaken in accordance with the waste management hierarchy with reuse options investigated after commissioning of the Merchandising Yard¹⁸. No wood waste materials will be stockpiled for long periods on-site, or disposed of on-site¹⁹.

Wastewater Screened Solids

As discussed in Section 6.3, the collection and treatment of run-off from areas where solid wastes have been stored should minimise the potential impact of contaminated stormwater on the surrounding environment.

Solids (such as soil and wood fibre) collected within the screening/interceptor system on-site will be removed manually on a regular basis, or upon solids filling 15% of the system. This material will, where possible, be:

- Beneficially reused as a soil conditioner within plantation areas;
- Beneficially reused for other approved projects (e.g. compost); and/or
- Disposed of to an approved landfill²⁰.

Oil, grease and petrol collected in this system will be removed off-site by a licensed waste transport operator.

Refer to Section 6.7 regarding the monitoring of the screening/interceptor system on-site.

¹⁸ Commitment: Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.

¹⁹ Commitment: No wood waste will be stockpiled for long periods or disposed of on-site.

²⁰ Commitment: Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.

General Refuse and Workshop Wastes

General refuse generated within administration and workshop areas will be collected and stored in a waste hopper with a lid to minimise potential for leachate generation²¹.

Where possible, measures will be implemented for the minimisation of wastes generated, and reuse options investigated. General refuse requiring disposal will be collected regularly by a licensed waste contractor and disposed of to an approved landfill.

6.6 Hazardous Materials

6.6.1 Potential Impact

As noted for the other proposed facilities for the Wood Centre development, other than fuel, there will be limited hazardous materials stored or used on-site as part of the operation of the Merchandising Yard. Those hazardous materials that will be used on the site are detailed in Table 58.

Refer to Section 6.1.2 for description of the diesel and LPG storage facilities.

Inadequate management of storage and handling of these hazardous materials could result in direct contamination of soil, groundwater, and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

On-site vehicle maintenance will occur in the two workshops on-site²².

²¹ Commitment: Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to a licensed landfill.

²² Commitment: Conduct vehicle maintenance only in workshops.

Table 58 Hazardous Materials Stored On-Site - Merchandising Yard

Hazardous Materials	Active Ingredient	Dang. Goods Class & Subsidiary Risk (as appropriate)	Hazchem Code	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Location
Diesel (Petroleum)	Petroleum Distillate	3[Y]E	3A1	I, II, or III	45,000 L	45,000 L	Above ground bunded and roofed storage tank at refuelling station for communal use.
Petrol (Petroleum)	Petroleum	3[Y]E	EPG	II	5000 L	5000 L	Above ground bunded and roofed storage tank refuelling station for communal use.
LPG (Liquid petroleum gas)	Liquid Petroleum	2.1		-	45 kg	450 kg	Above ground storage cylinder (Gas storage area in workshop)
Oils and grease (Hydrocarbon)	Petroleum	3[Y]	-		20 L drums	60 L	Workshop over mobile bund
Acetylene	Acetylene	2.1	2[S]E	-	7.0 m ³ cylinders	30 m ³	Workshop
Herbicides					25 L	50 L	Workshop over mobile bund

6.6.2 Management Measures

In order to limit diesel, petroleum and LPG storage on each site, these hazardous materials will generally be stored at the refuelling station (Figure 5) operated by the Site Wide Manager located on the Merchandising Yard site. No other diesel, petroleum or LPG will be stored on the Merchandising Yard site.

Fuels (diesel, petrol and LPG) will be stored in above ground storage tanks that meet appropriate Australian Standards, *Dangerous Goods Act 1998* and *Dangerous Goods (General) Regulations 1998*. Management measures will include bunding, valves and roofing to ensure AS-1940 regulations are met²³.

An inventory of hazardous materials stored and handled on-site will be kept, including the location of storage, quantities and the associated material safety data sheets²⁴.

Acetylene cylinders will be stored within a secure area of the workshop in accordance with relevant Australian Standards, with in-use cylinders maintained in other areas of the site as necessary.

Valves on bunds will be kept closed and locked, with controlled discharge of stormwater conducted by trained personnel as required. A licensed waste contractor will be organised to collect spilled hazardous material within the bund for disposal, or recycling²⁵.

Minor quantities of oils, grease and herbicide will be stored over mobile bunds within the workshop areas. Material safety data sheets will be maintained in a hazardous materials management and emergency preparedness manual (the manual) that is kept in a centralised location, and a copy will be displayed in each storage area²⁶.

Equipment and on-site vehicles will be maintained and operated to ensure optimal performance and minimise potential for spillage to occur. Equipment and vehicle maintenance will be undertaken within the workshop on hardstand areas.

²³ Commitment: All hazardous substances will be stored with signage and fire control measures according to AS-1940.

²⁴ Commitment: Maintain an inventory of hazardous substances on-site.

²⁵ Commitment: Employ licensed clean-up crew when required.

²⁶ Commitment: Store hazardous substances in a secure safe building or bund with MSDS and signage in storage locations.

Waste oil will be collected in containers and collected for recycling by licensed waste contractor²⁷.

As discussed in Chapter 5, an emergency response plan will be designed for the Merchandising Yard site and training of staff will be undertaken to ensure all are familiar with the plan and responsibilities²⁸. A component of the plan will be the location of and handling of the spill kit to be maintained at an appropriate location for containment and clean-up of materials in the event of spillage. Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds.

In the event that a spillage occurs within the facility there are contingency measures in place to mitigate off-site affects. The measures presented in Chapter 5 will allow effective containment when combined with the practice of closing the shut-off valve on the sump before washing down the spill site. The contaminated water will drain to the closed sump from which the water can be pumped and disposed of at an approved location.

Where an accidental or emergency emission of hazardous materials exceeds a statutory requirement (according to either regulation or Permit conditions), notification will be given to the Director of Environmental Management (DEM) as soon as reasonably practicable, and within 24 hours of becoming aware of the release of the pollutant in relation to the Merchandising Yard activities²⁹.

6.7 Monitoring, Reporting and Review

6.7.1 Monitoring

Dust

High traffic areas within the Merchandising Yard will be visually monitored. If required the area will be watered to minimise dust generation³⁰.

²⁷ Commitment: Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain record of waste oil quantities.

²⁸ Commitment: Design an emergency response plan for the Merchandising Yard and provide training.

²⁹ Commitment: Report all hazardous material emission to DEM within 24 hours of becoming aware.

³⁰ Commitment: Visually monitor dust emissions and control dust by watering.

Stormwater and Process Wastewater

The collection and distribution of stormwater and process water from the site to the communal facility will be checked on a weekly basis to ensure the screening/interceptor system is operating effectively. The solids removal system will be checked daily or on a more frequent basis³¹. The frequency of the inspections will be modified after six months of operation based on inspection results³².

The wastewater flow from the site passing through the screening/interceptor system will be sampled on a regular basis. If the results of the monitoring are consistent with on-site operational requirements the frequency of sampling may be reduced to monthly. Monitoring will be undertaken for TSS, TPHC and BOD in accordance with standard industry practice. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be reported to the DEM on an annual basis³³. When TSS and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures).

Noise

A record of noise emission complaints will be kept in a complaints register for the site, together with details of investigations and actions³⁴.

As discussed in section 6.4, noise modelling will be conducted again once all equipment specifications are provided. Noise modelling will be undertaken to predict noise impact and will take into account factors such as:

- Topography;
- Meteorological conditions; and
- Exact location and orientation of key equipment.

In addition, formal monitoring of noise emissions from the Wood Centre as a whole will be undertaken after six months of operation. The parameters that will be measured

³¹ Commitment: Daily inspection and cleaning of the solids removal system.

³² Commitment: Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.

³³ Commitment: Monitor water quality for BOD, TPHC and TSS regularly and continuously monitor flow rate from screening/interceptor system outlet. Report results to the DEM annually.

³⁴ Commitment: Record noise emission complaints with details of investigations and actions.

include sound levels and frequency patterns.

The monitoring will be undertaken in accordance with a program approved by DPIWE. A report will be submitted to the DEM within 6 months.

Other

Monitoring data for the wastewater will be reported to the DEM on an annual basis.

When an emission of hazardous materials exceeds statutory requirement, a special accident report will be submitted within 5 days of an accident to the DEM. The report will detail the extent of the emission, the likelihood of environmental harm, the cause of the event, procedures applied to minimise the environmental harm, monitoring results, and the system introduced to avoid any repetition³⁵.

A general incident response and notification protocol will be developed and implemented along with reporting procedures for the Merchandising Yard³⁶. Refer to Section 6.7.2.

Oil supplied and waste oil returned for re-use will be recorded. Similarly, the following will be recorded for internal management purposes regarding hazardous materials and solid wastes, the:

- Quantity;
- Type of material;
- Details of transport (i.e. the waste contractor used); and
- Method of disposal, or reuse³⁷.

6.7.2 Reporting

The Merchandising Yard proponent will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. Reports are to be forwarded to the Site

³⁵ Commitment: Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.

³⁶ Commitment: The facility manager will develop and implement an incident response and notification protocol.

³⁷ Commitment: Maintenance of internal management records regarding hazardous materials storage and usage.

Wide Manager. This will comprise the incident reporting protocol and will allow the Site Wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;
- The proponent may report the incident to external organisations that are needed to provide response support, e.g. State Emergency Services;
- The proponent gathers details about the incident and supplies them to the office of the Site Wide Manager and Environmental Committee; and
- The Site Wide Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to DEM as soon as reasonably practicable but no later than 24 hours after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the attention of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

The proponent's responsibilities include but are not limited to:

- Developing and implementing Environmental Action Plans (EAP);

- Developing clear communication arrangements, taking into account after hours and holiday periods;
- Clearly defining roles and responsibilities;
- Maintaining, modifying, reviewing and analysing all monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
- Requesting that additional monitoring or testing be conducted to confirm or negate the original recordings;
- Determining if EAPs or amendments to Operating Procedures are required; and
- Ensuring the maintenance and calibration of monitoring equipment.

Monitoring defined in EAPs will address:

- Water quality and quantity;
- Visual observations;
- Noise; and
- Hazardous materials handling.

EAPs will also address:

- Triggers for implementing monitoring;
- Sampling and analysis;
- Interpretation and corrective action;
- Recording and maintaining monitoring data;
- Monitoring reviews;
- Control actions as a result of monitoring;
- Selecting monitoring equipment;
- Maintenance and calibration of monitoring equipment; and
- Calibration records.

By effectively implementing the Incident Reporting Protocol, the facility may be able to decrease its impact on the environment.

6.7.3 Review

An EMP review for the Merchandising Yard will be undertaken, as described in Chapter 5, within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE³⁸.

³⁸ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

CHAPTER 7 REGROWTH SAWMILL

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7. REGROWTH SAWMILL - ENVIRONMENTAL MANAGEMENT PLAN

7.1 Sawmill Process Description

The following section describes the process of producing milled wood products. A heat plant is required in the Sawmill process to produce steam used to recondition timber in the case of collapse and to dry timber in kilns. A description of the heat plant process is included below. The activities conducted in the Sawmill will comply with the current best practice environmental management conditions operating throughout Australia.

7.1.1 Description of Operation and Equipment

One hardwood Sawmill of approximately 6 Ha in extent is proposed processing regrowth and plantation logs. A typical process flow diagram is shown in Figure 27 and quantities of wood that flow through the Sawmill site are illustrated in Figure 28. The sawmill operations that will be conducted in enclosed spaces will include green milling, wood by-product chipping, reconditioning, kiln drying and dry milling. Operations conducted in the open will be limited to temporary log storage, limited cross cutting, air drying and the car park.

Green Mill

Sawlogs processed on-site will be stockpiled in the Merchandising Yard and transferred as and when required. No long-term stockpiling of logs will be undertaken on-site, although a small stockpile will exist at the infeed to facilitate consistent milling operations. Typically only sawlogs sufficient for one day of operation will be stored on-site. Sawlogs will be transported from the Merchandising Yard to the Sawmill by log loader. The log loaders from the Merchandising Yard will be utilised for this operation.

The mill will comprise a 'large log line' (for logs with a diameter greater than 50 centimetres) and a 'small log line' (for logs with a diameter less than 50 centimetres). A log loader will carry the larger logs to the infeed deck, and the smaller logs placed on a second infeed deck.

The large logs will be passed from the infeed deck to a grading station. Grading ensures optimal board recovery through the best possible cut plan per milling run to ensure maximum recovery of saleable board. The large logs are worked (Plate 5) into cants, or boards, by the head rig before passing through a series of circular saws, edgers and re-saws. This machinery mills the timber to the required board thicknesses. The small logs will be passed from the infeed deck to a conveyor

through a water recirculating log wash located within the Green Mill. The small logs will then be directed to either a circular bench saw and re-saw or a chipper canter, with boards being milled through the saw configurations and moved via conveyors to the racking area.

Plate 5 Breakdown Saw



All wood by-product from the milling process of small and large logs will be chipped by the wood by-product chipper, stored in an enclosed elevated chip bin on-site and subsequently trucked to the wood fibre mill.

In addition, a conveyor belt runs down the centre of the Sawmill and carries sawdust from the head rig, series of circular saws, edgers and resaws, and the circular bench saw or chipper canter to an enclosed sawdust hopper at the rear of the building. A loader or conveyor transports the contents of the hopper to the Merchandising Yard fuelwood processor outfeed conveyor for later use in the Power Station.

Sawn timber will then be directed to the racking area of the Sawmill where the boards will be sorted and racked according to length and thickness in preparation for air seasoning.

Wood By-product Chipper

As mentioned above, all green wood by-product from the head rig, circular saw, edger and resaw series will be diverted to the electrically powered, wood by-product chipper for chipping and subsequent storage in an enclosed elevated chip bin (200 m³). The green wood by-product from the chipper canter will be diverted directly to the chip bin for storage, as it will already be correctly sized. The wood by-product chipper will be located adjacent to the green mill. Wood by-product chips will be trucked to the wood fibre stockpile inside the ring road of the Wood Centre.

Air Seasoning

The open air seasoning is undertaken in the Air Drying Yard, and will last for approximately 6 months but may be longer in winter (Plate 6). During this time, the moisture content of the boards will be reduced to fibre saturation point of between 20 and 30%. Boards will then be routed to the kilns for further drying to moisture content levels of between 9 and 12 % depending on market conditions and customer requirement.

Plate 6 Air Drying Timber



Reconditioning

Reconditioning will be undertaken, as a preliminary stage of kiln drying, where cellular collapse of the timber occurs in the pre-dryers, or during air seasoning due to seasoning defect. Reconditioning the timber and increasing the moisture content of the board removes this collapse.

Racks of timber are transferred by forklift to the reconditioning chambers and subjected to a steam atmosphere for periods of eight hours or longer, depending on the thickness of the timber. Water is injected into the dry steam from the heat plant to facilitate reconditioning. This water and condensate discharges from the floor of the chambers to wastewater drainage system where it will be passed through an on-site effluent treatment system prior to discharge to the communal site-wide sewage treatment plant.

As mentioned, steam will be sourced from a heat plant to be situated on the Sawmill sites. Refer to the description of the heat plant provided below.

Kiln Drying

Reconditioned timber and suitable timber from the Air Drying Yard is transferred by forklift, or electric trolleys on rails, to one of the kilns, where final drying takes place. Heat is supplied by steam piped from, and recycled to, the heat plant. Temperature and humidity are carefully controlled.

After kiln drying, the timber is first destacked and then:

- Stored in undercover racks before further processing;
- Sold in the rough-sawn state; or
- Moved directly to the dry (planing and moulding) mill for sizing and dressing.

Dry (Planing and Moulding) Mill

The kiln dried racks are then transferred to the dry mill by forklift, or railed trolley, and traverse truck for further downstream processing, where a combination of planers, plane or dress all rough sawn timber into a board product known as planed or dressed all round timber.

Unusable off-cuts such as dockings are directed to a hogger and then blown to the storage bins. Dry fines such as shavings and sawdust from the planer are removed by a dust extraction system and blown to the same storage bins to be used as fuel for the heat plant. A dust filtration system installed above the shavings bin will minimise the emission of fine particulates to the atmosphere. The shavings will be directed to the heat plant via a fuel supply conveyor.

A variety of products will be produced depending on the market demand. Markets will include local, interstate and overseas.

Heat Plant

Wood by-products generated within the plant include sawdust, shaving fines and waste wood both green and dry. While the Power Station represents a potential purchaser for wood by-products, the most efficient application for the by-products is to use them as fuel in the mill's own heat plant. It is intended that a heat plant will be utilised to produce heat and steam for the Sawmill depending on timing of availability of steam from a central facility (the power station).

The heat plant requires diesel for start-up and is subsequently fueled by dry wood by-product from the Sawmill. Green fuel will be transported to the fuelwood processor by truck or loader from the Green Mill, while a blower will move the dry fuel from the Dry Mill to the on-site heat plant. The heat plant will comprise a fuel storage silo, feeder, feed conveyor, steam boiler, a flue, steam reticulation to the kilns and

reconditioner and condensate from the kilns, condensate tank, boiler water treatment system, a feed water pump and bottom and flyash storage.

Ash that drops into the furnace grate will be removed from the steam boiler and stored. In addition, the flue dust will be collected and stored. The ash and flue dust will be disposed of through use by local industry or as soil conditioner in the forest. The condensate return system from the condensate tank to the steam boiler will limit the release of steam to the environment. Finally, blowdown from the steam boiler will be directed to the sewage treatment plant.

The temperature and pressure of the steam produced by the 5MW Sawmill heat plant are 150°C and 7.5 bar respectively. This level of heating does not constitute super heated steam therefore there is a lower potential of incident occurring and a Hazard and Operability study are not required.

Storage and Dispatch

It is estimated that up to half of the processed timber will be stored under cover before dispatch. Storage on site will be provided for 8,000 m³. A total of 15,000 m³ of dried finished timber product will be loaded by forklift onto trucks for transport to market per annum (refer to Chapter 4).

Principal Items of Equipment and Operation

The principal items of equipment to be used in the Sawmill, the basic function and the likely hours of operation are summarised in Table 59. Each item is identified on the process flow diagram (Figure 27).

Table 59 Details of the Sawmill Operations Equipment

Equipment	Function	Power/Fuel	Hrs used/day
Infeed live deck	Loading of logs	Electricity	Up to 24 hrs
Log wash	Washing of small logs	Electricity	Up to 24 hrs
Head rig	Converts logs to cants	Electricity	Up to 24 hrs
Circular Saw	Cut to required thickness	Electricity	12 to 24
Edger	Dimension cutting	Electricity	12 to 24
Re-saw	Dimension cutting	Electricity	12 to 24
Circular bench saw	Cross cutting	Electricity	12 to 24
Chipper canter	Chips cant off-cuts	Electricity	12 to 24
Conveyors	Transfer of wood and sawdust	Electricity	Up to 24 hrs
Sawdust hopper	Enclose sawdust	-	Up to 24 hrs

Equipment	Function	Power/Fuel	Hrs used/day
Loader or truck	Transport hopper	Diesel or LPG	12 to 24
Chipper	Minimise wood by-product size	Electricity	12 to 24
Chip bin	Enclose chips	-	24 hrs
Reconditioning chambers	Treat warping, twisting and shrinkage	Steam	Up to 24 hrs
Heat Plant	Provide steam and heat	Wood by-product	Up to 24 hrs
Screening/interceptor trap	Filter discharge and treat	N/A	Up to 24 hrs
Kiln	Drying	Steam	Up to 24 hrs
Truck	Transport and traverse	Diesoline	12 to 24
Forklift	Sort and transport	Diesoline	12 to 24
Planers and Moulders	Dress production	Electricity	12 to 24
Dust extraction system	Dust extraction	Electricity	12 to 24
Shredder	Minimise wood by-products	Electricity	12 to 24
Blowers	Transport shavings to bin	Electricity	12 to 24
Shavings bin	Storage	N/A	24 hrs
Dust filtration system	Minimise emissions	Electricity	24 hrs

7.1.2 Description of Buildings and Associated Infrastructure

The major buildings on the Sawmill site are identified on the Site Plan (Figure 5) and include the:

- Green Mill;
- Wood By-product Chipper;
- Reconditioning Chamber;
- Kiln;
- Dry Mill;
- Heat Plant;
- Storage and Dispatch

- Hazardous materials store (located in the green mill);
- Office; and
- Amenities.

The details of the building dimensions and construction materials for the preceding buildings are provided in Table 60. In all instances cliplock colorbond roofing will be used. The colour of the buildings will be chosen to blend with the local environment. The materials for construction of the buildings include concrete slab floors and either precast steel sheet, tilt-up concrete panels, or aluminium sandwich panels.

Table 60 Building Dimensions and Construction Materials

Building	Area (m ²)	Height (m)	Construction Material		
			Floor	Walls	Roof
Green Mill	2500	12	Concrete slab	Precast & Steel sheet	Steel Sheet & noise absorbing insulation (Colourbond Trimdek clad)
Wood By-product Chipper	900	15	Concrete slab	Precast	Steel Sheet & noise absorbing insulation (Colourbond Trimdek clad)
Reconditioner Chamber (part of kiln)		12	Concrete slab	Aluminium sandwich	Steel Sheet (Colourbond Trimdek clad)
Kiln	3696	5	Concrete slab	Aluminium sandwich	Steel Sheet (Colourbond Trimdek clad)
Dry Mill	3040	12	Concrete slab	Precast and Steel sheet	Steel Sheet & noise absorbing insulation (Colourbond Trimdek clad)
Heat Plant	3600	25	Concrete slab	Tilt-up concrete panels and steel sheet	Steel Sheet (Colourbond Trimdek clad)
Storage & Dispatch	4900	12	Concrete slab	Tilt-up concrete panels and steel sheet	Steel Sheet (Colourbond Trimdek clad)
Office (computing, accounting and sales)	264	5	Concrete slab	Tilt-up concrete panels	Steel Sheet (Colourbond Trimdek clad)
Amenities	360	5	Concrete slab	Tilt-up concrete panels	Steel Sheet (Colourbond Trimdek clad)

Offices

The administration office buildings will house computing, accounting and sales staff. The buildings will be heated either from a reticulated steam system, or by an electric heating system.

Amenities

Amenities, comprising a lunchroom, showers and toilets, for the Sawmill will be provided in a separate building. The buildings will be heated either from a reticulated steam system, or by an electric heating system.

Car Parking

A hardstand car park (1656 m²) will provide parking for personnel, service vehicles, and visitors.

7.1.3 Source of Wood and Quantity of Production

A total of 50,000 m³ of green wood material will be transferred from the Merchandising Yard to the Sawmill for processing.

Of the 50,000 m³ green wood material infeed to the Sawmill, the approximate product distribution is shown in Figure 28. It is not possible to provide a simple breakdown of the products because the units of measurement are not comparable. The products are:

- dried finished hardwood product to market;
- sawdust for heat plant production;
- woodchips from the wood by-product chipper to the Wood Fibre Mill; and
- water.

Some volume of the original 50,000 m³ of green wood is lost in shrinkage (10%).

Figure 27 Sawmill Process Flow Diagram

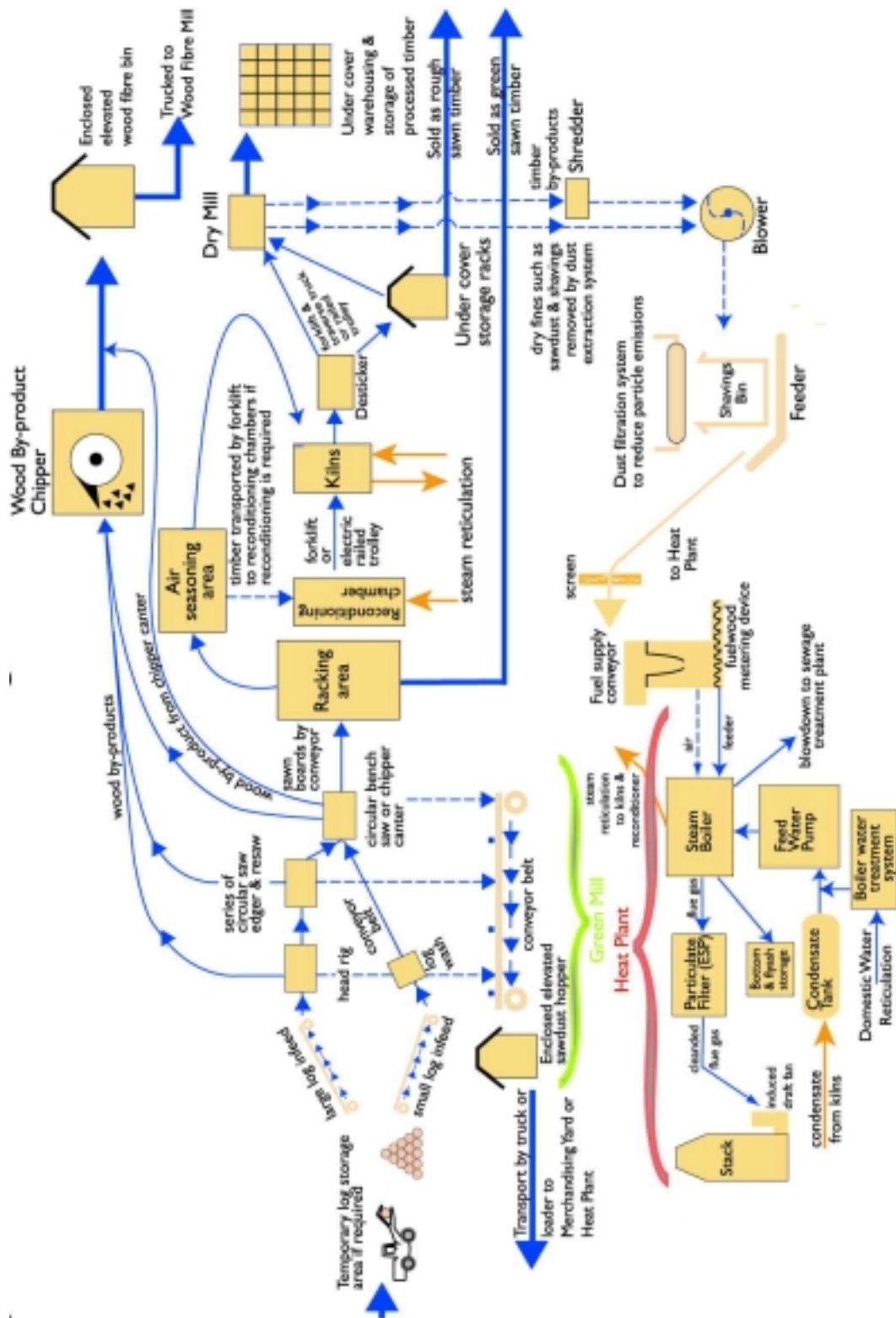
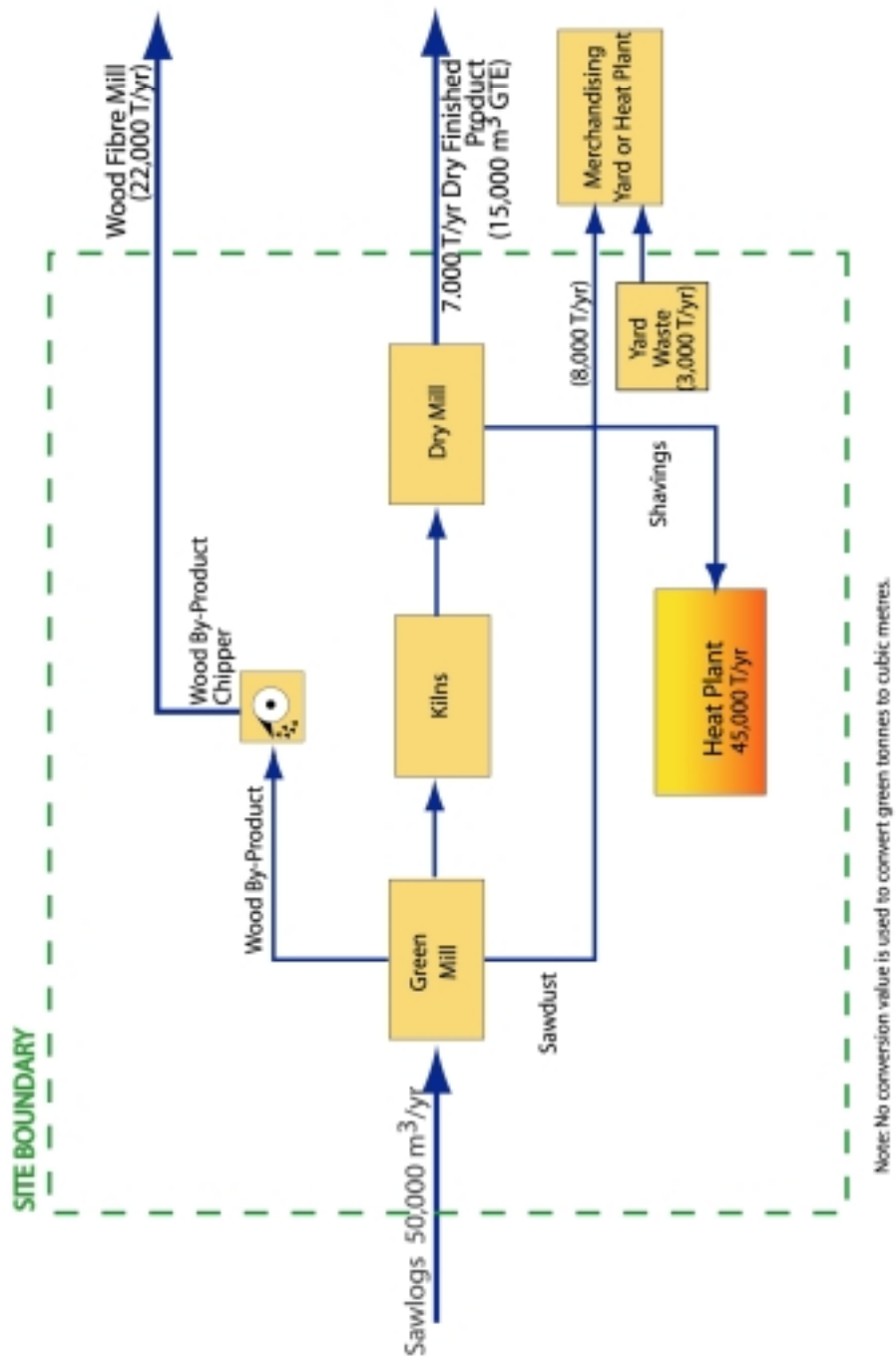


Figure 28 Sawmill Wood Flow Diagram



7.1.4 *Emission Sources*

Atmospheric Emissions

Diffuse and point source air emissions include the following:

- Heat plant emissions including stack emissions and intermittent steam flow to atmosphere during boiler safety valve tests;
- Steam emissions from reconditioners and driers;
- Dust from yards and stockpiles;
- Sawdust from green mill, and dry mill; and
- Fugitive emissions from the plant area.

Water Emissions

Three types of wastewater will be generated during the operation of the Sawmill: stormwater, process wastewater and domestic wastewater. Figure 29 illustrates the expected volumes of process water and stormwater flows.

Stormwater

Contaminated stormwater run-off will be collected from paved and unpaved operational areas (including oil and fuel spillages from trucks).

Problems with tannins and lignins may occur if prolonged leaching from sawdust and other wood by-product stockpiles occurs. Tannin rich water can lower pH to the detriment of native aquatic fauna and can also result in a decrease in oxygen levels in water.

Process Wastewater

Water will be drawn from the storage pond system for use in the Sawmill for:

- the log wash process; and
- dust suppression in high traffic areas.

Reticulated potable water will be utilised within administration and workshop areas, but no clean water will be required for use within process areas.

Process wastewater will be generated from:

- Log washing of sawlogs (the estimated make-up water from the storage pond is 2 ML per year while the rest is recirculated);
- Wastewater from reconditioners will be emitted sporadically for approximately 2 hours per day (0.3ML/year);
- Boiler water treatment system bleed stream (1.0 ML/year); and
- Wastewater from heat plant (boiler) blowdown (1.0 ML/year).

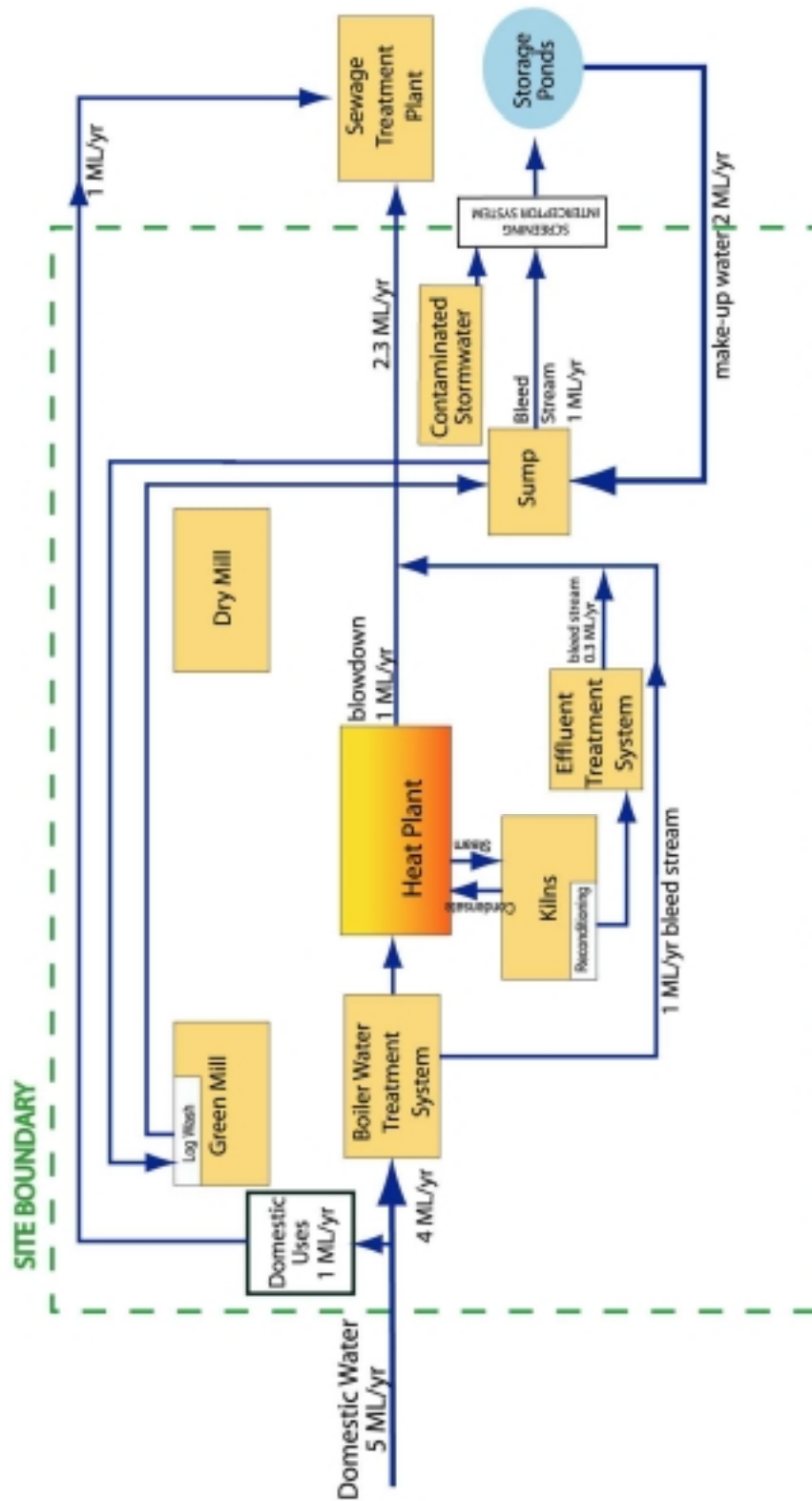
The total amount of wastewater produced by the Sawmill process will be 4.3 ML/year. Of this total 3.3 ML/yr will be directed to the sewage treatment plant and 1 ML/year will be directed to the storage pond. The potential impacts and management of the wastewater on the Sawmill site is discussed in Section 7.3. Refer to Chapter 5 for further discussion regarding site wide wastewater management.

Wastewater contaminants are likely to include wood products such as fines, dust (less than 700 tonnes per annum) and tannins.

Domestic Wastewater

Domestic wastewater will include sewage and grey water generated by site personnel. Based on the assumed generation of 150 L/day per person and up to 40 employees, the maximum level of domestic wastewater generated by the Sawmill is estimated to be 6 kL/day.

Figure 29 Sawmill Water Flow Diagram



Noise Emissions

The main sources of noise associated with the Sawmill operation include:

- Transport, unloading and loading of sawlogs;
- Chain saw use for off-cuts, and damaged or out of specification timber;
- Milling and planing operations (including headrig, edger, resaw and planer);
- Wood By-Product Chipper;
- Desticking, stacking, and loading for dispatch of boards;
- Fans in the reconditioner (tonal noise);
- Heat plant (boiler forced air and induced draft fans);
- Chipping;
- Reversing alarms on vehicles; and
- Kiln associated noises such as fans.

Solid Waste

Solid waste generated by the Sawmill will comprise:

- Yard waste, dirt and bark (440 m³/yr);
- Log wash solids (220 m³/yr);
- Bottom ash and flue ash from the heat plant (1,000 T/yr); and
- General refuse from administration offices and amenities.

Sludge from the Sawmill wastewater screening/interceptor system for the collection of surface run-off from external operational areas (described in Section 7.5.2) will predominantly comprise wood fines and silt. Solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated each day will be collected for disposal and/or reuse at an approved site.

Wood By-Product

- Wood fines, shavings and sawdust (10,000 T/yr); and

- Wood fibre generated on-site from off-cuts, and damaged or out of specification timber (19,000 T/yr).

7.1.5 Projected Hours of Operation and Employment

Operation at the Sawmill will be 312 days a year with the potential to operate 24 hours a day from Monday to Saturday.

It is predicted that approximately 30 to 40 personnel will be employed on site.

7.2 Atmospheric Emissions

As described in Section 7.1.4, emissions to the atmosphere may arise at various stages in the Sawmill process. The potential sources of atmospheric emissions are shown on Figure 20. The emissions will be in the form of:

- Fugitive sawdust;
- Dust from wood fibre handling during the transfer from the wood by-product chipper to the Wood Fibre stockpile;
- Dust from vehicular movements;
- Dust from dressing and moulding;
- Water vapour from kilns;
- Steam from conditioners;
- Fugitive steam from kilns and heat plant; and
- Particulates from the heat plant.

In addition, greenhouse gas emissions relevant to the Sawmill are discussed.

7.2.1 Potential Impact

Point Source Transport and On-Site Vehicle Exhaust Emissions

As in the case of the Merchandising Yard, loaders and transport vehicles will be used around the Sawmill. The gas generation rates of the equipment will be the same as those provided in Table 55, Chapter 6 however distances travelled will be less and consequently total emissions per year will also be less than for the Merchandising Yard. Refer to Chapter 6 for an explanation of the emission rates.

Fugitive Sawdust and Wood Fibre Particles from Milling.

The green mill, chipper and dry mill will produce fugitive sawdust and wood fibre particles.

There is a potential impact from these fugitive emissions causing contamination in the southwest of the site and from crossing the boundary of the premises.

Dust from Vehicular Movements

Dust generation is a concern because it is both an environmental and occupational health and safety issue. The prevailing wind direction and speed for the site have not been specifically determined around the Sawmill but it is acknowledged that a health and safety concern will exist if the winds tend to direct dust from the Sawmill onto other areas of the Wood Centre.

Steam Emissions from Kilns

Boilers, along with re-conditioners and driers produce steam however no adverse impacts are anticipated.

Heat Plant Emissions

Wood by-product, including sawdust, will be burned in the heat plant, which has the potential to produce particulate emissions that will affect air quality. In addition, the heat plant start-up requires diesel consequently associated diesel emissions will, on occasion, be produced. Appropriate disposal of ash is required in order to limit impacts on the quality of the environment.

The heat plant emissions have been considered for the combined effect along with the RPV mill heat plant emissions and the power station emissions. Refer to Chapter 10 and Appendix U for description and analysis of the air quality modelling results. The modelling has provided a good estimate of the actual conditions however it is recommended that the model be re-run once engineered specifications and weather data from the site is available to confirm the findings.

Greenhouse Gas Emissions

The Sawmill represents both a generator of greenhouse gas and effectively a carbon sink. Fuel to power the Sawmill represents a small source of greenhouse gas. The timber produced by the Sawmill will be of a high quality used for long-term use such as house construction. This material will therefore not be subject to decomposition that would release CO₂.

It is acknowledged that Sawmill loaders and transport vehicles will emit greenhouse gases. The typical generation rate of gas emissions from the equipment is provided in Table 55, Chapter 6. Details, regarding these emissions, are provided in Chapter 6.

7.2.2 *Management Measures*

Point Source Transport and On-Site Vehicle Exhaust Emissions

The release of combustion particulate and gases will be minimised through the selection of late model diesel engines and normal vehicle maintenance. The generation of nitrogen and sulphur oxides and carbon monoxide will be minimised through the use of modern combustion equipment that provides a suitable balance of air to fuel at an appropriate combustion temperature¹.

Fugitive Sawdust and Wood Fibre Particles from Milling

Dust and fugitive emissions to the atmosphere will be minimised by capturing emissions during sawing and transport to a cyclone dust filtration system above the shavings bin via enclosed ducting². A collection system is necessary to achieve a high rate of collection efficiency for all wood fibre, sawdust and wood dust particles.

To collect wood fibre, cyclone separators will recover wood fibre particles from an air stream by introducing the air tangentially into a conical circular vessel. Upon entering the cyclone separator, the conveying air travels tangentially to the bottom of the separator before reversing direction and travelling vertically upwards in the centre of the vessel. At the point of change of direction, fibres separate from the airstream and continue to fall under gravity to the base of the cyclone. All air moving through the system is collected and treated.

A regular schedule for cyclone and dust collector maintenance will ensure their efficient working condition and that the storage never reaches its maximum. To assist this, the sawdust level will be indicated by an audible alarm triggered before the sawdust level reaches the outlet from the cyclone. The floor of the sawdust storage discharge bay will be sealed and kept swept.

Sawdust and wood fibre will also be generated in the chipper and will be managed as described for the hogger in the Fuelwood Processor.

¹ Commitment: Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.

² Commitment: Utilise and maintain appropriately designed ventilation system to manage dust and fugitive emissions.

These management measures will ensure that no dust emissions resulting from the Sawmill operation leave the site³.

Dust from Vehicular Movements

Heavy traffic areas in the Sawmill will be watered as necessary to avoid dust emissions⁴. If watering proves to be an inadequate dust control measure to prevent cross boundary emissions, high traffic areas will be sealed and a street sweeper will be used to clean up wood fibre and sawdust⁵.

These management measures, combined with those previously mentioned, will ensure that no dust emissions leave the site.

Heat Plant Emissions

The following mitigation measures are based on the results of the modelling undertaken for air quality of the heat plant emissions. The results of the modelling are provided in Appendix U. The modelling has provided a good estimate of the actual conditions however it is recommended that the model be re-run once engineered specifications and weather data from the site is available to confirm the findings⁶.

The use of the heat plant will ensure that no open burning occurs on the premises thereby eliminating uncontrolled ash and related emissions⁷.

The installation of cyclone filters or electrostatic precipitation will be used to control particulate emissions from the heat plant. The total ash emission from the heat plant is estimated to be 1,000 T/yr. The ash will be contained and eliminated in a controlled manner involving removal from the site for disposal in a licensed landfill, for occasional use by industry or as soil conditioner in the forest as allowed or required by conditions.

The heat plant stack will be fitted with an obscuration meter. This meter will provide real time analysis of particulate levels in the stack. The heat plant control panel will

³ Commitment: No dust from on-site activities will leave the site.

⁴ Commitment: Dust suppression of highly trafficked unpaved areas will be achieved by watering.

⁵ Commitment: Seal high traffic areas of the Sawmill site and use street sweeper to clean-up wood fibre and sawdust if watering is an inadequate dust control measure.

⁶ Commitment: Conduct air quality modelling once engineering specifications and weather data for the site is available.

⁷ Commitment: Open fires will not be permitted on the site.

be fitted with a display of the obscuration meter level and warning alarms if the recorded level is above the upper control limit. The obscuration meter will be calibrated against in-stack monitoring for particulates using a NATA certified laboratory. The frequency of the calibration test will be every 12 months or at a frequency recommended by the manufacturer of the selected obscuration meter.

Predicted contaminant concentration in gaseous emissions from the heat plant are given in Table 61 and monitoring measures are described in 7.7.1. The fuel level of 45,000 Tpa is a conservative over estimate and therefore a worse case scenario.

Table 61 Air Emissions from Sawmill Heat Plant, fuel level of 45,000 tonnes pa

	Emission Factor (kg/t)	Quantity	Units	Total Emission (kg/yr)
Particulates	0.090	45,000	tonnes/yr	4,050
CH ₄	0.042	45,000	tonnes/yr	1,890
N ₂ O	0.041	45,000	tonnes/yr	1,845
NO _x	0.750	45,000	tonnes/yr	33,750
CO	6.800	45,000	tonnes/yr	306,000
CO ₂	940.000	45,000	tonnes/yr	42,300,000
NM VOC*	0.068	45,000	tonnes/yr	3,060

*NM VOC – Non-Methane Volatile Organic Compound

Emissions from the heat plant have been calculated using emission factors published by the US EPA 1995, AP42 Table 1.6-1 and 1.6-2.

7.3 Wastewater Emissions

Wastewater emissions from each of the facilities at the Wood Centre will be collected, treated and reused in a combined system for the site as a whole. This system is described in detail in Chapter 5. In the following section the wastewater generated in the Sawmill will be briefly described.

7.3.1 Potential Impact

Process Wastewater and Contaminated Stormwater

Activities to be undertaken in the outdoor areas of the Sawmill, which have potential to result in stormwater contamination and/or the generation of contaminated process wastewater, have been described in Section 7.1.5.

As described in Chapter 6, untreated wastewater has the potential to contain contaminants associated with wood processing and vehicular activities on-site. If emitted to the environment this contamination has the potential to degrade the receiving environment.

As explained in Chapter 5 the heat plant water treatment and blowdown will have a bleed stream that will remove process water with potentially high TDS levels from the system. The contaminated water will be directed to the sewage treatment plant as the volumes involved will be sufficiently diluted by the domestic wastewater flow. The sewage treatment plant will be designed to cater for these wastewater flows.

Domestic Wastewater

As described in Chapter 6, the high biochemical oxygen demand, high solids, nutrients and bacteriological contamination of domestic wastewater has potential to adversely impact on the environment if not treated appropriately prior to discharge.

Domestic sewage and grey water from the office and amenities facilities will be directed to a site-wide sewage treatment system and will therefore not be considered further in this section. Refer to Chapter 5.

7.3.2 Management Measures

Process Wastewater and Contaminated Stormwater

Water (4.0 ML/yr) from the domestic water source will be treated on-site for use in the heat plant boiler. Blowdown from the boiler will be directed to the sewage treatment plant (1.0 ML/yr). The balance of water will evaporate from the kiln process or runoff from the reconditioner. The reconditioner runoff (300 kL/yr) will be treated on-site by an effluent treatment system before passing through the site screening/interceptor system to the site-wide storage pond (Figure 29).

Log wash water will be recirculated through a sump with a bleed stream contributing 1.0 ML to the site-wide storage pond annually. Contaminated stormwater will be collected by concrete or earthen stormwater drains from paved and hardstand areas, respectively and passed through a screening/interceptor system on-site. The system will be located on the site boundary. The system will provide initial removal of coarse suspended solids (e.g. soil and wood fibre) as well as some oil and/or fuel residues that have been entrained in the wastewater stream. The traps will be cleaned regularly in order to maintain their efficiency. The sediment management is discussed in Section 7.5.2. The wastewater will be piped across the site boundary to the storage ponds for reuse on-site⁸.

⁸ Commitment: Contaminated process wastewater and stormwater will pass through a

The facility operator will undertake monitoring for TPHC, TSS and BOD from the outlet of the screening/interceptor system on an on-going basis and in accordance with standard industry practice. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be reported to the Director of Environmental Management on an annual basis⁹. Where the TSS and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures).

Water Collected in External Hazardous Materials Bunds

Hazardous materials stored externally in bunds will be roofed to minimise stormwater collection within the bund. Any water collected in bunds as a result of combined wind and rain will be visually inspected prior to discharge to stormwater drains and then to the screening/interceptor system to ensure that it is suitable for discharge¹⁰.

Where bund water is considered likely to be unsuitable for discharge, testing will be undertaken and a licensed waste contractor organised to collect and dispose of the wastewater. Records will be maintained for internal management purposes¹¹.

7.4 Noise Emissions

7.4.1 Potential Impact

As discussed in Chapter 6, when assessing the potential noise impacts of the Wood Centre operations, Terts (2001) has taken into consideration the following matters:

- The existing noise climate in the Wood Centre;
- The weather conditions at the time of measurement (i.e. no rain and little or no wind);
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- Possible DPIWE permit conditions for noise;

screening/interceptor system prior to discharge to the site wide storage ponds.

⁹ Commitment: Annual reporting of wastewater monitoring results to the DEM.

¹⁰ Commitment: Undertake controlled disposal of contaminated water from bunds.

¹¹ Commitment: Test potentially contaminated bund water and organise for its approved disposal.

-
- Assessment of the predicted noise levels against possible DPIWE noise limits; and
 - Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres was as follows (Terts 2001).

Distant noise level data was obtained for existing operating facilities located in Tasmania (sewage treatment plant, merchandising yard, saw mill, veneer mill and wood fibre mill), and from a manufacturer (wood fired power station, and portable wood fibre plant).

The following formula was then used to determine the attenuation of sound over flat and gently undulating ground.

$$\text{Attenuation, dB(A)} = 6\text{dB(A)/dd} + 3\text{dB(A)/km}$$

Where dd=doubling of distance.

It should be noted that the calculations obtained by using this model, do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;
- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components;
- Whether the noise is regrettably inflicted or mindlessly caused; and
- The time of day or night the noise occurs.

As mentioned in Section 7.1.4, the main operations to be undertaken in the Sawmill that have potential to generate noise nuisance include:

- Transport and unloading of sawlogs;

- Infeed conveyor;
- Cutting and planing operations (including headrig, edger and resaw);
- Wood By-Product Chipper
- Desticking, stacking, and loading for dispatch of boards;
- Fans in reconditioner (tonal noise)
- Reversing alarms on vehicles; and
- Associated kiln operations including fans.

Figure 20 shows the potential sources of noise from the Sawmill site.

Noise levels were obtained at a distance of 450 m from a large sawmill processing about 200,000 m³ of raw material annually, and which included chippers for the processing of wood waste from the green and dry mill. It should be noted that as the Sawmill at the Wood Centre will process only 50,000 m³ per year, the noise assessment below represents a worst-case scenario. Table 62 outlines the mean values that were obtained over two nights and results from eleven, 15 minute samples, and the estimated noise level of this Sawmill 6 kilometres from the Wood Centre.

Table 62 Noise Levels from a Typical Sawmill

DISTANCE FROM SOURCE	MEAN & SD	L ₁₀ dB(A)	L ₉₀ dB(A)	L _{eq} dB(A)
450 m	Mean	52.6	45.7	49.3
	Standard Deviation	1.07	2.08	1.88
6 km	Mean	13.6	7.0	14.1
	Standard Deviation			1.88

Terts (2001) notes that the L_{eq} noise level of 14.1 dB(A) is not likely to be heard from 6 km. Refer to Appendix N for the complete Noise Assessment report.

7.4.2 Management Measures

Although the noise assessment has demonstrated that noise emissions from the Sawmill are unlikely to be heard at the nearest residence a number of management measures will be implemented, to ensure environmental best practice is achieved.

All equipment will be selected and maintained to minimise noise emissions¹². The

¹² Commitment: Select and maintain equipment to minimise noise emissions.

log trucks, chain saws, and mobile log loaders will all be fitted with standard noise control equipment¹³. The operation of this equipment and vehicles will be undertaken in a manner that complies with appropriate occupational health and safety requirements.

All buildings will be oriented so that openings face the south, north or west. Some buildings including the Green Mill, Dry Mill and Wood By-Product Chipper will be built with noise absorbing insulation in the walls and roof, to absorb excessive noise¹⁴. Chapter 2, Figure 5 shows the location of buildings in relation to one another and the buffering that is provided by the buildings and storage around the Green Mill and Wood By-Product Chipper in particular.

When the technical specifications for key items of equipment in the Sawmill have are available an assessment of the noise impact will be undertaken to verify the predicted noise levels.¹⁵

All noise complaints will be recorded, investigated and the facilities manager will take necessary remedial action

7.5 Solid Waste and Wood By-Product Generation and Disposal

7.5.1 Potential Impact

There is a potential for solid waste and wood by-product from the milling processes to contribute to water contamination if allowed to accumulate in an uncontrolled manner on-site. Other solid wastes such as office waste and packaging materials may cause litter related problems if not adequately managed. Refer to Figure 28 for description of the main wood flows on the Sawmill site.

7.5.2 Management Measures

Solid Waste and Wood By-product Recovery and Reuse

Wood by-product will be used to generate heat and steam for use in the Sawmill processes. Excess wood by-product will be transported to the Power Station via the

¹³ Commitment: Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.

¹⁴ Commitment: Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.

¹⁵ Commitment: A noise assessment will be undertaken following selection of equipment and provision of technical specifications.

fuelwood processor and conveyors in the Merchandising Yard. This diversion will eliminate the need for stockpiling at the Sawmill site and the associated issues including the potential for leaching.

As described in Chapters 6 and 10, wood by-product will be used to generate power in the Power Station¹⁶. In this way, solid waste will be used beneficially by the generation and export of 30-50 MW to the local grid and will eliminate the potential for contribution to fugitive air emissions or water contamination.

Yard wood waste and rocks will also be generated as part of Sawmill operations. Depending on its composition, this material will, either be recycled as fuel for the heat plant, returned to the forest or disposed of to an approved landfill. No wood by-product will be disposed of on-site. The amount of wastes cannot be estimated at this stage however every effort will be made to ensure that waste management is undertaken in accordance with the waste management hierarchy with reuse options investigated after commissioning of the Sawmill¹⁷.

Ash from the heat plant will be collected and will be distributed on the coupe areas to assist with regeneration.

Wastewater Screened Solids

As described in Section 7.3.2, the collection and treatment of surface run-off should minimise the potential impact of contaminated stormwater on the surrounding environment. Solid waste will not be stored externally in stockpiles or allowed to accumulate on-site therefore the potential for stormwater to become contaminated will be reduced.

Solids (such as soil and wood fibre) collected within the screening/interceptor system on-site will be removed manually on a regular basis, or upon solids filling 15% of the system, whichever occurs first. This material will, where possible, be:

- Beneficially reused as a soil conditioner within plantation areas;
- Beneficially reused for other approved projects; and/or
- Disposed of to an approved landfill.

The minor quantities of solid waste generated from the boiler water treatment system

¹⁶ Commitment: Utilise all appropriate wood by-product for power generation.

¹⁷ Commitment: Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.

will also be managed in this manner¹⁸.

Oil, grease, petrol and oil contaminated material collected in this system will be removed off-site by a licensed waste transport operator to an approved landfill.

Refer to Section 7.7.1 regarding the monitoring of the screening/interceptor system on-site.

Miscellaneous Solid Wastes

As described in 7.1.4, solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated each day will be collected for disposal and/or reuse at an approved site.

General refuse generated by administration and packaging will be collected and stored in waste hoppers with lids to minimise potential for leachate generation¹⁹.

Where possible, measures will be implemented for the minimisation of wastes generated, recycling and other reuse options will be investigated. General refuse requiring disposal will be collected regularly by a licensed waste contractor and disposed of to an approved landfill.

7.6 Hazardous Materials, Health and Safety Issues

7.6.1 Potential Impact

As noted for the other proposed facilities for the Wood Centre development, other than fuel, there will be limited hazardous materials stored or used on-site as part of the operation of the Sawmill site (Figure 20).

Hazardous materials stored or handled on-site during the operation of the Sawmill are likely to include materials as detailed in Table 63 and Table 64.

Table 63 Hazardous Materials Annual Use Rate

¹⁸ Commitment: Reuse or dispose solid waste from boiler water treatment system in an approved manner.

¹⁹ Commitment: Collect and store general refuse in a waste hopper for collection by a licensed waste contractor and disposal in an approved landfill.

Reagent	Use	Typical Annual rate
Hydrochloric Acid (32% solution or Sulphuric Acid)	Water pH adjustment	4 T/yr
Sodium Bicarbonate (or Lime)	Water pH adjustment	3 T/yr
Aqueous Ammonia	Boilerwater treatment	500 L/yr
Sodium Triphosphate (3.5% solution)	Boilerwater treatment	200 L/yr
Carbohydrazine (6% solution)	Oxygen scavenger	200 L/yr

Table 64 Hazardous Materials Stored/Used On-Site Sawmill

Hazardous Materials	Active Ingredient	Dang. Goods Class & Subsidiary Risk (as appropriate)	Hazchem Code	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Type and Location
Diesel (Petroleum)	Petroleum Distillate	3[Y]E	3A1	I, II, or III	200 L	400 L	Above ground bunded tank in or adjacent to heat plant
Grease	Petroleum	4			25 L	200 L	Sealed drum
Oils	Petroleum	3 [Y]	-	-	25 L	50 L	Bunded Store
Paint	Solvent	3 [Y]E or 2 [Y]E			25 L	50 L	Tin Container
Degreaser	Petroleum	9			25 L	50 L	Tin Container
Acetylene	Acetylene	2.1	2 [S] E		7.0 m ³	200 m ³	Sealed G cylinder
Oxygen	Oxygen	2.2	2 [S]		8.9 m ³	250 m ³	Sealed G cylinder
Hydrochloric Acid (32% Solution Sulphuric Acid)	Hydrochloric Acid	8	2R/EPG 8AI	II	2 T	2.5 T	Bunded sealed drum in workshop
Sodium Bicarbonate (or Lime)	Sodium Bicarbonate (or Lime)	-	-	-	2 T	3 T	Bunded sack in workshop
Aqueous Ammonia (25% solution)	Ammonia	8	2P/8AI	III	200 L	400 L	Bunded sealed drum in workshop
Sodium Triphosphate (3.5% solution)	Sodium Triphosphate	-	-	-	100 L	200 L	Bunded sealed drum in workshop
Carbohydrazine (6% solution)	Carbohydrazine	-	-	-	100 L	200 L	Bunded sealed drum in workshop

There is a potential fire risk associated with production and storage of wood products with the above hazardous products. In addition, leakage of hazardous products into the environment can cause significant short and long-term contamination of soils, groundwater and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

7.6.2 Management Measures

In order to limit diesel storage on each site, diesel will generally be stored in the communal diesel store (45 kL) operated by the site wide manager. A small (400 L) diesel fuel store will be located on the Sawmill site primarily for heat plant start-up purposes. The diesel will have a bund with an impervious base, locked valve and roof²⁰.

To reduce the risk of release to the environment or the potential for fire, all hazardous substances will be stored with signage and fire control measures according to the Dangerous Goods Act and Regulations and the Australian Standards (AS-1940)²¹.

All hazardous materials for the Sawmill will be stored in a designated area of the site workshop.

Relocatable bunds will be used in this facility for the storage of minor chemicals, and the containment of potential spills. Material safety data sheets (MSDS) will be displayed where hazardous materials are stored; and appropriate occupational health and safety equipment will be provided to meet appropriate standards and regulatory requirements²².

Oxy-acetylene will be stored in a suitable enclosure external to the building.

As discussed in Chapter 5, an emergency response plan will be designed for the Sawmill site and training of staff will be undertaken to ensure all are familiar with the plan and responsibilities²³. A component of the plan will be the location of and handling of the spill kit to be maintained at an appropriate location for containment

²⁰ Commitment: Design and construction of the diesel storage to meet appropriate standards and legislation.

²¹ Commitment: All hazardous substances will be stored with signage and fire control measures according to AS-1940.

²² Commitment: Store hazardous substances in a secure safe building or bund with MSDS and signage in storage locations.

²³ Commitment: Design an emergency response plan for the Sawmill sites and provide training.

and clean-up of materials in the event of spillage²⁴. Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds²⁵.

An inventory will be kept of any hazardous materials stored and handled on-site, including the location of storage, their quantities, and their MSDS²⁶.

Any fluids released during fixed-machinery maintenance operations on sealed surfaces will be captured for reuse or appropriate disposal. Waste lubricating oils will be collected in one or more 205 L drums, to be held in the oil store, for return to recycling along with the oil recycled from the adjacent operations. Waste oil drums will be stored within an area where spillage can be contained, and/or collected by the wastewater management system²⁷.

In the event that a spillage occurs within the facility there are contingency measures in place to mitigate off-site affects. These measures are presented in Chapter 5.

All spillage accidents will be reported to DPIWE. Where an emergency or accidental emission exceeds a statutory requirement (according to either regulation or Permit conditions), notification will be given to the Director of Environmental Management (DEM) as soon as reasonably practicable and within 24 hours of becoming aware of the release of the pollutant in relation to the Sawmill activities²⁸.

7.7 Monitoring and Review

7.7.1 Monitoring

The largely manual operation of the Sawmill will provide few avenues for potential contamination of the environment. To ensure the operation of the Sawmill is in accordance with the EMP and best practice environmental management the following monitoring programs will be implemented.

Dust

High traffic areas within the Sawmill will be monitored visually. If required the area

²⁴ Commitment: Maintain a spill-kit on-site and contain spills.

²⁵ Commitment: Employ licensed clean-up crew when required.

²⁶ Commitment: Maintain an inventory of hazardous substances on-site.

²⁷ Commitment: Collect waste oil in drum(s) for removal and recycling by waste contractor and maintain a record of quantities.

²⁸ Commitment: Report accidental emission to DEM within 24 hours of becoming aware of it.

will be watered as determined necessary to minimise dust generation²⁹. Atmospheric monitoring may be conducted if complaints are received³⁰.

Stormwater and Process Wastewater

The collection and distribution of stormwater and process water from the site to the communal facility will be inspected on a weekly basis to ensure the screening/interceptor system is operating effectively. The frequency of the inspections will be modified, six months after commissioning based on inspection results and in accordance with DPIWE³¹.

The wastewater flow from the site passing through the screening/interceptor system will be sampled on a regular basis. If the results of the monitoring are consistent with on-site operational requirements the frequency of sampling may be reduced to monthly. Monitoring will be undertaken for TSS, TPHC, and BOD³² in accordance with standard industry practice. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be reported to the DEM on an annual basis. When TSS and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures).

Prior to discharge to the Sewage Treatment Plant the wastewater will be monitored for TDS, pH and BOD on a daily basis³³.

Heat Plant Emissions

The heat plant stack emissions will be continuously monitored by an obscuration meter, which will record the particulate density in the waste gas as a percentage light obscuration value. The instrument will be set to sound an audible alarm if the value exceeds Ringelmann 1 as 20% equivalent opacity. Adjustment to the fuel-to-air ratio

²⁹ Commitment: Visual dust monitoring and control dust by watering.

³⁰ Commitment: Atmospheric monitoring will be conducted if complaints are received.

³¹ Commitment: Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.

³² Commitment: Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously. Report the results to the DEM annually.

³³ Commitment: Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.

will be undertaken immediately to regain efficient energy generation³⁴. In addition, air sampling downwind of the heat plant can be conducted if complaints are received.

Monitoring data for the heat plant will be reported to the DEM on an annual basis³⁵.

Noise

A record of noise emission complaints will be kept in a complaint register for the site, together with details of investigations and actions³⁶.

In addition, formal monitoring of noise emissions from the Wood Centre as a whole will be undertaken 6 months after commissioning. The parameters that will be measured include sound intensity and frequency patterns. The monitoring will be undertaken in accordance with a program approved by DPIWE. A report will be submitted to the DEM within six months.

Other

The volume of oil supplied and waste oil returned for re-use will be recorded. In addition, internal management records regarding hazardous materials storage and use will be maintained³⁷. The records will include details regarding quantity, type of material, details of transport and methods of disposal or reuse.

Monitoring data for the wastewater and heat plant will be reported to the DEM on an annual basis.

When an emission of hazardous materials or wastewater exceeds a statutory requirement a special report will be submitted to the DEM within 5 days of a hazardous material emission. The report will detail the extent of the emission, the likelihood of environmental harm, the cause of the event, procedures applied to minimise the environmental harm, monitoring results, and the system introduced to avoid any repetition³⁸.

³⁴ Commitment: Continuously monitor stack emissions with an obscuration meter and alarm system. In case of poor emissions, immediately adjust fuel-to-air ratio.

³⁵ Commitment: Annual reporting of heat plant stack monitoring results to the DEM.

³⁶ Commitment: Record noise emission complaints with details of investigations and actions.

³⁷ Commitment: Maintenance of internal management records regarding hazardous materials storage and use.

³⁸ Commitment: Monitoring data will be submitted to the Director of Environmental Management annually. In the case of an emergency emission full details will be submitted within 5 days.

A general incident response and notification protocol will be developed and implemented along with reporting procedures for the Sawmill site³⁹. Refer to Section 7.7.2. for a description of what the protocol should include.

Wood fine and sawdust collection systems will be monitored visually on a regular basis to ensure they are operating effectively and for the removal of collected solids⁴⁰.

7.7.2 Reporting

The Sawmill proponent will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. Reports are to be forwarded to the Site Wide Manager. This will comprise the incident reporting protocol and will allow the Site Wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;
- The proponent may report the incident to external organisations that are needed to provide response support, e.g. State Emergency Services;
- The proponent gathers details about the incident and supplies them to the office of the Site Wide Manager and Environmental Committee; and
- The Site Wide Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to DEM as soon as reasonably practicable, but no later than 24 hours,

³⁹ Commitment: The facility manager will develop and implement an incident response and notification protocol.

⁴⁰ Commitment: Regular visual inspection of sawdust and wood fines handling systems and solids removal.

after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the attention of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

The proponent's responsibilities include but are not limited to:

- Developing and implement Environmental Action Plans (EAP);
- Developing clear communication arrangements, taking into account after hours and holiday periods;
- Clearly defining roles and responsibilities;
- Maintaining, modifying, reviewing and analysing all monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
- Requesting that additional monitoring or testing be conducted to confirm or negate the original recordings;
- Determining if EAPs or amendments to Operating Procedures are required; and
- Ensuring the maintenance and calibration of monitoring equipment.

Monitoring defined in EAPs will address:

- Water quality and quantity;
- Visual observations;
- Noise; and
- Hazardous materials handling.

EAPs will also address:

- Triggers for implementing monitoring;

- Sampling and analysis;
- Interpretation and corrective action;
- Recording and maintaining monitoring data;
- Monitoring reviews;
- Control actions as a result of monitoring;
- Selecting monitoring equipment;
- Maintenance and calibration of monitoring equipment; and
- Calibration records.

By effectively implementing the Incident Reporting Protocol, the facility may be able to decrease its impact on the environment.

7.7.3 *Review*

An EMP review for the Sawmill will be undertaken, as described in Chapter 5, within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE⁴¹.

⁴¹ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

CHAPTER 8 ROTARY PEELED VENEER MILL

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8. ROTARY PEELED VENEER- ENVIRONMENTAL MANAGEMENT PLAN

8.1 Rotary Peeled Veneer Mill Process Description

The following chapter describes the process of producing rotary peeled veneer. A heat plant is required in the Rotary Peeled Veneer (RPV) Mill process to produce steam used to dry veneer. A description of the heat plant process is included below. A viable alternative to having a heat plant on the RPV site is to pipe steam from the Power Station. The activities conducted at the RPV Mill will comply with the current best practice environmental management conditions operating throughout Australia.

8.1.1 *Description of Operation and Equipment*

The RPV Mill is located at the northern end of the site (refer to Figure 5) with direct access to the internal loop road. Refer to Figure 30 for the process flow diagram of the proposed operation and Figure 31 for wood flow through the RPV Mill site. All RPV Mill operations will be conducted in an enclosed space. Operations conducted in the open will be limited to temporary log storage and the car park. Refer to Table 66 for details on building dimensions and construction materials.

RPV is a thin sheet of veneer derived from regrowth pulpwood. Depending on the application, the thickness of the veneer sheet varies, see section 8.1.3 for details about products.

Peeling System Infeed

Peeler blocks will be cut to length in the Merchandising Yard, segregation area. Refer to Chapter 6 for description of segregation process. The peeler blocks will be placed on a log infeed deck by either a rubber tyred loader, or a fixed, electrically operated log grapple. From the infeed the blocks are taken one by one into the lathe charger that scans the blocks and in turn places them into the lathe on optimum centres (Plate 7).

Plate 7 Log infeed to Lathe



Rotary Lathe, Scanner and Clipper

In the rotary lathe, a full-length knife progressively peels a pre-set thickness of veneer from the rotating block at speeds of up to 100 metres per minute. Subject to block quality, peeling proceeds down to a core diameter as low as 50 mm. Once released from the lathe, the core falls onto a cross conveyor which transfers the core to a wood by-product chipper. The wood by-product generated is then blown to the fuel storage silo of the heat plant or transported by bins to the merchandising yard and onto the Power Station by conveyor if there is excess.

Due to the small diameter of core material production, it is expected that chips produced from cores will not meet export chip specification. In the event that export quality chips are produced they will be sold to the wood fibre mill.

The veneer ribbon is cut longitudinally and transversely (“clipping”) to suit the size requirements of the finished dry veneer and to eliminate waste (Plate 8). The peeling line has one, 8 foot rotary clipper and two, 4 foot clippers. The veneer by-product is collected on a combination of conveyors and taken to a green waste veneer chipper from which wood by-product is blown to the fuel storage silo of the heat plant.

Veneer suitable for further processing is stacked in preparation for the veneer drying process, with a minimum of manual intervention in a largely mechanised process.

A critical performance criterion is the recovery of raw block volume to green veneer. The imperfections, which prevent the peeler logs being acceptable as sawlogs, also result in the generation of waste veneer. Selection of peeler material is therefore a balance between log quality against log cost.

Plate 8 Peeled veneer prior to clipping



Veneer Drying

Veneer sheets are conveyed through the dryer on a series of closely spaced roller pairs, called a deck. The rollers rotate in unison and are driven by a common chain running the whole length of the dryer. The six decks are housed in a large insulated container with fans circulating hot dry air, and a number of separately controlled drying stages along the length.

The length of the decks and the container is such that the veneer reaches the desired dryness in a single pass. Thus each deck can be loaded with green veneer at one end and dry veneer unloaded at the other. The speed of the deck can be varied to suit the different drying rates of different qualities and thicknesses of veneer.

To ensure that the hot dry air uniformly sweeps all veneer surfaces, a series of “jet boxes” cover the top and bottom veneer surfaces in each deck. In addition, close control of the temperature and humidity is required to maximise drying rate. These two requirements are most economically achieved by constructing self-contained sections along the length of the dryer, each provided with its own air inlet, fan, heating coil by-pass controls and exhaust. Warm moist air will be discharged to the atmosphere.

Full sheets of veneer are fed directly into a set of feed rollers at the drive end of the machine. Part sheets of veneer are fed into semi automatic machines between rollers at the feed end. These part sheets are stacked and graded at the outlet from the dryer.

Steam required for the veneer drying process will be sourced from the heat plant situated on the RPV site, as described later in this chapter.

Composing

Part sheets of dried veneer are fitted together to make full sheets in a process called “composing”. The purpose of composing is to make full sheets from small pieces for easy handling before the product is finished in the plywood plant. Composers take random width short grain veneers, trim them accurately and assemble them into full sized short grain core veneer sheets. This is undertaken by applying hot polypropylene adhesive at the joint in a series of reinforcing strings to assist holding the pieces together. This is a fairly slow and labour-intensive process and in this mill a total of seven composers will be installed to handle the part-sheets expected to be produced in the peeling operation. The gluing process is carefully controlled using calibrated application equipment to minimise wastage.

Each of the seven proposed veneer composers incorporates a clipper. Waste veneer is generated while peeling away the out-of-cylindrical portions of the block and thereafter when imperfections in the rounded block need to be eliminated. The wood by-product from the dry veneer clipper is chipped and then blown to the fuel storage silo for the on-site heat plant.

Stacking, Packaging And Dispatch

Finished veneer stacks are compressed hydraulically between timber top and bottom pallets, wrapped in polyethylene sheet for protection from rain, and strapped using steel or plastic straps. A typical package contains a one metre depth of veneer sheets in one of the two sheet sizes of 2,440 x 1,220 mm or 1,820 x 910 millimetres.

Only temporary storage of finished packages stacked up to four deep is provided in the mill, major storage is provided off-site.

Transport Within the RPV Mill

Stacks of green veneer, dry veneer and finished product will be moved around the RPV Mill using light rubber tyre (gas powered) forklift trucks. The size of the production building and the continuous airflow into the veneer dryer are judged sufficient to prevent any significant build-up of exhaust products.

Future Block Conditioning

Conditioning of peeler blocks is a process of bringing the blocks to a uniform, preset temperature and moisture content before peeling. Conditioning often improves the quality and quantity of acceptable veneer produced.

It is not intended that blocks be conditioned for the initial development, however, depending upon performance, conditioning facilities may be constructed later and be subject to separate approvals. If so, the conditioning facility will comprise a concrete enclosure similar to a normal timber-drying kiln. Conditioning will be achieved by

storing logs in an atmosphere with gentle fan circulation, temperature adjustable up to 60°C, and relative humidity of 100%. Provision will be made to condition 20% of the daily throughput. Steam will be sourced from the mill's heat plant or the power station for this process and will be circulated through steel heating coils for temperature control. Humidity will be maintained by spraying water over the heating coils.

Heat Plant

Steam is required for the veneer drying process. It is planned to install a 15 MW stand-alone heat plant on the RPV Mill site for this purpose. There is also an option to obtain steam from the Wood Centre Power Station. The timing of the availability of steam from a central facility will determine which option will be used.

Wood by-products generated within the RPV Mill include peeler cores and waste veneer both green and dry. These by-products will be used as fuel in the mill's own heat plant. At design veneer production rates, it is expected that approximately 20,000 tonnes per annum of combustible wood by-products will be generated, sufficient to meet approximately 45% of the total fuel required by the heat plant. The wood by-product is prepared for use in the heat plant by designated chippers within the mill.

The heat plant requires diesel for start-up and is subsequently fueled by wood by-product. The internally generated fuelwood will be blown directly to a fuel storage silo with a particulate filter mounted above it. Up to 25,000 tonnes per annum of forestry residue will be sourced from the forest and/or from other facilities on-site, and delivered to a truck dump at the heat plant. The truck dump will have a live floor hopper feeding a belt type reclaim feeder and a bucket or screw type elevator lifting trucked fuel to the top of the silo. The silo will have capacity to store three day's operating fuel to allow some flexibility in fuel deliveries. Fuel will be extracted from the bottom of the silo by a live bottom and delivered to the heat plant furnace in-feed using a screw conveyor.

Ash that drops into the furnace grate will be removed from the steam boiler and stored. In addition, the flue dust will be collected and stored. The ash and flue dust will be disposed of through use by local industry or as soil conditioner in the forest.

Steam will be generated at a pressure of approximately 7.5 bar to allow a temperature of up to 150°C to be utilised in the veneer dryer. The veneer dryer requires approximately 12 MW of thermal heating for winter operation. A steam capacity of 15 MW has been selected for the heat plant to allow for some future expansion. The level of heating does not constitute super heated steam (>700 kpa) therefore there is a lower potential of incident occurring and a Hazard and Operability study are not required.

The heat plant furnace is a tall but otherwise conventional combustion chamber with a steam swept incline, chain type ash conveyor and variable top-grade air supply to control flame temperature. Heat transfer surfaces are water-tube type with natural circulation between a top hot drum and bottom headers. As defined by Australian Standards, the

system will be rated for "limited attendance." Condensate water will be returned to the steam boiler via a condensate tank and feed water pump. Make-up water will be pumped from the domestic water supply and treated by the boiler water treatment system before entering the heat plant.

Ash that drops into the furnace grate will be removed from the steam boiler and stored. In addition, the flue dust will be collected and stored. The ash and flue dust will be disposed of through use by local industry or as soil conditioner in the forest.

Process Supervision

It is envisaged that in the main mill building, overall production supervision would be centralised in an elevated control room with a view over all production centres and material movements.

In this location there will be a comprehensive central control room, which will display and record all production data. Some operations, such as the peeling and composing, will be controlled locally in which case display and data will be relayed from the local control station to the central control room. Other operations, for example the dryer, will be controlled directly from the central control room with occasional delegation to local control stations.

It is also planned to provide a dual redundant backup computer system to maintain mill integrity in the event of system failure, as well as to allow for maintenance work with minimal interruption to manufacturing

Principal Items of Equipment and Operation

The main types of RPV Mill equipment, their function, specifications and hours of operation are outlined in Table 65.

Table 65 Details of the Main Types of Rotary Peeled Veneer Mill Equipment

Equipment	Function	Power/Fuel	Hrs used/day
Heat plant (including fuel receival hopper, silo, furnace, boiler, condensate system, fans and pumps).	Steam raising.	Plant by-product and Forest residue	24 hrs
Block receival (including infeed deck and conveyor).	Receival and temporary storage of peeler blocks, presentation to infeed of peeling system.	Electricity	24 hrs
Peeling system (including charger, rotary lathe, scanner, clippers, veneer conveyors, core and waste veneer conveyors, veneer stackers).	Conversion of peeler blocks into stacked green veneer, waste veneer on conveyor and peeler cores on conveyor.	Electricity	24 hrs
Dryer (including infeed, dryer chamber and conveying decks, air handling, outfeed and dry veneer stackers).	Drying of green veneers to finished moisture content.	Electricity	24 hrs
Composing (including short and long grain composers, infeed and outfeed stackers and waste veneer conveyors).	Converts random width veneer strips into full sheets, presents waste veneer on conveyor.	Electricity	24 hrs
Finished product handling (including cold press and packaging systems).	Presses, wraps and crates stacks of dry veneer.	Electricity / Manual	24 hrs
By-product conversion.	Accepts peeler cores and waste veneer (green and dry), chips and blows fibre to heat plant for storage.	Electricity	24 hrs

Figure 30 Rotary Peeled Veneer Mill Process Flow Diagram

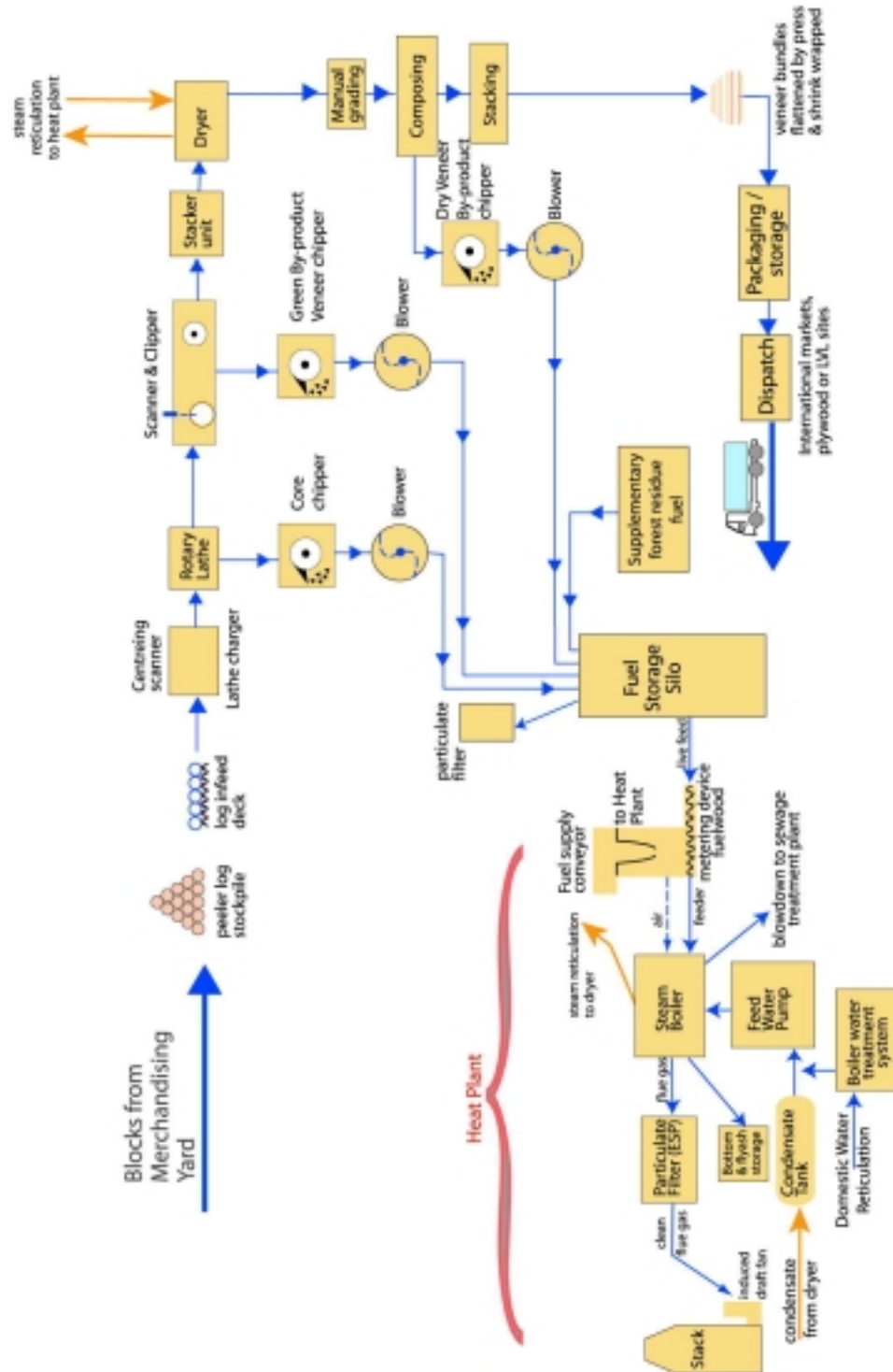
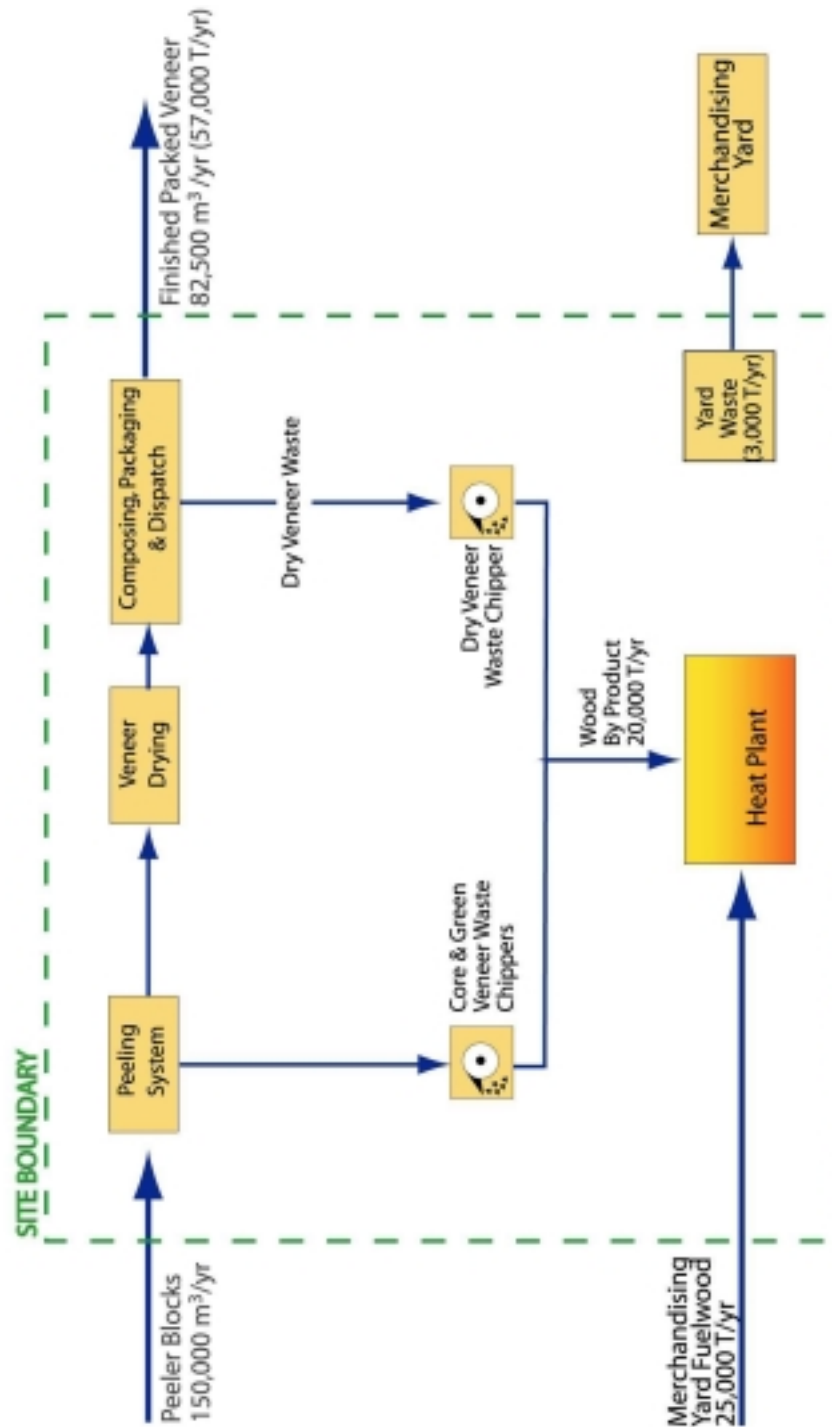


Figure 31 Rotary Peeled Veneer Mill Wood Flow Diagram



8.1.2 Description of Buildings and Associated Infrastructure

Principal Buildings

The major buildings and services on the RPV Mill site are as follows:

- Main RPV mill building (including heat plant, veneer production, and product storage);
- Peeler log stockpile;
- Workshop including hazardous materials storage;
- Office; and
- Amenities.

Although the docking mill is in close proximity to the RPV it is considered part the merchandising yard and as such is described in Chapter 6. The details of the building dimensions and construction materials for the preceding buildings are provided in Table 66.

Table 66 Building Dimensions and Construction Materials – Rotary Peeled Veneer Site

Building	Area (m ²) (Approx.)	Height (m)	Construction Material		
			Floor	Walls	Roof
Main RPV Mill building	14,000	6	Concrete slab	Tilt-up concrete panels and steel sheet	Steel sheet (Colourbond Trimdek clad)
Office	280	5	Concrete slab	Brick	Steel sheet (Colourbond Trimdek clad)
Amenities	350	5	Concrete slab	Brick	Steel sheet (Colourbond Trimdek clad)
Workshop	380	12	Concrete slab	Steel sheet (Colourbond Trimdek clad)	Steel sheet (Colourbond Trimdek clad)

Main Veneer Plant Building

The main RPV Mill building will have plan dimensions of approximately 50 m width by 230 m length and be designed around providing a clear and logical flow path for the product. The building will be constructed with provision for a 50 m extension for the future addition of a plywood plant.

Office

Office space and corporate facilities will be provided.

Amenities

The amenities building, based on the requirements of the Building Code of Australia, will be constructed adjacent to the main office to provide for approximately 125 production staff.

Workshop

A workshop will be constructed on-site in which maintenance equipment, small amounts of hazardous goods and tools will be stored, selected maintenance tasks carried out and three offices will be included.

Car Parking

Car parking will be provided for all staff, commercial vehicles and visitors to the site. This will account for approximately 50 personnel and visitors.

8.1.3 Source of Wood and Quantity of Production

Quantity of Production

From 150,000 tonnes of peeler blocks received at the RPV Mill, 82,500 m³ (57,000 tonnes) of packaged dried rotary peeled veneer sheet, and approximately 20,000 tonnes of green wood by-product and small amounts of dry veneer trimming waste will be generated.

Maximum recovery of rotary peelable billets is an objective of the Merchandising Yard these will be directed to the RPV mill.

The heat plant, or power station, will consume all of the above wood by-product generated on-site and will be supplemented by forest residue from the forest floor as required.

Block Supply

Blocks will be primarily *Eucalyptus obliqua* and *E. globulus*, which share a similar drying characteristic. *E. regnans* may also be peeled although its drying characteristics are different and must therefore be dried separately. *E. nitens* may also be trialed. All blocks will come from regrowth forests less than 100 years old.

Products

Products will be manufactured slightly oversized for each of two sheet sizes:

- 3' x 6' (finished plywood size 1,820 mm x 910 mm); and
- 4' x 8' (finished plywood size 2,440 mm x 1,220 mm).

For each sheet size four products will be manufactured:

- Short grain core veneer (2.4 mm thick) being a mixture of full sheets and sheets composed from jointers in the core builder;
- Long grain core veneer (1.2 mm thick) being a mixture of full sheets and sheets built from random width veneers;
- Face veneer sheets (1.2 mm thick) being high quality full sheets; and
- Back veneer sheets (1.2 mm thick) being medium quality full sheets.

8.1.4 Emission Sources

Air emissions

Air emissions associated with the operation of the RPV Mill are likely to include:

- Dust generated during the unloading of forest residues from trucks (material to be used as fuelwood in the heat plant);
- Dust from wood fibre generation and blowing operations on-site;
- Hot moist air discharged from the veneer dryer fans. A plume of water vapour can be expected under cooler atmospheric conditions, but no significant dust load is expected;
- Small fugitive steam losses from leaks and air ejection points;
- Furnace stack emissions from the heat plant;
- Large steam flow to atmosphere when boiler safety valves are tested and activated in the steam system;

- Exhaust from diesel and/or LPG powered vehicles both within and outside of the building associated with forklift movements; and
- Odour emissions associated with hot polypropylene used to join part sheets of dry veneer in the composers. (Note: The odour from this operation is not offensive and is barely perceivable to the operator standing adjacent to the process joining area).

Water Emissions

The RPV Mill is primarily a dry process, with water emissions produced by the boiler water treatment system, the boiler, contaminated stormwater and domestic wastewater. Figure 32 illustrates the water flows on the RPV Mill site excluding the domestic wastewater that is discussed in Chapter 5.

Process Wastewater

Process wastewater from the RPV Mill will only comprise a low volume stream that is associated with the boiler water treatment bleed stream and heat plant (boiler) blowdown. The quantities are expected to be approximately 1.0 ML/yr for each of these streams.

Domestic Wastewater

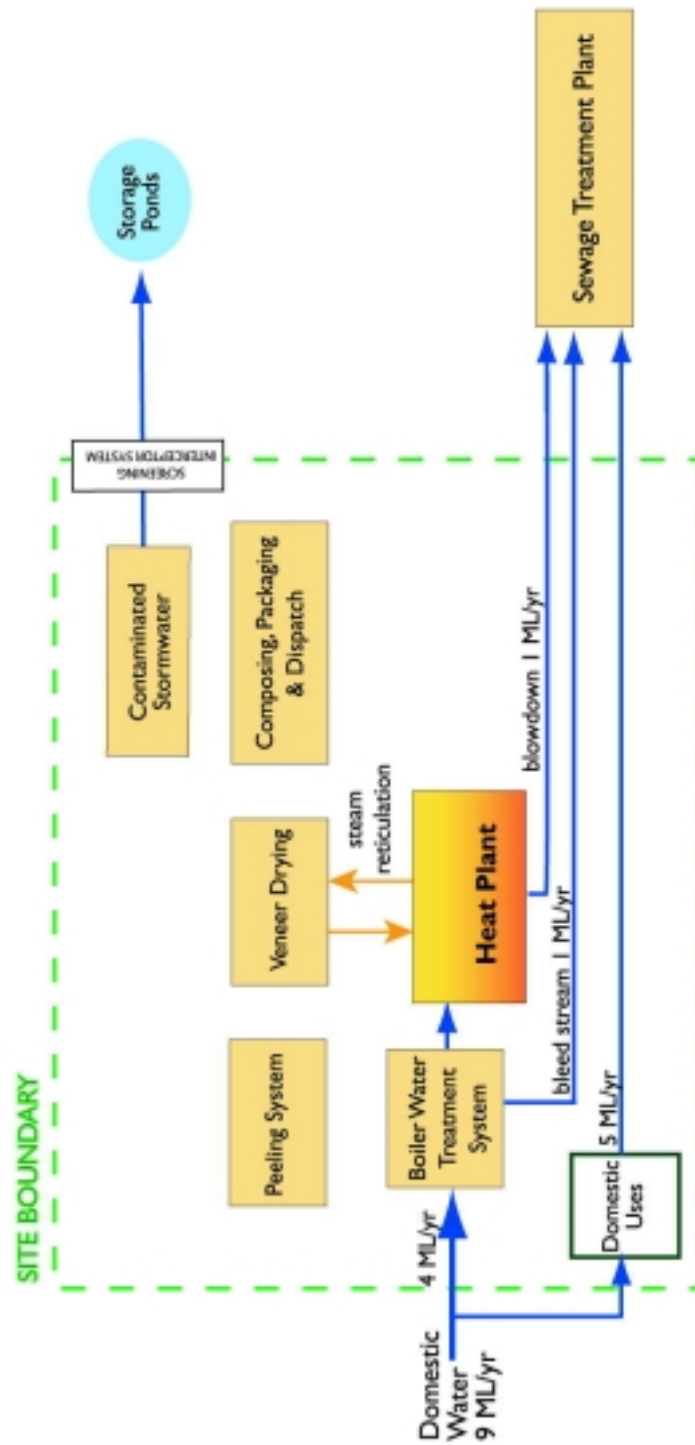
Approximately 150 L/day/person (or a total of 18,750 L/day for 125 employees) of sewer and grey water will be generated by amenities for site personnel and visitors.

Contaminated Stormwater

Contaminated stormwater from external operational areas should be low in volume and potential contaminant levels, as the majority of activities will be undertaken within the main RPV Mill building. External activities will primarily comprise docked log conveying into the building and product transport vehicles leaving the building.

Contaminants may include traces of oil and fuel associated with vehicle movements and conveyors and minor wood materials generated during conveying, such as wood fines and sawdust.

Figure 32 Rotary Peeled Veneer Mill Water Flow Diagram



Noise Emissions

The RPV Mill comprises: a number of pieces of mechanical handling equipment; steam is generated on the site; large amounts of air is recirculated and mobile equipment is used for many transport tasks.

The main noise sources associated with the operation of the RPV Mill and heat plant include:

- Docked veneer log/block handling into the building;
- Peeling of blocks;
- Clipping of veneer (uses a high velocity guillotine or knife/anvil);
- Dryer fans;
- Core and waste veneer chippers (cutting noise);
- Motors for driving/maintaining component activities (ranging in capacity from 0.1 kW to 45 kW);
- Vehicle movements associated with wood by-product and product handling;
- Heat plant - boiler forced and induced draft fans;
- Veneer dryer (8 – 37 kW fans and 7 – 26 kW fans in the drying and cooling sections);
- Heat plant safety valve discharge and blowdown systems; and
- Reversing alarms on vehicles.

Much of this equipment will be housed within the main process building and heat plant.

In general, veneer mills are quieter than sawmills as noisy equipment and activities are undertaken within the confines of the process building, and the only external noise source is from external log handling operations.

Solid Waste

The main types of solid waste that is likely to be generated as part of the RPV Mill operation are as follows:

- Wood by-products (including peel, clippings, composing/jointing, wood fines,

peeler cores, off-cuts, and damaged veneer);

- Packaging wastes (including polyethylene sheet, and steel or plastic strapping);
- General office, domestic refuse (e.g. paper, plastic and food scraps);
- Minor quantities of workshop wastes (e.g. metal shavings, wood fibres); and
- Waste glue containers.

The quantity of wood by-product generated by the RPV Mill is predicted to be 20,000 tonnes per year plus a small amount of dry wood by-product. It is not possible to predict the quantity of other wastes generated at this time. Solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated will be collected for disposal and/or reuse at an approved site.

8.1.5 Projected Hours of Operation

A continuous 24 hour shift production operation is planned for maximum utilisation of capital equipment.

A day maintenance crew and administration staff of 47 will work a conventional 5 day week. A crew of 27 will maintain operations during the night shift.

8.2 Atmospheric Emissions

Emissions to the atmosphere may arise at various stages in the RPV Mill process. The potential sources of atmospheric emissions are shown on Figure 20. The emissions will be in the form of:

- Fugitive sawdust;
- Dust from wood fibre handling;
- Dust from vehicular movements;
- Fugitive steam and moist air emissions; and
- Composer Emissions.

In addition, greenhouse gas emissions relevant to the RPV Mill are discussed.

8.2.1 *Potential Impact*

Fugitive Dust, Sawdust and Wood Fibre Particle Emissions

Dust generated during the unloading of forest residues from trucks for use as fuelwood in the heat plant, and forklift or loader operations have potential to cause on-site nuisance if not managed appropriately, but are not likely to result in nuisance off-site.

Internal forklift movements have potential to be cause for occupational health and safety risk if not managed properly.

Wood fibre generation and blowing operations will be fully enclosed for normal operations, but have potential to cause on-site nuisance if not managed appropriately.

Fugitive Steam and Moist Air Emissions

A plume of water vapour (moist air) and/or steam flow is likely to be visible under cooler atmospheric conditions from sources such as:

- Heat plant stack;
- Veneer dryer fans;
- Boiler safety valves; and
- Small fugitive steam loss from leaks and air ejection points.

The impact of steam and moist air emissions should not be cause for adverse impact on air quality and will not be considered further.

Vehicle Exhaust Emissions

Diesel powered vehicles will be fitted with standard equipment and should not adversely impact on the local air quality. Indoor air quality will be degraded where gas powered forklifts are used within buildings and have potential to be an occupational health and safety risk if not managed appropriately.

Composer Emissions

Potential odour emissions and fumes associated with hot polypropylene operations and the joining of part veneer sheets is not likely to be offensive and will barely be perceivable to the operator standing adjacent to the process joining area. No off-site emissions will result from this process.

Heat Plant Emissions

Wood by-product, including sawdust will be burned in the heat plant, which has the potential to produce particulate emissions that will affect air quality. In addition, the heat plant start-up requires diesel, consequently associated diesel emissions will, on occasion, be produced. Appropriate disposal of ash is required in order to limit impacts on the quality of the environment.

The heat plant emissions have been considered for the combined effect along with the sawmill heat plant emissions and the power station emissions. Refer to Chapter 10 and Appendix U for description and analysis of the air quality modelling results. The modelling has provided a good estimate of the actual conditions however it is recommended that the model be re-run once engineered specifications and weather data from the site is available to confirm the findings.

Greenhouse Gas Emissions

The RPV Mill represents both a generator of greenhouse gas and effectively a carbon sink. Fuel to power the RPV Mill and vehicles represents a small source of greenhouse gas. The RPV Mill product will be of a high quality for long-term use and will not be subject to decomposition that would release CO₂.

8.2.2 Management Measures

Fugitive Dust, Sawdust and Wood Fibre Particle Emissions

The generation of dust associated with external vehicular movements should be low due to the limited requirement for movements outside of the main veneer mill building. External movements will primarily be from the peeler log stockpile to the docking mill. Watering of unpaved areas will be undertaken as determined necessary¹. If this practice is not adequate, highly trafficked areas will be sealed². These management measures will ensure that dust is confined to the site as effectively as possible³

The fuelwood handling system from truck unloading onwards at the heat plant will be designed and operated to minimise the potential for dust emissions with the incorporation

¹ Commitment: Dust suppression of highly trafficked unpaved areas will be achieved by watering.

² Commitment: Seal highly trafficked areas of the RPV site and use street sweeper if watering is an inadequate dust control measure.

³ Commitment: Ensure dust is confined to the site.

of coarse particulate filters over the fuel storage bin and for filtering flue gas⁴. In addition, an electrostatic precipitator will be positioned for flue gas filtration subsequent to the coarse particulate filter.

By using pneumatically conveyed air to move wood by-product from the chippers to the fuel storage and discharging air to the atmosphere through a particulate filter, the dust collection system will prevent dust emissions from the wood fibre production.

Particulate control will be limited to personal protection for operational personnel⁵. Given the size of particulates and the construction of the RPV Mill it is unlikely that particulates will leave the building. The relatively slow release of volatile organic carbon (VOC) from the log steaming and veneer drying throughout the year will be controlled to some degree by passing exhaust gases back to the wood by-product heat plant but will be limited by the need to introduce oxygen to the combustion chamber. It is unlikely that the VOC emissions from the veneer drying will impact unduly on the environment. The estimate for VOCs is conservative (North American softwoods compared to Australian hardwoods) and it is expected that there will be no need to control the VOCs.

Composing Emissions

An appropriately designed ventilation system will be installed in the main RPV Mill building to ensure hot polypropylene emissions are managed in accordance with relevant occupational health and safety requirements⁶.

Heat Plant Emissions

The following mitigation measures are based on the results of the modelling undertaken for air quality of the heat plant emissions. The results of the modelling are provided in Appendix U. The modelling has provided a good estimate of the actual conditions however it is recommended that the model be re-run once engineered specifications and weather data from the site is available to confirm the findings⁷.

The use of the heat plant will ensure that no open burning occurs on the premises, thereby

⁴ Commitment: Design and operation of fuelwood transfer to minimise dust generation.

⁵ Commitment: Provide personnel with appropriate protection equipment.

⁶ Commitment: Installation and on-going operation of an appropriately designed ventilation system in the main RPV Mill building.

⁷ Commitment: Conduct air quality modelling once engineering specifications and weather data for the site is available.

eliminating uncontrolled ash and related emissions⁸.

The installation of cyclone filters and electrostatic precipitation will be used to control particulate emissions from the heat plant. The total ash emission from the Rotary Peeled Veneer Mill heat plant is estimated at 1,000 T/yr. The ash will be contained and eliminated in a controlled manner involving removal from the site for disposal in a licensed landfill, for occasional use by industry or as soil conditioner in the forest as allowed or required by conditions.

Predicted contaminant concentration in gaseous emissions from the heat plant are given in Table 67.

Table 67 Air Emissions from the Rotary Peeled Veneer Heat Plant based on a fuel level of 45,000 tonnes per annum

	Emission Factor (kg/t)	Quantity	Units	Total Emission (kg/yr)
Particulates	0.090	7,000	tonnes/yr	4,050
CH ₄	0.042	45,000	tonnes/yr	1,890
N ₂ O	0.041	45,000	tonnes/yr	1,845
NO _x	0.750	45,000	tonnes/yr	33,750
CO	6.800	45,000	tonnes/yr	306,000
CO ₂	940.000	45,000	tonnes/yr	42,300,000
NM VOC*	0.068	45,000	tonnes/yr	3,060

*NM VOC – Non-Methane Volatile Organic Compound

Emissions from the heat plant have been calculated using emission factors published by the US EPA 1995, AP42 Table 1.6-1 and 1.6-2.

Particulate emissions will be continuously monitored by the monitoring program described in section 8.7. The heat plant stack will be fitted with an obscuration meter. This meter will provide real time analysis of particulate levels in the stack. The heat

⁸ Commitment: Open fires will not be permitted on-site.

plant control panel will be fitted with a display of the obscuration meter level and warning alarms if the recorded level is above the upper control limit. The obscuration meter will be calibrated against in-stack monitoring for particulates using a NATA certified laboratory. The frequency of the calibration test will be every 12 months or at a frequency recommended by the manufacturer of the selected obscuration meter.

An obscuration meter will be used in combination with an audible alarm. Adjustments to fuel-to-air ratio will be used to control particulate emissions and efficient energy generation⁹.

Vehicle Exhaust and Greenhouse Gas Emissions

Vehicle exhaust emissions will be managed by use of vehicles that are fitted with standard exhaust management equipment¹⁰.

Refer to Chapter 5 regarding site-wide greenhouse gas emission management.

8.3 Wastewater Emissions

Wastewater emissions from each of the facilities at the Wood Centre will be collected, treated and reused in a combined system for the site as a whole. This system is described in detail in Chapter 5.

In the following section the wastewater generated on the RPV site will be described.

8.3.1 Potential Impact

Process Wastewater and Contaminated Stormwater

Contaminated stormwater will be generated within both external unsealed highly trafficked and the peeler log stockpile areas, as the majority of wood processing activities will be conducted within buildings. The high level of suspended solids in the contaminated stormwater has potential to degrade the receiving environment if discharged untreated.

The process wastewater resulting from the boiler blowdown will be high in total suspended solids. This wastewater stream will be discharged to the site-wide sewage treatment plant, as the volumes involved will be sufficiently diluted by the domestic wastewater flow. The sewage treatment plant will be designed to cater for these

⁹ Commitment: Monitor heat plant particulate emissions with an obscuration and audible alarm and adjust fuel-to-air ratio as required.

¹⁰ Commitment: Utilise modern vehicles with appropriate exhaust management equipment.

wastewater flows.

Boiler blowdown, condensate and boiler water treatment effluent is likely to contain dissolved and suspended matter, which may impact on the receiving environment if not managed appropriately.

Water collected in hazardous material bunds may become contaminated during: tank filling within the bund; operations; or by tank failure. Discharge of contaminated stormwater from this facility has potential to adversely impact on soil and water quality.

Domestic Wastewater

The RPV Mill will employ approximately 125 employees. It is predicted that domestic wastewater generation will be 18,750 litres. This wastewater is expected to be high in solids, BOD, nutrients and faecal coliforms, and will require treatment and sustainable management in order to avoid causing adverse impact on the receiving environment.

Domestic sewage and grey water from the office and amenities facilities will be directed to a site-wide sewage treatment system and will therefore not be considered further in this chapter. Refer to Chapter 5.

8.3.2 Management Measures

Contaminated Stormwater

All stormwater will be captured in cement or earthen stormwater drains from paved and hardstand areas, respectively where potential contamination may occur. This wastewater stream will then pass through a screening/interceptor system to remove coarse suspended pollutants (wood fibres and soil) as well as some oil or fuel residues from the site areas prior to being fed to the storage ponds¹¹. The management of solids from this system is presented in section 8.5.

The interceptor system will be monitored as detailed in Chapter 5 to ensure it is operating effectively.

¹¹ Commitment: Collection of contaminated stormwater and screening prior to diversion to the site-wide storage pond.

Process Wastewater

Process water will be drawn from the domestic water supply as required for the heat plant steam reticulation system. It is estimated that 4 ML/yr will be treated in the boiler water treatment system before circulation through the heat plant. The recycling of water through the heat plant reduces the demand on domestic water. A small amount of water will be diverted from the boiler water treatment system and heat plant as a bleed stream and blowdown, respectively. These two water streams will be treated in the site-wide sewage treatment plant¹² and will amount to 2.0 ML/yr.

Collected solids will be removed from the screening/interceptor system as determined necessary¹³. This material will be beneficially reused where possible in an approved manner, or disposed of to an approved landfill. The minor quantities of solid waste generated from the boiler water treatment system will be reused and/or disposed of in an approved manner¹⁴.

Water Collected in External Hazardous Materials Bunds

Most hazardous materials will be stored in the workshop however if hazardous materials are stored externally in bunds they will be roofed to minimise stormwater collection within the bund. Water collected in bunds will be visually inspected prior to discharge to stormwater drains to ensure that it is suitable for discharge¹⁵.

Where bund water is considered likely to be unsuitable for discharge, testing will be undertaken and a licensed waste contractor organised to collect and dispose of the wastewater. Records will be maintained for internal management purposes¹⁶.

8.4 Noise Emissions

Noise emissions from the RPV Mill have been assessed and mitigation measures are

¹² Commitment: Treat boiler water treatment system bleed stream and heat plant blowdown in sewage treatment plant.

¹³ Commitment: Regular solids removal from wastewater screens.

¹⁴ Commitment: Reuse or dispose solid waste from boiler water treatment system in an approved manner.

¹⁵ Commitment: Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.

¹⁶ Commitment: Test potentially contaminated bund water, organise for its approved disposal and maintain records of disposal.

discussed below. Figure 20 shows the main potential sources of noise from the RPV Mill.

8.4.1 Potential Impact

In assessing the potential noise impacts of the Wood Centre operations, Terts (2001) has taken into consideration the following matters:

- The existing noise climate at the Wood Centre site;
- The weather conditions at the time of measurement (i.e. no rain and little or no wind);
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- Possible DPIWE permit conditions for noise;
- Assessment of the predicted noise levels against possible DPIWE noise limits; and
- Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres was as follows (Terts 2001).

Distant noise level data was obtained for existing operating facilities located in Tasmania (sewage treatment plant, merchandising yard, sawmill, veneer mill and wood fibre mill), and from a manufacturer (wood fired power station, and portable wood fibre plant).

The following formula was then used to determine the attenuation of sound over flat and gently undulating ground.

$$\text{Attenuation, dB(A)} = 6\text{dB(A)/dd} + 3\text{dB(A)/km}$$

Where dd=doubling of distance.

It should be noted that the calculations obtained by using this model, do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;
- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components;
- Whether the noise is regrettably inflicted or mindlessly caused; and
- The time of day or night the noise occurs.

As described in Section 8.1.4, the main potential noise source is the transfer of docked peeler logs into the main RPV Mill building, since the majority of RPV mill operations are to be undertaken within the main RPV building.

A noise assessment of an operating veneer mill of comparable size, had a noise level at 45 m as follows (Terts, 2001):

- L10-61 dB(A)
- L90-58 dB(A)
- Leq-61 dB(A)

Based on this sound output, the calculated noise level at 6 kilometres is an Leq of 0.5 dB(A), which will not be heard by the nearest residence.

8.4.2 Management Measures

Although the noise assessment has demonstrated that noise emissions from the RPV Mill are unlikely to be heard at the nearest residence a number of management measures will be implemented, to ensure environmental best practice is achieved.

All equipment will be selected and maintained to minimise noise emissions¹⁷. The log trucks, chain saws, and mobile log loaders will all be fitted with standard noise control equipment. The operation of this equipment and vehicles will be undertaken in a manner that complies with appropriate occupational health and safety requirements¹⁸.

¹⁷ Commitment: Select and maintain machinery to minimise noise emissions.

¹⁸ Commitment: Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.

Although no significant noise impacts are expected from the RPV Mill operation, the following management measures will be implemented to further minimise potential generation of elevated noise:

- The loading of veneer product onto transport vehicles will typically be undertaken within the main RPV Mill building¹⁹.
- Orientation of the buildings is shown in Figure 5. Openings will be limited in number and avoid the east ends of the buildings. Noise absorbing insulation will be used in the buildings.
- For safety purposes, reversing alarms and/or flashing lights will be used on forklifts and log loaders. Due to the nature of surrounding site, it is considered unlikely that the sound level of the alarms would be cause for complaint, provision will however be made for sound level modification if found to be a cause of nuisance²⁰.
- Control mechanisms for sound intensity of PA system speakers and shift sirens will enable adequate noise management²¹.

When the technical specifications for key items of equipment in the RPV Mill have been finally selected on assessment of the noise impact will be undertaken to verify the predicted noise levels. This is discussed further in Section 8.7.2.

All noise complaints will be recorded, investigated and the facility manager will take necessary remedial action²².

8.5 Solid Waste Disposal and Generation

8.5.1 Potential Impact

The RPV Mill will generate a large quantity of wood by-product, 30,000 T/yr, including peel, clippings, composing/jointing, wood fines, peeler cores, off-cuts, and damaged veneer. Figure 31 illustrates the main wood flows on the RPV Mill site.

¹⁹ Commitment: Conduct veneer product loading operations within the RPV Mill building where possible.

²⁰ Commitment: Modify sound levels of alarms if found to be a cause of nuisance.

²¹ Commitment: Control sound intensity of PA system speakers and shift sirens.

²² Commitment: Investigate, record and take remedial action as necessary in response to all noise complaints.

If not managed appropriately, the wood by-product materials, the screened wood by-products and sediment from the wastewater management system screens, ash from the heat plant, and miscellaneous waste materials generated on-site, have potential to:

- Accumulate and adversely impact on the aesthetics of the site,
- Cause dust and litter generation;
- Attract vermin; and
- Generate leachate and contaminate stormwater.

There will be negligible quantities of waste glue generated as a result of the calibrated application equipment used. The only waste related to the gluing operation to be disposed of are the empty glue containers.

8.5.2 *Management Measures*

Wood by-products

Wood by-products are generated from the peeling operation in which recovery to green veneer is approximately 75%. The remaining 25% of block mass appear as either waste veneer or peeler cores. This wood by-product will be minimised where possible through the adoption of process technology that maximises the production of veneer and composing where possible.

Large wood by-products will be directed to the Green By-Product Veneer Chipper prior to use in the heat plant, then temporarily stored on-site in hoppers (with lids if stored in external areas)²³. Other wood by-product such as wood fines and sawdust will be directed to a hopper for temporary storage prior to use in the heat plant.

If any, veneer off-cuts containing glue, will not be burnt in the heat plant but will be disposed of to an off-site composting plant or approved reuse or disposal site.

Wastewater Screened Solids

As discussed in Section 8.3.2, the collection and treatment of run-off from areas of solid waste should minimise the potential impact of contaminated stormwater on the surrounding environment.

²³ Commitment: Wood by-products will be reused as fuelwood in the heat plant on-site.

Solids (such as soil and wood fibre) collected within the screening/interceptor system on-site will be removed manually on a regular basis, or upon solids filling 15% of the system. This material will, where possible, be:

- Beneficially reused as a soil conditioner within plantation areas;
- Beneficially reused for other approved projects; and/or
- Disposed of to an approved landfill²⁴.

Oil, grease, petrol and oil contaminated material collected in this system will be removed off-site by a licensed waste transport operator.

Refer to section 8.7 regarding the monitoring of the screening/interceptor system on-site.

Ash

Ash from the heat plant will be removed on a regular basis. The quantity of ash that will be produced annually is estimated at 1,000 tonnes. The ash will be contained in a sealed hopper and then transported to an approved reuse activity (such as spreading as a soil conditioner within plantation areas, incorporation into a compost product, or other approved reuse project), and/or disposed of to approved landfill²⁵.

Miscellaneous Waste Materials

The generation of miscellaneous waste materials on-site will be minimised where possible through the design and installation of process equipment, and the implementation of operational procedures (e.g. returning empty containers to suppliers, or refilling them).

As described in 8.1.4, solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated will be collected for disposal and/or reuse at an approved site.

Reuse and recycling options will be investigated and implemented as determined appropriate (e.g. waste oil, paper, glass, and can recycling). Miscellaneous waste materials will be collected regularly by a waste contractor and disposed of to approved

²⁴ Commitment: Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.

²⁵ Commitment: Collection and beneficial reuse of screened solids and ash.

landfill²⁶.

The amount of miscellaneous wastes cannot be estimated at this stage however, as described above, every effort will be made to ensure that waste management is undertaken in accordance with the waste management hierarchy with reuse options investigated after commissioning of the RPV Mill²⁷.

Empty glue containers will be disposed of to an approved landfill²⁸.

8.6 Hazardous Materials, Health and Safety Issues

8.6.1 Potential Impact

As noted for the other proposed facilities for the Wood Centre development, other than fuel, there will be limited hazardous materials stored or used on-site as part of the operation of the RPV site. Those hazardous materials that will be used on the site are detailed in Table 68 and Table 69 and the location of storage is shown in Figure 20.

These hazardous materials do have the potential to adversely impact on water quality, result in soil contamination, and/or be an occupational health and safety risk if not managed appropriately. The amount of water treatment chemicals to be used annually are identified in Table 68. All of the hazardous materials to be used on-site are identified in Table 69.

8.6.2 Management Measures

Hazardous Materials Storage and Bunding

In order to limit diesel storage on each site, diesel will generally be stored in the communal diesel store (45 kL) operated by the site wide manager. A small diesel fuel storage (200 L) will be located on the RPV Mill site primarily for heat plant start-up purposes.

The majority of hazardous materials detailed in Table 69 are hazardous materials that are stored and/or used in minor quantities on-site (e.g. oil and grease). These minor

²⁶ Commitment: Regular collection of general refuse for disposal at approved landfill by waste contractor.

²⁷ Commitment: Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.

²⁸ Commitment: Empty glue containers will be disposed of to an approved landfill.

quantities of fuels, chemicals and gases will be stored in relocatable bunds, or similar facility as required by AS-1940, within the workshop and main RPV Mill building²⁹.

The petrol and diesel fuel storage facility will be constructed to meet the requirements of Australian Standard AS-1940, and the Dangerous Goods Act and Regulations. It will have a bund with an impervious base, locked valve and roof³⁰.

To reduce the risk of release to the environment or the potential for fire, all hazardous substances will be stored with signage and fire control measures according to the Dangerous Goods Act and Regulations and the Australian Standards (AS-1940).

Material safety data sheets will be displayed where hazardous materials are stored; and appropriate occupational health and safety equipment will be provided to meet appropriate standards and regulatory requirements³¹.

Table 68 Hazardous Materials Annual Rate of Use

Reagent	Use	Typical Annual rate
Hydrochloric Acid (32% solution or Sulphuric Acid)	pH adjustment	4 T/yr
Sodium Bicarbonate (or Lime)	pH adjustment	3 T/yr
Aqueous Ammonia	Boilerwater treatment	500 L/yr
Sodium Triphosphate (3.5% solution)	Boilerwater treatment	200 L/yr
Carbohydrazine (6% solution)	Oxygen scavenger	200 L/yr

²⁹ Commitment: Storage of minor quantities of hazardous materials in relocatable bunds or similar facility as required by AS-1940.

³⁰ Commitment: Design and construction of the diesel storage to meet appropriate standards and legislation.

³¹ Commitment: Display of relevant material safety data sheets and signage in storage locations.

Table 69 Hazardous Materials Stored/Used On-Site – Rotary Peeled Veneer Mill

Hazardous Materials	Active Ingredient	Dang. Goods Class	Hazchem	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Location & Type
Diesel	Petroleum distillate	3 [Y]E	3A1	I, II or III	200 L	200 L	Bunded store in or adjacent to the heat plant
Liquid Petroleum Gas	Liquid Petroleum	2.1		-	45 kg	2250 kg	Gas store adjacent to workshop.
Grease and oils	Petroleum	3 [Y]	-	-	25 L	250 L	Bunded store in workshop & main RPV Mill building
Paint	Solvents	3	-	-	25 L	50 L	Sealed tins in workshop
Degreaser	Petroleum	9	-	-	25 L	50 L	Bunded store in workshop & main RPV Mill building
Acetylene	Acetylene	2.1	2 [S] E	-	7.0 m ³	200 m ³	Cylinder in workshop
Oxygen	Oxygen	2.2	2 [S]	-	8.9 m ³	250 m ³	Cylinder in workshop
Hydrochloric Acid (32% Solution or Sulphuric Acid)	Hydrochloric Acid	8	2R/EP G 8AI	II	2T	2.5T	Bunded sealed drum in workshop
Sodium Bicarbonate (or Lime)	Sodium Bicarbonate	-	-	-	2T	3T	Bunded sack in workshop
Aqueous Ammonia (25% solution)	Ammonia	8	2P/8AI	III	200L	400L	Bunded sealed drum in workshop
Sodium Triphosphate (35% solution)	Sodium Triphosphate	-	-	-	100L	200L	Bunded sealed drum in workshop
Carbohydrazine (6% solution)	Carbohydrazine	-	-	-	100L	200L	Bunded sealed drum in workshop

As discussed in Chapter 5, an emergency response plan will be designed for the RPV Mill facility and training of staff will be undertaken to ensure all are familiar with the plan and responsibilities³². A component of the plan will be the location of and handling of the spill kit to be maintained at an appropriate location for containment and clean-up of materials in the event of spillage³³. Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds³⁴.

An inventory will be kept of any hazardous materials stored and handled on-site, including the location of storage, their quantities, and their material safety data sheets³⁵.

Waste lubricating oils will be collected in 205 L drums for return to recycling along with the oil recycled from the adjacent operations. Waste oil drums will be stored within an area where spillage can be contained, and/or collected by the wastewater management system³⁶.

In the event that a spillage occurs within the facility there are contingency measures in place to mitigate off-site affects. These measures are presented in Chapter 5.

All spillage incidents of hazardous materials with potential to harm the environment will be reported to DPIWE. Where an emergency or accidental emission exceeds a statutory requirement (according to either regulation or Permit conditions), notification will be given to the Director of Environmental Management (DEM) as soon as reasonably practicable and within 24 hours of becoming aware of the release of the pollutant in relation to the RPV Mill activity³⁷.

³² Commitment: Design an emergency response plan for the RPV Mill site and provide training.

³³ Commitment: Maintain a spill-kit on-site and contain spills.

³⁴ Commitment: Employ licensed clean-up crew when required.

³⁵ Commitment: Maintain an inventory of hazardous substances on-site.

³⁶ Commitment: Collection of waste oil in drums for removal and recycling by waste contractor.

³⁷ Commitment: Report accidental emission to DEM within 24 hours of becoming aware of it.

8.7 Monitoring and Review

8.7.1 Monitoring

To ensure the operation of the RPV Mill is in accordance with the EMP and best practice environmental management the following monitoring programs will be implemented as described for the sawmill, with the following additional measures.

Dust and Air Emissions

High traffic areas within the RPV Mill site will be monitored visually. If required the area will be watered as determined necessary to minimise dust generation³⁸.

Contaminated Stormwater & Process Wastewater

The collection and distribution of stormwater and process wastewater from the site to the site-wide facility will be checked on a weekly basis to ensure the screening/interceptor system is operating effectively. The solids removal system will be checked daily or on a more frequent basis. The frequency of the inspections will be modified after six months of operation based on inspection results³⁹.

The wastewater flow from the site passing through the screen/interceptor system will be sampled by the facility operator at the outlet on a regular basis. If the results of the monitoring are consistent with on-site operational requirements the frequency of monitoring may be reduced to monthly. Monitoring will be undertaken for TPHC, TSS and BOD in accordance with standard industry practice⁴⁰. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be reported to the Director of Environmental Management on an annual basis. When TSS and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures).

³⁸ Commitment: Undertake visual monitoring and water for dust suppression as necessary.

³⁹ Commitment: Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.

⁴⁰ Commitment: Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor outlet continuously. Report results to the DEM annually.

Prior to discharge to the Sewage Treatment Plant the wastewater will be monitored for TDS, pH and BOD on a daily basis⁴¹.

Heat Plant Emissions

The heat plant stack emissions will be continuously monitored by an obscuration meter, which will record the particulate density in the waste gas as a percentage light obscuration value. The instrument will be set to sound an audible alarm if the value exceeds Ringelmann 1 as 20% equivalent opacity. Adjustment to the fuel-to-air ratio will be undertaken immediately to regain efficient energy generation⁴².

Monitoring data for the heat plant will be reported to the DEM on an annual basis⁴³.

Noise

A record of noise emission complaints will be kept in a complaint register for the site, together with details of investigations and actions⁴⁴.

In addition, formal monitoring of noise emissions from the Wood Centre as a whole will be undertaken after 6 months of operation. The parameters that will be measured include sound intensity and frequency patterns. The monitoring will be undertaken in accordance with a program approved by DPIWE. A report will be submitted to the DEM within six months.

Other

Oil supplied and waste oil returned for re-use will be recorded. Similarly, the following will be recorded for internal management purposes regarding hazardous materials and solid wastes, the⁴⁵:

⁴¹ Commitment: Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.

⁴² Commitment: Continuous obscuration monitoring of the heat plant stack emissions.

⁴³ Commitment: Annual reporting of heat plant stack monitoring results to the DEM.

⁴⁴ Commitment: Record noise emission complaints with details of investigations and actions.

⁴⁵ Commitment: Maintenance of internal management records regarding hazardous materials storage and use.

- Quantity;
- Type of material;
- Details of transport (ie. the waste contractor used); and
- Method of disposal, or reuse.

When an emission of hazardous materials or wastewater exceeds a statutory requirement, a special report will be submitted to the DEM within 5 days. The report will detail the extent of the emission, the likelihood of environmental harm, the cause of the event, procedures applied to minimise the environmental harm, monitoring results, and the system introduced to avoid any repetition⁴⁶.

A general incident response and notification protocol will be developed and implemented along with reporting procedures for the RPV Mill⁴⁷. Refer to Section 8.7.2.

Wood fine and sawdust collection systems will be monitored visually on a regular basis to ensure they are operating effectively and for the removal of collected solids⁴⁸.

8.7.2 Reporting

The RPV Mill proponent will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. Reports are to be forwarded to the Site Wide Manager. This will comprise the incident reporting protocol and will allow the Site Wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever

⁴⁶ Commitment: Notification of emissions that exceed statutory requirements and provision of a report to the DEM.

⁴⁷ Commitment: Develop and implement an incident response and notification protocol.

⁴⁸ Commitment: Regular visual inspection of sawdust and wood fines handling systems and solids removal.

degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;
- The proponent may report the incident to external organisations that are needed to provide response support, e.g. State Emergency Services;
- The proponent gathers details about the incident and supplies them to the office of the Site Wide Manager and Environmental Committee; and
- The Site Wide Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to the DEM as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the attention of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

The proponent's responsibilities include but are not limited to:

- Developing and implement Environmental Action Plans (EAP);
- Developing clear communication arrangements, taking into account after hours and holiday periods;
- Clearly defining roles and responsibilities;

- Maintaining, modifying, reviewing and analysing all monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
- Requesting that additional monitoring or testing be conducted to confirm or negate the original recordings;
- Determining if EAPs or amendments to Operating Procedures are required; and
- Ensuring the maintenance and calibration of monitoring equipment.

Monitoring defined in EAPs will address:

- Water quality and quantity;
- Visual observations;
- Noise; and
- Hazardous materials handling.

EAPs will also address:

- Triggers for implementing monitoring;
- Sampling and analysis;
- Interpretation and corrective action;
- Recording and maintaining monitoring data;
- Monitoring reviews;
- Control actions as a result of monitoring;
- Selecting monitoring equipment;
- Maintenance and calibration of monitoring equipment; and
- Calibration records.

By effectively implementing the Incident Reporting Protocol, the facility may be able to decrease its impact on the environment.

8.7.3 *Review*

An EMP review for the RPV Mill will be undertaken, as described in Chapter 5, within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE⁴⁹.

⁴⁹ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

CHAPTER 9 WOOD FIBRE MILL

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9. WOOD FIBRE MILL - ENVIRONMENTAL MANAGEMENT PLAN

9.1 Wood Fibre Mill Process Description

The Wood Fibre Mill will occupy approximately 4 hectares in the middle of the Wood Centre (Figure 5). The mill has direct access to the internal ring road network and is located immediately south of the Sawlog Stockpile. A typical process flow diagram for the mill is shown in Figure 33 and Figure 34 outlines the wood flow through the Wood Fibre Mill. The activities conducted in the Wood Fibre Mill will comply with the current best practice environmental management conditions operating throughout Australia.

9.1.1 *Description of Operation and Equipment*

The Wood Fibre Mill operations conducted in enclosed space will include:

- wood fibre processing;
- screening; and
- maintenance works.

Operations conducted in the open will be limited to log, residue and processed wood fibre storage/stockpiles. Refer to Table 71 for details on building dimensions and construction materials.

Log Receiving and Stockpiling

Wood fibre is generated from logs that are not suitable for higher value-adding processing. After washing, incoming log trucks carrying pulpwood only will travel via the weighbridge, to the Wood Fibre Mill for processing. Additional logs will be transported from the merchandising yard and shorts stockpile after sorting of mixed loads as described in Chapter 6.

At the Wood Fibre Mill logs can then be relayed directly from the truck to the Wood Fibre Mill line, most likely using a Wagner L 90 mobile loader or equivalent. A stockpile will accommodate all pulp logs not capable of being directly loaded onto the infeed deck. In such situations, mobile loaders will conduct unloading, stockpiling and transfer of logs to the wood fibre processing line. A second unit in the form of a Komatsu WA 500 (or equivalent) would be utilised as a secondary off loader during L90 down time of the primary loading equipment. A servicing facility for the loaders is provided in the workshop building at the Merchandising Yard.

Log Feeder Deck and Sorting

The feeder deck will be 14 metres long and 9 metres wide. Logs will be manually moved along a feeder deck by the loader and will pass through a log wash if determined necessary by the operator.

Logs will then pass by a knuckle boom loader positioned next to the wood fibre infeed conveyor (Plate 9). This loader will enable positioning and sorting of logs to facilitate even wood supply to the wood fibre machine line and to enable non-conforming products to be removed from the line. Rejected logs will be transferred to the fuelwood processor on the Merchandising Yard site.

Plate 9 Log infeed deck



Log Processing and Screening

The wood fibre machine will be a 2.84 metre diameter unit, the disc fitted with twelve knives and driven by a 2,000 kW motor. This unit will be positioned within a specially designed enclosure for noise control.

Air will be supplied by an air compressor located in the workshop or the wood fibre processor building. The compressor will operate intermittently as a continuous flow is not required. Some condensation will occur during air compression.

Wood fibre will be transported by conveyor belt to two fibre size classifiers (screens). The screening/sorting process will separate undersized and oversized fibre from fibre suitable for export. Undersized fibre will fall onto a conveyor belt that will lead to an overhead bin and be transported to the Merchandising Yard. Oversized fibre will be processed by a second wood fibre machine (i.e. re-chipped) to achieve the desired export size and fed back for rescreening.

All export size wood fibre will then be transported by conveyor belt and loaded into one of two receiving, enclosed, elevated wood fibre bins or onto a 2,000 tonne ground wood fibre stockpile when production exceeds transport and capacity. If necessary, a wheeled loader will be used to transport wood fibre back from the storage to the conveyor to be loaded via the enclosed elevated wood fibre bins. Trucks will be loaded directly from the enclosed overhead wood fibre bins (Plate 10).

Plate 10 Typical Overhead wood fibre bin



Wood by-product including wood fines and undersized wood fibre will be conveyed to an enclosed elevated hopper for later covered conveyance or trucking to the merchandising yard for use as fuelwood.

Treated wastewater will be drawn from the storage pond system for the irrigation of:

- Log washing;
- Irrigation of the Wood Fibre Mill rotary screws; and

- Use on selected conveyors for dust suppression.

Reticulated clean water will be utilised within administration and workshop areas, but little or no clean water will be required for use within process areas.

Knife Sharpening and Setting

On-site facilities for sharpening and mounting knives into knife blocks will be provided in the workshop. Knives are set in the blocks using Babbit metal that contains a range of low melting point metals including some lead. Babbit metal is used in a closed cycle environment where the used Babbit metal is wholly recycled to prevent loss. Babbit metal is melted from the used knife blocks in a small gas-fired furnace. The molten metal is collected in a ladle and poured into the newly set knife blocks where it solidifies.

Principal Items of Equipment and Operation

Principal items of equipment to facilitate wood fibre operations and the likely hours of operation are listed in Table 70.

Table 70 Details of the Main Wood Fibre Operations Equipment

Equipment	Function	Power/Fuel	Hrs Use/Day
a) Mobile log handling units a) L90 b) WA500	Unloading, sorting and transfer to infeed deck	Diesel	24 hrs
Log wash	Removes dirt from whole logs	-	24 hrs
Knuckleboom loader / Prentice Crane	Positioning and sorting to achieve even wood supply to the Wood Fibre Mill	Diesel	24 hrs
Wood Fibre Mill Drive Motors	Power and drive the wood fibre mills	Electricity	24 hrs
Wood Fibre Mills	Produces wood fibre from whole logs and oversized wood fibre	Electricity	24 hrs
Conveyors / belts	Transfer wood fibre and wood by-product to appropriate destinations	Electricity	24 hrs
20 hp Air compressor	Cleaning and control air	Electricity	5-8 hrs
Flat Screen	Separates undersized and oversized wood fibre from wood fibre suitable for export	Electricity	24 hrs

Figure 33 Wood Fibre Mill Process Flow Diagram

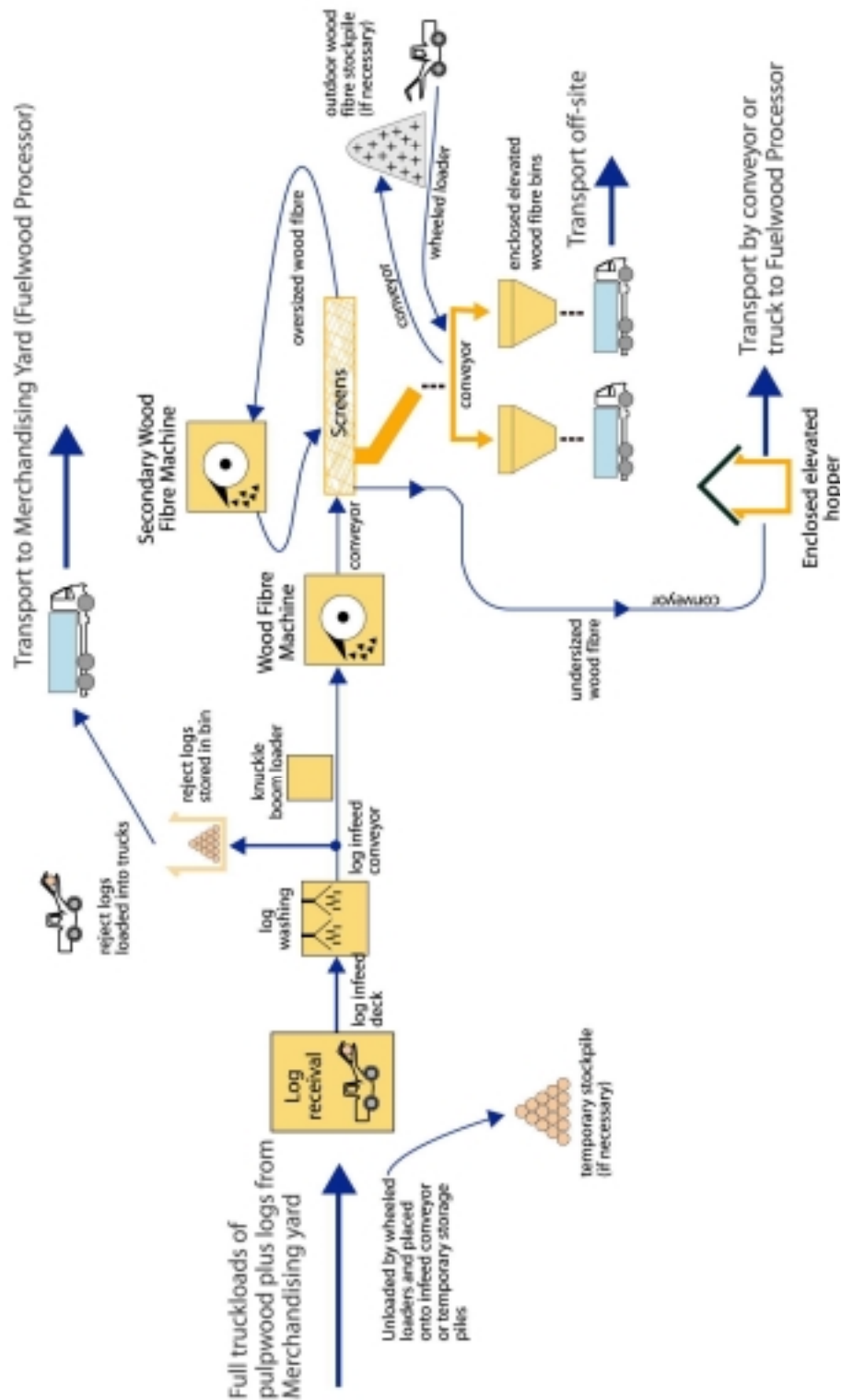
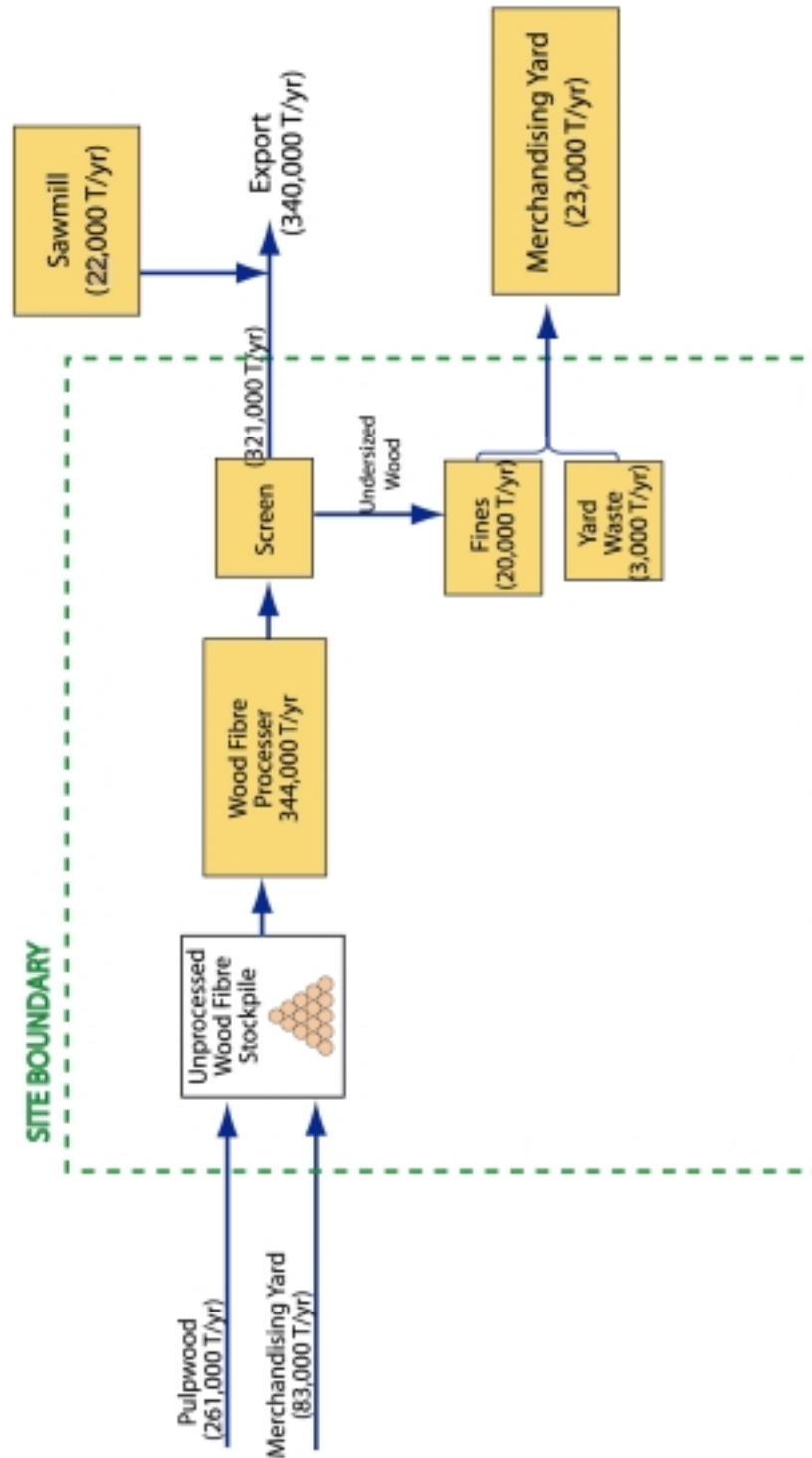


Figure 34 Wood Fibre Mill Wood Flow Diagram



9.1.2 Description of Buildings and Associated Infrastructure

The Wood Fibre Mill is located in the middle of the Wood Centre, on the inside of the ring road and adjacent to the south side of the Sawlog Stockpile. There are four buildings on the Wood Fibre Mill site. The dimensions and construction materials of the buildings and open areas on the Wood Fibre Mill site are briefly described in Table 71.

Table 71 Building Dimensions and Construction Materials

Building	Area (m ²)	Height (m)	Construction Material		
			Floor	Walls	Roof
Wood Fibre Processor	6000	15	Concrete slab	Steel Cladding	Steel sheet (Colourbond Trimdek clad)
Workshop	600	5-6	Concrete slab	Brick	Steel sheet (Colourbond Trimdek clad)
Office	196	5-6	Concrete slab	Brick	Steel sheet (Colourbond Trimdek clad)
Amenities	360	5-6	Concrete slab	Brick	Steel sheet (Colourbond Trimdek clad)
Enclosed Elevated Hopper	-	15	Steel	Steel	Steel

Office

The administration office building will house computing, accounting and sales staff. It will be painted to suit its environs with a colourbond roof. Building heating will be provided by a reticulated steam or electric heating system.

Amenities

Amenities for the Wood Fibre Mill will be provided in a separate building of the same construction as the office. Amenities will comprise a lunchroom, showers and toilets. The buildings will be heated either from a reticulated steam system, or by an electric heating system.

Car Parking

A hardstand car park of approximately 680 m² will be provided for 24 personnel, service vehicles, and visitors.

Workshop

The workshop will be located adjacent to the office. It will house the knife sharpening equipment.

Minor quantities of oils and lubricants will be stored within the workshop over AS1940 approved mobile bunds, or within a secure store with floor bund.

Wood Fibre Stockpile

The wood fibre stockpile is located on the west side of the Wood Fibre Mill. It is a hardstand open area with the stockpile in the centre and space for loader movement around the stockpile. Drainage of the stockpile will be provided by earthen stormwater drains and directed to the site screening/interceptor system.

9.1.3 Source of Wood and Quantity of Production

Pulpwood principally will come from the Huon Valley forest resource. Small amounts of pulpwood will be entrained in the peeler billet wood that will be transported from the Derwent Valley to make up the required volumes of rotary peeled veneer material.

At the coupe landing pulpwood loads will be loaded and transported directly to the Wood Fibre Mill. All other timber will be loaded for transport to the Merchandising Yard where it will be sorted and segregated for appropriate distribution to sites in the Wood Centre. A proportion of pulpwood will eventuate in the sorting of mixed loads. This pulpwood will be stockpiled and transported to the Wood Fibre Processor.

Annual estimated green wood inflow and product (wood fibre) outflow is represented in Table 72. The reason why product outflow is greater than wood inflow is attributable to excess wood by-products from the sawmill being transferred to the Wood Fibre Mill for wood fibre processing. Such an approach is consistent with the project objectives of achieving maximum value recovery from all timber delivered to the site. All wood by-products, if not suitable for wood fibre production, will be transferred to the fuelwood processor in the Merchandising Yard and onto the Power Station for electricity generation or to heat plants that require supplementary fuelwood.

Table 72 Estimated Annual Wood and Product Flow - Wood Fibre Mill

Green wood inflow (pa)		Estimated product outflow (pa)	
Pulpwood	261,000 t	Wood fibre	340,000 t
Other on-site wood by-product	83,000 t	Wood fines to merchandising yard	23,000 t

9.1.4 Emission Sources

Atmospheric Emissions

The main potential sources of emissions to atmosphere associated with the Wood Fibre mill include:

- Wood fibre stockpile activities;
- Wood fibre particulate from wood fibre processing;
- Dust from vehicular activities on-site (e.g. log loader and truck); and
- Fumes from Babbit metal melting

The breakdown of emissions from wood fibre processing and vehicular activities is outlined in Table 73.

Table 73 Wood Fibre Mill Atmospheric Emissions

Emission	Emission Factor* (kg/tonne)	Quantity (tonnes)	Estimated Total Emissions (kg/yr)
PM 10	0.001	340,000	340
TSP	0.002	340,000	680

*USEPA 1995

Water Emissions

Wastewater emissions will comprise stormwater and wastewater streams, as described below and illustrated by the water flow diagram (Figure 35).

Stormwater

- Contaminated stormwater run-off collected from paved and unpaved

operational areas (including oil and fuel spillages from trucks and loaders). Refer to discussion of site-wide wastewater management in Chapter 5, as stormwater quantities have been calculated on a site-wide, rather than individual facility basis.

- Clean stormwater collected from roof areas that are relatively free of wood contamination.

Wastewater

- Process wastewater collected from processing of pulp logs (i.e. lubrication of knives and log wash). It is estimated that approximately 40 ML/year of process wastewater will be generated.

Wastewater contaminants are likely to include wood products such as wood fines, dust and tannins.

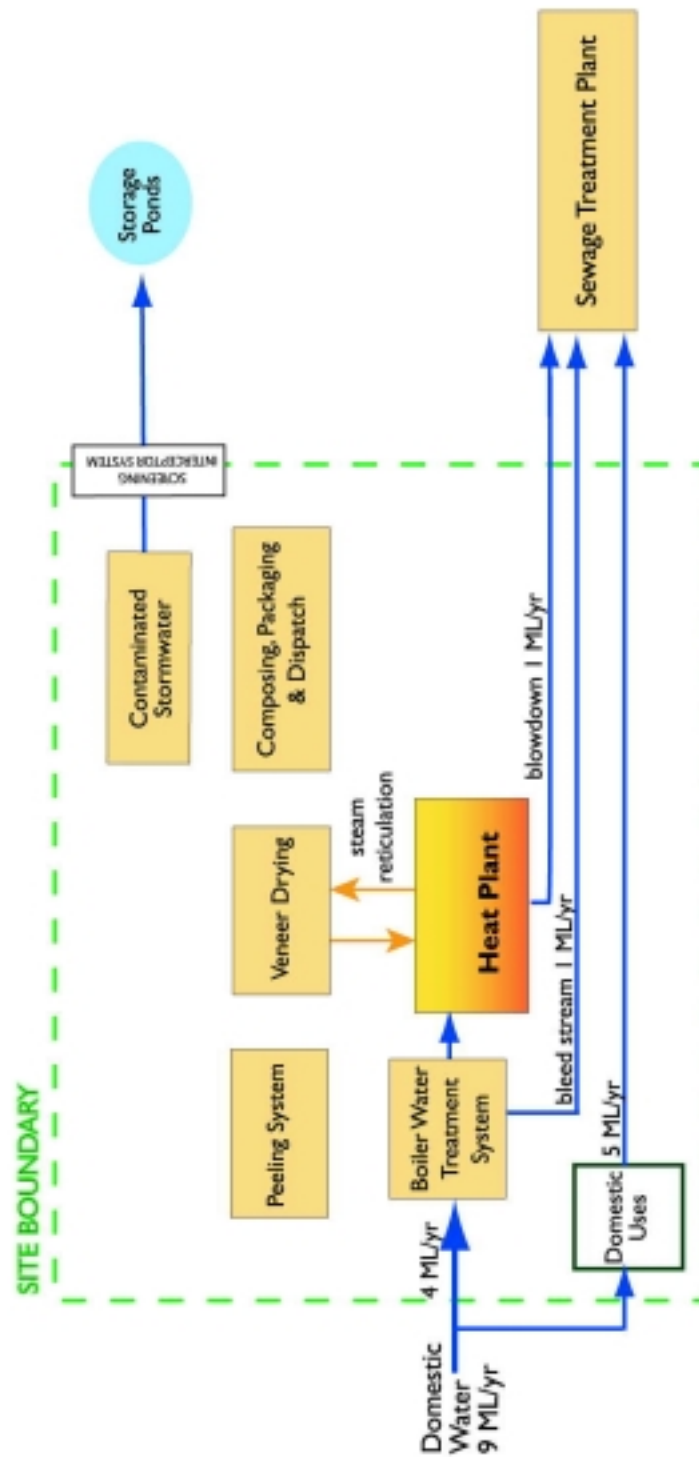
- Domestic wastewater sewer and grey water generated by site personnel. Approximately 1,500 L/day of domestic wastewater will be generated on the Wood Fibre Mill site (based on the following assumptions; 150 L/day per person and up to 10 employees).

Noise Emissions

Noise emissions from the Wood Fibre Mill are judged to represent one of the most significant potential impacts arising from the Wood Centre proposal. The main sources of noise associated with the wood fibre operation are likely to include:

- Wood Fibre Mill infeed/throat (including conveying and vibration from the uncut section of a log during the chipping process);
- Wood fibre processing enclosure (i.e. chipping);
- Wood fibre screening; and
- Pulpwood and fibre transport and handling by truck and log loader.

Figure 35 Wood Fibre Mill Water Flow Diagram



Solid Waste

Although the logs will have been sorted and prepared (to some extent) in the merchandising yard, a significant quantity of wood by-product will still be generated as part of Wood Fibre Mill operation, including:

- Log yard debris such as soils, rot and slivers (approximately 3,000 tonnes per annum);
- Screened solids, comprised of a mixture of fine, washed woody particles and soil (approximately 300 tonnes per annum); and
- Undersized wood fibre, wood fines and sawdust (approximately 20,000 tonnes per annum).

As with log yard debris and screen solids, these products will be transferred to the adjacent composting area off-site to reuse or to an approved refuse disposal site. Undersized wood fibre will be transferred to the fuelwood processor.

Other solid wastes generated on-site will include:

- Workshop wastes (e.g. blade sharpening room residues including lead, metal shavings and babbitt metal); and
- Relatively small quantities of general refuse that will be generated by the office and amenities (e.g. domestic wastes, paper and plastics).

9.1.5 Projected Hours of Operation and Employment

Operation at the Wood Fibre Mill will be 312 days a year with the potential to operate 24 hours a day 6 days per week.

It is predicted that 10 to 14 personnel will be employed by the Wood Fibre Mill operation in three shifts of 4 people and 2 non-shift workers. This includes log unloading and site vehicle drivers.

9.2 Atmospheric Emissions

9.2.1 Potential Impact

Three potential sources of atmospheric emissions will exist on the Wood Fibre Mill site (Figure 20). The first source concerns fugitive sawdust escaping from the wood fibre conveyors and hoppers. If a wood fibre stockpile is used it will be a potential source of fugitive wood fibre but will not contribute to atmospheric emissions. Another possible source of air emissions may result from log truck and log loader activities in operational areas.

9.2.2 Management Measures

The following management measures will mitigate the potential impacts of the wood fibre mill on air quality.

Wood fibre conveyors will be covered to reduce fugitive sawdust emissions to negligible levels¹. In addition, all hoppers will be fitted with lids. Generally, stockpiles are not a source of fugitive sawdust or chips but the transport transition phases are the source of atmospheric emissions. If a stockpile is used wood fibre will be transferred from the stockpile to the processor by covered conveyors.

There are no buildings downstream of the prevailing wind therefore building wake effects are not expected to create fugitive wood fibre build-up.

Spraying high traffic unpaved areas during adverse dry and windy weather conditions will be used to reduce dust emissions generated by vehicular movements². In the event that dust from unpaved areas cannot be effectively controlled by water spraying such areas will be sealed³. As a result of paving and sweeping, the amount of dust generated by log truck and log loader movements will be significantly reduced.

¹ Commitment: Conveyors and hoppers will be covered to reduce fugitive sawdust emissions.

² Commitment: Dust suppression of highly trafficked unpaved areas by watering.

³ Commitment: Seal high traffic areas of Wood Fibre Mill area and use street sweeper to clean up wood fibre and sawdust.

These management measures are anticipated to be effective measures to minimise potential air emissions, however, atmospheric monitoring will determine whether these measures are sufficient to ensure no dust leaves the site⁴.

The Babbit metal furnace and ladling area will be provided with a fume extraction system that effectively ventilates the work-space⁵.

9.3 Wastewater Emissions

Wastewater emissions from each of the facilities at the Wood Centre will be collected, treated and reused in a combined system for the site as a whole. This system is described in detail in Chapter 5. In the following section the wastewater generated by the Wood Fibre Process is briefly described.

9.3.1 Potential Impact

Process Wastewater and Contaminated Stormwater

Activities to be undertaken within the Wood Fibre Mill that have the potential to result in stormwater contamination and/or the generation of contaminated process wastewater include:

- Vehicular and log movements;
- Log storage, temporary wood by-product and wood fibre storage;
- Log cutting and docking; and
- Wood fibre processing (rotary screw air compressors, if used, will discharge water condensate).

The wood fibre processing lubrication will contribute two litres per second of lubrication water to the log wash recycle flow, this will reduce the amount of water required as make-up water for the logwash. As described in Chapter 9, this wastewater has potential to contain contaminants associated with wood processing and vehicular activities on-site. Mobile and fixed equipment has the potential to release grease and oil that may find its way into surface and stormwater drains if not removed by absorbent materials. If untreated and emitted to the environment this

⁴ Commitment: Ensure no dust leaves the site.

⁵ Commitment: Fume extraction system will be provided in babbit metal work area.

contamination has the potential to degrade the receiving environment (eg. result in reduced health of aquatic habitats if discharged to a watercourse, sedimentation of vegetation or impact on soil structure).

The greatest potential source of contaminated water is likely to be derived from uncovered storage area run-off that is likely to contain wood products such as tannins, dust and fines. The volume of run-off will be determined by rainfall but the number of times that the log yard area is sprayed to reduce dust emissions will be a contributing factor. Dust reduction spraying will occur during adverse dry and windy conditions.

Domestic Wastewater

The high biochemical oxygen demand, high solids, nutrients and bacteriological contamination of domestic wastewater has the potential to adversely impact on the environment if not treated appropriately prior to discharge.

Domestic sewage and grey water from the office and amenities facilities will be directed to an on-site communal wastewater treatment system and will therefore not be considered further in this chapter. Refer to Chapter 5.

9.3.2 Management Measures

Process Wastewater and Contaminated Stormwater

Process wastewater and contaminated stormwater will be collected by concrete or earthen stormwater drains from paved and hardstand areas, respectively, and passed through a screening/interceptor system on-site. This system will provide initial removal of coarse suspended solids (e.g. soil and wood fibre) as well as some oil and fuel residues that have been entrained in the wastewater stream. This wastewater will then be piped to the site-wide storage ponds for reuse⁶. The facility operator will regularly collect samples of wastewater from the screening/interceptor outlet point to the storage pond system. Analysis will be undertaken for TPHC, TSS, and BOD⁷. In addition, continuous flow rate from the site will be monitored to affect efficient use of water.

⁶ Commitment: Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.

⁷ Commitment: Pass water through screening/interceptor system prior to discharge to storage ponds and regularly test for TPHC, BOD and TSS. Continuously monitor flow rate from the system.

Maintenance servicing will only be conducted on-site in the workshop area with suitable clean-up materials available to prevent oil and grease from contaminating stormwater⁸. These measures will significantly reduce the opportunity for such deposits to enter water flows. Refer to Chapter 5 for site-wide hazardous material management.

Very small amounts of rotary screw condensate from the air compressor will be collected in a sump within the compressor and disposed of periodically⁹. There is no prevailing literature to suggest any necessary or prescribed treatment of this product therefore it can be safely included as process water directed to the storage ponds via the screening interceptor system.

Blade sharpening waste will be captured in a metalworking tray beneath the machinery and disposed of to an approved landfill. This solid waste will not effect water management.

Water Collected in External Hazardous Materials Bunds

Hazardous materials stored externally in bunds will be roofed to minimise stormwater collection within the bund. Any water collected in bunds as a result of combined wind and rain will be visually inspected prior to discharge to stormwater drain and the screening/interceptor system to ensure that it is suitable for discharge¹⁰.

Where bund water is considered likely to be unsuitable for discharge, testing will be undertaken and a licensed waste contractor organised to collect and dispose of the wastewater. Records will be maintained for internal management purposes¹¹.

9.4 Noise Emissions

Noise emissions from the Wood Fibre Mill have been assessed and mitigation measures are discussed below. Figure 20 shows the potential sources of noise from the Wood Fibre Mill.

⁸ Commitment: All machine and vehicle maintenance will be undertaken in the workshop area where clean-up materials will be immediately available.

⁹ Commitment: Collection of rotary screw condensate in a sump and regular disposal.

¹⁰ Commitment: Undertake controlled disposal of contaminated water from bunds.

¹¹ Commitment: Test potentially contaminated bund water, organise for its approved disposal and maintain records.

9.4.1 Potential Impact

In assessing the potential noise impacts of the Wood Centre operations, Terts (2001) has taken into consideration the following matters:

- The weather conditions at the time of measurement (i.e. no rain and little or no wind);
- The existing noise climate in the Wood Centre;
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- Possible DPIWE permit conditions for noise;
- Assessment of the predicted noise levels against possible DPIWE noise limits; and
- Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres was as follows (Terts 2001).

Distant noise level data was obtained for existing operating facilities located in Tasmania (sewage treatment plant, merchandising yard, sawmill, veneer mill and wood fibre mill), and from a manufacturer (wood fired power station, and portable wood fibre plant).

The following formula was then used to determine the attenuation of sound over flat and gently undulating ground.

$$\text{Attenuation, dB(A)} = 6\text{dB(A)/dd} + 3\text{dB(A)/km}$$

Where dd=doubling of distance.

It should be noted that the calculations obtained by using this model, do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;

- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components;
- Whether the noise is regretfully inflicted or mindlessly caused; and
- The time of day or night the noise occurs.

As noted previously, the main operations to be undertaken in the Wood Fibre Mill that have potential to generate noise nuisance include:

- Wood Fibre Mill infeed/throat (including conveying and vibration from the uncut section of a log during the chipping process);
- Wood fibre processing enclosure (i.e. chipping);
- Wood fibre screening; and
- Pulpwood and fibre transport and handling (e.g. log loader movements).

The proposed wood fibre processor for the Wood Centre, has a disc diameter of 2.84 metres, with 12 knives driven by a 2000 hp motor.

A much larger woodchip facility having a disc diameter of 3.66 metres, with 10 knives and driven by a 4000 hp motor has been the subject of detailed noise monitoring and assessment. It can therefore be considered to be a worst-case scenario for the Wood Centre site. The monitoring station was beyond the line of sight of the chipper, and was located in a valley. The land where the chipper and the monitoring station was located is somewhat similar in topography to that between the proposed chipper site and the nearest neighbour, i.e. tree covered intervening hills and valleys.

The mean noise levels obtained during 4 nights at a distance of 4,100 metres (beyond line of sight) from the larger existing plant were as follows (Terts, 2001):

- L10-36.4 dB(A) (30 minutes)
- L90-33 dB(A) (30 minutes)
- Leq-35.1 dB(A) (30 minutes)

In addition, there were discrete noise events associated with the operation of the chipping and debarking operations that could be heard on occasions from this site.

The mean noise levels for these events during the 4 night monitoring period ranged from 40.3 dB(A) to 46.8 dB(A) (Terts,2001).

This noise survey was conducted during daytime and night time hours at:

- temperatures between 1.5 and 5.5 °C;
- relative humidity between 79 and 93%;
- air pressure between 982 and 997;
- wind speed between 0 and 2 m/s with a westerly direction when blowing; and
- cloud cover was always 0.8 octals.

Table 74 outlines the typical noise levels that the above Wood Fibre Mill produced at 4,100 m and the calculated noise level at 6,000 m.

Table 74 Typical Noise Levels Expected

(Terts 2001)

Source	L _{eq} at 4100 m dB(A)	L _{eq} at 6000 m dB(A)
Existing Wood fibre facility	35.1	25.8

The discrete noise events described above would in turn be reduced to between 32-38 dB(A) at 6 kilometres. Both the general plant noise level of 25.8 dB(A) and the discrete noise levels of up to 38 dB(A) are below the measured ambient noise level at the Wood Centre site of 41 dB(A) (Terts, 2001).

In summary, if the wood fibre operation described above were to be located at the Wood Centre it is unlikely to be heard at the nearest residence, 6 kilometres from the site. In addition, as noted above the wood fibre mill assessed is larger than the plant proposed, and so the noise emissions will be lower, providing a lower risk of potential noise impacts at the nearest residence.

9.4.2 Management Measures

A number of management measures will be implemented to ensure that noise emissions from the Wood Fibre Mill are not heard at the nearest residence and to ensure environmental best practice is achieved.

Orientation of the buildings is shown in Figure 5. Openings will be limited in number

and avoid the east ends of the buildings. Noise absorbing insulation will be used in the buildings. In addition, the natural topography provides noise buffers of the Wood Centre site¹².

The main concern in terms of a source of noise emissions from the Wood Fibre Mill is the wood fibre processor, therefore an enclosed room will be designed and built with appropriate acoustic suppression materials including sound absorbent curtains on the entrance and exit. In addition, openings in the wood fibre processor room walls and ceiling will be minimised. Where openings are required, control of noise escaping will be regulated by controlling access to buildings and not leaving doors open¹³.

As the Wood Fibre Mill will be the major source of noise emissions from the Wood Centre, a number of additional measures are proposed to achieve adequate suppression of noise emissions.

Wood Fibre Processor Throat and Chipping

Given that the primary noise emission point will be the wood fibre processor throat, suitable provision to alleviate the key frequency component(s) will be made. The provisions include the ability to fit appropriate suppression equipment such as three, quarter wave tuning stubs. The harmonics of the blade-passing frequency will be assessed to determine where the stubs are required. When technical specifications for key items of equipment in the Wood Fibre Mill have been finally selected, an assessment of the noise impact will be undertaken to verify the predicted noise levels¹⁴. At this stage there will be a focus on whether the fitting of suppression equipment is necessary and, if so, the design of the suppression installation to minimise intensity levels in critical frequency ranges.

Surrounding buildings and storage areas will also buffer the noise emissions from the Wood Fibre Mill. In addition, the mill will be oriented so that there are no openings in the direction of the nearest occupied residence at six kilometres

¹² Commitment: Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.

¹³ Commitment: Enclose the Wood Fibre Mill in a building designed for acoustic suppression.

¹⁴ Commitment: Undertake noise impact assessment once technical specifications for Wood Fibre Mill equipment are available.

Screen Room

Of secondary, but still potentially significant importance in terms of noise output, is the Wood Fibre Mill screen room. The dominant component of screening is processing noise from the re-chipper. The re-chipper will be enclosed in a tilt slab enclosure that will greatly reduce any potential impacts with respect to site and beyond-boundary noise¹⁵.

Mobile Loaders

Noise from mobile log loaders is anticipated to be variable, with peak sound power output expected to be less than that emanating from the chipper and housings. Log loader noise is thus not expected to be of primary concern to beyond-boundary levels however, the mobile log loaders will be fitted with standard noise control equipment¹⁶. The operation of this equipment will be undertaken in compliance with appropriate occupational health and safety requirements.

Other Sources

Noise from other discrete sources such as water pumps and air compressors is expected to be relatively insignificant and standard practices will be applied¹⁷. Standard practices, in conjunction with noise control procedures to be adopted as appropriate at the design stage will include:

- Orientation of the mill in a direction away from the Wood Centre eastern boundary;
- Noise buffers such as stockpiles in the log sorting area and sawlog stockpiles; and
- Control of sound intensity from reversing signals on the log loaders and from PA system speakers and shift sirens.

In addition, any noise related complaints will be recorded and investigated by Site

¹⁵ Commitment: Enclose re-chipper in a building designed for acoustic suppression.

¹⁶ Commitment: Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.

¹⁷ Commitment: Application of standard practices in the case of discrete noise sources.

Manager and remedial measures implemented¹⁸.

9.5 Solid Waste Generation and Disposal

9.5.1 Potential Impact

There is a potential for solid wood by-product from the milling process to contribute to fugitive air emissions and water contamination if allowed to accumulate in an uncontrolled manner on-site. Figure 34 outlines the wood flow on the Wood Fibre Mill site.

Another potential source of solid waste is blade sharpening. Further solid wastes such as office waste and packaging materials may cause litter related problems if not adequately managed.

9.5.2 Management Measures

Wood By-product Recovery and Reuse

As described at the beginning of this chapter and in Chapter 10 wood by-product will be used to generate energy in the Power Station or heat plants¹⁹. In this way, solid wood by-product will be used beneficially for the generation and export of 30-50 MW to the local grid and will eliminate the potential for contribution to fugitive air emissions or water contamination.

Minor quantities of muddy wood by-product and rocks will also be generated as part of Wood Fibre Mill operations. Depending on its composition, this material will either be sent for composting, returned to the forest or disposed of to an approved landfill along with the wastewater screened solids. No wood by-product will be stockpiled on-site or disposed of on-site²⁰.

Wastewater Screened Solids

As described in Chapter 9, the collection and treatment of surface run-off should minimise the potential impact of contaminated stormwater on the surrounding environment. Solid wood by-product will not be stored externally in stockpiles or

¹⁸ Commitment: Investigate and implement remedial measures in response to noise complaints.

¹⁹ Commitment: Utilise all wood by-product for energy generation.

²⁰ Commitment: No wood by-product will be disposed of on-site.

allowed to accumulate on-site thereby decreasing the potential for contaminated run-off.

Solids (such as soil and wood fibre) collected within the screening/interceptor system on-site will be removed manually on a regular basis, or upon solids filling 15% of the system. This material will, where possible, be:

- Beneficially reused as a soil conditioner within plantation areas;
- Beneficially reused for other approved projects (e.g. composting); and/or
- Disposed of to an approved landfill²¹.

Oil, grease, petrol and oil contaminated material collected in this system will be removed off-site by a licensed waste transport operator.

Refer to section 9.7 regarding the monitoring of the screening/interceptor system on-site.

Blade Sharpening Wastes

Wastes from the blade sharpening room will be kept separate to prevent water contamination and dispatched to a licensed landfill depending on its composition²².

Miscellaneous Solid Wastes

General refuse generated by administration and packaging will be collected and stored in a waste hopper with a lid to minimise potential for leachate generation. Where possible, measures will be implemented for the minimisation of wastes generated, and reuse options investigated. General refuse requiring disposal will be collected regularly by a licensed waste contractor and disposed of to an approved landfill²³.

The amount of wastes cannot be estimated at this stage however, as mentioned above, every effort will be made to ensure that waste management is undertaken in

²¹ Commitment: Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.

²² Commitment: Dispatch of blade sharpening waste to licensed landfill.

²³ Commitment: Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to an approved landfill.

accordance with the waste management hierarchy with reuse options investigated after commissioning of the Wood Fibre Mill²⁴.

9.6 Hazardous Materials

9.6.1 Potential Impact

As noted for the other proposed facilities for the Wood Centre development, other than fuel, there will be limited hazardous materials stored or used on-site as part of the operation of the Wood Fibre Mill site.

Hazardous materials stored or handled on-site during the operation of the Wood Fibre Mill will include materials as detailed in Table 75. The storage locations are shown in Figure 20.

There is a potential fire risk associated with production and storage of wood products with the above hazardous products. In addition, leakage of hazardous products into the environment can cause significant short and long-term contamination of soils, groundwater and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

²⁴ Commitment: Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.

Table 75 Hazardous Materials Stored/Used On-Site - Wood Fibre Generation

Hazardous Materials	Active Ingredient	Dang. Goods Class & Subsidiary Risk (as appropriate)	Hazchem Code	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Type and Location
Automotive Oil	Petroleum distillate	3 [Y] E	3A1		20 L	400 L	Roofed and banded store in or adjacent to the workshop
Petrol	Petroleum	3 [Y] E	EPG		20 L	400 L	Roofed and banded store in or adjacent to the workshop
Grease	Petroleum	4			25 L	200 L	Underground Storage Tank
Oils	Petroleum	3 [Y]	-		25 L	200 L	Banded Store in workshop
Paint		3			25 L	50 L	Metal Container in workshop
Degreaser	Petroleum	9			25 L	50 L	Metal Container in workshop
Acetylene	Acetylene	2.1	2 [S] E		7.0 m ³	200 m ³	Sealed G cylinder in workshop
Oxygen	Oxygen	2.2	2 [S]		8.9 m ³	250 m ³	Sealed G cylinder in workshop

Note: Mobile bunds will be used when refuelling.

9.6.2 *Management Measures*

In order to limit diesel storage on each site, diesel will generally be stored in the communal diesel store (45,000 L) operated by the FT site manager. A small fuel storage will be provided for diesel on the Wood Fibre Mill site. It will have a bund with impervious base, locked valve and roof.

To reduce the risk of release to the environment or the potential for fire, all hazardous substances will be stored with signage and fire control measures according to the Dangerous Goods Act and Regulations and the Australian Standards (AS-1940)²⁵.

A secure fully banded hazardous materials store will be established for the storage of small quantities of oils and grease within the workshop.

Relocatable bunds will be used in this facility for the storage of minor chemicals, and the containment of potential spills. Material safety data sheets will be displayed where hazardous materials are stored and appropriate occupational health and safety equipment will be provided to meet appropriate standards and regulatory requirements²⁶.

Bunds will be inspected on a daily basis. Any spilt material will be promptly mopped up or treated with absorbent material. Any leaks will be promptly repaired²⁷.

As discussed in Chapter 5, an emergency response plan will be designed for the Wood Fibre Mill site and training of staff will be undertaken to ensure all are familiar with the plan and responsibilities²⁸. A component of the plan will be the location of and handling of the spill kit to be maintained at an appropriate location for containment and clean-up of materials in the event of spillage²⁹. Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds³⁰.

²⁵ Commitment: All hazardous substances will be stored with signage and fire control measures according to AS-1940.

²⁶ Commitment: Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.

²⁷ Commitment: Bunds will be inspected daily for spilt material that will be promptly mopped up or treated with absorbent material and any leaks will be promptly repaired.

²⁸ Commitment: Design an emergency response plan for the Wood Fibre Mill site and provide training.

²⁹ Commitment: Maintain a spill-kit on-site and contain spills.

³⁰ Commitment: Employ licensed clean-up crew when required.

An inventory will be kept of any hazardous materials stored and handled on-site, including the location of storage, their quantities, and their material safety data sheets³¹.

Any fluids released during machinery maintenance operations will be captured for reuse or appropriate disposal. Waste lubricating oils will be collected in one or more 205 L drums, to be held in the oil store, for return to recycling along with the oil recycled from the adjacent operations³².

In the event that a spillage occurs within the facility there are contingency measures in place to mitigate off-site affects. These measures are presented in Chapter 5.

All spillage accidents will be reported to DPIWE. Where an emergency or accidental emission exceeds a statutory requirement (according to either regulation or Permit conditions), notification will be given to the Director of Environmental Management (DEM) as soon as reasonably practicable and within 24 hours of becoming aware of the release of the pollutant in relation to that Wood Fibre Mill activity³³.

9.7 Monitoring and Review

9.7.1 Monitoring

To ensure the operation of the Wood Fibre Mill is in accordance with the EMP and best practice environmental management the following monitoring programs will be implemented.

Dust

High traffic areas within the Wood Fibre Mill will be monitored visually. If required the area will be watered as determined necessary to minimise dust generation the effectiveness of this will be monitored and additional action taken to address any residual problems.³⁴

Wastewater.

The collection and distribution of stormwater and process water from the site to the communal facility will be checked on a weekly basis to ensure the

³¹ Commitment: Maintain an inventory of hazardous substances on-site.

³² Commitment: Collection of waste oil in drum(s) for removal and recycling by a waste contractor. Maintain a record of quantities.

³³ Commitment: Report hazardous material emission to DEM within 24 hours.

³⁴ Commitment: Visually monitor dust emissions and effectiveness of control by watering.

screening/interceptor system is operating effectively. The solids removal system will be checked daily or on a more frequent basis to ensure that at least 25% of the system containment capacity is always available³⁵. The frequency of the inspections will be modified after 6 months of operation based on inspection results³⁶.

The wastewater flow from the site immediately passing through the screen/interceptor system will be sampled on a regular basis. If the results of the monitoring are consistent with on-site operational requirements the frequency of monitoring may be reduced to monthly. Monitoring will be undertaken for TPHC, TSS and BOD in accordance with standard industry practice³⁷. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be submitted to the Director of Environmental Management annually. Where TSS and BOD levels exceed performance criteria additional on-site treatment will be conducted prior to discharge to the communal wastewater system as described in Section 5.7.4 (contingency measures).

Noise

A record of noise emission complaints will be kept in a complaint register for the site, together with details of investigations and assessment of the effectiveness of remedial actions³⁸.

In addition, formal monitoring of noise emissions from the Wood Centre as a whole will be undertaken after 6 months of operation. The parameters that will be measured include sound intensity and frequency patterns. The monitoring will be undertaken in accordance with a program approved by DPIWE. A report will be submitted to the DEM within six months.

Other

Oil supplied and waste oil returned for re-use will be recorded.

Monitoring data for the wastewater will be reported to the DEM on an annual basis. Where a hazardous materials emission exceeds a statutory requirement (according to either regulation or Permit conditions), a special report will be submitted to the DEM

³⁵ Commitment: Daily inspection and cleaning of solids removal system to ensure at least 25% capacity is available.

³⁶ Commitment: Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.

³⁷ Commitment: Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously. Report results to the DEM annually.

³⁸ Commitment: Record noise emission complaints with details of investigations and actions.

within 5 days. The report will detail the extent of the emission, the likelihood of environmental harm, the cause of the event, procedures applied to minimise the environmental harm, monitoring results, and the system introduced to avoid any repetition³⁹. In addition, management records regarding hazardous material storage and use will be maintained⁴⁰.

A general incident response and notification protocol will be developed and implemented along with reporting procedures for the Wood Fibre Mill⁴¹.

Staff Health Monitoring

Monitoring measures such as the regular and ongoing urine sampling of knife sharpening staff, will be conducted to ensure that the fume extraction measures are effective⁴².

9.7.2 Reporting

The Wood Fibre Mill proponent will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. Reports are to be forwarded to the Site Wide Manager. This will comprise the incident reporting protocol and will allow the Site Wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;
- The proponent may report the incident to external organisations that are needed to provide response support, e.g. State Emergency Services;

³⁹ Commitment: Submit monitoring data to the Director of Environmental Management annually. In the case of an emergency emission full details will be submitted within 5 days.

⁴⁰ Commitment: Maintain internal management records for hazardous material storage and use.

⁴¹ Commitment: Develop and implement an incident response and notification protocol.

⁴² Commitment: Conduct staff health monitoring of knife sharpening staff.

- The proponent gathers details about the incident and supplies them to the office of the Site Wide Manager and Environmental Committee; and
- The Site Wide Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to DEM as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the notice of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

The proponent's responsibilities include but are not limited to:

- Developing and implementing Environmental Action Plans (EAP);
- Developing clear communication arrangements, taking into account after hours and holiday periods;
- Clearly defining roles and responsibilities;
- Maintaining, modifying, reviewing and analysing all monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
- Requesting that additional monitoring or testing be conducted to confirm or negate the original recordings;
- Determining if EAPs or amendments to Operating Procedures are required; and
- Ensuring the maintenance and calibration of monitoring equipment.

Monitoring defined in EAPs will address:

- Water quality and quantity;

- Visual observations;
- Noise; and
- Hazardous materials handling.

EAPs will also address:

- Triggers for implementing monitoring;
- Sampling and analysis;
- Interpretation and corrective action;
- Recording and maintaining monitoring data;
- Monitoring reviews;
- Control actions as a result of monitoring;
- Selecting monitoring equipment;
- Maintenance and calibration of monitoring equipment; and
- Calibration records.

By effectively implementing the Incident Reporting Protocol, the facility may be able to decrease its impact on the environment.

9.7.3 Review

An EMP review for the Wood Fibre Mill will be undertaken, as described in Chapter 5, within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE⁴³.

⁴³ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

CHAPTER 10 WOOD FIRED POWER STATION

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10. WOOD FIRED POWER STATION - ENVIRONMENTAL MANAGEMENT PLAN

10.1 Wood Fired Power Station Process Description

The Power Station will occupy approximately 15 hectares in the southern area of the Wood Centre (Figure 5). The Power Station has direct access to the internal ring road network. A process flow diagram for the Power Station is shown in Figure 36. The activities conducted in the Wood Fired Power Station will comply with the current best practice environmental management conditions operating throughout Australia.

10.1.1 Description of Operation and Equipment

The Power Station will generate between 30 and 50 MW of electricity by using qualifying wood residue from the forest and wood by-product from the other Wood Centre facilities under the *Renewable Energy Act 2000*. The wood residues and wood by-product will be delivered from forest operations and processing facilities (Figure 36).

Figure 37 illustrates the quantities of wood flowing through the Power Station. Logging residue left in the coupe is currently burnt in order to assist with regeneration and future site management. By harvesting a substantial amount of this residue for use as fuel in the Power Station, the extent and nature of regeneration burns at the coupes will be substantially reduced and smoke generation minimised. Reducing the amount of residue being burnt will not have any impact on future regeneration, as the quantity of ash produced does not greatly affect the regeneration. Where practicable, ash from the Power Station will be returned to the forest and spread over regenerated coupes.

Plate 11 Power Station



The Power Station will require a reliable supply of fuel from the logging residue and/or timber processing wood by-product to operate continuously for 24 hours/day, 7 days/week, 330 to 340 days/year over at least 25 years. In order to ensure reliable wood by-product supply during inclement weather and other potential interruptions, the Power Station will maintain stockpiles on-site of the wood by-product fuel. The stockpiles will contain up to 45 days supply and will consist of both open piles and under-cover storage for weather protection. The processed fuelwood open pile storage will be 3 to 4 m high with a volume of up to 180,000 m³. The processed fuelwood covered storage facility will be 6 to 8 m high with a volume of up to 90,000 m³. Including the fuelwood storage and the 50 MW generation Power Station, the facility will occupy approximately 15 Ha. Apart from small quantities of automotive diesel fuel (ADO) for start-up and combustion control no non-wood products will be burnt in the Power Station. A photograph of a typical power station is shown in Plate 11.

Fuelwood Receiving, Sorting and Storage

Forest residues and timber processing wood by-product, up to 333,000 dry tonnes per year, will be processed to size at the merchandising yard fuelwood processor and conveyed to the Power Station. Dry tonnes is defined as 40 to 50% water content. Additionally, if determined suitable as fuel, a conveyor for undersized wood fibre, approximately 23,000 dry tonnes per year, will link the wood fibre mill to the Power Station or alternatively, depending on installation costs, it will be delivered by truck. Any other timber processing wood by-product will be delivered by truck from the sawmill (7,000 tonnes per year) to the merchandising yard fuelwood processor and waste from the merchandising yard (6,000 tonnes per year). Depending on active storage levels in the boiler feed bin and the quality of the wood by-product, the fuelwood will either be conveyed to the bin for direct firing in the boiler or to the temporary storage areas for subsequent reclamation and use.

Sorting, Screening, and Combustion

Processed fuelwood will be sorted and blended as required for quality, with moisture content being the prime factor. The fuelwood will then be reclaimed by mobile equipment (usually a rubber-tyred front loader) when required for boiler operation.

After screening to remove and recycle oversized material, the processed fuelwood will be fired in the boiler. If any oversized material is screened, it will be returned to the fuelwood processor in the Merchandising Yard. Controlled fuelwood feed rates, a water-cooled grate and various air supply locations in the boiler will be used to control combustion. Steam will be generated and superheated within the tube and drum arrangement of the boiler to approximately 100 bar pressure and 510°C temperature for delivery to the turbine.

The hot flue gases will pass through the economiser to heat the boiler feedwater and the

air heater to heat the combustion air. The cooled flue gases will then be routed to a coarse filter system to remove large particulates and reduce loading on the fine filter system, an electrostatic precipitator (ESP).

The ESP removes fine-sized particulates by imparting a charge to the small particles (in this case fine particles that make up ‘smoke’). These charged particles are then drawn to a collecting plate electrode where they are held. Collected particles gradually pass to the bottom of the electrode and the ESP where the collected particles are conveyed to a holding bin by a screw conveyor. The flue gases are drawn through the induced draft (ID) fan and routed to the approximately 40 m high stack for discharge to the atmosphere. The ESP will be sized to maintain particulate emissions below 80 mg/Nm³.

The key elements in the design and operation of an effective ESP include:

- Physical size and orientation of the ESP chamber – length versus width, tall and narrow or short and wide;
- Resistivity of the dust – a measure of the electrical charge on the dust particle;
- Velocity of the gas stream – how fast the gas passes through the precipitator;
- Concentration of the dust particles in the gas stream;
- Particle size and percent weight classifications;
- Collecting plate electrode area; and
- Required efficiency.

Steam Generation and Water Treatment

The superheated, high-pressure steam will be directed to the turbine-generator set to generate electric power. The low-pressure exhaust steam from the turbine will be condensed to water in the condenser. Condenser cooling water will be circulated from the cooling tower, through the condenser then back to the cooling tower. By spraying the cooling water, temperature will be maintained at or near atmospheric dew points. Pending economic evaluation, limited amounts of low-pressure steam may be extracted from the turbine and routed to the RPV mill and sawmill located at the Wood Centre for heating and drying processes. Fuel rates will increase by approximately 20,000 dry tonnes/yr (35,000 wet tonnes/yr) to furnish “export” steam.

Figure 36 Wood Fired Power Station Process Flow Diagram

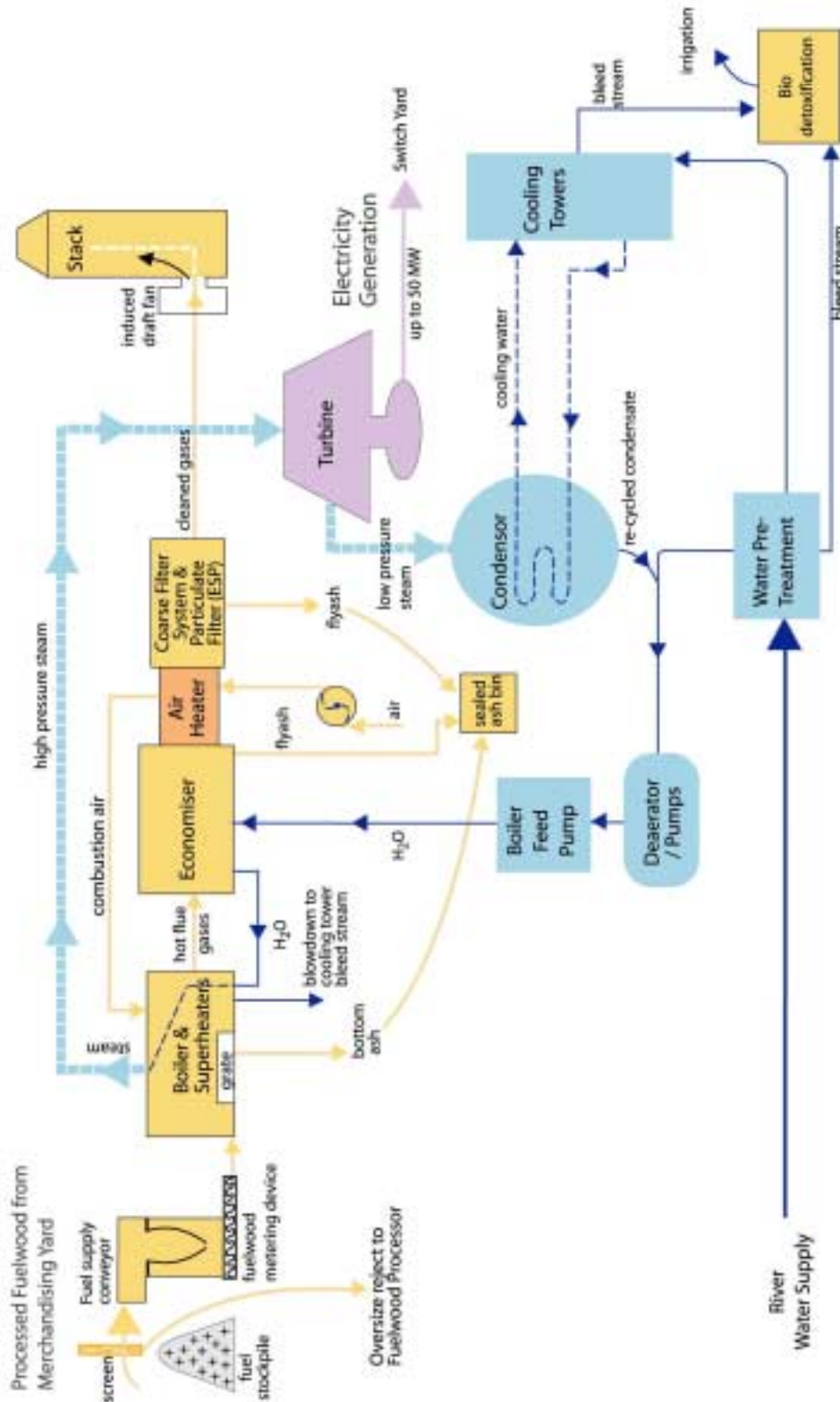
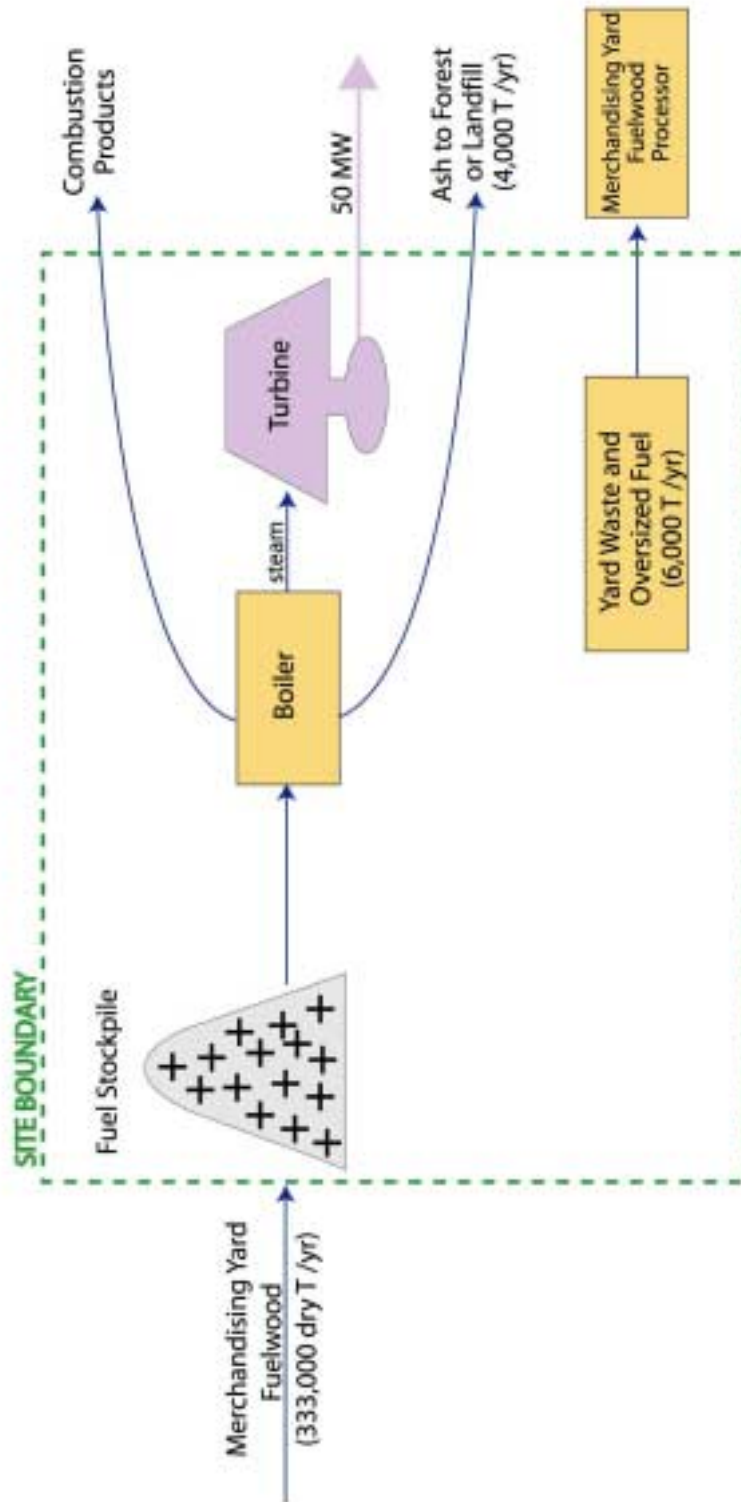


Figure 37 Wood Fired Power Station Wood Flow Diagram



Raw river water will be treated (dosed) with a bromide-based biocide. The treated water will be circulated through the cooling tower and condenser. The cooling tower water will be monitored fortnightly to determine efficacy of biocide treatment and specifically *Legionella* build-up as per Australian Standard AS 3666. Warm water, after circulating through the condenser, will be cooled in the evaporative cooling tower. A bleed stream from the cooling tower will be routed to discharge as wastewater including small quantities of reject water from the water treatment processes and the boiler blowdown. The cooling tower bleed stream will require monitoring for biocide before release for irrigation. A biot detoxification unit will be provided to ensure the pretreated bleed stream to the cooling tower and the bleed stream from the cooling tower is suitable for irrigation (Figure 36).

A small stream of river water will be treated with phosphates, oxygen scavengers and demineralised via ion exchange to produce high-purity boiler make-up water, which is added to the condensate, passed through a deaerator and is pumped into the boiler.

Refer to Figure 38 for distribution of water throughout the Power Station facility.

Ash Management

Ash will be collected at several locations from the boiler. Typical ash production will be 4,000 to 7,000 tonnes annually for a 50 MW Power Station (or 3,000 to 4,000 tonnes per year for a 30 MW Power Station.) Coarse size bottom ash from the furnace will be collected in a wet conveyor system and routed to the sealed ash bin. The finer sized flyash in the flue gases will be collected and removed via bottom discharges from the economiser and air heater, coarse filter system, and the electrostatic precipitator. The dry, collected flyash will also be conveyed to the sealed ash bin.

The ash management will be undertaken in accordance with the waste management hierarchy, with reuse options investigated after commissioning of the Power Station. At this stage it is proposed that ash will be removed from the bin periodically and sprayed with water for dust control as it is loaded into trucks for possible composting or for off-site re-use or disposal. Typically, ash trucks will remove ash once per day for 3 to 5 days per week, depending on truck capacity. There will be no ash ponds on the Power Station site.

Power Generation

The generated power will be frequency regulated and adjusted for voltages within the switchyard where a transformer will be located. PCB-free oils will be used in the transformers which will be situated in bunds. Power exported to the grid will be up to 50 MW at 66 kV or higher voltage, with an additional 3.5 to 4 MW consumed by the Power Station.

10.1.2 Description of Buildings and Associated Infrastructure

The Power Station is located at the southern end of the Wood Centre. There are eleven buildings and structures on the Power Station site. The approximate dimensions and likely construction materials of the buildings and open areas at the Power Station site are outlined in Table 76.

Office / Control and Amenities Building

The Office / Control Building will house the offices, control room, amenities, instrument and the electrical room. The building will be a ground level construction on a concrete slab and will most likely be brick or pre-cast walls, painted to suit its environs with a colourbond roof.

Amenities will comprise a lunchroom, showers and toilets. The building will be heated either from a reticulated steam system or by an electric heating system, with air conditioning for computers as required.

Table 76 Building/Structure Dimensions and Construction Materials

Building	Area (m ²)	Height (m)	Construction Material		
			Floor	Walls	Roof
Office / Control room / Amenities	1,900	5-6	Concrete slab	Brick / Precast Concrete	Steel sheet (Colourbond Trimdek clad)
Workshop / Warehouse	1,500	8-10	Concrete slab	Brick / Pre-cast Concrete	Steel sheet (Colourbond Trimdek clad)
Turbine Hall	1,250	20	Concrete slab	Precast Concrete/Steel Cladding	Steel sheet (Colourbond Trimdek clad)
Stack	-	40	Concrete slab	Steel	N/A
Sealed Ash Bin	-	15	Steel	Steel	Steel sheet (Colourbond Trimdek clad)
ESP with Boiler	440	20	Concrete slab	Open/Steel Cladding	Steel sheet (Colourbond Trimdek clad)
Switchyard	1,690	8	Concrete slab	Open	Open
Water Storage Tank	4,800 kL	10	Concrete slab	Steel	Steel sheet
Water Treatment Plant (WTP)	1,800	5-6	Concrete slab	Open	Steel sheet
Cooling Tower	1,000	20	Concrete slab	Open	

Building	Area (m ²)	Height (m)	Construction Material		
			Floor	Walls	Roof
Covered Fuelwood Storage	Up to 20,000	6-8	-	Open/Steel Cladding	Steel sheet (Colourbond Trimdek clad)
Open Pile Storage	45,000	3-4	-	-	-

Workshop and Warehouse

The workshop and separate warehouse building will be constructed on a concrete slab, with colourbond walls and roof.

Hazardous goods (except for diesel oil) will be stored near the water treatment plant where all liquids will be stored in sealed tanks and solid powders in sealed bins on concrete pads with bunds in accordance with AS-1940. Many of the smaller tanks will be located in an enclosed facility for weather protection again in accordance with AS-1940. In the event of reagent spillage, the reagent will be reclaimed for reuse and failing that it will be pumped to the water treatment plant for recycling but under no circumstance will it be released beyond the Power Station site boundaries. Large spills will be collected from the sump and transported off-site for proper disposal by a licensed waste transporter.

Any fire fighting equipment and the loader will be kept near the processed fuelwood covered storage.

Car Parking

A hardstand car park (684 m²) will provide parking for approximately 24 personnel, service, and visitor vehicles.

10.1.3 Source of Wood and Quantity of Production

The fuel source for the Power Station will be wood by-product and processed forest residues supplied from the forest and adjacent processing operations via the fuelwood processor. The fuelwood will qualify as an eligible renewable resource under the *Renewable Energy Act 2000*. When fed into the burner the processed fuelwood will typically be 50 mm x 10 mm in size, with 30 to 45% moisture content and 1 to 2% ash content. The green wood by-products from the Wood Centre will be supplemented as needed, or as available, by processed wood by-products from other local sources, including other sawmills, and discarded wood residues. Only clean non-painted and non-preserved treated wood will be used.

The Power Station will generate and export up to 50 MW to the local grid for typically 8,000 hours per year, producing up to 400,000 MWh/yr. (Production will be less in

major overhaul maintenance years, which are usually every sixth year, at approximately 370,000 MWh/yr for 50 MW generation). Pending economic evaluation, up to 15 tonne/hr of low-pressure steam could also be furnished to the RPV mill and sawmill in which case the fuel rates will be increased by approximately 20,000 dry tonnes per year. The volumes of wood by-product from sources on-site are outlined in Table 77.

Table 77 Estimated Volume of Wood By-Product Supplied from Adjacent Facilities to the Power Station (tonnes/pa)

Facility	Yard Waste Dry tonnes	Wood By-Product for Combustion Dry tonnes	Totals Dry tonnes
Merchandising Yard	6,000	0*	6,000
Sawmill		8,000	8,000
RPV Mill	0	0	0**
Wood Fibre Mill	3,000	20,000	23,000
Totals	9,000	28,000	37,000

*The merchandising yard will be the source of sawlog and pulp log wood by-products that will be directed to the fuelwood processor for use in the Power Station. The amounts have been identified by sawmill and wood fibre mill contributions because they come from the wood destined for these facilities. **The wood by-product from the RPV mill will be used in the RPV mill heat plant.

10.1.4 Emission Sources

Emissions from the Power Station will consist of air emissions, wastewater discharges, limited amounts of solid wastes, and noise emissions typical of a small industrial operation.

Air Emissions

The main potential emission sources to the atmosphere associated with the operation include:

- Diffuse wood particulate emissions associated with vehicular movements on-site and wood storage and conveying systems;
- Minor amounts of boiler ash (dust) emissions from the ash truck loading facility;
- Flue gas discharge from the Power Station stack (refer to composition description below);

- Water vapour from the cooling tower; and
- Steam venting to atmosphere when boiler safety valves are tested or activated for safety reasons in the steam system.

The majority of these emissions will come from combustion of the fuelwood. The total amount of material burnt is effectively unchanged with the proposed development because the wood residue includes materials that are normally left on the forest floor and burnt in preparation of an ash bed for the replacement forest and vehicle access.

The 20 metre high cooling tower will emit water vapour containing a small amount of liquid water droplets in the steam. Typical rates of water vapour will be 140 to 150 tonne/hr at 30 to 40°C for 50 MW. Water vapour plumes from the cooling tower and the stack will be visible during periods of low temperature and/or high humidity weather.

Particulate emissions from the boiler flue gases will be controlled with coarse and fine filter systems. Flue gases will be discharged from an approximately 40 m high stack. The typical composition of flue gases from the Power Station is provided below with estimated annual mass emissions based on an 8,000 hr/yr operation:

- 90-100 kg/s flow at 50 MW (or 55-60 kg/s flow at 30 MW);
- 130-150°C temperature;
- 18-20 m/s velocity;
- 19-21 % v/v moisture;
- 60-65 % v/v nitrogen;
- 3-5 % v/v oxygen;
- 10-15 % v/v carbon dioxide (525,000,000 kg/yr);
- Below 100 vppm SO₂;
- Below 80 mg/Nm³ particulates - dry, corrected to 12 % CO₂ (150,000 kg/yr); and
- Below 500 mg/Nm³ NO_x (as NO₂) dry, corrected to 7% O₂ (960,000 kg/yr).

Greenhouse Gas Emissions

Given that the same amount of material burnt as a result of forest operations is unchanged, the proposed Power Station represents an overall neutral impact on carbon

dioxide emissions. However, there may be some small reduction in other greenhouse gas generation due to a more efficient combustion process than open burning on the forest floor. This will lead to more complete combustion of methane and other hydrocarbons liberated during the combustion of wood. In addition, there will be less methane from wood decomposition. As a result less methane will be released to the atmosphere.

Air emissions, including greenhouse gases, from the Power Station stack have been projected by the boiler vendor’s engineer. The maximum particulate emission rate is projected at 80 mg/Nm³ (dry, corrected to 12% CO₂). The projections for 50 MW generation are summarised in Table 78.

Table 78 Power Station Atmospheric Emissions

Emission	Annual Projection, kg/yr (8,000 hr/yr)
Total Particulates	Below 150,000
Methane, CH ₄	Below 20,000
Nitrous Oxide, N ₂ O	Below 26,000
Nitrogen Oxides, NO _x (as NO ₂)	Below 225,000
Carbon Monoxide, CO	Below 1,920,000
Carbon Dioxide, CO ₂	Below 525,000,000
Non-Methane VOC’s	Below 6,000

Emissions for power generation below 50 MW will be proportionally lower than those shown in Table 78.

Refer to Chapter 5 regarding site-wide greenhouse gas emission management.

Water Emissions

Three kinds of water emissions will emanate from the Power Station site: stormwater, process water and domestic water. Figure 38 illustrates the water flow of stormwater and process water on the site.

Stormwater

Contaminated stormwater run-off collected from paved and unpaved operational areas is likely to contain:

- Suspended wood fibre solids (e.g. cellulosic and lignin materials);
- Suspended sediment from local soils;

- Tannins which provide a distinctive coloration of the water; and
- Trace amounts of hydrocarbons (e.g. fuels and oils associated with vehicle usage on-site).

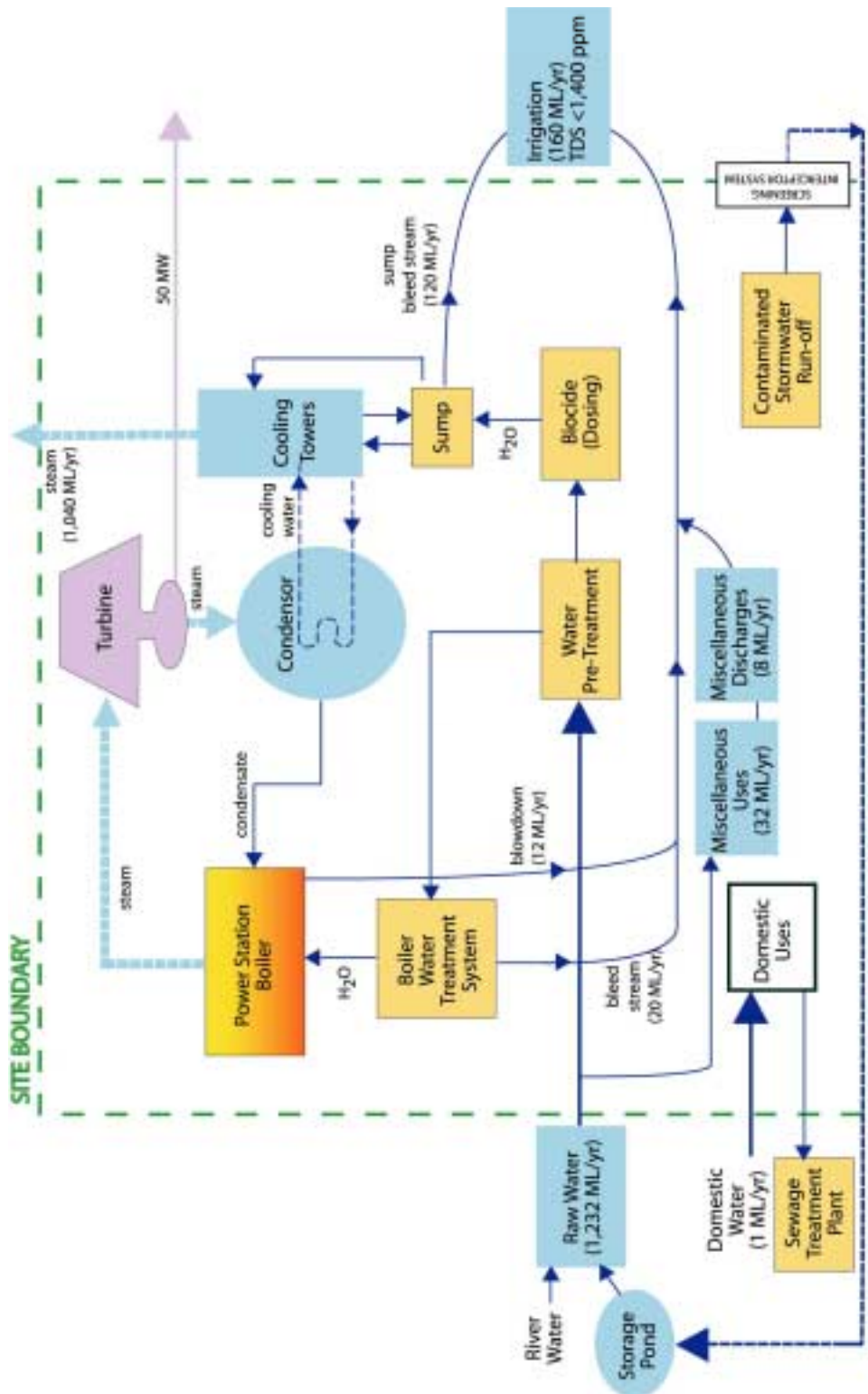
Wastewater

Water from the clean storage pond and/or the river will be furnished at a rate of up to 1,232 ML/yr. As discussed in Chapter 3, the Total Dissolved Solids (TDS) of the Huon River samples taken adjacent to the site were 52 and 56 mg/L in September and October 2000, respectively.

The main potential sources of wastewater associated with the operation of the Power Station include:

- The primary wastewater discharge from the Power Station will be the cooling tower stream (120 ML/yr) with small quantities of reject water from the water treatment processes (20 ML/yr) and blowdown from the boiler (12 ML/yr). The wastewater will be at temperatures of 5 to 10°C above ambient. Typical wastewater flow at less than 1,500 mg/L TDS will be approximately 160 ML/yr. Occasionally the rate will rise as high as 30 kL/hr and the concentration to 2,000 mg/L TDS, not necessarily simultaneously. The salts in the wastewater (TDS) depend on the quality of the raw water and will essentially be the same species, at higher concentrations, as the raw water supply from the river and recycled run-off.
- The backing of the ion exchange column is likely to be undertaken with a mild alkali (e.g. sodium hydroxide) and will produce small volumes of wastewater (compared to the boiler blowdown) containing TDS. This wastewater stream will be combined with the boiler water treatment system stream. The TDS levels will be considerably lower than the levels in the boiler blowdown.
- Domestic wastewater sewer and grey water generated by site employees/personnel. A maximum of 4.5 kL/day of domestic wastewater will be generated on the Power Station site (based on the assumption of 150 L/day per person and up to 30 employees). Annual rates are expected to be less than 1.0 ML.
- There will be no ash ponds on-site, so no water will be discharged from these sources.

Figure 38 Wood-Fired Power Station Water Flow Diagram



Noise Emissions

The main potential sources of nuisance noise associated with the operation of the Power Station include:

- fans, blowers, pumps;
- fuelwood conveyors; and
- transformer.

Solid Wastes

Solid wastes generated by the Power Station will include:

- Boiler ash (including coarse bottom ash and fine flyash). Typical ash production will be 4,000 to 7,000 wetted tonnes/yr at 50 MW (3,000 to 4,000 tonnes/yr at 30 MW).
- General refuse from the wood residue sorting operation (e.g. rock, unusable wood residues, metal and other rubbish/wastes). The quantity is not predictable since it results from random quantities in the delivered wood residues. The latter is expected to be less than 2,000 tonnes per year.
- Filtered solids (including wood fibre solids, soil, tannins and hydrocarbons) from recycled run-off water and other water treatment is expected to be less than 500 tonnes per year.
- Solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated each day will be collected for disposal and/or reuse at an approved site.
- General refuse from office, amenities and maintenance operations.

10.1.5 Projected Hours of Operation and Employment

The Power Station will operate 24 hours per day, 7 days per week except for scheduled and forced outage periods for maintenance. Typical operation will be 8,000 (\pm 100) hours per year.

Truck delivery will occur between 7:00 a.m. and 7:00 p.m. six days per week, while the fuelwood conveyor will operate continuously when the Wood Centre is operating.

Approximately every sixth year, there will be an extended period for scheduled maintenance of about six weeks, i.e. major overhaul maintenance years. Typical

operation of the Power Station in the major overhaul maintenance years will be 7,400 (\pm 200) hours per year.

It is predicted that the Power Station will employ 20 to 30 personnel with approximately three operating personnel at nights, weekends and holidays.

10.2 Atmospheric Emissions

Emissions to the atmosphere may arise at various stages in the Wood Fired Power Station process. The potential sources of atmospheric emissions are shown on Figure 20. The emissions may be in the form of:

- Fugitive dust and air;
- Flue gas emissions;
- Water vapour emissions; and
- Vehicle exhaust emissions.

10.2.1 Potential Impact

Fugitive Dust and Ash

There will be some fugitive dust emissions from fuelwood conveying systems during dry periods that will typically be contained within the site with screening barriers and water sprays and will therefore not result in nuisance off-site.

There may also, on occasions, be small amounts of fugitive dust (ash) emissions at the ash-truck loading station.

Flue Gas Emissions

Particulate emissions from fuelwood combustion via the stack will be controlled by the ESP to less than 80 mg/Nm³ (dry, corrected to 12% CO₂). Particulates have the potential to adversely impact on air quality if they are allowed to disperse in the air.

The other flue gas emissions listed in 10.1.4 above also have the potential to adversely impact on air quality.

Water Vapour Emissions

The cooling tower will emit water vapour containing a small amount of liquid water droplets. Typical rates of water vapour will be 140-150 tonne/hr at 30-40°C for 50 MW. A water vapour plume may be visible from the cooling tower, and from the stack,

during periods of cool temperature and/or high humidity weather.

The impact of water vapour emissions will not be cause for adverse impact on air quality and is not considered further.

Vehicle Exhaust Emissions

Diesel powered vehicles will be fitted with standard emission control equipment, well maintained and should not adversely impact on the local air quality. Vehicle exhaust emissions are not considered further.

10.2.2 Management Measures

In order to assess the potential impact of flue gas emissions, air modelling using a standard meteorological data file and the Ausplume model has been undertaken for the Power Station. Emissions from the heat plants have also been included in the air modelling in order to fully assess the stack emissions from the Wood Centre. Refer to Appendix U for a complete description of the assessment. The model will be re-run prior to commissioning when the engineering specifications for equipment become available¹. This action is intended to verify the results of the model.

The 99.9 percentile^a worst case for each pollutant plus the second highest^b predicted values for Glen Huon and Huonville has been recorded in Table 79.

All predicted peak Ground Level Concentrations [GLCs] for the target receptors are below the NEPM objectives in all cases. In the case of CO and NOx, the highest results are recorded from westerly winds. This result is in direct response to the terrain effects acting together with the low inversion levels. Further modelling using increased stack heights or exit velocities did little to alter the predicted location of the worst case GLC although increased velocities and increased stack height did lead to lower GLCs at receptor locations.

Table 79 Worst case effects for Power Station emissions [Hobart.met]

	NEPM objective (mg/m3) (ug/m3)		Predicted 99.9 percentile GLC (ug/m3)	99.9 percentile GLC as a percentage of NEPM	Glen Huon (ug/m3)	Huonville (ug/m3)
CO	11.3	11,300	699	6%	11.3	6.28
NOx	0.25	250	167	67%	7.58	2.75
Particulates	0.05	50	12.9	26%	0.14	0.072

¹ Commitment: Undertake air quality modelling for the Power Station and heat plant stack emissions once engineering specifications and site weather data are available.

	NEPM objective (mg/m3) (ug/m3)	Predicted 99.9 percentile GLC (ug/m3)	99.9 percentile GLC as a percentage of NEPM	Glen Huon (ug/m3)	Huonville (ug/m3)
Arsenic	-	0.014 4	-	0.000 571	0.000 165
Cadmium	-	0.000 869	-	0.000 034 5	0.000 009 96
Lead	0.50	0.262	52%	0.010 3	0.002 99
Dioxins	0.000 002 ^c	0.000 000 403	20%	0.000 000 0164	0.000 000 006 04

a. 99.9 percentile – the observation used is 99.9th highest reading. This allows for any anomalous results in the model represented by the highest figure. Selecting the 99.9 percentile reflects regulatory convention.

b. The second highest reading is used to allow for anomalous results within the Air Dispersion model.

c. Objective is taken from the EPA Victoria 2000.

Of particular note is the effect of terrain on westerly winds pushing the plume east from the Power Station. From the location of the Southwood facility and the surrounding terrain the plume tends to impact the surrounding terrain due east and on the ridge north of the facility. It is apparent that Maximum GLC's are mostly found to be within 2000 metres of the site restricting off-site impacts. The terrain surrounding the Southwood facility has a strong impact on the location of peak GLC's.

The design and operation of the Wood Centre combustion sources will be undertaken to comply with the four-tiered approach recommended by the Air Quality Management and Policy Development (DPIWE 2000b) for managing and regulating air emissions from industrial facilities². This four-tiered approach is based on:

- Adopting Best Practice Environmental Management;
- Compliance with ambient air objectives;
- Setting limits for Ground Level Concentrations; and
- Setting limits for in-stack emission levels.

The in stack emission levels set out in the Discussion Paper on Air Quality Management and Policy Development (January 2000) (DPIWE 2000b) are outlined in Table 80. These levels will be met as part of the performance requirements.

² Commitment: Equipment will be designed and operated to comply with the four-tiered approach recommended by the Discussion Paper on Air Quality Management and Policy Development (January 2000).

Table 80 Air Regulation Emission Levels

Parameter	Source Classification	Proposed Air Policy Emission Level (DPIWE 2000b)
Particulates	Any boiler or incinerator	100 mg/m ³ @ 7% O ₂
Smoke	Fuel burning plant and equipment	Ringelmann 1 as 20% equivalent opacity
Nitrogen Oxides	Any trade, industry, or process emitting nitrogen oxides Steam Boilers (liquid/solid fuel)	80 mg/m ³ @ 7% O ₂
Carbon Monoxide	Any trade, industry, or process	2,500 mg/m ³
Sulphur Dioxide	Other installations	10 mg/m ³ (as SO ₃)

Additional specific management measures to be implemented are described below.

Fugitive Dust, Sawdust and Particulate Emissions

Covered conveyors will control fugitive dust³ during conveying.

Ash will be wetted upon discharge from the ash bin prior to truck loading⁴.

All trafficked areas will be paved to minimise dust generation. A street sweeper will be employed to control dust on sealed surfaces if necessary⁵. In addition, dust suppression of highly trafficked unpaved areas will be achieved by watering⁶.

Dust will be controlled such that no visible dust will travel across the site boundary⁷.

³ Commitment: Conveyors will be covered to control fugitive dust.

⁴ Commitment: Ash will be wetted following discharge from the ash bin.

⁵ Commitment: Seal highly trafficked areas of the Power Station and use street sweeper if watering is an inadequate dust control measure.

⁶ Commitment: Water highly trafficked unpaved areas to suppress dust.

⁷ Commitment: No dust will travel beyond the site boundary as an air emission.

Stack Particulate Emissions

A coarse filter system traps and removes particulate and reduces loading while the electrostatic precipitator (ESP) removes very fine particulate to the bottom discharges. These devices collect and remove particulate emissions from the boiler flue gases. The coarse filter system combined with the ESP will maintain emissions below 80 mg/Nm^3 ⁸. Given that the dust particle will actually accept a charge (resistivity) it is possible to design an efficient precipitator to perform at a specified performance level. It is therefore possible to state with a reasonable degree of certainty that the electrostatic precipitator will effectively control the particulate emissions from the Power Station.

The dry flyash will be conveyed to the sealed ash bin.

The Power Station stack will be fitted with an obscuration meter. This meter will provide real time analysis of particulate levels in the stack. The Power Station control panel will be fitted with a display of the obscuration meter level and warning alarms if the recorded level is above the upper control limit. The obscuration meter will be calibrated against in-stack monitoring for particulates using a NATA certified laboratory. The frequency of the calibration test will be every 12 months or at a frequency recommended by the manufacturer of the selected obscuration meter.

The Power Station will be shut down for repairs if the opacity of the stack emissions continually exceeds 20% (Ringelmann 1)⁹. A monitoring system will be set up to an alarm to alert controllers when Ringelmann 1 is exceeded. The remote location of the Wood Centre reduces the impact of the limited emissions on residences and publicly accessed areas.

10.3 Wastewater Emissions

10.3.1 Potential Impact

Refer to Figure 38 for description of the main water flows within the Power Station site.

Contaminated Stormwater

Activities to be undertaken within the Power Station that have potential to result in stormwater contamination include:

⁸ Commitment: Installation and maintenance of a coarse filter system and ESP will maintain the emissions below 80 mg/Nm^3 .

⁹ Commitment: Adjust fuel-to-air ratio immediately if stack emission opacity exceeds 20% and shut the Power Station down for repairs if opacity continues to exceed 20%.

- Vehicular movements;
- Wood fibre storage in stockpiles; and
- Sediment from local soils.

Process Wastewater

As mentioned in Chapter 10, the primary wastewater stream will be cooling tower and boiler bleed streams with small quantities of reject water from the treatment process. This will contain elevated levels of TDS (up to 1500 mg/L). The cooling tower blowdown must be removed from the system to avoid excessive levels of TDS in the cooling water and fouling of the cooling tower.

Domestic Wastewater

The high biochemical oxygen demand, high solids, nutrients and bacteriological contamination of domestic wastewater has potential to adversely impact on the environment if not treated appropriately prior to discharge.

Domestic sewer and grey water from the office and amenities facilities will be directed to an on-site communal wastewater treatment system and will not be considered further in this chapter. Refer to Chapter 5.

10.3.2 Management Measures

Contaminated Stormwater and Process Wastewater

Contaminated stormwater will be collected by earthen or cement stormwater drains depending on factors as slope, soil type and whether the area being drained is hardstand or paved. The stormwater will then pass through a screening/interceptor system on-site. This system will provide initial removal of coarse suspended solids (e.g. soil and wood fibre) as well as some oil and grease that have been entrained in the wastewater stream. The solids will be removed from the screening/interceptor system on a regular basis. The stormwater will then be piped to the site-wide storage ponds for reuse¹⁰. The facility operator will collect samples of wastewater from the screening/interceptor outlet point to the storage pond system regularly. Analysis will be undertaken for TPHC, TSS and BOD. In addition, continuous flow rate from the site will be monitored to affect efficient use of water.

¹⁰ Commitment: Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.

Irrigation of Process Water

The cooling tower bleed stream will contain:

- Dissolved solids from the raw river water, concentrated approximately 15 times by evaporation in the cooling tower;
- Those chemicals introduced to minimise the buildup of algae within the cooling tower; and
- Those chemicals introduced to minimise the risk of legionella in the cooling water circuit.

As described above, it is proposed to discharge this wastewater stream by irrigation. In order to ensure water quality is suitable for irrigation a detoxification unit will treat water from the bleed streams. A large area of plantation suitable for irrigation is available within a few kilometres of the site, and a properly functional land irrigation system for the bleed stream can be established with suitable performance standards, investigation, design and cost. However, in the detailed design stage of the project alternative disposal routes will be investigated. In terms of each of the latter two bleed stream components described above, it is considered that once dosing requirements (if any) are finalised for the control of legionella, slime and corrosion, that treatment systems can (including possible biocide detoxification) be developed to enable discharge of the wastewater to a natural watercourse such as the Huon River.

In terms of dissolved solids, by far the greatest source in the bleed stream is the river water itself. At the target concentration of 1,250 ppm the bleed stream water is expected to be below normal drinking water standards but otherwise safe for drinking, and possibly slightly salty to taste. Again it is considered that this could be discharge to the Huon River without adverse impact.

A decision on the disposal route finally selected will be determined during the detailed design stage and will be subject to the approval of the DPIWE.

Water Collected in External Hazardous Materials Bunds

If hazardous materials are stored externally in bunds, the bunds will be roofed to minimise stormwater collection within the bund. Water collected in bunds, as a result of a combination of rain and wind, will be visually inspected prior to discharge to stormwater drain to ensure that it is suitable for discharge¹¹.

¹¹ Commitment: Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.

The management procedure for bund water that is unsuitable for discharge will involve water quality testing, containment, and collection and disposal by a licensed waste contractor if compliance cannot be achieved. Records will be maintained for internal management purposes¹².

10.4 Noise

Noise emissions from the Wood Fired Power Station are not expected to be heard from beyond the boundary of the Wood Centre. To support this contention a worse case scenario model based on noise measurements from another power station has been conducted. The assessment and mitigation measures are discussed below. Figure 20 shows the potential sources of noise from the Wood Fired Power Station.

10.4.1 Potential Impact

As discussed in Chapter 6, when assessing the potential noise impacts of the Wood Centre operations, Terts (2001) has taken into consideration the following matters:

- The existing noise climate in the Wood Centre;
- The predicted operating noise levels at the residences in other ownership, 6 kilometres from the Wood Centre;
- The weather conditions at the time of measurement (i.e. no rain and little or no wind);
- Possible DPIWE permit conditions for noise;
- Assessment of the predicted noise levels against possible DPIWE noise limits; and
- Noise mitigation measures.

The methodology used to predict the noise levels likely to be encountered at 6 kilometres is described below (Terts 2001).

Distant noise level data was obtained for existing operating facilities located in Tasmania (sewage treatment plant, merchandising yard, saw mill, veneer mill and wood fibre mill), and from a manufacturer (wood fired power station, and portable wood fibre plant).

¹² Commitment: Test potentially contaminated bund water and organise for its approved disposal.

The following formula was then used to determine the attenuation of sound over flat and gently undulating ground.

$$\text{Attenuation, dB(A)} = 6\text{dB(A)/dd} + 3\text{dB(A)/km}$$

Where dd=doubling of distance.

It should be noted that the calculations obtained by using this model, do not include the attenuation provided by topographical features such as hills, which are prevalent around the Wood Centre. As such the predicted noise levels at the nearest residence are extremely conservative, and represent the worst case.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether the calculated noise levels are intrusive or not depends on the following factors:

- The level of the background noise;
- The level of the intruding noise;
- Whether the noise has tonal components;
- Whether the noise has impulsive components; and
- The time of day or night the noise occurs.

Steam Turbine

The total sound power level of a 50 MW Wood Fired Power Station without noise control is estimated to be approximately SWL ~ 118 dB(A) and with maximum noise control approximately SWL = 95 dB(A) (Terts, 2001). The turbine and generator will be enclosed in a building (the turbine hall) and will not be a noise source beyond the building.

The expanded noise level from other items of equipment including pumps blowers, fans and conveyors is shown in Table 81.

Table 81 Typical Noise Levels Expected from the Site Equipment

(Terts 2001)

Source	Noise at 250 m (dB(A))	Noise at 6000 m (dB(A))
Pumps blowers, fans, conveyors.	60	15.1

If an allowance is made for tonal components due to forced draft and induced draft fans, an additional 5 dB(A) should be added to the 15.1 dB(A) to give a noise level of 20.1dB(A). It is considered that due to the ambient noise level this is unlikely to be heard at 6 kilometres from the Wood Centre. It should be noted that this noise level represents the worst-case situation with no noise controls in place.

Safety Steam Release

The safety steam release noise has been measured from an 8 MW boiler with a stack height of 30 metres. The measurement was taken at a distance of 860 meters in a direct line of sight with the stack. The noise level measured ranged from 48 to 62 dB(A). Terts (2001) estimates that a 50 MW boiler may generate a noise level 11.9 dB(A) higher than the 8 MW boiler, with the maximum noise level potentially experienced at 6 kilometres, of 42 dB(A).

This noise level can be reduced with the use of appropriate attenuation equipment such as silencers.

Transformer

A 50 MVA transformer is anticipated to have a sound power level of 100.8 dB(A) or sound pressure of 70 dB(A) (Terts, 2001). At 6 kilometres (the nearest residence), the sound pressure level has been calculated as -0.8 dB(A) (Terts, 2001), and so will not be heard.

10.4.2 Management Measures

Although the noise assessment has demonstrated that noise emissions from the Power Station are unlikely to be heard at the nearest residence a number of management measures will be implemented, to ensure environmental best practice is achieved.

The only exception to this may be the boiler safety valve noise. However, this is an infrequent operation (less than a daily basis), and would generally have duration of no more than 15 minutes. Safety valves will vent through a silencer and venting will only occur during day-time hours¹³.

The steam turbine, generator, and associated equipment will be enclosed in a building (Turbine Hall), which will attenuate noise from the high-speed equipment. In addition,

¹³ Commitment: Safety valves will vent through a silencer and venting will only occur during day-time hours.

the Turbine Hall openings will be oriented away from the nearest residences.¹⁴ Other sources of noise emitted from the Power Station will be the fans, blowers, pumps and conveyors. Silencers will be installed in the stacks, on steam safety valves and other steam vents to reduce noise emissions and equipment will be selected and maintained to minimise noise emissions¹⁵. Stack design will allow for tuning stubs to be installed if necessary¹⁶.

Following the final selection of equipment noise modelling will be undertaken, to verify the predicted noise levels¹⁷.

In addition, all noise complaints will be investigated, and the complaints and actions taken will be recorded¹⁸.

10.5 Solid Waste Generation and Disposal

10.5.1 Potential Impact

There is a potential for solid waste from the Power Station to contribute to fugitive air emissions and water contamination if allowed to accumulate in an uncontrolled manner on-site. Other solid wastes such as office waste and packaging materials may cause litter related problems if not adequately managed. Refer to Figure 36 for a description of the overall process and Figure 37 for description of the main wood flows on the Power Station site.

¹⁴ Commitment: Utilise soundproofing and orientate openings toward the Wood Centre.

¹⁵ Commitment: Install silencers on equipment as appropriate and select and maintain equipment to minimise noise emissions.

¹⁶ Commitment: Stack design will allow for tuning stubs to be installed if necessary.

¹⁷ Commitment: Undertake noise modelling when final equipment selection has been made.

¹⁸ Commitment: Investigate and apply appropriate mitigation measures if a noise complaint is received.

10.5.2 *Management Measures*

The Wood Centre is organised to minimise the production of solid waste. By incorporating the Power Station in the facility, any surplus wood residue from the Wood Centre that is suitable as fuel will be used for the production of electricity. This use of wood by-product maximises productivity of the wood fibre and minimises solid waste production.

The primary solid waste produced by the Power Station will be boiler ash (wood ash). Coarse size bottom ash will be collected in a wet trough-conveyor sub-system and the fine-sized flyash will be collected, dry, in a coarse filter system and the ESP. All ash will be conveyed to a sealed ash bin for subsequent discharge to trucks, with spray water for dust control. The ash will be removed from the site for composting additive, or disposal in approved landfills, and for occasional use by local industry, or as soil conditioner back to the forests as allowed or required.

As described in 10.1.4, solid waste generated from the boiler water treatment system will be largely dependent on the raw water quality, with the amount generated not considered to be significant. The small quantities generated each day will be collected for disposal and/or reuse at an approved site.

From time to time, there will also be small quantities of rock, unusable wood residues, metal and other rubbish/wastes that will be removed by a licensed contractor from the yard for disposal into a licensed landfill¹⁹. The amount of wastes can not be estimated at this stage however every effort will be made to ensure that waste management is undertaken in accordance with the waste management hierarchy with reuse options investigated after commissioning of the Power Station²⁰.

Contaminated stormwater will be passed through a screening/interceptor system on-site²¹. This system will provide initial removal of coarse suspended solids (e.g. soil and wood fibre) as well as oil, grease and fuel residues that have been entrained in the wastewater stream. The solids (approximately 300 tonnes per annum) will be utilised in compost, disposed of in a landfill or recycled through the fuelwood processor in the merchandising yard to the Power Station. The wastewater will then be piped to the site-

¹⁹ Commitment: Ash and unusable solid waste will be removed from the site to a licensed landfill or for appropriate reuse.

²⁰ Commitment: Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.

²¹ Commitment: Regularly dispose of screening/interceptor solids and oils to beneficial reuse operations and/or approved landfill.

wide storage ponds for reuse.

10.6 Hazardous Materials

10.6.1 Potential Impact

As noted for the other proposed facilities for the Wood Centre development, other than fuel, there will be limited hazardous materials stored or used on-site as part of the operation of the Power Station. Hazardous materials stored or handled on-site during the operation of the Power Station are detailed in Table 82 and Table 83. The storage locations are shown in Figure 20.

Table 82 Hazardous Materials Annual Use Rate

Reagent	Use	Typical Annual Rate
Oxidising Biocide (Bromide chemistry)	Biocide	<20 tonne/yr
Sodium Bicarbonate or Lime	pH adjustment	10-25 tonnes/yr
Aqueous Ammonia (25% solution)	Boiler water treatment	5 kL/yr
Sodium Triphosphate (3.5% solution)	Boiler water treatment	2 kL/yr
Carbohydrazine (6% solution)	Oxygen scavenger	2 kL/yr
Activated carbon	Water filtration for organic matter	10-20 tonne/yr
Fuel Oil	Boiler Start-up	80-120 kL/yr
Diesel Oil [Must have diesel stored near to emergency generator]	Emergency Generator, Mobile Equipment	50 kL/yr
Other (lubrication and turbine oils, corrosion inhibitors, anti-scaling agents, ion-exchange resins, standard machine shop and maintenance materials).		

The potential risk associated with hazardous material storage is the leakage of hazardous products into the environment that can cause significant short and long-term contamination of soils, groundwater and/or indirect contamination of surface waters if allowed to enter the wastewater stream and released untreated.

Table 83 Hazardous Materials Stored/Used On-Site – Power Station Facilities

Hazardous Materials	Active Ingredient	Dang. Goods Class & Sub. Risk (as appropriate)	Hazchem Code / Emergency Guide	Packaging Class	Container Size	Max. Quantity Stored on-site	Storage Type and Location
Fuel Oil	Petroleum distillate	3 [Y]			20 kL	20 kL	Bunded roofed storage adjacent to boiler.
Sodium Bicarbonate or Lime	Sodium Bicarbonate or Lime	-	-	-	1 tonne	1-2 tonnes	Bunded roofed tank at WTP
Aqueous Ammonia (25% solution)	Ammonia	8	2P / 8A1	III	200 L	0.25 kL	Bunded roofed sealed drum at WTP
Sodium Triphosphate (3.5% solution)	Sodium Triphosphate	-	-	-	200 L	0.25 kL	Bunded roofed sealed drum at WTP
Carbohydrazine (6% solution)	Carbohydrazine	-	-	-	200 L	0.25 kL	Bunded roofed sealed drum in Workshop
Oxidising biocide	Bromide						Bunded roofed tank at WTP
Automotive Diesel Fuel	Petroleum	3 [Y]	-	-	5 kL	10-20 kL	Bunded sealed tank in Workshop
Activated carbon	Activated Carbon	4.2	1[Z] / 4A2	III	1 tonne	5 tonnes	Bunded sack in Workshop
Other (lubrication and turbine oils, corrosion inhibitors, anti-scaling agents, ion-exchange resins, standard machine shop and maintenance materials).						<0.5 T or 0.25 kL each.	Bunded sealed drums in Workshop

WTP: Water treatment plant

10.6.2 *Management Measures*

In order to limit diesel storage on each site, diesel will generally be stored in the communal diesel store (45,000 L) operated by the site-wide manager. Additionally, a fuel oil storage of up to 20,000 L will be located on the Power Station site primarily for boiler start-up purposes.

The fuel storage facility will have a bund with impervious base, locked valve and roof. To reduce the risk of release to the environment, all hazardous substances will be stored with signage and fire control measures according to the Dangerous Goods Act and Regulations and the Australian Standards (AS-1940)²².

A secure fully bunded hazardous materials store will be established for the storage of small quantities of oils and grease. The building will be of the same structure and cladding as other buildings on-site and will have a concrete floor.

Bunds will be used in this facility for the storage of minor chemicals, and the containment of potential spills. Material safety data sheets will be displayed where hazardous materials are stored and appropriate occupational health and safety equipment will be provided to meet appropriate standards and regulatory requirements²³.

The above ground diesel and fuel oil tanks will be located in a bund in accordance with AS-1940.

An inventory will be kept of any hazardous materials stored and handled on-site, including the location of storage, their quantities, and their material safety data sheets²⁴.

Any fluids released during machinery maintenance operations will be captured for reuse or appropriate disposal. Waste lubricating oils will be collected in one or more 205 L drums for recycling along with the oil recycled from the adjacent operations²⁵.

²² Commitment: All hazardous substances will be stored with signage and fire control measures according to AS-1940.

²³ Commitment: Store hazardous substances in a secure safe building or bund with material data safety sheets and signage in storage locations.

²⁴ Commitment: Maintain an inventory of hazardous substances on-site.

²⁵ Commitment: Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain a record of quantities.

Waste oil drums will be stored within an area where spillage can be contained, and/or collected by the wastewater management system.

In the event that a significant spillage breaches the containment facilities and enters the wastewater stream, wastewater will be directed to a storage pond where treatment options can be implemented, or the spilled material can be temporarily contained within the interceptor sumps and collected by waste contractor for treatment.

As discussed in Chapter 5, an emergency response plan will be designed for the Power Station facility and training of staff will be undertaken to ensure all are familiar with the plan and responsibilities²⁶. A component of the plan will be the location of and handling of the spill kit to be maintained at an appropriate location for containment and clean-up of materials in the event of spillage²⁷. Licensed waste contractors will be employed on an as needs basis to collect and dispose of spilled material that has been collected in bunds²⁸.

In the event that a spillage occurs within the facility there are contingency measures in place to mitigate off-site affects. These measures are presented in Chapter 5.

All spillage incidents of hazardous materials with potential to harm the environment will be reported to DPIWE²⁹. Where an emergency emission exceeds a statutory requirement (according to either regulation or Permit conditions), notification will be given to the Director of Environmental Management (DEM) as soon as reasonably practicable and within 24 hours of becoming aware of the release of the pollutant in relation to that Power Station activity³⁰.

10.7 Preliminary Hazard Analysis and Risk Assessment

10.7.1 Introduction

A preliminary hazard identification and risk assessment was conducted on the Power Station. The potential hazards were systematically identified using a preliminary

²⁶ Commitment: Design an emergency response plan for the Sawmill site and provide training.

²⁷ Commitment: Maintain a spill-kit on-site and contain spills.

²⁸ Commitment: Employ licensed clean-up crew when required.

²⁹ Commitment: Report significant hazardous material incidents with potential to cause environmental harm to DPIWE.

³⁰ Commitment: Report accidental emission to DEM within 24 hours.

HAZOP study, in conjunction with the process flow diagram for the Power Station Figure 38. The Preliminary Hazard Analysis and Risk Assessment is provided in Appendix T.

10.7.2 Principal Site Hazards

The HAZOP study identified the following areas of the Power Station as having the potential to kill, injure, or cause significant engineering and environmental damage, resulting from abnormal operating conditions or accident based activities:

- Boiler;
- Steam Lines;
- Turbine;
- Cooling Tower;
- Particulate Filter System; and
- Chemical Storage.

Each of these identified areas have been assessed under the RERAC method described below.

10.7.3 Risk Assessment

The Hazard Identification above was then used to assess the risk of the most critical hazards present within the power plant site. The Rapid Environmental Risk Assessment Checklist (RERAC) methodology was used to quantify the likelihood and severity of an incident or hazard. This resulted in a ranking of each hazard in terms of total assessed risk (TAS). Events which are ranked the greatest TAS should be given the highest priority in terms of preventative action.

$$\text{Total Assessed Risk (TAS)} = \text{Likelihood} \times \text{Severity}$$

The acceptability of the hazards was then decided for the particular activity depending on which of the three following categories they fall in Table 84.

Table 84 Hazard Categories

CATEGORY	DESCRIPTION	TAS
Category One	Immediate action required to reduce TAS to 9 or below.	>14
Category Two	Medium term action required to reduce TAS to 9 or below.	9-14
Category Three	Action depends on company policy and resources. Long term target should be for all TAS scores to be <5.	<9

The likelihood (L) score (Table 85) and severity (S) (Table 86) are based on the frequency of the event (RERAC method) and the length of time that an impact will be felt. These are outlined in Table 87. The hazard activities which have a TAS ranking of <4 have not been included in Table 87 because these hazards are deemed to be of insignificant consequence.

Table 85 Likelihood Score, (Frequency of Possible Cause)

Event Probability	Score
Frequent Event (25 times per year)	5
Probable Event (5 times per year)	4
Occasional Event (1 time per year)	3
Remote Possibility (1 time per 5 years)	2
Improbable Event (1 time per 25 years)	1

Table 86 Severity Score Real Hazard Index

Severity	Description	Score
Critical	Major long-term engineering & environmental impacts and/or damage usually resulting in fatalities, multiple injury victims and/or highly visible to the public.	5
Major	Major short-term engineering & environmental impacts and/or significant human injury or injuries potentially fatal.	4
Significant	Minor short-term engineering & environmental impact and/or short-term human injuries and/or low public visibility.	3
Marginal	Marginal short-term engineering & environmental damage and/or minor human injuries.	2
Negligible	No measurable effect on the engineering or environmental condition on-site, no effect on workforce, not visible to the public.	1

Table 87 Hazard Category Summary for selected critical areas within the Power Station

Category One Hazards (TAS>14)

Activity	L	S	TAS	Consequence	Preventative Action
NIL	0	0	0	NIL	NIL

Category Two Hazards (9<TAS<14)

Activity	L	S	TAS	Consequence	Preventative Action
Boiler water feed pump failure	4	2	8	No water flow into the boiler, resulting in release of hot flue gases at the stack, and may cause thermal damage to equipment down stream.	There will be a backup pump. Switch over is automatic. Proper control alarms will warn of deviation in temperature, or water flow, alert operators, before damage is caused.
High pressure steam line weld or joint failure	4	2	8	Line rupture, venting material may cause electrical and structural damage, and injure nearby workers.	Regularly scheduled maintenance on all piping infrastructure, and structural testing.

Category Three Hazards (4<TAS<8)

Activity	L	S	TAS	Consequence	Preventative Action
Fuel feed flow rate deviation	3	2	6	Incomplete combustion resulting in the generation of undesirable gaseous compounds such as CO, and increased levels of particulate matter.	Continuous monitoring of feed flow rates, as well as CO levels leaving through the stack.
Non-functional cooling tower	3	2	6	Build-up of low pressure steam due to little or no condensation activity leading to line ruptures.	Recommendations detailed in the HAZOP section should be implemented.
Non-functional air circulation system	3	2	6	Incomplete combustion will occur, resulting in coarse size particulates generated, as well as CO, NO _x , and other combustion by-products.	Temperature, oxygen, and CO alarms will alert the operators of the deviation. Compliance to a regular maintenance schedule will prevent this from occurring.
Inoperative ESP	2	2	4	Fine dust particles will be released with the effluent gas, through the stack.	An air emission monitor will alert the operators, should the particulate level rise beyond the set point level required by EPA guidelines.
Inadequate Turbine Maintenance	1	4	4	Accelerated wear of turbine components, eventually leading to lower power generation and ultimately, to mechanical damage.	A proper and rigorous maintenance procedure will be implemented and complied to.
Fork lift accidents at the chemical storage area	2	2	4	Loss of containment of boiler water treatment chemicals due to rupture of tanks or pipes.	Appropriate bunding and protection on all sensitive equipment in the storage area. Chemical spill kits readily available in immediate vicinity.

As detailed in Table 87, there were no Category One hazards (requiring immediate action) identified. The vast majority of all RERAC assessments fell under a TAS ranking of 5, the recommended level for industry operations.

Only one hazard fell under Category Two (requiring medium term action), which was the hazard of ruptures in lines containing high pressure steam. Line ruptures pose a direct hazard to operators and electrical equipment. Implementation of the recommended control measures will significantly reduce the likelihood and severity of

these events. There are no direct environmental effects associated with this hazard.

Category Three hazards are deemed minor, and company policy should dictate that a long term goal be set to reduce the TAS scores to below 5.

10.7.4 Conclusion

This preliminary RERAC study did not identify any catastrophic environmental hazard event scenarios. Based upon the HAZOP and RERAC studies, it was concluded that if the actions and recommendations outlined in Appendix T are acted upon, then there is little risk associated with hazards, which have significant environmental consequences. A detailed HAZOP study will be undertaken prior to the commencement of Power Station construction³¹.

10.8 Monitoring, Reporting and Review

10.8.1 Monitoring

To ensure the operation of the Power Station is in accordance with the EMP and best practice environmental management the following monitoring programs will be implemented.

Dust

High traffic areas within the Power Station site will be paved and monitored visually³².

Process Wastewater and Contaminated Stormwater

The collection and distribution of stormwater and process wastewater from the site to the communal facility will be checked on a weekly basis to ensure the screening/interceptor system is operating effectively. The solids removal system will be checked daily or on a more frequent basis during rainstorms³³. The frequency of

³¹ Commitment: Conduct a detailed HAZOP study prior to commencement of Power Station construction.

³² Commitment: Visually monitor dust emissions and control dust by watering.

³³ Commitment: Where practicable, daily inspection and removal of the solids from the solids removal system.

the inspections will be modified after six months of operation based on inspection results³⁴.

The contaminated stormwater flow from the site passing through the screening/interceptor system will be sampled on a regular basis. If the results of the monitoring are consistent with on-site operational requirements the frequency of sampling may be reduced to monthly. Monitoring will be undertaken for TPHC, TSS and BOD in accordance with standard industry practice. In addition, continuous flow rate from the site will be monitored to affect efficient use of water. Monitoring data for wastewater discharge from the site will be reported to the Director of Environmental Management on an annual basis³⁵.

The cooling tower water will be monitored fortnightly to determine efficacy of biocide treatment and specifically Legionella build-up as per Australian Standard 3666. Once proven effective the monitoring may be decreased to monthly.

Stack Emissions

The boiler stack emissions will be continuously monitored by a regularly calibrated opacity meter, which will record the particulate density in the waste gas as a percentage of the light obscuration value. The instrument will be set to sound an audible alarm if the value exceeds a specific level (less than 20%). If opacity continually exceeds 20%, repairs will be made as appropriate³⁶. In addition, air sampling downwind of the Power Station can be conducted if complaints are received.

Monitoring data for the Power Station will be reported to the DEM on an annual basis³⁷.

Noise

A record of noise emission complaints will be kept in a complaint register for the site,

³⁴ Commitment: Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.

³⁵ Commitment: Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously and report to the DEM annually.

³⁶ Commitment: Monitoring of boiler stack emissions and modification of boiler operation if opacity exceeds 20%.

³⁷ Commitment: Annual reporting of Power Station stack monitoring results to the DEM.

together with details of investigations and actions³⁸.

Other

Oil supplied and waste oil returned for re-use will be recorded.

Monitoring data for the wastewater and stack emissions will be reported to the DEM on an annual basis. For emergency or abnormal emissions, a special report will be submitted within 5 days to the DEM detailing the extent of the emission, the likelihood of environmental harm, the cause of the event, procedures applied to minimise the environmental harm, monitoring results, and the system introduced to avoid any repetition³⁹.

A general incident response and notification protocol will be developed and implemented along with reporting procedures for the Power Station⁴⁰.

10.8.2 Reporting

The Wood-fired Power Station proponent will establish and maintain a procedure to monitor, measure and report key characteristics of its operations and activities that have potential to have a significant impact on the environment. Reports are to be forwarded to the Site Wide Manager. This will comprise the incident reporting protocol and will allow the Site Wide Manager to determine the effectiveness of environmental measures implemented in reducing impacts on the environment and/or to determine the extent of potential environmental harm. The measures ensure the management of the activity will achieve ongoing minimisation of the activity's environmental harm through cost effective measures.

Environmental harm is defined, for the purposes of the *Environmental Management and Pollution Control Act 1994*, as any adverse effect on the environment (of whatever degree or duration) and includes an environmental nuisance. The responsibilities for reporting environmental incidents are as follows:

- The person discovering a reportable environmental incident, as described below, on the proponent's site must report it to the proponent;

³⁸ Commitment: Record noise emission complaints with details of investigations and actions.

³⁹ Commitment: Submit monitoring data to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.

⁴⁰ Commitment: Develop and implement an incident response and notification protocol.

-
- The proponent may report the incident to external organisations that are needed to provide response support, e.g. State Emergency Services;
 - The proponent gathers details about the incident and supplies them to the office of the Site Wide Manager and Environmental Committee; and
 - The Site Wide Manager is responsible for reporting environmental incidents to relevant external organisations (e.g. DPIWE) who are not involved in immediate response.

The activities on the Wood Centre are Level 2 activities and therefore incidents must be reported to DEM as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the release of a pollutant occurring as the result of an emergency, accident or malfunction in relation to that activity.

When an incident occurs so that serious or material environmental harm from pollution is caused or threatened in the course of an activity undertaken by a person, the person must, as soon as reasonably practicable, but no later than 24 hours, after becoming aware of the incident, notify DPIWE of the incident, its nature, the circumstances in which it occurred and the action taken to deal with it. A person is not required to notify DPIWE of such an incident if the person has reasonable grounds for believing that the incident has already come to the notice of DPIWE or any officer engaged in the administration or enforcement of the *Environmental Management and Pollution Control Act 1994*.

Good practices as outlined below will ensure that environmental incidents will be minimised.

The proponent's responsibilities include but are not limited to:

- Developing and implementing Environmental Action Plans (EAP);
- Developing clear communication arrangements, taking into account after hours and holiday periods;
- Clearly defining roles and responsibilities;
- Maintaining, modifying, reviewing and analysing all monitoring procedures, so that overall trends in environmental performance are assessed and recorded;
- Requesting that additional monitoring or testing be conducted to confirm or negate the original recordings;
- Determining if EAPs or amendments to Operating Procedures are required; and

- Ensuring the maintenance and calibration of monitoring equipment.

Monitoring defined in EAPs will address:

- Water quality and quantity;
- Visual observations;
- Noise; and
- Hazardous materials handling.

EAPs will also address:

- Triggers for implementing monitoring;
- Sampling and analysis;
- Interpretation and corrective action;
- Recording and maintaining monitoring data;
- Monitoring reviews;
- Control actions as a result of monitoring;
- Selecting monitoring equipment;
- Maintenance and calibration of monitoring equipment; and
- Calibration records.

By effectively implementing the Incident Reporting Protocol, the facility may be able to decrease its impact on the environment.

10.8.3 Review

An EMP review for the Power Station will be undertaken, as described in Chapter 5, within 12 months of the commencement of operations and at agreed intervals thereafter in accordance with the requirements of DPIWE⁴¹.

⁴¹ Commitment: Review EMP after 12 months of operation and as agreed with DPIWE thereafter.

CHAPTER 11 HEALTH IMPACTS &

**CHAPTER 12 CUMULATIVE EFFECT, CONCLUSIONS AND
COMMITMENTS**

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11. HEALTH IMPACT ASSESSMENT

11.1 Health Issues and Potential Impacts

The key health issues associated with this project have been identified and include the following:

- Transport related impacts.
- Noise;
- Air pollution;
- Wastewater management;
- Control of biological hazards; and

11.1.1 Transport Related Impacts

Transport of logs and products to and from the site will result in changed traffic movements and an increase in traffic in some areas, therefore the noise level in areas within the route. It was concluded (refer to Chapter 4) that the noise level generated by additional day-time traffic will be acceptable provided that mitigation measures are undertaken including:

- Treatment of wood fibre transport bins to minimise drumming noises when empty;
- Minimise the number of fleet vehicles;
- Reduce transport vehicle speed;
- Keep the trucks well maintained; and
- Use electro-magnetic rather than engine exhaust braking.

The transport related safety issues involve consideration of the roads, the vehicles, and the drivers, to ensure that the overall transport operation unit is safe, and follows best practice.

The upgrade of roads will comply with DIER's standards for the operation of high performance vehicles (HPV) and will ensure the following:

- Construction and capacity of the roads and bridges are suitable;

- Construction of roads that have suitable turn-out lanes;
- Provision of adequate line of sight; and
- Provision of adequate shoulders on roads.

Vehicles will be required to be maintained and kept in good mechanical condition, and carry an appropriate notice stating that the vehicle has been approved under the relevant Tasmanian traffic regulations and the National Heavy Vehicle Accreditation Scheme for operation on the route.

Drivers will be given specific training with respect to operation on the route. They will take special precaution on sections of road where the line of sight is limited; and be particularly careful when operating in the vicinity of schools (scheduling of operation should be such that operation past schools during school start and finish times is avoided).

It is considered that the transport impact on the community are capable of being satisfactorily managed and an agreed range of remedial work undertaken within the community.

11.1.2 Noise

Detailed assessments of the potential noise impacts (that have the potential to be heard beyond the site boundaries) for each Wood Centre facility, and the proposed mitigation measures are provided in Sections 5.7.5, 6.4, 7.4, 8.4, 9.4 and 10.4 (Appendix N).

The most significant noises for operators and visitors on-site are those generated by the breakdown of wood, movement of logs between operating units, vehicle noises, and operating machinery. Of these, the chipper at the wood fibre plant is considered the loudest.

Operation within enclosed facilities will confine the potential noise impact for off-site receptors, with no off-site impacts anticipated. Operators and visitors to the site will be required to wear ear plugs when entering processing facilities, thereby minimising noise impacts.

Outside noises associated with trucks and the movement of logs are significant within the site, but will not have an effect on residential areas, since the site is located over six kilometres from the nearest house and topography will have a reducing affect on noise travel. It is predicted that no unacceptable noise impacts will occur.

11.1.3 Air Pollution

Due to the climatic conditions of the region, temperature inversion can occur. This is most likely to occur in the wintertime, when dense cloud formations trap air emissions within the site. This inversion layer can range from 50 - 100 m above ground.

The most significant air emissions will originate from the power plant boiler. Location of the 40 m boiler stack at higher ground should reduce the risk of discharging the emissions within the inversion layer. Refer to Chapter 10 for discussion of the potential impacts of air emissions and the mitigation measures to be implemented.

Poorly controlled burning usually results in incomplete combustion, hence the generation and release of fine particulate matter, CO, NO_x, and organic compounds. An example of this is the burning of biomass fuel in open air.

Open-air regeneration burns in Tasmania normally take place within a restricted time frame during early autumn. As a consequence, the emissions are concentrated, and thus increase the risk of impact on the population. Open-air vegetation fires increase the risk of acute respiratory infections, due to the fine airborne particles (<2.5 micrometres) that can potentially penetrate deep into the lungs and cause respiratory diseases.

In an average age-standardised hospital admission rates study conducted between 1994-98, it was found that the average incidence of hospital admission rates related to respiratory diseases and infections within the Huon Valley was lower than that observed for Tasmania as a whole. However, this was not considered statistically significant, as their 95% confidence intervals overlap. These medical conditions include asthma, pneumonia and influenza, pulmonary diseases, and other diseases of the respiratory system. This excludes the occurrence of acute respiratory infections, as it has been shown that residents of the Huon Valley are significantly less affected by such conditions.

In light of this information, appropriate measures need to be taken to ensure that the Wood Centre development does not have a significantly adverse health impact on the residents within the surrounding environment. The Wood Centre development reduces the open-air regeneration burning by burning the forest residues within its own boundaries, under controlled conditions. Further advantages include:

- Particulate emissions are reduced due to filtration of the combustion gases;
- Dispersion of emissions is better controlled since there is only one point source;
- Better combustion control results in lower levels of CO, NO_x, and VOC; and

- Year-round burning results in a much greater dilution of these emissions.

The emissions released into the air from the burning of wood are mostly combustion products, which include wood particulates, dioxins, CO_x, NO_x, and a small amount of volatile organic compounds (VOC). Dioxins, specifically, are generally formed during the combustion of chlorine and organic compounds.

Dioxins form more readily at temperatures between 300 – 700 °C, which typically occurs when a fire is smouldering, or soon after a heavy load of fuel is introduced. At temperatures above 700°C, dioxin formation is minimised due to its instability and thermal degradation at these high temperatures. A well-controlled boiler ensures that the combustion temperature is maintained above 700°C, with the fire-box temperature normally around 1000°C. Clean hardwood has negligible levels of chlorine entrained, further reducing the likelihood of dioxin formation.

The processing of secondary combustion air in the furnace reduces the hazard potential of more harmful wastes such as carbon monoxides and VOC produced by incomplete combustion.

Provided that the above mitigation measures are applied, the human health impact of these emissions is not considered to be significant.

The generation of very fine particulates (e.g. mineral dust) is inevitable. Outdoor water sprays will be used to prevent mineral dust being blown around the site.

The health impacts associated with outdoor vehicular emissions have been considered, and is believed to be insignificant relative to the combined vehicle emissions within the Huon Valley. However, it is worth noting that indoor use, or the use of vehicles within enclosed spaces, is a potential health risk to operators due to the more elevated concentrations generated within a confined space. Facilities where this is likely to occur will be designed to operate in accordance with contemporary workplace guidelines to minimise the impact on indoor air quality.

11.1.4 Wastewater Management

Wastewater generated during the processing on site will contain mainly soil and wood particulates. Precautions taken to control the release of wastewater from the site include the use of a sump and associated separator/interceptor system within all facilities to contain, treat and reuse the wastewater within each facility. The on-site storage ponds will collect the wastewater from each facility, which will then be re-used for processing purposes within the site.

Domestic sewage is to be treated in an on-site package treatment plant, and irrigated in accordance with an irrigation management plan. No significant health impact is likely to occur if these management measures are implemented.

11.1.5 Control of Biological Hazards

Due to the recent outbreaks of Legionnaire's disease, some concern has been raised for the control and prevention of this potential biological health hazard. The *Legionella* bacteria tends to flourish in warm, sunny, humid environments such as those provided by humidifiers and cooling towers. The following lists recommended measures to be incorporated in the design of the power station's cooling tower to prevent the potential risks associated with *Legionella*:

- Exclusion of sunlight;
- Maintain the correct bleed rates to prevent bacterial accumulation;
- Stainless steel cooling tower construction;
- Disposable fill material to ensure minimal build-up of bacteria;
- Efficient drift eliminators to prevent large moisture droplets from being carried across to other areas within the site;
- Locate towers away from any type of disturbance and fresh air intake vents;
- Minimise the tower basin volume to prevent the occurrence of a large warm water reservoir should the cooling tower cease running; and
- Steps be taken to prevent the standby tower from harbouring warm water when not in operation.

The cooling tower will comply with the relevant sections of the *Public Health Act 1997* in particular Part 5: Premises, Division 4: Public Health Risk Activities and Part 6: Water. It will be registered and maintenance will be performed on a regular basis. The major aspects of the cooling tower maintenance will include:

- at least monthly inspection of the cooling tower;
- regular water treatment;
- complete cleaning and disinfection of the tower every three to six months;
- cleaning of the tower prior to start-up, following seasonal shut down;
- microbiological testing at least monthly of tower water to provide good practice; and
- maintain records.

The cooling tower maintenance will also be conducted in accordance with the *Legionella* Guidelines provided by the Public and Environmental Health Service.

The presence of three storage ponds within the Wood Centre development site has the potential to become a breeding ground for mosquitoes and other insects. With this comes the risk of diseases caused by arboviruses, organisms that utilise insects as their carrier, and infect humans and/or animals. There is a potential that Ross River virus may be transmitted in temperate climates.

The climatic conditions at the Wood Centre are not ideal for mosquito breeding. However, to further minimise this risk, it is proposed that continuous monitoring of the ponds will be carried out to check for mosquito larvae, at critical times of the year. Additionally, the construction of the storage dams will be at a reasonable grade to avoid the development of shallow swampy lands when water recedes.

Klebsiella pneumoniae is an important bacterial pathogen, which may be associated with timber processing wastewater. *K.pneumoniae* infections are common in hospitals and may cause pneumonia and urinary tract infections. However like all pathogens does not survive for long periods in the natural environment. It is carried in the intestinal tract of 30-40 % of humans and animals, and may survive in the environment for short periods in industrial wastewater such as textile finishing and pulp and paper mill wastewater. As the domestic wastewater at the Wood Centre is collected and managed in a separate reticulation system, to the process wastewater, the potential for contamination of the storage ponds is considered to be low. However, in accordance with normal occupational health and safety practices, personnel on site will be made aware of the potential health issue, and appropriate hygienic practices implemented.

11.1.6 Health Impact Summary

There are five main aspects of the proposed operation that have the potential to impact on human health both within the site boundaries and off-site. The detailed assessment of each of these aspects has concluded that provided contemporary occupational health and safety practices and procedures are implemented and the proposed environmental management and mitigation measures are in place that adverse health impacts will be minimised.

12. CUMULATIVE EFFECT, CONCLUSIONS AND COMMITMENTS

12.1 Introduction

This chapter draws on previous sections to describe the cumulative potential impact of the Wood Centre, and in doing so, summarises the potential impacts on the existing environment of its constituent wood processing facilities that are to be developed and operated on the site. Conclusions are drawn with regard to the net environmental effects of the project by considering the mitigative measures committed to in the previous sections. The mitigative measures that will assist in reducing the cumulative effect of the development are presented as commitments in tabular form at the end of this chapter.

12.2 Cumulative Effect of the Development

12.2.1 Wood Supply and Production

The Wood Centre is designed to act as a central catchment point for timber that is harvested in Southern Tasmania. The integration of the different wood processing operations on the Wood Centre site will enable greater recovery of wood resources and beneficial use of wood by-products.

There will be no changes to the harvesting arrangements under the Regional Forest Agreement as a result of the development.

The timber harvesting plans that are already established for the Huon District over the next 10 years will result in about 2000 ha of State forest being harvested and regenerated each year.

12.2.2 Planning Issues

The Wood Centre site and surrounding area is State forest, owned by the Crown.

The site is currently zoned Rural under the *Huon Planning Scheme 1979*. Not all facilities which make up the proposed Wood Centre development concur with the intent of the current Rural Zone. In the Rural zone a Timber Mill is discretionary and Light and General Industry are not permitted.

In accordance with Section 43A of the *Land Use Planning and Approvals Act 1993* a request has been made to amend the *Huon Planning Scheme* to introduce a specific zone for the subject site to permit the proposed current and future uses.

12.2.3 Social and Economic Issues

The proposed project will deliver significant economic and social benefits to Tasmania and the Huon Valley in particular.

The Huon Valley has a long history as a resource based economy from its early beginnings with fruit and vegetables production, and forestry related industry, primarily timber getting. The Wood Centre will further develop the existing forestry based industry in the region.

Employment resulting from the proposed development will include stability for the existing 15 to 20 harvesting contractors, currently employing some 100 to 150 operational staff in the area. A further 200 to 250 people will be directly employed at the Wood Centre. There are identifiable negative impacts on employment opportunities in existing industries from the Wood Centre development as all existing wood supply contracts to local mills will be retained.

This employment will contribute about \$9 million a year in wages and salaries to the economy. The construction period will also create around 200 direct jobs over a period of 12 months. The flow on effects will mean that at least the same number of jobs (200) will be created indirectly.

There will be additional benefits to existing sawmillers including:

- Improved inventory control with reduced log holding capacity required by the sawmiller;
- Improved safety for forest workers preparing logs;
- Improved log specification and quality control as a result of improved log grading and preparation within the Merchandising Yard; and
- Improved delivery lead times as a result of improved transport efficiencies and stockholding.

There will be a greater volume of timber recovered to solid wood products locally.

Modifications in traffic flows should have positive social benefits by reducing log traffic through several major population centres. Further, by moving processing facilities closer to the forest, most of the wood that is moved away from the site will be in enclosed vehicles. Redirection of the traffic flow will impact on some smaller centres.

Electricity generation on site will assist in increasing the reliability of power supply south of Huonville. Additional generating capacity at the end of the transmission

network provides an attractive method of improving reliability of the network as a whole.

The Wood Centre will make a significant contribution to the Huon Valley Municipality rate base.

The Huon Valley has a growing tourism industry that in part depends on the forests. FT is seeking to enhance this tourism appeal through provision of interpretation in the forest and establishment of tourist-centred facilities such as the Tahune Forest AirWalk. Forestry and tourism have developed side-by-side over the past 100 years. Various tourist operators benefit from using infrastructure developed by FT to provide access to forest pursuits in State forest. These and new operations will continue to benefit from infrastructure improvements that are occurring. In addition, the public will be able to view the hardwood and special timber processing in the Wood Centre as a showcase.

A community advisory committee has been established and will be maintained, to ensure that along with local government input, there is a direct opportunity for the community to have ongoing input to the project.

In support of this positive social and economic development, the proposed Wood Centre will cause a minimal impact to the visual integrity of the forests while increasing productivity and maximising use of residues.

12.2.4 Transport and Roads

The potential impacts of traffic movements to and from the Wood Centre include:

- Noise, dust and vibration associated with truck movement;
- Increased traffic;
- Deterioration of road surfaces due to heavy vehicle movements;
- Incompatibility with the present design standard of the roads; and
- Interference with schools and/or other sensitive activities along the transport route.

These potential impacts have been assessed in detail along the proposed transport routes to and from the Wood Centre. An assessment of the indirect transport costs (in terms of environmental noise, greenhouse emissions, local air pollution, water pollution, road construction and maintenance, and road accidents) of the existing transport arrangements when compared to those proposed for the Wood Centre, identified that there would be a decrease in these costs of about 40% for the preferred

transport option.

A wide range of mitigation measures will be undertaken to minimise the potential transport impacts. These include:

- Upgrading of transport routes to DIER and AUSTRROADS standards;
- Stormwater Management during construction to Soil and Water Management Guideline Standards (June 1999);
- Use of a modern, well maintained transport fleet;
- Training of drivers for operations on the transport routes;
- Development and implementation of a comprehensive Traffic Management Plan, covering all aspects of the transport operation; and
- Regular monitoring and enforcement of the transport operation.

While the transport associated with the Wood Centre will result in the redirection of the traffic flow through some smaller population centres, it will result in an overall reduction in log traffic through several major population centres. It is considered that the transport impacts on the community are capable of being satisfactorily managed once an agreed range of remedial work, identified with the community to ameliorate these impacts, are implemented.

12.2.5 Environmental Management Issues

The proposed development will be constructed and operated in accordance with the principles of best practice environmental management as defined in the *Environmental Management and Pollution Control Act 1994*.

12.2.5.1 Terrestrial Issues

The development is to be established in an area on the top of a low ridge, which has no significant land constraints. Excavations will be undertaken to provide a level base for the establishment of facilities.

The fluvio-glacial terrace escarpment encircling the ridge is vulnerable to degradation if disturbed by specific activities and will be impacted in some areas. This layer has been disturbed in some areas of the site by previous site uses (Sharples 1994). The element will be mapped and records kept where excavations are likely to intercept this layer (refer to Chapter 3).

The potential for erosion and sedimentation will be managed both during construction and operation and should be of low potential impact as the result of the mitigation

measures.

12.2.5.2 Atmospheric Emissions

Diffuse and Point Source Emissions

Management measures are to be implemented within each wood processing facility to minimise potential dust emissions from vehicular movements, storage and handling of wood materials and emission of particulates. The implementation of the proposed measures (described in the management measures sections of each facilities EMP) will ensure a low potential for nuisance and/or environmental impact by diffuse particulate emissions.

The main point source atmospheric emissions to be associated with the operation of the Wood Centre are stack emissions from the wood fired combustion facilities at the power station, sawmill and rotary peeled veneer mill (refer to Figure 20). The effective design and operation of these facilities will ensure that emissions meet regulatory standards. Air quality modelling using a standard meteorological data file and the Ausplume model has been undertaken (Appendix U). The results of the modelling indicate that all predicted peak Ground Level Concentrations (GLCs) for the target receptors are below the National Environmental Pollution Measures (NEPM) objectives in all cases. FT will undertake further air quality modelling using meteorological data that will be collected from a weather station on the site this ensable results with a 99.9% confidence level.

Greenhouse Gases

The Wood Centre development will impact on the global greenhouse environment as follows:

- In the Tasmanian context, the release of CO₂ will effectively remain the same, as the same amount of CO₂ will be released whether the wood is burnt in the Power Station, or on the forest floor as a seed bed for the establishment of new forests.
- By reducing fuel used for transport, less CO₂ will be emitted from this source.

In summary, the CO₂ production of the power industry will remain the same, while the CO₂ produced by forestry activities will be reduced. Refer to Chapter 5 for further discussion of greenhouse issues.

12.2.5.3 Hydrology, Water Supply and Wastewater Emissions

The proposed maximum extraction of 5 megalitres a day from the Huon River for use within the Wood Centre operations represents 1% of the minimum flow conditions, or

0.07% of average flows. At this low rate of extraction no adverse impact is expected to the existing ecology of the Huon River.

Contaminated stormwater and process wastewater from the wood processing facilities will be provided with preliminary treatment on each wood processing site, and reused within that facility. Excess wastewater will be directed to site-wide storage ponds for reuse within the Wood Centre operations. No wastewater will be directly discharged to the Huon River except in the case of extreme rainfall events (1 in 10 year, 72 hour rainfall event).

The wastewater management approach proposed for the site will provide a multi-level protection system for any on-site spills or accidents, thereby minimising the opportunity for off-site environmental harm.

The water requirements of the Wood Centre have been significantly reduced through wood processing facilities:

- Establishing re-circulating systems; and
- Using wastewater from the on-site storage ponds in preference to a clean water supply.

Domestic wastewater will be directed from each wood processing site to a communal package treatment plant and application of treated wastewater to land. This facility will be designed and operated to meet statutory requirements.

An extensive water monitoring program will be implemented. Monitoring will include process water streams from each of the facilities, recycled wastewater, ground water at the irrigation site, river water quality upstream and downstream from the site.

The issue of irrigation will be fully assessed and documented in an Irrigation Management Plan to be submitted separately from this DPEMP.

Publication of results via a regularly maintained Forestry Tasmania Wood Centre website will be provided on the Forestry Tasmania site (www.forestrytas.com.au).

12.2.5.4 Noise Emissions

The sound pressure level, for the site as a whole, was derived from the following summary (Table 87) of calculated noise emissions for wood processing facilities and associated main noise sources. Refer to Figure 20 for location of noise emissions from the Wood Centre.

The calculated noise level at the nearest residence, 6 kilometres from the Wood Centre is Leq 28.4 dB(A) compared to a background noise level of Leq 38-44 dB(A).

Due to the location of the proposed development and the management measures proposed for implementation, noise from the operation is considered to have a very low potential for nuisance to any residence.

Table 87 Summary Of Main Noise Sources At Wood Processing Facilities

(Terts, 2001)

Facility / Activity	Noise Level dB(A) from 6 km	
	Lmax	Leq
<i>Merchandising Yard</i>		
• Log drops (mean)	19.6	
• Log loader		14.3
• Chainsaw		8.9
• Fuelwood Processor		19.1
<i>Sawmill</i>		
• General		10.3
• Log drops (mean)	19.6	
• Log loader		14.3
• Chainsaw		8.9
<i>Rotary Peeled Veneer Mill</i>		
• General (machine hall noise)		0.5
• Log drops (mean)	19.6	
• Log loader		14.3
• Chain saw		8.9
<i>Wood Fibre Generation</i>		
• General		25.8
• Discrete noise events	32 - 37.5	
<i>Wood Fired Power Station</i>		
• Power station (General)		20.1
• Transformer		0.0
<i>Wastewater / Reuse Facility</i>		9.3
<i>LOGARITHMIC TOTAL</i>	37.7	28.4

The wood fibre processor is the main noise source on the Wood Centre site. This facility will be fully enclosed in a sound absorbing structure, oriented so that its opening is not directed towards off-site residences. In addition, where possible fuelwood processors (hoggers and/or tub grinders) will be situated behind other

buildings so that the buildings provide additional noise barriers in the direction of residences. The proposed location of potential noise producing equipment is shown in Figure 20.

The calculated noise level at the nearest residence, 6 kilometres from the Wood Centre is Leq 28.4 dB(A) compared to a background noise level of Leq 38-44 dB(A).

Due to the isolated nature of the proposed development and the management measures proposed for implementation, noise from the operation is considered to have a very low potential for nuisance to any residence.

These noise emissions relate to the emissions from the site whereas noise that may affect the health of employees on site is considered as a component of the Health Impact Assessment.

12.2.5.5 *Solid Waste Generation and Disposal*

Solid wastes generated on-site will be managed in accordance with the waste management hierarchy of waste avoidance and minimisation, resource recovery and disposal. The establishment of the wood processing operations on the Wood Centre site will enable maximum recovery of wood and reuse of the wood by-products generated, predominantly as fuelwood in the wood fired power station and heat plants (Figure 6). The environmental impact of solid waste generation will be minimal.

General refuse, packaging wastes, office waste, rock and wood by-product rubble that cannot be used as fuelwood will be disposed of off-site at an approved landfill on a regular basis. Table 88 identifies the solid waste generated by each facility and the disposal alternatives.

Solid wastes from wastewater management systems will be directed to beneficial reuse options where possible in preference to disposal to landfill. No disposal of waste will occur on-site, so no adverse impact is likely to occur.

Table 88 Solid Waste Disposal Summary

Facility	Composition of Solid Waste	Volume (Tpa)	Disposal Mechanism and Location
Merchandising Yard	Wood fines, sawdust, off-cuts, slivers, dockings, bark and out of specification wood.	6,000 T	Power Station
	Mud, rocks and screenings	4,000 T	Returned to forest floor or disposal at a landfill by truck
	General Refuse		Landfill
Sawmill	Wood fines, sawdust, off-cuts and shavings	1,000T	Power Station and Sawmill Heat Plant

Facility	Composition of Solid Waste	Volume (Tpa)	Disposal Mechanism and Location
	Mud, rocks and screenings	220 T	Returned to forest floor or disposal at a landfill by truck
	Ash	1,000 T	Returned to forest floor
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
RPV Mill	Wood fines, sawdust, off-cuts and off specification veneer	1,000 T	Power Station or RPV Heat Plant
	Mud, rocks and screenings	750 T	Returned to forest floor or disposal at a landfill by truck
	Ash	1,000 T	Returned to forest floor
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
Wood Fibre Mill	Wood fines, sawdust, and undersize chips	1,000 T	Power Station
	Mud, rocks and screenings	1,500 T	Returned to forest floor or disposal at a landfill by truck
	General refuse		Landfill
Wood-Fired Power Station	Mud, rocks and screenings	1,500 T	Returned to forest floor or disposal at a landfill by truck
	Boiler ash (coarse and flyash)	4,000 T	Returned to forest floor or disposal at a landfill by truck
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
Sewage Treatment Plant	Sludge and Screenings		Reuse where approved options are identified or disposal at municipal landfill
Site Wide	Mud and rocks	1,000 T	Returned to forest floor or disposal at a landfill by truck
	General refuse		Landfill
Total		23,970 T	Per annum solid waste reuse/disposal

12.2.5.6 Hazardous Materials

The main type of hazardous materials to be stored and handled on the Wood Centre site are petroleum hydrocarbons (e.g. diesel) in relatively small volumes. Minor quantities of other materials such as LPG, water and wastewater treatment chemicals,

herbicides, and paints will also be stored on-site. There is a low potential for spillage of these materials during storage, as secure stores and bunds will be provided in accordance with relevant Australian Standards and statutory requirements. For storage locations, refer to Figure 20.

In the event of spillage, contingency measures will be in place on each wood processing site for the containment and clean-up of materials, including:

- Standard response procedures and training of site personnel in response;
- Maintenance of spill kits on-site;
- Establishment of bunds where necessary;
- Ability to collect and recover spillages in wastewater collection pits; and
- Implementation of incident reporting procedures.

The Environmental Pollution Control Act (1994) provides penalties for companies and individuals for breaches of the Act.

12.2.5.7 Health Impact Assessment

The key health issues associated with this project have been identified and include:

- Noise;
- Air pollution;
- Wastewater management;
- Control of biological hazards; and
- Transport related impacts.

The most significant noises that may effect the health of employees on-site are those generated by the breakdown of wood, movement of logs between operating units, vehicle noises, and operating machinery. Of these, the chipper at the wood fibre plant is considered the loudest. The operation of this equipment within enclosed facilities will confine the potential noise impact for off-site receptors, with no off-site impacts anticipated.

The most significant air emissions will originate from the power plant boiler. Location of the 40 m boiler stack on higher ground and the use of environmental best practice pollution control measures will reduce the risk of off-site impacts.

The Wood Centre development reduces the open-air regeneration burning, the forest residues are transported to the Power Station for energy generation on-site, under controlled conditions. Further advantages include:

- Particulate emissions are reduced due to filtration of the combustion gases;
- Dispersion of emissions is better controlled since there is only one point source;
- Better combustion process and control resulting in lower levels of emissions; and

Provided that the mitigation measures proposed are applied, the human health impact of air emissions will be negligible compared to existing levels.

Wastewater of two forms will be produced at the Wood Centre: processing wastewater and domestic wastewater. Wastewater generated during the processing on-site will be reused on-site with only occasional discharge during periods of defined high rainfall.

Wastewater in the form of domestic sewage is to be treated in an on-site package treatment plant, and irrigated in accordance with an irrigation management plan. No significant health impact is likely to occur if these management measures are implemented.

A number of measures will be incorporated in the design of the power station's cooling tower to prevent the potential risks associated with *Legionella*, including the following:

- Exclusion of sunlight;
- Stainless steel cooling tower construction;
- Monitoring and dosing the water; and
- Locate towers away from any type of disturbance and fresh air intake vents; and

To minimise the risk associated with mosquitoes in the on-site storage ponds, it is proposed that regular monitoring of the ponds will be carried out to check for mosquito larvae, at critical times of the year.

Occupational health and safety standards will be followed at each facility. The procedures and measures to be taken by operators will be defined in the facility standard operating procedures prior to commissioning.

Transport of logs and products to and from the site will result in changed traffic movements and an increase in traffic an associated noise in some areas along the route but decreased noise in other areas. A wide range of mitigation measures will be undertaken in consultation with the community including:

- Treatment of wood fibre transport bins to minimise drumming noises when empty;
- Minimise the number of fleet vehicles;
- Reduce transport vehicle speed;
- Keeping the trucks well maintained; and
- Use electro-magnetic rather than engine exhaust braking.

The transport related safety issues involve consideration of the roads, the vehicles, and the drivers, to ensure that the overall transport operations are safe, and follow best practice.

It is considered that the transport impacts on the community are capable of being satisfactorily managed.

In summary, the detailed assessment of each of the potential health issues has concluded that, provided contemporary occupational health and safety practices and procedures are implemented, and the proposed environmental management and mitigation measures are in place, adverse health impacts will be minimised.

12.2.5.8 Hazard Analysis and Risk Assessment

A preliminary hazard identification and risk assessment was conducted on the power station as required by the DPMP Guidelines (Appendix A). The study was done in accordance with AS/NZS 4360, 1999 Risk Management Standards.

The potential hazards were systematically identified using a preliminary Hazard Analysis and Operability Study (HAZOP) (Perry, R.H. 1998) in conjunction with the schematic process flow diagram for the power station. The identified hazards are detailed under each specific operational area, together with relevant actions and recommendations on solutions for prevention. The methodology of the HAZOP is detailed in Appendix T.

The HAZOP study identified the following areas of the power station as having the potential to kill, injure, or cause significant engineering and environmental damage, resulting from abnormal operating conditions or accident based activities:

- Fuel Stockpile;

- Boiler;
- Steam Lines;
- Turbine;
- Cooling Tower;
- Particulate Filter System;
- Air circulation system; and
- Chemical Storage.

Each of these identified areas has been assessed under the Rapid Environmental Risk Assessment Checklist (RERAC) method.

The Hazard Identification above was then used to assess the risk of the most critical hazards present within the power plant site. The RERAC methodology was used to quantify the likelihood and severity of an incident or hazard. This resulted in a ranking of each hazard in terms of total assessed risk (TAS). Events which are ranked the greatest TAS should be given the highest priority in terms of preventative action.

$$\text{Total Assessed Risk (TAS)} = \text{Likelihood} \times \text{Severity}$$

There were no Category One hazards (requiring immediate action) identified. The vast majority of all RERAC assessments fell under a TAS ranking of 5, the recommended level for industry operations.

Only one hazard fell under Category Two (requiring medium term action) and that was the hazard associated with ruptures of lines containing high pressure steam. Whilst deemed hazardous, it is generally not a catastrophic event. There are no direct environmental effects associated with this hazard.

This preliminary RERAC study has not identified any catastrophic environmental hazard event scenarios. Based upon the HAZOP and RERAC studies, it is concluded that if the actions and recommendations outlined in *Preliminary Hazard Analysis and Risk Assessment for the Wood Centre Development* (Appendix T) are acted upon, then there is little risk associated with hazards, which have significant environmental consequences.

12.2.5.9 Fire Fighting and Emergency Services

The temporary storage and processing of stockpiles of wood material on the Wood Centre site is a potential source of fuel in the event of a fire. Other potential fire hazards include the:

- Storage of fuels for loaders and equipment used on-site;
- Conducting of vehicle and equipment maintenance, and possibly oxy-acetylene activities within workshop areas; and
- Location of the site within bushland.

A number of management measures will be implemented on-site including:

- Storage of fuels in approved facilities and wood materials will not be stored in close proximity to fuels;
- Maintenance of site fire main and adequate numbers of appropriate fire extinguishers on-site;
- Buildings will typically be constructed with cladding exteriors; and
- All vehicle and equipment maintenance and oxy-acetylene activities will be undertaken within confined areas with appropriate separation to stored flammable materials (e.g. workshop areas).

A fire service system will be installed at the site in accordance with the requirements of the Tasmania Fire Service and the relevant Australian Standards, including the Building Code of Australia.

In addition, a Fire Management Plan and an Emergency Response Plan will be developed for the site by the Site Manager to meet the requirements of the Tasmanian Fire Service and the State Emergency Service, which will contain more specific plans for the respective facilities.

12.2.5.10 Flora and Fauna

No plant species of local, state-wide or national conservation significance were located on the site during surveys of the site and review of literature and databases regarding flora in the region. However, *Westringia angustifolia* was identified in the riparian zone on the south side of the Huon River therefore any activities that may impact the riparian zone will be preceded by a vegetation survey of the riparian zone.

The proposed development will result in some loss of heathland communities and the some of the copses of *Eucalyptus amygdalina* woodland community. This impact is not considered to be significant as this forest type is considered to be sufficiently protected under the RFA (pers. comm. Stephen Casey 2001).

Seven faunal species of conservation significance are known, or are likely, to occur in the area of the proposed development. Seven faunal species of conservation significance are known, or are likely, to occur in the area of the proposed

development. The proposed development will, however, only have potential to directly impact on one of these species, the Mt Mangana Stag Beetle. This impact is due to the necessity for clearing of some areas of wet *Eucalyptus obliqua* forest vegetation situated around the periphery of the site that is potential habitat for the stag beetle. A survey will be undertaken prior to construction to determine if the stag beetle is present within the wet *E.obliqua* forest around the periphery of the site. The areas, if found, will be delineated in order to protect the species. Where this is not possible, a permit to relocate due to damage to the area will be sought from DPIWE.

Management measures will be implemented to limit the extent of disturbance during construction and any disturbed areas will be rehabilitated as defined in the landscape master plan.

The project was referred to the Federal Minister for Environment under the *Environmental Protection and Biodiversity Conservation Act* determined that there were no controlled actions.

12.2.5.11 ***Aboriginal and Cultural Heritage***

The Wood Centre development will not impact on European heritage sites, as no sites are known to occur on, or within six kilometres of the site.

No Aboriginal cultural heritage sites were located on the Wood Centre site during a site investigation, nor records of known sites located on the Tasmanian Aboriginal Site Index. Although no Aboriginal sites were located, clearing of the site in preparation for development may uncover relics or features that were not previously evident due to the presence of thick vegetation.

As a precaution, an additional investigation of representative areas will be undertaken during the construction period to determine if any Aboriginal cultural heritage features are present. In addition, management measures will be implemented for the protection of any Aboriginal sites located during construction activities (refer to Chapter 5).

12.2.5.12 ***Visual Impact***

The site is situated on top of a low ridge within State forest, and has been partially modified in several areas by quarrying activities and associated vehicle tracks and a new major road. No readily accessible vantage points are situated within the vicinity of the site which are accessible by vehicles.

Potential areas that may overlook the site are as follows:

- Top of Barn Back from Forestry Tasmania road;
- 200 m section of Bermuda Road (Forestry Tasmania section of road);

- Hartz Mountain looking north; and
- Edwards Road (Forestry Tasmania road).

In general, the views provided from these areas are restricted and distant from the site. The site may be viewed during flights in the vicinity of the Wood Centre.

Given this and the measures to be used to mitigate any potential visual impacts including, use of similar architecture of the main buildings, the use of building and roof colours to minimise contrast with the surrounding vegetation, and the development of a landscape plan for the site, the visual impact of the Wood Centre will be minimal.

12.2.5.13 Energy Use

Electrical power demand for the site is estimated to be up to 10 MW. In addition to electrical power, the RPV mill and Sawmill will require thermal power for drying and conditioning.

The establishment of the power station for power and thermal generation on the site means that, on the whole, the site will be a net exporter of energy.

The following management measures will be implemented:

- Overall energy use will be minimised by selecting where possible motors, lighting and drying equipment that is efficient with respect to power usage;
- The detailed process design will maximise the potential to recover process heat and considerable use will be made of regenerative heat exchangers to achieve the aim; and
- The heat plants will include flue gas economisers for heat recovery.

12.2.5.14 Monitoring

The effectiveness of management measures associated with the development and operation of the Wood Centre and its wood processing components will be monitored to ensure impact on the environment is minimised, statutory requirements are met, and environmental management commitments are implemented. In summary, monitoring of site operations will include:

- Construction operations;
- Water quantity extracted from the Huon River and comparison to flow data;
- Discharge of wastewater from wood processing sites to the site-wide

management system (for internal management purposes);

- Discharge into and from the storage ponds;
- Water quality in the Huon River and Kings Creek;
- Soil and groundwater at the irrigation sites;
- Ambient noise monitoring;
- Obscuration monitoring of combustion plant discharges;
- Recording of noise level emissions associated with noisy equipment (as necessary);
- Monitoring of surface waters in the vicinity of the wastewater irrigation site(s);
- Observation of dust generation from highly trafficked areas (for internal management purposes);
- Maintenance of solid waste records (for internal management purposes);
- Maintenance of hazardous materials records for each wood processing operation (for internal management purposes);
- Complaints and incident reporting investigation and rectification; and
- Quantity of raw materials being used.

In addition, a site environmental committee will be established to oversee environmental management issues on-site.

12.3 Conclusions

This DPEMP has described all aspects of the proposed Wood Centre including the critical environmental effects both positive and negative.

This project meets the commitment by FT to promote sustainable work and innovative practices. By initiating a project that involves the manufacture of value added wood products on a central site within the forests, FT is allowing for local employment opportunities and improved transport efficiencies.

The Wood Centre development focuses on maximising overall returns and achieving greater resource recovery from existing levels of timber supply in the Southern Forests without significant impact on the natural environment.

The proposed Power Station will result in the reduction of forest residue being burnt in re-establishment burns. Instead, the excess residue will be utilised as fuelwood to produce power from a renewable resource for the site as well as the local community. The fuel load within the coupe is thus greatly reduced and will account for the reduction in burn intensity and levels of smoke emission.

The proposed Wood Centre site in the Southern Forests is suitable as a future wood processing centre because it has:

- A significant buffer from conflicting landuses;
- A strategic location in relation to the wood resource and for transportation purposes; and
- Suitable environmental conditions.

The site, after thorough investigation and assessment of potential impacts, has been found to be suitable for establishment and operation of the proposed developments. The site has no conflicting adjacent zoning and land use; provides significant buffers in relation to incompatible land uses; and is suitable in terms of the identified need for employment and technologically advanced resource development in the region. The site has good access to the wood fibre source and with some road improvements will have a suitable transport route to export facilities.

Provided operating standards set down in the legislation, and commitments described in this DPEMP are maintained, the proposed development is not expected to adversely affect adjacent land-uses or the quality of the environment in the area.

The potential benefits and operational efficiencies can be realised without having to harvest any more trees than current levels. The Wood Centre development focuses on maximising overall returns and achieving greater resource recovery from existing levels of timber supply in the Southern Forests without significant impact on the natural environment.

The site has been selected and the proposed development will be in accordance with best practice environmental management techniques and procedures and the *Environmental Management and Pollution Control Act 1994*. These techniques have included:

- A detailed site selection process;
- The provision of a buffer zone around the site;
- The proposed development of the site;

- The proposed minimisation of waste production;
- Detailed environmental management and site operations;
- The progressive and final site rehabilitation; and
- The proposed monitoring and reporting procedures.

12.4 Summary of Environmental Commitments

Forestry Tasmania (FT) is committed to operating the Wood Centre responsibly with respect to the environment. This includes not only meeting the specific regulatory requirements of the relevant agencies, but where possible and appropriate, achieving best practice environmental management.

In the preceding Sections, the potential environmental impacts that may arise from the Wood Centre operation have been detailed and where appropriate actions and procedures, which will be instigated to prevent and or minimise these impacts, have been provided.

The environmental commitments made by FT throughout the DPEMP are summarised in Table 89 below. This table summarises each commitment according to operational site and identifies the timing to carry out the commitment. The table also includes reference to the page number of the DPEMP where additional information can be obtained regarding each commitment.

Table 89 Summary of Environmental Commitments

(CM: Road Construction Manager; SM: Wood Centre Site Manager; FM: Facility Manager; FT: Forestry Tasmania)

Note: Timing (Year) 1: Includes construction

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
TRANSPORT ISSUES					
1	Construction traffic will generally be restricted to daylight hours.	CM	✓		98
2	Speed restrictions for construction traffic will be imposed in sensitive areas.	CM	✓		98
3	Drivers will be given training with respect to operation on sensitive sections of the route during construction.	CM	✓		98
4	Erosion control measures detailed in the Forest Practices Code will be implemented during the construction program.	CM	✓		98
5	Conduct preliminary survey to identify vertebrate roadkill 'hotspots' prior to construction and apply appropriate mitigative measures where necessary.	CM/FT	✓		98
6	Seal those road sections where dust is a problem to residents on sections of Denison Road	CM	✓		102
7	Monitor road kill on Weld and Denison Road during first two years operation.				102
8	Truck operating times will be reviewed and amended with the Community Consultative Committee.	SM	✓		103
9	Ensure that upgrading work to meet the operating requirements of all road users is completed before production commences at the Wood Centre.	CM	✓		120
10	Standard planning and development application process will be followed for any new road construction.	CM	✓		120
11	No commitment, Terts reference.				129
12	Utilise HPVs for wood fibre transport if accepted by the community.	SM		✓	136

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
13	Design HPVs and other product transport vehicles to minimise noise generation.	SM	✓	✓	136
14	Schedule trucks to avoid school bus operating times.	SM		✓	136
15	Schedule trucks in accordance with the limitations of the Central Scheduling and Traffic Management Plan.	SM		✓	136
16	Enforce speed restrictions in consultation with community.	SM		✓	137
17	Reduce braking and acceleration of vehicles.	SM		✓	137
18	Minimise size of transport fleet.	SM		✓	137
19	Use of trained drivers.	SM		✓	137
20	Use modern well maintained vehicles.	SM		✓	137
21	HPV and Log truck trailers will be provided with air bag suspension systems.	SM		✓	137
22	Prepare Traffic Management Plan	SM	✓		138
23	Apply appropriate sealing finishes near residential areas.	CM	✓	✓	138
24	Seal sections of gravel road adjacent to residences if dust is identified as a problem.	CM	✓	✓	140
25	Seal and upgrade North Huon Road.	CM	✓		140
26	Improve road route prior to commencement of HPV transport.	CM	✓		142
27	Vehicles will carry appropriate State Road Traffic Act Regulation and National HVAS notice.	SM		✓	144
28	Fit vehicles with Road Friendly Suspension and carry appropriate certification.	SM	✓	✓	145
29	Drivers will be dedicated to the operation.	SM		✓	145
30	Drivers will take special precaution on road sections where the line of sight is limited.	SM		✓	145
31	Drivers will take particular care in the vicinity of school bus routes.	SM	✓	✓	145

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
32	Trucks will not operate past the Showground on Huon Valley Show Day.	SM	✓	✓	146
33	Develop a new playground to meet Australian Standards at a location agreed with the community.	SM	✓		147
34	Implement erosion control measures for road works in accordance with the Forest Practices Code.	CM	✓	✓	148
35	Monitor transport at representative locations after 12 months operation, and provision of a report to DPIWE.	SM	✓		148
WOOD CENTRE (SITE WIDE) ISSUES					
	<i>Construction</i>				
1	Establish a temporary boundary prior to construction to limit construction disturbance.	SM	✓		153
2	Erect sediment control fences to contain sediment to designated areas.	SM	✓		153
3	Monitor soil retaining measures daily.	SM	✓		153
4	Divert uncontaminated runoff to storage ponds via earthen drainages during construction.	SM	✓		154
5	Provide an effective system for managing sewage during construction.	SM	✓		154
6	Develop a Construction Environmental Management Plan to control soil disturbance during the construction phase.	SM	✓		154
7	Implement rehabilitation and/or stabilisation works during construction to limit erosion.	SM	✓		154
8	Prepare a dust minimisation strategy for the construction phase.	SM	✓		156
9	Monitor dust generation daily, and implement suppression measures as required.	SM	✓		156
10	Ensure visible dust is effectively suppressed so that none leaves the site during construction.	SM	✓		156
	<i>Emergency Measures</i>				
11	Implement management measures to minimise fire hazards on-site.	SM	✓	✓	159

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Install a suitable ring main and adequate fire hydrants	SM	✓		159
13	Maintain fire breaks around the site.	SM	✓	✓	160
14	Develop and implement an emergency response plan.	SM	✓	✓	161
15	Implement energy management measures to comply with BPEM conditions.	SM	✓	✓	165
16	Liaise with DPIWE to develop management measures for water extraction during periods of low water flow.	SM	✓	✓	170
17	Develop a water budget once technical specifications are available.	SM	✓		172
	<i>Terrestrial</i>				
18	A capacity of 65 ML will be maintained at all times for a 72 hour, 1 in 10 year storm event.	SM		✓	173
19	Assess storage dam capacities as component of detailed design stage of the development.	SM	✓		174
20	Document and record the glacio-fluvial terrace system where it is to be disturbed.	SM	✓		182
21	Establish boundaries during construction and operation to limit surface disturbance by vehicular activities.	SM	✓		182
22	Cut and fill batters will be less than 1.5 horizontal to vertical.	SM	✓		183
23	Minimise areas exposed to excavation.	SM	✓		183
24	Plant and mulch areas as soon as possible.	SM	✓		183
25	Construct a stormwater management system during the construction period to prevent erosion.	SM	✓		183
26	Collect and treat all stormwater from the site during construction.	SM	✓		184

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
	<i>Atmospheric Emissions and Greenhouse Effect</i>				
27	Seal the internal ring road.	SM	✓		191
28	Undertake good housekeeping to prevent build up of soil, woodchips and dust on roads.	SM	✓	✓	191
29	Revegetate disturbed areas to prevent generation of windblown soil and dust.	SM	✓	✓	191
30	Cover stockpiles and truck cargoes with tarpaulins during construction	SM		✓	191
31	Install and monitor weather station on the site to provide data for air quality modelling prior to commissioning.	SM	✓	✓	192
32	Implement management measures to reduce the potential for nuisance odour generation.	SM		✓	192
33	Erect and maintain signage with a contact number for notification of problems.	SM	✓	✓	193
34	Investigate and record odour complaints.	SM		✓	193
	<i>Water Supply</i>				
35	Create additional water storage on-site if water extraction from the Huon River during low flow periods has to be reduced.	SM	✓	✓	193
36	Predict optimal abstraction timing using DPIWE ongoing monitoring data.	SM		✓	194
37	Ensure optimal use of water.	SM		✓	194
	<i>Wastewater Emissions</i>				
38	Direct stormwater from rooves to screening/interceptor system and onto site-wide storage ponds.	SM		✓	197
39	Drainage from undeveloped areas will continue to flow in natural drainage lines.	SM		✓	197
40	Provide on-site wastewater treatment at each facility.	SM		✓	197

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
41	Manage stormwater on-site.	SM		✓	197
42	No stormwater overflow will occur during non-storm conditions.	SM		✓	198
43	Monitor vegetation sprayed with treated water for signs of contamination or damage due to application.	SM		✓	198
44	Remove sludge from stormwater settling ponds when it has reached 10% of the total storage or as determined necessary, and beneficially reuse where possible. The sludge maintenance program and desludging protocol will be implemented within 12 months of operation.	SM		✓	198
45	Ensure the sewage treatment plant is designed to manage boiler water treatment chemicals.	SM	✓		199
46	Direct all sewage from all facilities to the on-site sewage treatment plant.	SM		✓	199
47	Utilise portable toilets during construction with regular disposal by contractor.	SM	✓		199
48	Collect and direct domestic wastewater to appropriately designed on-site treatment plant.	SM		✓	199
49	Monitor water quality to determine if other methods of treatment need to be implemented.	SM		✓	199
50	Line storage ponds with impermeable clay liner.	SM	✓		200
51	Design, construct and maintain wastewater reticulation piping in accordance with industry best practice.	SM	✓	✓	200
52	Develop Irrigation Management Plan prior to irrigation program implementation. Address the potential for groundwater contamination at the irrigation site in the plan.	SM	✓		200
<i>Noise Emissions</i>					
53	Select and maintain machinery to minimise noise emissions.	SM	✓	✓	203

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
54	A noise level survey will be undertaken prior site commissioning.	SM	✓		203
55	Investigate and record noise complaints.	SM		✓	203
56	House water supply pump station in building with soundproofing.	SM	✓	✓	204
	<i>Solid Waste Generation</i>				
57	Regular removal of solid waste and screenings from the site-wide wastewater management system.	SM		✓	204
58	Store solid waste in a lidded hopper and disposed of by a licensed waste contractor.	SM		✓	204
	<i>Hazardous Waste</i>				
59	Site Manager will ensure safe operation of communal diesel facility.	SM		✓	207
60	Store hazardous substances in accordance with AS-1940.	SM		✓	207
61	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	SM		✓	207
62	Maintain a spill-kit on-site and contain spills.	SM		✓	207
63	Employ licensed clean-up crew when required.	SM		✓	207
64	Maintain an inventory of hazardous substances on-site.	SM		✓	208
65	Emergency spill response procedures and staff training to be implemented at each facility	SM/FM		✓	208
66	Report all significant hazardous material incidents that have the potential to cause environmental harm to DPIWE within 24 hrs.	SM		✓	208

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
<i>Flora and Fauna</i>					
67	Conduct survey of riparian zone for <i>Westringia angustifolia</i> prior to conducting activities which have potential to disturb vegetation in the riparian zone.	SM	✓		209
68	Investigate the possible existence of the Mt Mangana Stag Beetle within wet <i>E. obliqua</i> forest and delineate appropriately.	SM	✓		210
<i>Aboriginal Heritage and Culture</i>					
69	Undertake an Aboriginal heritage survey upon clearing the site in preparation for development.	SM	✓		211
70	Aboriginal sites encountered will be protected and/or managed in an approved manner.	SM	✓	✓	211
<i>Decommissioning and Rehabilitation</i>					
71	Maintain a riparian buffer of 120 m between the Wood Centre and the Huon River.	SM	✓	✓	212
72	Develop and adhere to a landscaping master plan.	SM	✓	✓	212
73	Retain native vegetation within the 10 metre prescribed planning set back from the site boundary adjacent to Weld Road.	SM	✓	✓	212
74	Submit a decommissioning and rehabilitation plan to DPIWE in the event of closure.	SM	✓		214
<i>Site-Wide Monitoring</i>					
75	Appoint a Site Manager with responsibility for common use services.	FT	✓		214
76	Establish an environment committee for the implementation and management of site-wide environmental issues.	FT	✓		214
77	Site Manager will ensure disturbance does not exceed site boundaries.	SM	✓	✓	215

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
78	Site Manager will ensure dust suppression.	SM	✓	✓	215
79	Site Manager will ensure success of rehabilitation treatment.	SM	✓	✓	215
80	Log and monitor river water abstraction rates.	SM		✓	216
81	Monitor water quality from the storage ponds.	SM		✓	216
82	Receive and maintain copies of wastewater quality from each facility.	SM		✓	216
83	Sample at storage ponds on a weekly basis for the first 6 months for internal management purposes and provide results on the Wood Centre web site.	SM	✓		216
84	Report water quality data for the process wastewater storage ponds to DPIWE quarterly for the first 12 months of operation.	SM	✓		217
85	Review frequency of sampling and analysis after 12 months and modify as appropriate.	SM	✓	✓	217
86	Undertake ongoing monitoring of wastewater quality within the WWTP for internal operational purposes.	SM		✓	218
87	Monitor domestic wastewater quality at the sewage treatment plant outlet monthly.	SM		✓	218
88	Ensure sustainability of the irrigation program by testing water quality parameters after the sewage treatment plant commissioning.	SM	✓		218
89	Forward results of water quality tests to DPIWE every 6 months.	SM		✓	219
90	Establish groundwater monitoring bores at the irrigation sites.	SM	✓		219
91	Monitor groundwater quarterly for the first year and six monthly or yearly thereafter depending on the results.	SM	✓	✓	219

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
92	Make water sampling results publicly available through a regularly updated web site.	SM		✓	220
93	Collect representative soil samples from each reuse area and monitor on an annual basis.	SM		✓	221
94	Test soil samples for heavy metals.	SM		✓	221
95	Report soil sample results to DPIWE annually and publish on web page.	SM		✓	221
96	Maintain a log of sludge removed from the sewage treatment plant and stormwater dams for disposal, including information regarding the method and site of disposal.	SM		✓	221
97	Monitor (visually) vegetation within reuse areas for <i>Phytophthora cinnamomi</i> infection symptoms.	SM		✓	222
98	Noise monitoring will be conducted to ensure statutory requirements and commitments are met.	SM	✓		222
99	Obscuration monitoring of combustion plant discharge will be conducted and reported to the Site Wide Manager.	SM		✓	222
100	Maintain a log of complaints regarding general site issues and record outcomes of the investigation(s).	SM		✓	222
101	Environmental Committee will create a Site Wide Management Plan for hazardous materials.	SM	✓		222
102	Develop an incident response and notification protocol for site wide issues.	SM	✓		223
103	Establish a Community Consultative Committee.	SM	✓		226
104	The Site Manager will convene regular meetings of the Community Consultative Committee.	SM		✓	226
105	The Site Manager will place minutes of meetings on a regularly updated web page.	SM		✓	226

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
106	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	SM	✓	✓	227
MERCHANDISING YARD AND FUELWOOD PROCESSOR					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	244
2	Sweep log sorting and fuelwood processor areas regularly to control fugitive sawdust and wood fibre.	FM		✓	244
3	Use covered conveyors.	FM		✓	244
4	Seal high traffic areas of the Merchandising Yard and use street sweeper to clean up wood fibre and sawdust if watering is an inadequate dust control measure.	FM		✓	244
5	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	244
	<i>Wastewater Emissions</i>				
6	Treated wastewater will be used for appropriate purposes in the Merchandising Yard.	FM		✓	246
7	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	246
8	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	247
9	Test potentially contaminated bund water, organise for its approved disposal and maintain records.	FM		✓	247
	<i>Noise Emissions</i>				
10	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	250
11	Ensure forklifts and loaders are fitted with standard noise control equipment.	FM	✓	✓	250

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Modify sound levels of alarms if found to be a cause of nuisance.	FM		✓	250
13	Control sound intensity of PA system speakers and shift sirens.	FM		✓	250
14	Orientate buildings openings away from nearest residence and utilise noise absorbent insulation in the roof and walls of buildings containing noisy machinery.	FM	✓		250
15	Locate the fuelwood processor adjacent to buildings that will provide a noise barrier.	FM	✓		251
16	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM	✓		251
	<i>Solid Waste Generation</i>				
17	Maximise use of all wood waste for power generation.	FM		✓	251
18	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	252
19	No wood waste will be disposed of on-site.	FM		✓	252
20	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	252
21	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to a licensed landfill.	FM		✓	253
	<i>Hazardous Materials</i>				
22	Conduct vehicle maintenance only in workshops.	FM		✓	253
23	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	255
24	Maintain an inventory of hazardous substances on-site.	FM		✓	255
25	Employ licensed clean-up crew when required.	FM		✓	255

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	255
27	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain record of waste oil quantities.	FM		✓	256
28	Design an emergency response plan for the Merchandising Yard and provide training.	FM	✓	✓	256
29	Report all hazardous material emission to DEM within 24 hours of becoming aware.	FM		✓	256
	<i>Monitoring and Review</i>				
30	Visually monitor dust emissions and control dust by watering.	FM		✓	256
31	Daily inspection and cleaning of the solids removal system.	FM		✓	257
32	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	257
33	Monitor water quality (BOD, TPHC and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report results to the DEM annually.	FM		✓	257
34	Record noise emission complaints with details of investigations and actions.	FM		✓	257
35	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	258
36	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	258
37	Maintenance of internal management records regarding hazardous materials storage and usage.	FM		✓	258

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
38	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	261
SAWMILL					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	279
2	Utilise and maintain appropriately designed ventilation system to manage dust and fugitive emissions.	FM		✓	279
3	No dust from on-site activities will leave the site.	FM		✓	280
4	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	280
5	Seal high traffic areas of the Sawmill site and use street sweeper to clean-up wood fibre and sawdust if watering is an inadequate dust control measure.	FM	✓	✓	280
6	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM	✓		280
7	Open fires will not be permitted on the site.	FM		✓	280
	<i>Wastewater Emissions</i>				
8	Contaminated process wastewater and stormwater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	282
9	Annual reporting of wastewater monitoring results to the DEM.	FM		✓	283
10	Undertake controlled disposal of contaminated water from bunds.	FM		✓	283
11	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	283
	<i>Noise Emissions</i>				

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Select and maintain equipment to minimise noise emissions.	FM	✓	✓	285
13	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	286
14	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		286
15	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM/SM	✓		286
	<i>Solid Waste Generation</i>				
16	Utilise all appropriate wood by-product for power generation.	FM		✓	287
17	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	287
18	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	288
19	Collect and store general refuse in a waste hopper for collection by a licensed waste contractor and disposal in an approved landfill.	FM		✓	288
	<i>Hazardous Materials</i>				
20	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		291
21	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	291
22	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	291
23	Design an emergency response plan for the Sawmill site and provide training.	FM	✓	✓	291

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
24	Maintain a spill-kit on-site and contain spills.	FM		✓	292
25	Employ licensed clean-up crew when required.	FM		✓	292
26	Maintain an inventory of hazardous substances on-site.	FM		✓	292
27	Collect waste oil in drum(s) for removal and recycling by waste contractor and maintain a record of quantities.	FM		✓	292
28	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	292
	<i>Monitoring and Review</i>				
29	Visual dust monitoring and control dust by watering.	FM		✓	293
30	Atmospheric monitoring will be conducted if complaints are received.	FM		✓	293
31	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM	✓	✓	293
32	Monitor water quality (TPHC, BOD and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report the results to the DEM annually.	FM		✓	293
33	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	293
34	Continuously monitor stack emissions with an obscuration meter and alarm system. In case of poor emissions, immediately adjust fuel-to-air ratio.	FM		✓	294
35	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	294
36	Record noise emission complaints with details of investigations and actions.	FM		✓	294
37	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	294

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
38	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	294
39	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	295
40	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	295
41	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	297
ROTARY PEELED VENEER MILL					
	<i>Atmospheric Emissions</i>				
1	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	316
2	Seal highly trafficked areas of the RPV site and use street sweeper if watering is an inadequate dust control measure.	FM	✓	✓	316
3	Ensure dust is confined to the site.	FM		✓	316
4	Design and operation of fuelwood transfer to minimise dust generation.	FM	✓	✓	317
5	Provide personnel with appropriate protection equipment.	FM		✓	317
6	Installation and on-going operation of an appropriately designed ventilation system in the main RPV production building.	FM	✓	✓	317
7	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM		✓	317
8	Open fires will not be permitted on-site.	FM		✓	318
9	Monitor heat plant particulate emissions with an obscuration and audible alarm and adjust fuel-to-air ratio as required.	FM		✓	319

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
10	Utilise modern vehicles with appropriate exhaust management equipment.	FM		✓	319
	<i>Wastewater Emissions</i>				
11	Collection of contaminated stormwater and screening prior to diversion to the site-wide storage pond.	FM		✓	320
12	Treat boiler water treatment system bleed stream and heat plant blowdown in sewage treatment plant.	FM		✓	321
13	Regular solids removal from wastewater screens.	FM		✓	321
14	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	321
15	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	321
16	Test potentially contaminated bund water, organise for its approved disposal and maintain records of disposal.	FM		✓	321
	<i>Noise Emissions</i>				
17	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	323
18	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	323
19	Conduct veneer product loading operations within the RPV building where possible.	FM		✓	324
20	Modify sound levels of alarms if found to be cause of nuisance.	FM		✓	324
21	Control sound intensity of PA system speakers and shift sirens.	FM		✓	324
22	Investigate and record all noise complaints.	FM		✓	324
	<i>Solid Waste Generation</i>				
23	Wood by-products will be reused as fuelwood in the heat plant on-site.	FM		✓	325

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
24	Regularly dispose of screening/interceptor system solids and oils for beneficial reuse operations and/or approved landfill.	FM		✓	326
25	Collection and beneficial reuse of screened solids and ash.	FM		✓	326
26	Regular collection of general refuse for disposal at approved landfill by waste contractor.	FM		✓	327
27	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	327
28	Empty glue containers will be disposed of to an approved landfill.	FM		✓	327
	<i>Hazardous Materials</i>				
29	Storage of minor quantities of hazardous materials over relocatable bunds or similar facility as required by AS-1940.	FM		✓	328
30	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		328
31	Display of relevant material safety data sheets and signage in storage locations.	FM		✓	328
32	Design an emergency response plan for the RPV Mill site and provide training.	FM	✓	✓	330
33	Maintain a spill-kit on-site and contain spills.	FM		✓	330
34	Employ licensed clean-up crew when required.	FM		✓	330
35	Maintain an inventory of hazardous substances on-site.	FM		✓	330
36	Collection of waste oil in drums for removal and recycling by waste contractor.	FM		✓	330
37	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	330

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
<i>Monitoring and Review</i>					
38	Undertake visual monitoring and water for dust suppression as necessary.	FM		✓	331
39	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	331
40	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor outlet continuously. Report results to the DEM annually.	FM		✓	331
41	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	332
42	Continuous obscuration monitoring of the heat plant stack emissions.	FM		✓	332
43	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	332
44	Record noise emission complaints with details of investigations and actions.	FM		✓	332
45	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	332
46	Notification of emissions that exceed statutory requirements and provision of a report to the DEM.	FM		✓	333
47	Develop and implement an incident response and notification protocol.	FM	✓	✓	333
48	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	333
49	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	336
WOOD FIBRE MILL					
	<i>Atmospheric Emissions</i>				

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
1	Conveyors and hoppers will be covered to reduce fugitive sawdust emissions.	FM		✓	350
2	Dust suppression of highly trafficked unpaved areas watering.	FM		✓	350
3	Seal high traffic areas of Wood Fibre Mill area and use street sweeper to clean up wood fibre and sawdust.	FM		✓	350
4	Ensure no dust leaves the site	FM		✓	351
<i>Wastewater Emissions</i>					
5	Fume extraction system will be provided in babbitt metal work area.	FM		✓	351
6	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	352
7	Pass water through screening/interceptor system prior to discharge to storage ponds and regularly test for TPHC, BOD and TSS. Continuously monitor flow rate from the system.	FM		✓	352
8	All machine and vehicle maintenance will be undertaken in the workshop area where clean-up materials will be immediately available.	FM		✓	353
9	Collection of rotary screw condensate in a sump and regular disposal.	FM		✓	353
10	Undertake controlled disposal of contaminated water from bunds.	FM		✓	353
11	Test potentially contaminated bund water and organise for its approved disposal and maintain records.	FM		✓	353
<i>Noise Emissions</i>					
12	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		357

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
13	Enclose the Wood Fibre Mill in a building designed for acoustic suppression.	FM	✓		357
14	Undertake noise impact assessment once technical specifications for Wood Fibre Mill equipment are available.	FM	✓		357
15	Enclose re-chipper in a building designed for acoustic suppression.	FM	✓		358
16	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM		✓	358
17	Application of standard practices in the case of discrete noise sources.	FM		✓	358
18	Investigate and implement remedial measures in response to noise complaints.	FM		✓	359
	<i>Solid Waste Generation</i>				
19	Utilise all wood waste for power generation.	FM		✓	359
20	No wood waste will be disposed of on-site.	FM		✓	359
21	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	360
22	Dispatch blade sharpening waste to licensed landfill.	FM		✓	360
23	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to an approved landfill.	FM		✓	360
24	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	361
	<i>Hazardous Materials</i>				
25	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	363

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	363
27	Bunds will be inspected daily for spilt material that will be promptly mopped up or treated with absorbent material and any leaks will be promptly repaired.	FM		✓	363
28	Design an emergency response plan for the Wood Fibre Mill site and provide training.	FM	✓	✓	363
29	Maintain a spill-kit on-site and contain spills.	FM		✓	363
30	Employ licensed clean-up crew when required.	FM		✓	363
31	Maintain an inventory of hazardous substances on-site.	FM		✓	364
32	Collection of waste oil in drum(s) for removal and recycling by a waste contractor. Maintain a record of quantities.	FM		✓	364
33	Report hazardous material emission to DEM within 24 hours.	FM		✓	364
	<i>Monitoring and Review</i>				
34	Visually monitor dust emissions and effectiveness of control by watering.	FM		✓	364
35	Daily inspection and cleaning of solids removal system to ensure at least 25% capacity is available.	FM		✓	365
36	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	365
37	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously. Report results to the DEM annually.	FM		✓	365
38	Record noise emission complaints with details of investigations and actions.	FM		✓	365

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
39	Submit monitoring data to the Director of Environmental Management annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	366
40	Maintain internal management records for hazardous material storage and use.	FM		✓	366
41	Develop and implement an incident response and notification protocol.	FM	✓	✓	366
42	Conduct staff health monitoring of knife sharpening staff.	FM		✓	366
43	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	368
WOOD FIRED POWER STATION					
	<i>Atmospheric Emissions</i>				
1	Undertake air quality modelling for the Power Station and heat plant stack emissions once engineering specifications and site weather data are available.	FM	✓		386
2	Equipment will be designed and operated to comply with the four-tiered approach recommended by the Discussion Paper on Air Quality Management and Policy Development (January 2000).	FM	✓		387
3	Conveyors will be covered to control fugitive dust.	FM		✓	388
4	Ash will be wetted following discharge from the ash bin.	FM		✓	388
5	Seal highly trafficked areas of the Power Station and use street sweeper if watering is an inadequate dust control measure.	FM		✓	388
6	Water highly trafficked unpaved areas to suppress dust.	FM		✓	388
7	No dust will travel beyond the site boundary as an air emission.	FM		✓	388
8	Installation and maintenance of a coarse filter system and ESP will maintain the emissions below 80 mg/Nm ³ .	FM	✓	✓	389

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
9	Adjust fuel-to-air ratio immediately if stack emission opacity exceeds 20% and shut the Power Station down for repairs if opacity continues to exceed 20%.	FM		✓	389
	<i>Wastewater Emissions</i>				
10	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	390
11	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	391
12	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	392
	<i>Noise Emissions</i>				
13	Safety valves will vent through a silencer and venting will only occur during day-time hours.	FM		✓	394
14	Utilise soundproofing and orientate openings toward the Wood Centre.	FM	✓		395
15	Install silencers on equipment as appropriate and select and maintain equipment to minimise noise emissions.	FM	✓	✓	395
16	Stack design will allow for tuning stubs to be installed if necessary.	FM	✓		395
17	Undertake noise modelling when final equipment selection has been made.	FM	✓		395
18	Investigate and apply appropriate mitigation measures if a noise complaint is received.	FM		✓	395
	<i>Solid Waste Generation</i>				
19	Ash and unusable solid waste will be removed from the site to a licensed landfill or for appropriate reuse.	FM		✓	396
20	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	396
21	Regularly dispose of screening/interceptor solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	396

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
	<i>Hazardous Materials</i>				
22	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	399
23	Store hazardous substances in a secure safe building or bund with material data safety sheets and signage in storage locations.	FM		✓	399
24	Maintain an inventory of hazardous substances on-site.	FM		✓	399
25	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain a record of quantities.	FM		✓	399
26	Design an emergency response plan for the Sawmill site and provide training.	FM	✓		400
27	Maintain a spill-kit on-site and contain spills.	FM		✓	400
28	Employ licensed clean-up crew when required.	FM		✓	400
29	Report significant hazardous material incidents with potential to cause environmental harm to DPIWE.	FM		✓	400
30	Report accidental emission to DEM within 24 hours.	FM		✓	400
31	Conduct a detailed HAZOP study prior to commencement of Power Station construction.	FM	✓		405
	<i>Monitoring and Review</i>				
32	Visually monitor dust emissions and control dust by watering.	FM		✓	405
33	Where practicable, daily inspection and removal of the solids from the solids removal system.	FM		✓	405
34	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	406

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
35	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously and report to the DEM annually.	FM		✓	406
36	Monitoring of boiler stack emissions and modification of boiler operation if opacity exceeds 20%.	FM		✓	406
37	Annual reporting of Power Station stack monitoring results to the DEM.	FM		✓	406
38	Record noise emission complaints with details of investigations and actions.	FM		✓	407
39	Submit monitoring data to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	407
40	Develop and implement an incident response and notification protocol.	FM	✓		407
41	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	409

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CHAPTER 11 HEALTH IMPACTS &

**CHAPTER 12 CUMULATIVE EFFECT, CONCLUSIONS AND
COMMITMENTS**

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11. HEALTH IMPACT ASSESSMENT

11.1 Health Issues and Potential Impacts

The key health issues associated with this project have been identified and include the following:

- Transport related impacts.
- Noise;
- Air pollution;
- Wastewater management;
- Control of biological hazards; and

11.1.1 Transport Related Impacts

Transport of logs and products to and from the site will result in changed traffic movements and an increase in traffic in some areas, therefore the noise level in areas within the route. It was concluded (refer to Chapter 4) that the noise level generated by additional day-time traffic will be acceptable provided that mitigation measures are undertaken including:

- Treatment of wood fibre transport bins to minimise drumming noises when empty;
- Minimise the number of fleet vehicles;
- Reduce transport vehicle speed;
- Keep the trucks well maintained; and
- Use electro-magnetic rather than engine exhaust braking.

The transport related safety issues involve consideration of the roads, the vehicles, and the drivers, to ensure that the overall transport operation unit is safe, and follows best practice.

The upgrade of roads will comply with DIER's standards for the operation of high performance vehicles (HPV) and will ensure the following:

- Construction and capacity of the roads and bridges are suitable;

- Construction of roads that have suitable turn-out lanes;
- Provision of adequate line of sight; and
- Provision of adequate shoulders on roads.

Vehicles will be required to be maintained and kept in good mechanical condition, and carry an appropriate notice stating that the vehicle has been approved under the relevant Tasmanian traffic regulations and the National Heavy Vehicle Accreditation Scheme for operation on the route.

Drivers will be given specific training with respect to operation on the route. They will take special precaution on sections of road where the line of sight is limited; and be particularly careful when operating in the vicinity of schools (scheduling of operation should be such that operation past schools during school start and finish times is avoided).

It is considered that the transport impact on the community are capable of being satisfactorily managed and an agreed range of remedial work undertaken within the community.

11.1.2 Noise

Detailed assessments of the potential noise impacts (that have the potential to be heard beyond the site boundaries) for each Wood Centre facility, and the proposed mitigation measures are provided in Sections 5.7.5, 6.4, 7.4, 8.4, 9.4 and 10.4 (Appendix N).

The most significant noises for operators and visitors on-site are those generated by the breakdown of wood, movement of logs between operating units, vehicle noises, and operating machinery. Of these, the chipper at the wood fibre plant is considered the loudest.

Operation within enclosed facilities will confine the potential noise impact for off-site receptors, with no off-site impacts anticipated. Operators and visitors to the site will be required to wear ear plugs when entering processing facilities, thereby minimising noise impacts.

Outside noises associated with trucks and the movement of logs are significant within the site, but will not have an effect on residential areas, since the site is located over six kilometres from the nearest house and topography will have a reducing affect on noise travel. It is predicted that no unacceptable noise impacts will occur.

11.1.3 Air Pollution

Due to the climatic conditions of the region, temperature inversion can occur. This is most likely to occur in the wintertime, when dense cloud formations trap air emissions within the site. This inversion layer can range from 50 - 100 m above ground.

The most significant air emissions will originate from the power plant boiler. Location of the 40 m boiler stack at higher ground should reduce the risk of discharging the emissions within the inversion layer. Refer to Chapter 10 for discussion of the potential impacts of air emissions and the mitigation measures to be implemented.

Poorly controlled burning usually results in incomplete combustion, hence the generation and release of fine particulate matter, CO, NO_x, and organic compounds. An example of this is the burning of biomass fuel in open air.

Open-air regeneration burns in Tasmania normally take place within a restricted time frame during early autumn. As a consequence, the emissions are concentrated, and thus increase the risk of impact on the population. Open-air vegetation fires increase the risk of acute respiratory infections, due to the fine airborne particles (<2.5 micrometres) that can potentially penetrate deep into the lungs and cause respiratory diseases.

In an average age-standardised hospital admission rates study conducted between 1994-98, it was found that the average incidence of hospital admission rates related to respiratory diseases and infections within the Huon Valley was lower than that observed for Tasmania as a whole. However, this was not considered statistically significant, as their 95% confidence intervals overlap. These medical conditions include asthma, pneumonia and influenza, pulmonary diseases, and other diseases of the respiratory system. This excludes the occurrence of acute respiratory infections, as it has been shown that residents of the Huon Valley are significantly less affected by such conditions.

In light of this information, appropriate measures need to be taken to ensure that the Wood Centre development does not have a significantly adverse health impact on the residents within the surrounding environment. The Wood Centre development reduces the open-air regeneration burning by burning the forest residues within its own boundaries, under controlled conditions. Further advantages include:

- Particulate emissions are reduced due to filtration of the combustion gases;
- Dispersion of emissions is better controlled since there is only one point source;
- Better combustion control results in lower levels of CO, NO_x, and VOC; and

- Year-round burning results in a much greater dilution of these emissions.

The emissions released into the air from the burning of wood are mostly combustion products, which include wood particulates, dioxins, CO_x, NO_x, and a small amount of volatile organic compounds (VOC). Dioxins, specifically, are generally formed during the combustion of chlorine and organic compounds.

Dioxins form more readily at temperatures between 300 – 700 °C, which typically occurs when a fire is smouldering, or soon after a heavy load of fuel is introduced. At temperatures above 700°C, dioxin formation is minimised due to its instability and thermal degradation at these high temperatures. A well-controlled boiler ensures that the combustion temperature is maintained above 700°C, with the fire-box temperature normally around 1000°C. Clean hardwood has negligible levels of chlorine entrained, further reducing the likelihood of dioxin formation.

The processing of secondary combustion air in the furnace reduces the hazard potential of more harmful wastes such as carbon monoxides and VOC produced by incomplete combustion.

Provided that the above mitigation measures are applied, the human health impact of these emissions is not considered to be significant.

The generation of very fine particulates (e.g. mineral dust) is inevitable. Outdoor water sprays will be used to prevent mineral dust being blown around the site.

The health impacts associated with outdoor vehicular emissions have been considered, and is believed to be insignificant relative to the combined vehicle emissions within the Huon Valley. However, it is worth noting that indoor use, or the use of vehicles within enclosed spaces, is a potential health risk to operators due to the more elevated concentrations generated within a confined space. Facilities where this is likely to occur will be designed to operate in accordance with contemporary workplace guidelines to minimise the impact on indoor air quality.

11.1.4 Wastewater Management

Wastewater generated during the processing on site will contain mainly soil and wood particulates. Precautions taken to control the release of wastewater from the site include the use of a sump and associated separator/interceptor system within all facilities to contain, treat and reuse the wastewater within each facility. The on-site storage ponds will collect the wastewater from each facility, which will then be re-used for processing purposes within the site.

Domestic sewage is to be treated in an on-site package treatment plant, and irrigated in accordance with an irrigation management plan. No significant health impact is likely to occur if these management measures are implemented.

11.1.5 Control of Biological Hazards

Due to the recent outbreaks of Legionnaire's disease, some concern has been raised for the control and prevention of this potential biological health hazard. The *Legionella* bacteria tends to flourish in warm, sunny, humid environments such as those provided by humidifiers and cooling towers. The following lists recommended measures to be incorporated in the design of the power station's cooling tower to prevent the potential risks associated with *Legionella*:

- Exclusion of sunlight;
- Maintain the correct bleed rates to prevent bacterial accumulation;
- Stainless steel cooling tower construction;
- Disposable fill material to ensure minimal build-up of bacteria;
- Efficient drift eliminators to prevent large moisture droplets from being carried across to other areas within the site;
- Locate towers away from any type of disturbance and fresh air intake vents;
- Minimise the tower basin volume to prevent the occurrence of a large warm water reservoir should the cooling tower cease running; and
- Steps be taken to prevent the standby tower from harbouring warm water when not in operation.

The cooling tower will comply with the relevant sections of the *Public Health Act 1997* in particular Part 5: Premises, Division 4: Public Health Risk Activities and Part 6: Water. It will be registered and maintenance will be performed on a regular basis. The major aspects of the cooling tower maintenance will include:

- at least monthly inspection of the cooling tower;
- regular water treatment;
- complete cleaning and disinfection of the tower every three to six months;
- cleaning of the tower prior to start-up, following seasonal shut down;
- microbiological testing at least monthly of tower water to provide good practice; and
- maintain records.

The cooling tower maintenance will also be conducted in accordance with the *Legionella* Guidelines provided by the Public and Environmental Health Service.

The presence of three storage ponds within the Wood Centre development site has the potential to become a breeding ground for mosquitoes and other insects. With this comes the risk of diseases caused by arboviruses, organisms that utilise insects as their carrier, and infect humans and/or animals. There is a potential that Ross River virus may be transmitted in temperate climates.

The climatic conditions at the Wood Centre are not ideal for mosquito breeding. However, to further minimise this risk, it is proposed that continuous monitoring of the ponds will be carried out to check for mosquito larvae, at critical times of the year. Additionally, the construction of the storage dams will be at a reasonable grade to avoid the development of shallow swampy lands when water recedes.

Klebsiella pneumoniae is an important bacterial pathogen, which may be associated with timber processing wastewater. *K.pneumoniae* infections are common in hospitals and may cause pneumonia and urinary tract infections. However like all pathogens does not survive for long periods in the natural environment. It is carried in the intestinal tract of 30-40 % of humans and animals, and may survive in the environment for short periods in industrial wastewater such as textile finishing and pulp and paper mill wastewater. As the domestic wastewater at the Wood Centre is collected and managed in a separate reticulation system, to the process wastewater, the potential for contamination of the storage ponds is considered to be low. However, in accordance with normal occupational health and safety practices, personnel on site will be made aware of the potential health issue, and appropriate hygienic practices implemented.

11.1.6 Health Impact Summary

There are five main aspects of the proposed operation that have the potential to impact on human health both within the site boundaries and off-site. The detailed assessment of each of these aspects has concluded that provided contemporary occupational health and safety practices and procedures are implemented and the proposed environmental management and mitigation measures are in place that adverse health impacts will be minimised.

12. CUMULATIVE EFFECT, CONCLUSIONS AND COMMITMENTS

12.1 Introduction

This chapter draws on previous sections to describe the cumulative potential impact of the Wood Centre, and in doing so, summarises the potential impacts on the existing environment of its constituent wood processing facilities that are to be developed and operated on the site. Conclusions are drawn with regard to the net environmental effects of the project by considering the mitigative measures committed to in the previous sections. The mitigative measures that will assist in reducing the cumulative effect of the development are presented as commitments in tabular form at the end of this chapter.

12.2 Cumulative Effect of the Development

12.2.1 Wood Supply and Production

The Wood Centre is designed to act as a central catchment point for timber that is harvested in Southern Tasmania. The integration of the different wood processing operations on the Wood Centre site will enable greater recovery of wood resources and beneficial use of wood by-products.

There will be no changes to the harvesting arrangements under the Regional Forest Agreement as a result of the development.

The timber harvesting plans that are already established for the Huon District over the next 10 years will result in about 2000 ha of State forest being harvested and regenerated each year.

12.2.2 Planning Issues

The Wood Centre site and surrounding area is State forest, owned by the Crown.

The site is currently zoned Rural under the *Huon Planning Scheme 1979*. Not all facilities which make up the proposed Wood Centre development concur with the intent of the current Rural Zone. In the Rural zone a Timber Mill is discretionary and Light and General Industry are not permitted.

In accordance with Section 43A of the *Land Use Planning and Approvals Act 1993* a request has been made to amend the *Huon Planning Scheme* to introduce a specific zone for the subject site to permit the proposed current and future uses.

12.2.3 Social and Economic Issues

The proposed project will deliver significant economic and social benefits to Tasmania and the Huon Valley in particular.

The Huon Valley has a long history as a resource based economy from its early beginnings with fruit and vegetables production, and forestry related industry, primarily timber getting. The Wood Centre will further develop the existing forestry based industry in the region.

Employment resulting from the proposed development will include stability for the existing 15 to 20 harvesting contractors, currently employing some 100 to 150 operational staff in the area. A further 200 to 250 people will be directly employed at the Wood Centre. There are identifiable negative impacts on employment opportunities in existing industries from the Wood Centre development as all existing wood supply contracts to local mills will be retained.

This employment will contribute about \$9 million a year in wages and salaries to the economy. The construction period will also create around 200 direct jobs over a period of 12 months. The flow on effects will mean that at least the same number of jobs (200) will be created indirectly.

There will be additional benefits to existing sawmillers including:

- Improved inventory control with reduced log holding capacity required by the sawmiller;
- Improved safety for forest workers preparing logs;
- Improved log specification and quality control as a result of improved log grading and preparation within the Merchandising Yard; and
- Improved delivery lead times as a result of improved transport efficiencies and stockholding.

There will be a greater volume of timber recovered to solid wood products locally.

Modifications in traffic flows should have positive social benefits by reducing log traffic through several major population centres. Further, by moving processing facilities closer to the forest, most of the wood that is moved away from the site will be in enclosed vehicles. Redirection of the traffic flow will impact on some smaller centres.

Electricity generation on site will assist in increasing the reliability of power supply south of Huonville. Additional generating capacity at the end of the transmission

network provides an attractive method of improving reliability of the network as a whole.

The Wood Centre will make a significant contribution to the Huon Valley Municipality rate base.

The Huon Valley has a growing tourism industry that in part depends on the forests. FT is seeking to enhance this tourism appeal through provision of interpretation in the forest and establishment of tourist-centred facilities such as the Tahune Forest AirWalk. Forestry and tourism have developed side-by-side over the past 100 years. Various tourist operators benefit from using infrastructure developed by FT to provide access to forest pursuits in State forest. These and new operations will continue to benefit from infrastructure improvements that are occurring. In addition, the public will be able to view the hardwood and special timber processing in the Wood Centre as a showcase.

A community advisory committee has been established and will be maintained, to ensure that along with local government input, there is a direct opportunity for the community to have ongoing input to the project.

In support of this positive social and economic development, the proposed Wood Centre will cause a minimal impact to the visual integrity of the forests while increasing productivity and maximising use of residues.

12.2.4 Transport and Roads

The potential impacts of traffic movements to and from the Wood Centre include:

- Noise, dust and vibration associated with truck movement;
- Increased traffic;
- Deterioration of road surfaces due to heavy vehicle movements;
- Incompatibility with the present design standard of the roads; and
- Interference with schools and/or other sensitive activities along the transport route.

These potential impacts have been assessed in detail along the proposed transport routes to and from the Wood Centre. An assessment of the indirect transport costs (in terms of environmental noise, greenhouse emissions, local air pollution, water pollution, road construction and maintenance, and road accidents) of the existing transport arrangements when compared to those proposed for the Wood Centre, identified that there would be a decrease in these costs of about 40% for the preferred

transport option.

A wide range of mitigation measures will be undertaken to minimise the potential transport impacts. These include:

- Upgrading of transport routes to DIER and AUSTRROADS standards;
- Stormwater Management during construction to Soil and Water Management Guideline Standards (June 1999);
- Use of a modern, well maintained transport fleet;
- Training of drivers for operations on the transport routes;
- Development and implementation of a comprehensive Traffic Management Plan, covering all aspects of the transport operation; and
- Regular monitoring and enforcement of the transport operation.

While the transport associated with the Wood Centre will result in the redirection of the traffic flow through some smaller population centres, it will result in an overall reduction in log traffic through several major population centres. It is considered that the transport impacts on the community are capable of being satisfactorily managed once an agreed range of remedial work, identified with the community to ameliorate these impacts, are implemented.

12.2.5 Environmental Management Issues

The proposed development will be constructed and operated in accordance with the principles of best practice environmental management as defined in the *Environmental Management and Pollution Control Act 1994*.

12.2.5.1 Terrestrial Issues

The development is to be established in an area on the top of a low ridge, which has no significant land constraints. Excavations will be undertaken to provide a level base for the establishment of facilities.

The fluvio-glacial terrace escarpment encircling the ridge is vulnerable to degradation if disturbed by specific activities and will be impacted in some areas. This layer has been disturbed in some areas of the site by previous site uses (Sharples 1994). The element will be mapped and records kept where excavations are likely to intercept this layer (refer to Chapter 3).

The potential for erosion and sedimentation will be managed both during construction and operation and should be of low potential impact as the result of the mitigation

measures.

12.2.5.2 Atmospheric Emissions

Diffuse and Point Source Emissions

Management measures are to be implemented within each wood processing facility to minimise potential dust emissions from vehicular movements, storage and handling of wood materials and emission of particulates. The implementation of the proposed measures (described in the management measures sections of each facilities EMP) will ensure a low potential for nuisance and/or environmental impact by diffuse particulate emissions.

The main point source atmospheric emissions to be associated with the operation of the Wood Centre are stack emissions from the wood fired combustion facilities at the power station, sawmill and rotary peeled veneer mill (refer to Figure 20). The effective design and operation of these facilities will ensure that emissions meet regulatory standards. Air quality modelling using a standard meteorological data file and the Ausplume model has been undertaken (Appendix U). The results of the modelling indicate that all predicted peak Ground Level Concentrations (GLCs) for the target receptors are below the National Environmental Pollution Measures (NEPM) objectives in all cases. FT will undertake further air quality modelling using meteorological data that will be collected from a weather station on the site this ensable results with a 99.9% confidence level.

Greenhouse Gases

The Wood Centre development will impact on the global greenhouse environment as follows:

- In the Tasmanian context, the release of CO₂ will effectively remain the same, as the same amount of CO₂ will be released whether the wood is burnt in the Power Station, or on the forest floor as a seed bed for the establishment of new forests.
- By reducing fuel used for transport, less CO₂ will be emitted from this source.

In summary, the CO₂ production of the power industry will remain the same, while the CO₂ produced by forestry activities will be reduced. Refer to Chapter 5 for further discussion of greenhouse issues.

12.2.5.3 Hydrology, Water Supply and Wastewater Emissions

The proposed maximum extraction of 5 megalitres a day from the Huon River for use within the Wood Centre operations represents 1% of the minimum flow conditions, or

0.07% of average flows. At this low rate of extraction no adverse impact is expected to the existing ecology of the Huon River.

Contaminated stormwater and process wastewater from the wood processing facilities will be provided with preliminary treatment on each wood processing site, and reused within that facility. Excess wastewater will be directed to site-wide storage ponds for reuse within the Wood Centre operations. No wastewater will be directly discharged to the Huon River except in the case of extreme rainfall events (1 in 10 year, 72 hour rainfall event).

The wastewater management approach proposed for the site will provide a multi-level protection system for any on-site spills or accidents, thereby minimising the opportunity for off-site environmental harm.

The water requirements of the Wood Centre have been significantly reduced through wood processing facilities:

- Establishing re-circulating systems; and
- Using wastewater from the on-site storage ponds in preference to a clean water supply.

Domestic wastewater will be directed from each wood processing site to a communal package treatment plant and application of treated wastewater to land. This facility will be designed and operated to meet statutory requirements.

An extensive water monitoring program will be implemented. Monitoring will include process water streams from each of the facilities, recycled wastewater, ground water at the irrigation site, river water quality upstream and downstream from the site.

The issue of irrigation will be fully assessed and documented in an Irrigation Management Plan to be submitted separately from this DPEMP.

Publication of results via a regularly maintained Forestry Tasmania Wood Centre website will be provided on the Forestry Tasmania site (www.forestrytas.com.au).

12.2.5.4 Noise Emissions

The sound pressure level, for the site as a whole, was derived from the following summary (Table 87) of calculated noise emissions for wood processing facilities and associated main noise sources. Refer to Figure 20 for location of noise emissions from the Wood Centre.

The calculated noise level at the nearest residence, 6 kilometres from the Wood Centre is Leq 28.4 dB(A) compared to a background noise level of Leq 38-44 dB(A).

Due to the location of the proposed development and the management measures proposed for implementation, noise from the operation is considered to have a very low potential for nuisance to any residence.

Table 87 Summary Of Main Noise Sources At Wood Processing Facilities

(Terts, 2001)

Facility / Activity	Noise Level dB(A) from 6 km	
	Lmax	Leq
<i>Merchandising Yard</i>		
• Log drops (mean)	19.6	
• Log loader		14.3
• Chainsaw		8.9
• Fuelwood Processor		19.1
<i>Sawmill</i>		
• General		10.3
• Log drops (mean)	19.6	
• Log loader		14.3
• Chainsaw		8.9
<i>Rotary Peeled Veneer Mill</i>		
• General (machine hall noise)		0.5
• Log drops (mean)	19.6	
• Log loader		14.3
• Chain saw		8.9
<i>Wood Fibre Generation</i>		
• General		25.8
• Discrete noise events	32 - 37.5	
<i>Wood Fired Power Station</i>		
• Power station (General)		20.1
• Transformer		0.0
<i>Wastewater / Reuse Facility</i>		9.3
<i>LOGARITHMIC TOTAL</i>	37.7	28.4

The wood fibre processor is the main noise source on the Wood Centre site. This facility will be fully enclosed in a sound absorbing structure, oriented so that its opening is not directed towards off-site residences. In addition, where possible fuelwood processors (hoggers and/or tub grinders) will be situated behind other

buildings so that the buildings provide additional noise barriers in the direction of residences. The proposed location of potential noise producing equipment is shown in Figure 20.

The calculated noise level at the nearest residence, 6 kilometres from the Wood Centre is Leq 28.4 dB(A) compared to a background noise level of Leq 38-44 dB(A).

Due to the isolated nature of the proposed development and the management measures proposed for implementation, noise from the operation is considered to have a very low potential for nuisance to any residence.

These noise emissions relate to the emissions from the site whereas noise that may affect the health of employees on site is considered as a component of the Health Impact Assessment.

12.2.5.5 *Solid Waste Generation and Disposal*

Solid wastes generated on-site will be managed in accordance with the waste management hierarchy of waste avoidance and minimisation, resource recovery and disposal. The establishment of the wood processing operations on the Wood Centre site will enable maximum recovery of wood and reuse of the wood by-products generated, predominantly as fuelwood in the wood fired power station and heat plants (Figure 6). The environmental impact of solid waste generation will be minimal.

General refuse, packaging wastes, office waste, rock and wood by-product rubble that cannot be used as fuelwood will be disposed of off-site at an approved landfill on a regular basis. Table 88 identifies the solid waste generated by each facility and the disposal alternatives.

Solid wastes from wastewater management systems will be directed to beneficial reuse options where possible in preference to disposal to landfill. No disposal of waste will occur on-site, so no adverse impact is likely to occur.

Table 88 Solid Waste Disposal Summary

Facility	Composition of Solid Waste	Volume (Tpa)	Disposal Mechanism and Location
Merchandising Yard	Wood fines, sawdust, off-cuts, slivers, dockings, bark and out of specification wood.	6,000 T	Power Station
	Mud, rocks and screenings	4,000 T	Returned to forest floor or disposal at a landfill by truck
	General Refuse		Landfill
Sawmill	Wood fines, sawdust, off-cuts and shavings	1,000T	Power Station and Sawmill Heat Plant

Facility	Composition of Solid Waste	Volume (Tpa)	Disposal Mechanism and Location
	Mud, rocks and screenings	220 T	Returned to forest floor or disposal at a landfill by truck
	Ash	1,000 T	Returned to forest floor
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
RPV Mill	Wood fines, sawdust, off-cuts and off specification veneer	1,000 T	Power Station or RPV Heat Plant
	Mud, rocks and screenings	750 T	Returned to forest floor or disposal at a landfill by truck
	Ash	1,000 T	Returned to forest floor
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
Wood Fibre Mill	Wood fines, sawdust, and undersize chips	1,000 T	Power Station
	Mud, rocks and screenings	1,500 T	Returned to forest floor or disposal at a landfill by truck
	General refuse		Landfill
Wood-Fired Power Station	Mud, rocks and screenings	1,500 T	Returned to forest floor or disposal at a landfill by truck
	Boiler ash (coarse and flyash)	4,000 T	Returned to forest floor or disposal at a landfill by truck
	Solid waste from Boiler water treatment system		Reuse or dispose in an approved manner
	General refuse		Landfill
Sewage Treatment Plant	Sludge and Screenings		Reuse where approved options are identified or disposal at municipal landfill
Site Wide	Mud and rocks	1,000 T	Returned to forest floor or disposal at a landfill by truck
	General refuse		Landfill
Total		23,970 T	Per annum solid waste reuse/disposal

12.2.5.6 Hazardous Materials

The main type of hazardous materials to be stored and handled on the Wood Centre site are petroleum hydrocarbons (e.g. diesel) in relatively small volumes. Minor quantities of other materials such as LPG, water and wastewater treatment chemicals,

herbicides, and paints will also be stored on-site. There is a low potential for spillage of these materials during storage, as secure stores and bunds will be provided in accordance with relevant Australian Standards and statutory requirements. For storage locations, refer to Figure 20.

In the event of spillage, contingency measures will be in place on each wood processing site for the containment and clean-up of materials, including:

- Standard response procedures and training of site personnel in response;
- Maintenance of spill kits on-site;
- Establishment of bunds where necessary;
- Ability to collect and recover spillages in wastewater collection pits; and
- Implementation of incident reporting procedures.

The Environmental Pollution Control Act (1994) provides penalties for companies and individuals for breaches of the Act.

12.2.5.7 Health Impact Assessment

The key health issues associated with this project have been identified and include:

- Noise;
- Air pollution;
- Wastewater management;
- Control of biological hazards; and
- Transport related impacts.

The most significant noises that may effect the health of employees on-site are those generated by the breakdown of wood, movement of logs between operating units, vehicle noises, and operating machinery. Of these, the chipper at the wood fibre plant is considered the loudest. The operation of this equipment within enclosed facilities will confine the potential noise impact for off-site receptors, with no off-site impacts anticipated.

The most significant air emissions will originate from the power plant boiler. Location of the 40 m boiler stack on higher ground and the use of environmental best practice pollution control measures will reduce the risk of off-site impacts.

The Wood Centre development reduces the open-air regeneration burning, the forest residues are transported to the Power Station for energy generation on-site, under controlled conditions. Further advantages include:

- Particulate emissions are reduced due to filtration of the combustion gases;
- Dispersion of emissions is better controlled since there is only one point source;
- Better combustion process and control resulting in lower levels of emissions; and

Provided that the mitigation measures proposed are applied, the human health impact of air emissions will be negligible compared to existing levels.

Wastewater of two forms will be produced at the Wood Centre: processing wastewater and domestic wastewater. Wastewater generated during the processing on-site will be reused on-site with only occasional discharge during periods of defined high rainfall.

Wastewater in the form of domestic sewage is to be treated in an on-site package treatment plant, and irrigated in accordance with an irrigation management plan. No significant health impact is likely to occur if these management measures are implemented.

A number of measures will be incorporated in the design of the power station's cooling tower to prevent the potential risks associated with *Legionella*, including the following:

- Exclusion of sunlight;
- Stainless steel cooling tower construction;
- Monitoring and dosing the water; and
- Locate towers away from any type of disturbance and fresh air intake vents; and

To minimise the risk associated with mosquitoes in the on-site storage ponds, it is proposed that regular monitoring of the ponds will be carried out to check for mosquito larvae, at critical times of the year.

Occupational health and safety standards will be followed at each facility. The procedures and measures to be taken by operators will be defined in the facility standard operating procedures prior to commissioning.

Transport of logs and products to and from the site will result in changed traffic movements and an increase in traffic an associated noise in some areas along the route but decreased noise in other areas. A wide range of mitigation measures will be undertaken in consultation with the community including:

- Treatment of wood fibre transport bins to minimise drumming noises when empty;
- Minimise the number of fleet vehicles;
- Reduce transport vehicle speed;
- Keeping the trucks well maintained; and
- Use electro-magnetic rather than engine exhaust braking.

The transport related safety issues involve consideration of the roads, the vehicles, and the drivers, to ensure that the overall transport operations are safe, and follow best practice.

It is considered that the transport impacts on the community are capable of being satisfactorily managed.

In summary, the detailed assessment of each of the potential health issues has concluded that, provided contemporary occupational health and safety practices and procedures are implemented, and the proposed environmental management and mitigation measures are in place, adverse health impacts will be minimised.

12.2.5.8 Hazard Analysis and Risk Assessment

A preliminary hazard identification and risk assessment was conducted on the power station as required by the DPMP Guidelines (Appendix A). The study was done in accordance with AS/NZS 4360, 1999 Risk Management Standards.

The potential hazards were systematically identified using a preliminary Hazard Analysis and Operability Study (HAZOP) (Perry, R.H. 1998) in conjunction with the schematic process flow diagram for the power station. The identified hazards are detailed under each specific operational area, together with relevant actions and recommendations on solutions for prevention. The methodology of the HAZOP is detailed in Appendix T.

The HAZOP study identified the following areas of the power station as having the potential to kill, injure, or cause significant engineering and environmental damage, resulting from abnormal operating conditions or accident based activities:

- Fuel Stockpile;

- Boiler;
- Steam Lines;
- Turbine;
- Cooling Tower;
- Particulate Filter System;
- Air circulation system; and
- Chemical Storage.

Each of these identified areas has been assessed under the Rapid Environmental Risk Assessment Checklist (RERAC) method.

The Hazard Identification above was then used to assess the risk of the most critical hazards present within the power plant site. The RERAC methodology was used to quantify the likelihood and severity of an incident or hazard. This resulted in a ranking of each hazard in terms of total assessed risk (TAS). Events which are ranked the greatest TAS should be given the highest priority in terms of preventative action.

$$\text{Total Assessed Risk (TAS)} = \text{Likelihood} \times \text{Severity}$$

There were no Category One hazards (requiring immediate action) identified. The vast majority of all RERAC assessments fell under a TAS ranking of 5, the recommended level for industry operations.

Only one hazard fell under Category Two (requiring medium term action) and that was the hazard associated with ruptures of lines containing high pressure steam. Whilst deemed hazardous, it is generally not a catastrophic event. There are no direct environmental effects associated with this hazard.

This preliminary RERAC study has not identified any catastrophic environmental hazard event scenarios. Based upon the HAZOP and RERAC studies, it is concluded that if the actions and recommendations outlined in *Preliminary Hazard Analysis and Risk Assessment for the Wood Centre Development* (Appendix T) are acted upon, then there is little risk associated with hazards, which have significant environmental consequences.

12.2.5.9 Fire Fighting and Emergency Services

The temporary storage and processing of stockpiles of wood material on the Wood Centre site is a potential source of fuel in the event of a fire. Other potential fire hazards include the:

-
- Storage of fuels for loaders and equipment used on-site;
 - Conducting of vehicle and equipment maintenance, and possibly oxy-acetylene activities within workshop areas; and
 - Location of the site within bushland.

A number of management measures will be implemented on-site including:

- Storage of fuels in approved facilities and wood materials will not be stored in close proximity to fuels;
- Maintenance of site fire main and adequate numbers of appropriate fire extinguishers on-site;
- Buildings will typically be constructed with cladding exteriors; and
- All vehicle and equipment maintenance and oxy-acetylene activities will be undertaken within confined areas with appropriate separation to stored flammable materials (e.g. workshop areas).

A fire service system will be installed at the site in accordance with the requirements of the Tasmania Fire Service and the relevant Australian Standards, including the Building Code of Australia.

In addition, a Fire Management Plan and an Emergency Response Plan will be developed for the site by the Site Manager to meet the requirements of the Tasmanian Fire Service and the State Emergency Service, which will contain more specific plans for the respective facilities.

12.2.5.10 Flora and Fauna

No plant species of local, state-wide or national conservation significance were located on the site during surveys of the site and review of literature and databases regarding flora in the region. However, *Westringia angustifolia* was identified in the riparian zone on the south side of the Huon River therefore any activities that may impact the riparian zone will be preceded by a vegetation survey of the riparian zone.

The proposed development will result in some loss of heathland communities and the some of the copses of *Eucalyptus amygdalina* woodland community. This impact is not considered to be significant as this forest type is considered to be sufficiently protected under the RFA (pers. comm. Stephen Casey 2001).

Seven faunal species of conservation significance are known, or are likely, to occur in the area of the proposed development. Seven faunal species of conservation significance are known, or are likely, to occur in the area of the proposed

development. The proposed development will, however, only have potential to directly impact on one of these species, the Mt Mangana Stag Beetle. This impact is due to the necessity for clearing of some areas of wet *Eucalyptus obliqua* forest vegetation situated around the periphery of the site that is potential habitat for the stag beetle. A survey will be undertaken prior to construction to determine if the stag beetle is present within the wet *E.obliqua* forest around the periphery of the site. The areas, if found, will be delineated in order to protect the species. Where this is not possible, a permit to relocate due to damage to the area will be sought from DPIWE.

Management measures will be implemented to limit the extent of disturbance during construction and any disturbed areas will be rehabilitated as defined in the landscape master plan.

The project was referred to the Federal Minister for Environment under the *Environmental Protection and Biodiversity Conservation Act* determined that there were no controlled actions.

12.2.5.11 Aboriginal and Cultural Heritage

The Wood Centre development will not impact on European heritage sites, as no sites are known to occur on, or within six kilometres of the site.

No Aboriginal cultural heritage sites were located on the Wood Centre site during a site investigation, nor records of known sites located on the Tasmanian Aboriginal Site Index. Although no Aboriginal sites were located, clearing of the site in preparation for development may uncover relics or features that were not previously evident due to the presence of thick vegetation.

As a precaution, an additional investigation of representative areas will be undertaken during the construction period to determine if any Aboriginal cultural heritage features are present. In addition, management measures will be implemented for the protection of any Aboriginal sites located during construction activities (refer to Chapter 5).

12.2.5.12 Visual Impact

The site is situated on top of a low ridge within State forest, and has been partially modified in several areas by quarrying activities and associated vehicle tracks and a new major road. No readily accessible vantage points are situated within the vicinity of the site which are accessible by vehicles.

Potential areas that may overlook the site are as follows:

- Top of Barn Back from Forestry Tasmania road;
- 200 m section of Bermuda Road (Forestry Tasmania section of road);

- Hartz Mountain looking north; and
- Edwards Road (Forestry Tasmania road).

In general, the views provided from these areas are restricted and distant from the site. The site may be viewed during flights in the vicinity of the Wood Centre.

Given this and the measures to be used to mitigate any potential visual impacts including, use of similar architecture of the main buildings, the use of building and roof colours to minimise contrast with the surrounding vegetation, and the development of a landscape plan for the site, the visual impact of the Wood Centre will be minimal.

12.2.5.13 Energy Use

Electrical power demand for the site is estimated to be up to 10 MW. In addition to electrical power, the RPV mill and Sawmill will require thermal power for drying and conditioning.

The establishment of the power station for power and thermal generation on the site means that, on the whole, the site will be a net exporter of energy.

The following management measures will be implemented:

- Overall energy use will be minimised by selecting where possible motors, lighting and drying equipment that is efficient with respect to power usage;
- The detailed process design will maximise the potential to recover process heat and considerable use will be made of regenerative heat exchangers to achieve the aim; and
- The heat plants will include flue gas economisers for heat recovery.

12.2.5.14 Monitoring

The effectiveness of management measures associated with the development and operation of the Wood Centre and its wood processing components will be monitored to ensure impact on the environment is minimised, statutory requirements are met, and environmental management commitments are implemented. In summary, monitoring of site operations will include:

- Construction operations;
- Water quantity extracted from the Huon River and comparison to flow data;
- Discharge of wastewater from wood processing sites to the site-wide

management system (for internal management purposes);

- Discharge into and from the storage ponds;
- Water quality in the Huon River and Kings Creek;
- Soil and groundwater at the irrigation sites;
- Ambient noise monitoring;
- Obscuration monitoring of combustion plant discharges;
- Recording of noise level emissions associated with noisy equipment (as necessary);
- Monitoring of surface waters in the vicinity of the wastewater irrigation site(s);
- Observation of dust generation from highly trafficked areas (for internal management purposes);
- Maintenance of solid waste records (for internal management purposes);
- Maintenance of hazardous materials records for each wood processing operation (for internal management purposes);
- Complaints and incident reporting investigation and rectification; and
- Quantity of raw materials being used.

In addition, a site environmental committee will be established to oversee environmental management issues on-site.

12.3 Conclusions

This DPEMP has described all aspects of the proposed Wood Centre including the critical environmental effects both positive and negative.

This project meets the commitment by FT to promote sustainable work and innovative practices. By initiating a project that involves the manufacture of value added wood products on a central site within the forests, FT is allowing for local employment opportunities and improved transport efficiencies.

The Wood Centre development focuses on maximising overall returns and achieving greater resource recovery from existing levels of timber supply in the Southern Forests without significant impact on the natural environment.

The proposed Power Station will result in the reduction of forest residue being burnt in re-establishment burns. Instead, the excess residue will be utilised as fuelwood to produce power from a renewable resource for the site as well as the local community. The fuel load within the coupe is thus greatly reduced and will account for the reduction in burn intensity and levels of smoke emission.

The proposed Wood Centre site in the Southern Forests is suitable as a future wood processing centre because it has:

- A significant buffer from conflicting landuses;
- A strategic location in relation to the wood resource and for transportation purposes; and
- Suitable environmental conditions.

The site, after thorough investigation and assessment of potential impacts, has been found to be suitable for establishment and operation of the proposed developments. The site has no conflicting adjacent zoning and land use; provides significant buffers in relation to incompatible land uses; and is suitable in terms of the identified need for employment and technologically advanced resource development in the region. The site has good access to the wood fibre source and with some road improvements will have a suitable transport route to export facilities.

Provided operating standards set down in the legislation, and commitments described in this DPEMP are maintained, the proposed development is not expected to adversely affect adjacent land-uses or the quality of the environment in the area.

The potential benefits and operational efficiencies can be realised without having to harvest any more trees than current levels. The Wood Centre development focuses on maximising overall returns and achieving greater resource recovery from existing levels of timber supply in the Southern Forests without significant impact on the natural environment.

The site has been selected and the proposed development will be in accordance with best practice environmental management techniques and procedures and the *Environmental Management and Pollution Control Act 1994*. These techniques have included:

- A detailed site selection process;
- The provision of a buffer zone around the site;
- The proposed development of the site;

- The proposed minimisation of waste production;
- Detailed environmental management and site operations;
- The progressive and final site rehabilitation; and
- The proposed monitoring and reporting procedures.

12.4 Summary of Environmental Commitments

Forestry Tasmania (FT) is committed to operating the Wood Centre responsibly with respect to the environment. This includes not only meeting the specific regulatory requirements of the relevant agencies, but where possible and appropriate, achieving best practice environmental management.

In the preceding Sections, the potential environmental impacts that may arise from the Wood Centre operation have been detailed and where appropriate actions and procedures, which will be instigated to prevent and or minimise these impacts, have been provided.

The environmental commitments made by FT throughout the DPEMP are summarised in Table 89 below. This table summarises each commitment according to operational site and identifies the timing to carry out the commitment. The table also includes reference to the page number of the DPEMP where additional information can be obtained regarding each commitment.

Table 89 Summary of Environmental Commitments

(CM: Road Construction Manager; SM: Wood Centre Site Manager; FM: Facility Manager; FT: Forestry Tasmania)

Note: Timing (Year) 1: Includes construction

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
TRANSPORT ISSUES					
1	Construction traffic will generally be restricted to daylight hours.	CM	✓		98
2	Speed restrictions for construction traffic will be imposed in sensitive areas.	CM	✓		98
3	Drivers will be given training with respect to operation on sensitive sections of the route during construction.	CM	✓		98
4	Erosion control measures detailed in the Forest Practices Code will be implemented during the construction program.	CM	✓		98
5	Conduct preliminary survey to identify vertebrate roadkill 'hotspots' prior to construction and apply appropriate mitigative measures where necessary.	CM/FT	✓		98
6	Seal those road sections where dust is a problem to residents on sections of Denison Road	CM	✓		102
7	Monitor road kill on Weld and Denison Road during first two years operation.				102
8	Truck operating times will be reviewed and amended with the Community Consultative Committee.	SM	✓		103
9	Ensure that upgrading work to meet the operating requirements of all road users is completed before production commences at the Wood Centre.	CM	✓		120
10	Standard planning and development application process will be followed for any new road construction.	CM	✓		120
11	No commitment, Terts reference.				129
12	Utilise HPVs for wood fibre transport if accepted by the community.	SM		✓	136

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
13	Design HPVs and other product transport vehicles to minimise noise generation.	SM	✓	✓	136
14	Schedule trucks to avoid school bus operating times.	SM		✓	136
15	Schedule trucks in accordance with the limitations of the Central Scheduling and Traffic Management Plan.	SM		✓	136
16	Enforce speed restrictions in consultation with community.	SM		✓	137
17	Reduce braking and acceleration of vehicles.	SM		✓	137
18	Minimise size of transport fleet.	SM		✓	137
19	Use of trained drivers.	SM		✓	137
20	Use modern well maintained vehicles.	SM		✓	137
21	HPV and Log truck trailers will be provided with air bag suspension systems.	SM		✓	137
22	Prepare Traffic Management Plan	SM	✓		138
23	Apply appropriate sealing finishes near residential areas.	CM	✓	✓	138
24	Seal sections of gravel road adjacent to residences if dust is identified as a problem.	CM	✓	✓	140
25	Seal and upgrade North Huon Road.	CM	✓		140
26	Improve road route prior to commencement of HPV transport.	CM	✓		142
27	Vehicles will carry appropriate State Road Traffic Act Regulation and National HVAS notice.	SM		✓	144
28	Fit vehicles with Road Friendly Suspension and carry appropriate certification.	SM	✓	✓	145
29	Drivers will be dedicated to the operation.	SM		✓	145
30	Drivers will take special precaution on road sections where the line of sight is limited.	SM		✓	145
31	Drivers will take particular care in the vicinity of school bus routes.	SM	✓	✓	145

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
32	Trucks will not operate past the Showground on Huon Valley Show Day.	SM	✓	✓	146
33	Develop a new playground to meet Australian Standards at a location agreed with the community.	SM	✓		147
34	Implement erosion control measures for road works in accordance with the Forest Practices Code.	CM	✓	✓	148
35	Monitor transport at representative locations after 12 months operation, and provision of a report to DPIWE.	SM	✓		148
WOOD CENTRE (SITE WIDE) ISSUES					
	<i>Construction</i>				
1	Establish a temporary boundary prior to construction to limit construction disturbance.	SM	✓		153
2	Erect sediment control fences to contain sediment to designated areas.	SM	✓		153
3	Monitor soil retaining measures daily.	SM	✓		153
4	Divert uncontaminated runoff to storage ponds via earthen drainages during construction.	SM	✓		154
5	Provide an effective system for managing sewage during construction.	SM	✓		154
6	Develop a Construction Environmental Management Plan to control soil disturbance during the construction phase.	SM	✓		154
7	Implement rehabilitation and/or stabilisation works during construction to limit erosion.	SM	✓		154
8	Prepare a dust minimisation strategy for the construction phase.	SM	✓		156
9	Monitor dust generation daily, and implement suppression measures as required.	SM	✓		156
10	Ensure visible dust is effectively suppressed so that none leaves the site during construction.	SM	✓		156
	<i>Emergency Measures</i>				
11	Implement management measures to minimise fire hazards on-site.	SM	✓	✓	159

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Install a suitable ring main and adequate fire hydrants	SM	✓		159
13	Maintain fire breaks around the site.	SM	✓	✓	160
14	Develop and implement an emergency response plan.	SM	✓	✓	161
15	Implement energy management measures to comply with BPEM conditions.	SM	✓	✓	165
16	Liaise with DPIWE to develop management measures for water extraction during periods of low water flow.	SM	✓	✓	170
17	Develop a water budget once technical specifications are available.	SM	✓		172
	<i>Terrestrial</i>				
18	A capacity of 65 ML will be maintained at all times for a 72 hour, 1 in 10 year storm event.	SM		✓	173
19	Assess storage dam capacities as component of detailed design stage of the development.	SM	✓		174
20	Document and record the glacio-fluvial terrace system where it is to be disturbed.	SM	✓		182
21	Establish boundaries during construction and operation to limit surface disturbance by vehicular activities.	SM	✓		182
22	Cut and fill batters will be less than 1.5 horizontal to vertical.	SM	✓		183
23	Minimise areas exposed to excavation.	SM	✓		183
24	Plant and mulch areas as soon as possible.	SM	✓		183
25	Construct a stormwater management system during the construction period to prevent erosion.	SM	✓		183
26	Collect and treat all stormwater from the site during construction.	SM	✓		184

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
	<i>Atmospheric Emissions and Greenhouse Effect</i>				
27	Seal the internal ring road.	SM	✓		191
28	Undertake good housekeeping to prevent build up of soil, woodchips and dust on roads.	SM	✓	✓	191
29	Revegetate disturbed areas to prevent generation of windblown soil and dust.	SM	✓	✓	191
30	Cover stockpiles and truck cargoes with tarpaulins during construction	SM		✓	191
31	Install and monitor weather station on the site to provide data for air quality modelling prior to commissioning.	SM	✓	✓	192
32	Implement management measures to reduce the potential for nuisance odour generation.	SM		✓	192
33	Erect and maintain signage with a contact number for notification of problems.	SM	✓	✓	193
34	Investigate and record odour complaints.	SM		✓	193
	<i>Water Supply</i>				
35	Create additional water storage on-site if water extraction from the Huon River during low flow periods has to be reduced.	SM	✓	✓	193
36	Predict optimal abstraction timing using DPIWE ongoing monitoring data.	SM		✓	194
37	Ensure optimal use of water.	SM		✓	194
	<i>Wastewater Emissions</i>				
38	Direct stormwater from rooves to screening/interceptor system and onto site-wide storage ponds.	SM		✓	197
39	Drainage from undeveloped areas will continue to flow in natural drainage lines.	SM		✓	197
40	Provide on-site wastewater treatment at each facility.	SM		✓	197

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
41	Manage stormwater on-site.	SM		✓	197
42	No stormwater overflow will occur during non-storm conditions.	SM		✓	198
43	Monitor vegetation sprayed with treated water for signs of contamination or damage due to application.	SM		✓	198
44	Remove sludge from stormwater settling ponds when it has reached 10% of the total storage or as determined necessary, and beneficially reuse where possible. The sludge maintenance program and desludging protocol will be implemented within 12 months of operation.	SM		✓	198
45	Ensure the sewage treatment plant is designed to manage boiler water treatment chemicals.	SM	✓		199
46	Direct all sewage from all facilities to the on-site sewage treatment plant.	SM		✓	199
47	Utilise portable toilets during construction with regular disposal by contractor.	SM	✓		199
48	Collect and direct domestic wastewater to appropriately designed on-site treatment plant.	SM		✓	199
49	Monitor water quality to determine if other methods of treatment need to be implemented.	SM		✓	199
50	Line storage ponds with impermeable clay liner.	SM	✓		200
51	Design, construct and maintain wastewater reticulation piping in accordance with industry best practice.	SM	✓	✓	200
52	Develop Irrigation Management Plan prior to irrigation program implementation. Address the potential for groundwater contamination at the irrigation site in the plan.	SM	✓		200
<i>Noise Emissions</i>					
53	Select and maintain machinery to minimise noise emissions.	SM	✓	✓	203

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
54	A noise level survey will be undertaken prior site commissioning.	SM	✓		203
55	Investigate and record noise complaints.	SM		✓	203
56	House water supply pump station in building with soundproofing.	SM	✓	✓	204
	<i>Solid Waste Generation</i>				
57	Regular removal of solid waste and screenings from the site-wide wastewater management system.	SM		✓	204
58	Store solid waste in a lidded hopper and disposed of by a licensed waste contractor.	SM		✓	204
	<i>Hazardous Waste</i>				
59	Site Manager will ensure safe operation of communal diesel facility.	SM		✓	207
60	Store hazardous substances in accordance with AS-1940.	SM		✓	207
61	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	SM		✓	207
62	Maintain a spill-kit on-site and contain spills.	SM		✓	207
63	Employ licensed clean-up crew when required.	SM		✓	207
64	Maintain an inventory of hazardous substances on-site.	SM		✓	208
65	Emergency spill response procedures and staff training to be implemented at each facility	SM/FM		✓	208
66	Report all significant hazardous material incidents that have the potential to cause environmental harm to DPIWE within 24 hrs.	SM		✓	208

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
<i>Flora and Fauna</i>					
67	Conduct survey of riparian zone for <i>Westringia angustifolia</i> prior to conducting activities which have potential to disturb vegetation in the riparian zone.	SM	✓		209
68	Investigate the possible existence of the Mt Mangana Stag Beetle within wet <i>E. obliqua</i> forest and delineate appropriately.	SM	✓		210
<i>Aboriginal Heritage and Culture</i>					
69	Undertake an Aboriginal heritage survey upon clearing the site in preparation for development.	SM	✓		211
70	Aboriginal sites encountered will be protected and/or managed in an approved manner.	SM	✓	✓	211
<i>Decommissioning and Rehabilitation</i>					
71	Maintain a riparian buffer of 120 m between the Wood Centre and the Huon River.	SM	✓	✓	212
72	Develop and adhere to a landscaping master plan.	SM	✓	✓	212
73	Retain native vegetation within the 10 metre prescribed planning set back from the site boundary adjacent to Weld Road.	SM	✓	✓	212
74	Submit a decommissioning and rehabilitation plan to DPIWE in the event of closure.	SM	✓		214
<i>Site-Wide Monitoring</i>					
75	Appoint a Site Manager with responsibility for common use services.	FT	✓		214
76	Establish an environment committee for the implementation and management of site-wide environmental issues.	FT	✓		214
77	Site Manager will ensure disturbance does not exceed site boundaries.	SM	✓	✓	215

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
78	Site Manager will ensure dust suppression.	SM	✓	✓	215
79	Site Manager will ensure success of rehabilitation treatment.	SM	✓	✓	215
80	Log and monitor river water abstraction rates.	SM		✓	216
81	Monitor water quality from the storage ponds.	SM		✓	216
82	Receive and maintain copies of wastewater quality from each facility.	SM		✓	216
83	Sample at storage ponds on a weekly basis for the first 6 months for internal management purposes and provide results on the Wood Centre web site.	SM	✓		216
84	Report water quality data for the process wastewater storage ponds to DPIWE quarterly for the first 12 months of operation.	SM	✓		217
85	Review frequency of sampling and analysis after 12 months and modify as appropriate.	SM	✓	✓	217
86	Undertake ongoing monitoring of wastewater quality within the WWTP for internal operational purposes.	SM		✓	218
87	Monitor domestic wastewater quality at the sewage treatment plant outlet monthly.	SM		✓	218
88	Ensure sustainability of the irrigation program by testing water quality parameters after the sewage treatment plant commissioning.	SM	✓		218
89	Forward results of water quality tests to DPIWE every 6 months.	SM		✓	219
90	Establish groundwater monitoring bores at the irrigation sites.	SM	✓		219
91	Monitor groundwater quarterly for the first year and six monthly or yearly thereafter depending on the results.	SM	✓	✓	219

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
92	Make water sampling results publicly available through a regularly updated web site.	SM		✓	220
93	Collect representative soil samples from each reuse area and monitor on an annual basis.	SM		✓	221
94	Test soil samples for heavy metals.	SM		✓	221
95	Report soil sample results to DPIWE annually and publish on web page.	SM		✓	221
96	Maintain a log of sludge removed from the sewage treatment plant and stormwater dams for disposal, including information regarding the method and site of disposal.	SM		✓	221
97	Monitor (visually) vegetation within reuse areas for <i>Phytophthora cinnamomi</i> infection symptoms.	SM		✓	222
98	Noise monitoring will be conducted to ensure statutory requirements and commitments are met.	SM	✓		222
99	Obscuration monitoring of combustion plant discharge will be conducted and reported to the Site Wide Manager.	SM		✓	222
100	Maintain a log of complaints regarding general site issues and record outcomes of the investigation(s).	SM		✓	222
101	Environmental Committee will create a Site Wide Management Plan for hazardous materials.	SM	✓		222
102	Develop an incident response and notification protocol for site wide issues.	SM	✓		223
103	Establish a Community Consultative Committee.	SM	✓		226
104	The Site Manager will convene regular meetings of the Community Consultative Committee.	SM		✓	226
105	The Site Manager will place minutes of meetings on a regularly updated web page.	SM		✓	226

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
106	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	SM	✓	✓	227
MERCHANDISING YARD AND FUELWOOD PROCESSOR					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	244
2	Sweep log sorting and fuelwood processor areas regularly to control fugitive sawdust and wood fibre.	FM		✓	244
3	Use covered conveyors.	FM		✓	244
4	Seal high traffic areas of the Merchandising Yard and use street sweeper to clean up wood fibre and sawdust if watering is an inadequate dust control measure.	FM		✓	244
5	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	244
	<i>Wastewater Emissions</i>				
6	Treated wastewater will be used for appropriate purposes in the Merchandising Yard.	FM		✓	246
7	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	246
8	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	247
9	Test potentially contaminated bund water, organise for its approved disposal and maintain records.	FM		✓	247
	<i>Noise Emissions</i>				
10	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	250
11	Ensure forklifts and loaders are fitted with standard noise control equipment.	FM	✓	✓	250

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Modify sound levels of alarms if found to be a cause of nuisance.	FM		✓	250
13	Control sound intensity of PA system speakers and shift sirens.	FM		✓	250
14	Orientate buildings openings away from nearest residence and utilise noise absorbent insulation in the roof and walls of buildings containing noisy machinery.	FM	✓		250
15	Locate the fuelwood processor adjacent to buildings that will provide a noise barrier.	FM	✓		251
16	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM	✓		251
	<i>Solid Waste Generation</i>				
17	Maximise use of all wood waste for power generation.	FM		✓	251
18	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	252
19	No wood waste will be disposed of on-site.	FM		✓	252
20	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	252
21	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to a licensed landfill.	FM		✓	253
	<i>Hazardous Materials</i>				
22	Conduct vehicle maintenance only in workshops.	FM		✓	253
23	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	255
24	Maintain an inventory of hazardous substances on-site.	FM		✓	255
25	Employ licensed clean-up crew when required.	FM		✓	255

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	255
27	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain record of waste oil quantities.	FM		✓	256
28	Design an emergency response plan for the Merchandising Yard and provide training.	FM	✓	✓	256
29	Report all hazardous material emission to DEM within 24 hours of becoming aware.	FM		✓	256
	<i>Monitoring and Review</i>				
30	Visually monitor dust emissions and control dust by watering.	FM		✓	256
31	Daily inspection and cleaning of the solids removal system.	FM		✓	257
32	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	257
33	Monitor water quality (BOD, TPHC and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report results to the DEM annually.	FM		✓	257
34	Record noise emission complaints with details of investigations and actions.	FM		✓	257
35	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	258
36	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	258
37	Maintenance of internal management records regarding hazardous materials storage and usage.	FM		✓	258

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
38	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	261
SAWMILL					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	279
2	Utilise and maintain appropriately designed ventilation system to manage dust and fugitive emissions.	FM		✓	279
3	No dust from on-site activities will leave the site.	FM		✓	280
4	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	280
5	Seal high traffic areas of the Sawmill site and use street sweeper to clean-up wood fibre and sawdust if watering is an inadequate dust control measure.	FM	✓	✓	280
6	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM	✓		280
7	Open fires will not be permitted on the site.	FM		✓	280
	<i>Wastewater Emissions</i>				
8	Contaminated process wastewater and stormwater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	282
9	Annual reporting of wastewater monitoring results to the DEM.	FM		✓	283
10	Undertake controlled disposal of contaminated water from bunds.	FM		✓	283
11	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	283
	<i>Noise Emissions</i>				

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
12	Select and maintain equipment to minimise noise emissions.	FM	✓	✓	285
13	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	286
14	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		286
15	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM/SM	✓		286
	<i>Solid Waste Generation</i>				
16	Utilise all appropriate wood by-product for power generation.	FM		✓	287
17	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	287
18	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	288
19	Collect and store general refuse in a waste hopper for collection by a licensed waste contractor and disposal in an approved landfill.	FM		✓	288
	<i>Hazardous Materials</i>				
20	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		291
21	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	291
22	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	291
23	Design an emergency response plan for the Sawmill site and provide training.	FM	✓	✓	291

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
24	Maintain a spill-kit on-site and contain spills.	FM		✓	292
25	Employ licensed clean-up crew when required.	FM		✓	292
26	Maintain an inventory of hazardous substances on-site.	FM		✓	292
27	Collect waste oil in drum(s) for removal and recycling by waste contractor and maintain a record of quantities.	FM		✓	292
28	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	292
	<i>Monitoring and Review</i>				
29	Visual dust monitoring and control dust by watering.	FM		✓	293
30	Atmospheric monitoring will be conducted if complaints are received.	FM		✓	293
31	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM	✓	✓	293
32	Monitor water quality (TPHC, BOD and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report the results to the DEM annually.	FM		✓	293
33	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	293
34	Continuously monitor stack emissions with an obscuration meter and alarm system. In case of poor emissions, immediately adjust fuel-to-air ratio.	FM		✓	294
35	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	294
36	Record noise emission complaints with details of investigations and actions.	FM		✓	294
37	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	294

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
38	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	294
39	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	295
40	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	295
41	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	297
ROTARY PEELED VENEER MILL					
	<i>Atmospheric Emissions</i>				
1	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	316
2	Seal highly trafficked areas of the RPV site and use street sweeper if watering is an inadequate dust control measure.	FM	✓	✓	316
3	Ensure dust is confined to the site.	FM		✓	316
4	Design and operation of fuelwood transfer to minimise dust generation.	FM	✓	✓	317
5	Provide personnel with appropriate protection equipment.	FM		✓	317
6	Installation and on-going operation of an appropriately designed ventilation system in the main RPV production building.	FM	✓	✓	317
7	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM		✓	317
8	Open fires will not be permitted on-site.	FM		✓	318
9	Monitor heat plant particulate emissions with an obscuration and audible alarm and adjust fuel-to-air ratio as required.	FM		✓	319

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
10	Utilise modern vehicles with appropriate exhaust management equipment.	FM		✓	319
	<i>Wastewater Emissions</i>				
11	Collection of contaminated stormwater and screening prior to diversion to the site-wide storage pond.	FM		✓	320
12	Treat boiler water treatment system bleed stream and heat plant blowdown in sewage treatment plant.	FM		✓	321
13	Regular solids removal from wastewater screens.	FM		✓	321
14	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	321
15	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	321
16	Test potentially contaminated bund water, organise for its approved disposal and maintain records of disposal.	FM		✓	321
	<i>Noise Emissions</i>				
17	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	323
18	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	323
19	Conduct veneer product loading operations within the RPV building where possible.	FM		✓	324
20	Modify sound levels of alarms if found to be cause of nuisance.	FM		✓	324
21	Control sound intensity of PA system speakers and shift sirens.	FM		✓	324
22	Investigate and record all noise complaints.	FM		✓	324
	<i>Solid Waste Generation</i>				
23	Wood by-products will be reused as fuelwood in the heat plant on-site.	FM		✓	325

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
24	Regularly dispose of screening/interceptor system solids and oils for beneficial reuse operations and/or approved landfill.	FM		✓	326
25	Collection and beneficial reuse of screened solids and ash.	FM		✓	326
26	Regular collection of general refuse for disposal at approved landfill by waste contractor.	FM		✓	327
27	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	327
28	Empty glue containers will be disposed of to an approved landfill.	FM		✓	327
	<i>Hazardous Materials</i>				
29	Storage of minor quantities of hazardous materials over relocatable bunds or similar facility as required by AS-1940.	FM		✓	328
30	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		328
31	Display of relevant material safety data sheets and signage in storage locations.	FM		✓	328
32	Design an emergency response plan for the RPV Mill site and provide training.	FM	✓	✓	330
33	Maintain a spill-kit on-site and contain spills.	FM		✓	330
34	Employ licensed clean-up crew when required.	FM		✓	330
35	Maintain an inventory of hazardous substances on-site.	FM		✓	330
36	Collection of waste oil in drums for removal and recycling by waste contractor.	FM		✓	330
37	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	330

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
<i>Monitoring and Review</i>					
38	Undertake visual monitoring and water for dust suppression as necessary.	FM		✓	331
39	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	331
40	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor outlet continuously. Report results to the DEM annually.	FM		✓	331
41	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	332
42	Continuous obscuration monitoring of the heat plant stack emissions.	FM		✓	332
43	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	332
44	Record noise emission complaints with details of investigations and actions.	FM		✓	332
45	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	332
46	Notification of emissions that exceed statutory requirements and provision of a report to the DEM.	FM		✓	333
47	Develop and implement an incident response and notification protocol.	FM	✓	✓	333
48	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	333
49	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	336
WOOD FIBRE MILL					
	<i>Atmospheric Emissions</i>				

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
1	Conveyors and hoppers will be covered to reduce fugitive sawdust emissions.	FM		✓	350
2	Dust suppression of highly trafficked unpaved areas watering.	FM		✓	350
3	Seal high traffic areas of Wood Fibre Mill area and use street sweeper to clean up wood fibre and sawdust.	FM		✓	350
4	Ensure no dust leaves the site	FM		✓	351
	<i>Wastewater Emissions</i>				
5	Fume extraction system will be provided in babbitt metal work area.	FM		✓	351
6	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	352
7	Pass water through screening/interceptor system prior to discharge to storage ponds and regularly test for TPHC, BOD and TSS. Continuously monitor flow rate from the system.	FM		✓	352
8	All machine and vehicle maintenance will be undertaken in the workshop area where clean-up materials will be immediately available.	FM		✓	353
9	Collection of rotary screw condensate in a sump and regular disposal.	FM		✓	353
10	Undertake controlled disposal of contaminated water from bunds.	FM		✓	353
11	Test potentially contaminated bund water and organise for its approved disposal and maintain records.	FM		✓	353
	<i>Noise Emissions</i>				
12	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		357

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
13	Enclose the Wood Fibre Mill in a building designed for acoustic suppression.	FM	✓		357
14	Undertake noise impact assessment once technical specifications for Wood Fibre Mill equipment are available.	FM	✓		357
15	Enclose re-chipper in a building designed for acoustic suppression.	FM	✓		358
16	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM		✓	358
17	Application of standard practices in the case of discrete noise sources.	FM		✓	358
18	Investigate and implement remedial measures in response to noise complaints.	FM		✓	359
	<i>Solid Waste Generation</i>				
19	Utilise all wood waste for power generation.	FM		✓	359
20	No wood waste will be disposed of on-site.	FM		✓	359
21	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	360
22	Dispatch blade sharpening waste to licensed landfill.	FM		✓	360
23	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to an approved landfill.	FM		✓	360
24	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	361
	<i>Hazardous Materials</i>				
25	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	363

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	363
27	Bunds will be inspected daily for spilt material that will be promptly mopped up or treated with absorbent material and any leaks will be promptly repaired.	FM		✓	363
28	Design an emergency response plan for the Wood Fibre Mill site and provide training.	FM	✓	✓	363
29	Maintain a spill-kit on-site and contain spills.	FM		✓	363
30	Employ licensed clean-up crew when required.	FM		✓	363
31	Maintain an inventory of hazardous substances on-site.	FM		✓	364
32	Collection of waste oil in drum(s) for removal and recycling by a waste contractor. Maintain a record of quantities.	FM		✓	364
33	Report hazardous material emission to DEM within 24 hours.	FM		✓	364
	<i>Monitoring and Review</i>				
34	Visually monitor dust emissions and effectiveness of control by watering.	FM		✓	364
35	Daily inspection and cleaning of solids removal system to ensure at least 25% capacity is available.	FM		✓	365
36	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	365
37	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously. Report results to the DEM annually.	FM		✓	365
38	Record noise emission complaints with details of investigations and actions.	FM		✓	365

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
39	Submit monitoring data to the Director of Environmental Management annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	366
40	Maintain internal management records for hazardous material storage and use.	FM		✓	366
41	Develop and implement an incident response and notification protocol.	FM	✓	✓	366
42	Conduct staff health monitoring of knife sharpening staff.	FM		✓	366
43	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	368
WOOD FIRED POWER STATION					
	<i>Atmospheric Emissions</i>				
1	Undertake air quality modelling for the Power Station and heat plant stack emissions once engineering specifications and site weather data are available.	FM	✓		386
2	Equipment will be designed and operated to comply with the four-tiered approach recommended by the Discussion Paper on Air Quality Management and Policy Development (January 2000).	FM	✓		387
3	Conveyors will be covered to control fugitive dust.	FM		✓	388
4	Ash will be wetted following discharge from the ash bin.	FM		✓	388
5	Seal highly trafficked areas of the Power Station and use street sweeper if watering is an inadequate dust control measure.	FM		✓	388
6	Water highly trafficked unpaved areas to suppress dust.	FM		✓	388
7	No dust will travel beyond the site boundary as an air emission.	FM		✓	388
8	Installation and maintenance of a coarse filter system and ESP will maintain the emissions below 80 mg/Nm ³ .	FM	✓	✓	389

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
9	Adjust fuel-to-air ratio immediately if stack emission opacity exceeds 20% and shut the Power Station down for repairs if opacity continues to exceed 20%.	FM		✓	389
	<i>Wastewater Emissions</i>				
10	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	390
11	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	391
12	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	392
	<i>Noise Emissions</i>				
13	Safety valves will vent through a silencer and venting will only occur during day-time hours.	FM		✓	394
14	Utilise soundproofing and orientate openings toward the Wood Centre.	FM	✓		395
15	Install silencers on equipment as appropriate and select and maintain equipment to minimise noise emissions.	FM	✓	✓	395
16	Stack design will allow for tuning stubs to be installed if necessary.	FM	✓		395
17	Undertake noise modelling when final equipment selection has been made.	FM	✓		395
18	Investigate and apply appropriate mitigation measures if a noise complaint is received.	FM		✓	395
	<i>Solid Waste Generation</i>				
19	Ash and unusable solid waste will be removed from the site to a licensed landfill or for appropriate reuse.	FM		✓	396
20	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	396
21	Regularly dispose of screening/interceptor solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	396

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
	<i>Hazardous Materials</i>				
22	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	399
23	Store hazardous substances in a secure safe building or bund with material data safety sheets and signage in storage locations.	FM		✓	399
24	Maintain an inventory of hazardous substances on-site.	FM		✓	399
25	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain a record of quantities.	FM		✓	399
26	Design an emergency response plan for the Sawmill site and provide training.	FM	✓		400
27	Maintain a spill-kit on-site and contain spills.	FM		✓	400
28	Employ licensed clean-up crew when required.	FM		✓	400
29	Report significant hazardous material incidents with potential to cause environmental harm to DPIWE.	FM		✓	400
30	Report accidental emission to DEM within 24 hours.	FM		✓	400
31	Conduct a detailed HAZOP study prior to commencement of Power Station construction.	FM	✓		405
	<i>Monitoring and Review</i>				
32	Visually monitor dust emissions and control dust by watering.	FM		✓	405
33	Where practicable, daily inspection and removal of the solids from the solids removal system.	FM		✓	405
34	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	406

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE NO.
			1	ON-GOING	
35	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously and report to the DEM annually.	FM		✓	406
36	Monitoring of boiler stack emissions and modification of boiler operation if opacity exceeds 20%.	FM		✓	406
37	Annual reporting of Power Station stack monitoring results to the DEM.	FM		✓	406
38	Record noise emission complaints with details of investigations and actions.	FM		✓	407
39	Submit monitoring data to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	407
40	Develop and implement an incident response and notification protocol.	FM	✓		407
41	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	409

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**Guidelines for the preparation of a
DEVELOPMENT PROPOSAL
AND ENVIRONMENTAL MANAGEMENT PLAN**

for

FORESTRY TASMANIA

**PROPOSED INTEGRATED
TIMBER PROCESSING SITE
(SOUTHWOOD RESOURCES - HUON)
IN THE HUON VALLEY
TASMANIA**

June 2001



Tasmania

**Department of
Primary Industries,
Water and Environment**

GPO Box 44, Hobart Tasmania 7001

- G U I D E L I N E S —
Forestry Tasmania s Southwood Resources — Huon Proposal
June 2001

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GENERAL INFORMATION FOR THE PROPONENT
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These guidelines provide a summary of the information requirements for a Development Proposal and Environmental Management Plan (DPEMP) for Forestry Tasmania's proposed integrated timber processing site, also referred to as Southwood Resources-Huon, located near the confluence of the Huon and Arve Rivers, south west of Judbury. These guidelines are based on the Project Description (version June 2001) prepared by Forestry Tasmania in relation to the proposed activity.

The DPEMP document aims to provide:

- a source of information from which individuals and groups may gain an understanding of the proposal, the need for the proposal, the alternatives, the environment that it would affect, the effects that may occur and the measures taken to minimise any such adverse effects;
- a basis for public consultation and informed comment on the proposal; and
- a framework against which decision makers can consider the proposal, and determine the conditions under which any approval would be given.

The DPEMP should provide details of the project, describe the existing environment in the vicinity of the project site, identify all significant environmental effects associated with the project, and detail proposed measures to avoid or reduce potential adverse environmental effects.

It is recognised that some construction and operational details may not have been finalised at the time the DPEMP is submitted for assessment. The information presented in the document should be as up to date as possible. Where information is unavailable or details have not yet been finalised, estimates and the range of alternative options should be provided.

While these guidelines are intended to address all of the major issues associated with this project, they are not necessarily exhaustive. The guidelines should not be interpreted as excluding from consideration other matters deemed to be significant or matters that emerge as significant from environmental studies, public comments or otherwise during the course of the preparation of the DPEMP.

The main text of the DPEMP should be written in a clear and concise style that is easily understood by the general reader. Technical terminology should be avoided as far as possible. The detailed technical data and supplementary reports necessary to support the main text should be included in appendices. All sources of information should be referenced. An indication must also be given of the currency and reliability of the information used. In particular, the degree of confidence attached to any predictions must be indicated. It is recommended that information be presented on maps, diagrams and site plans to enhance the level of understanding.

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Five key activities are to be co-located at the site. These are:

- a log segregation yard
- a sawmill
- a veneer mill
- a wood fibre (woodchip) production facility
- a wood- fired power station.

The DPEMP should be prepared so that information relating to each of these key activities can be easily identified by relevant decision makers and the public.

Close consultation with the assessing authorities during the preparation of the DPEMP is recommended. More than one draft may be necessary before the document is considered suitable for public release.

Following the public consultation phase, the DPEMP may require amendment as a result of consideration of public and government agency submissions. This generally takes the form of a supplement to the document.

The proponent needs to ascertain whether or not the Commonwealth Minister for the Environment and Heritage is required to undertake an assessment and approve the project in accordance with the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999*.

Format

The DPEMP is to be submitted in a printed format and in an electronic format suitable for publishing on the internet (e.g. pdf format).

Copies are to be made available to the public upon request and for a nominal fee, in either printed or electronic format (CD ROM).

The next section details the required content of the DPEMP. This information has been set out in a manner which may be adopted as the structure for the DPEMP. This format need not be followed where the required information can be more effectively presented in an alternative format. However, any significant departure from the structure or any departure from the requirements and intent of these guidelines must be agreed upon by the assessing authorities.

CONTENTS OF THE DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN

(i) CONTENTS

Provide a list of the contents of the report with reference to the relevant page numbers.

(ii) FOREWORD

This section should briefly outline the assessment and approvals process, and explain the function of the DPEMP document in this process.

The opportunity for the public to comment on the draft DPEMP should be made clear. Information should be provided on:

- how to lodge a representation;
- the date by which representations must be received;
- the rights of a person who makes a representation to appeal against the granting of a permit;
- how representations may be regarded as public documents unless an argument is put to the contrary by the person making the representation.

(iii) EXECUTIVE SUMMARY

This section should provide a clear and concise summary of the DPEMP and include an overview of the project and its environmental implications. It should also contain headings that correspond to the main section headings and subheadings of the DPEMP.

The executive summary should be written in such a manner that it can be supplied to interested parties as a stand alone document.

1. INTRODUCTION

This section should identify the proponent(s) and provide relevant background to the project. The time frame for the development and commissioning of the project should also be given.

The relationships/links between the various elements of the project must be outlined, together with the relationship between the on-site managers, in the case where there may be more than one operator on the site. Other approvals required for the project to proceed (at Local, State and, if relevant, Commonwealth level) should be identified, and the status of each approval given.

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The rationale/need for the project should be outlined, together with the broad economic, environmental and social implications for the local and regional community.

An outline of any public consultation undertaken in preparation of this document should also be given.

2. DEVELOPMENT PROPOSAL

2.1 Site Description

This section should describe the proposed Southwood Resources - Huon site and proposed transport routes to and from the site, and must include:

- Information on land tenure for all land to be developed, with title details.
- Information on land use and ownership within 2km of the site and those areas which may be affected by the project, including vehicle movements. In particular, the location of individual residences, schools, hospitals, caravan parks and similar sensitive uses which may be affected by the project should be included (including any sites which are currently vacant, but for which construction plans have been lodged with the planning authority). The location and nature of commercial and industrial facilities should also be included along with tourist and recreational facilities or routes (such as camping areas, swimming areas, walking tracks etc.).
- A description of the vegetation of the development site and of any land to be used for wastewater irrigation.
- Details of the geology, geomorphology, soils and hydrology of the development site and any land to be used for wastewater irrigation.
- A description of the local meteorology at and in the vicinity of the site, including information relating to air dispersion.
- Existing utility services (electricity, water etc.) and the availability and capacity of these services in relation to the project.
- The acoustic environment of the site and surrounding area, including background noise levels for selected residences and other sensitive uses that could potentially be affected by the project. The selection of such sites is to be approved by the Director of Environmental Management.
- A description of the existing visual characteristics of the project site.

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- Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance which may be affected by the project, including the development of infrastructure directly resulting from the project.
- A description of the biological characteristics (flora, fauna and ecological communities) of the project site.
- Rare, threatened or endangered species or ecological communities, including those listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* and Tasmania's *Threatened Species Protection Act 1995*, which may be affected by the project.
- Any identified areas or habitats of conservation significance, including conservation areas and areas relating to the requirements of international treaties (e.g. designated Japan-Australia and China-Australia Migratory Bird Agreements, and Ramsar [wetlands] Convention).
- A description of natural processes of particular importance for the maintenance of the existing environment (e.g. fire, flooding).
- Information on species, sites or areas of landscape, aesthetic, wilderness, geo-conservation (as listed on the Tasmanian Geoconservation Database and identified on the site), scientific or otherwise special conservation significance which may be affected by the project.
- Any declared World Heritage Area properties that may be affected by the project.
- Any places listed or interim listed on the Register of the National Estate which may be affected by the project, and a summary of their statement of significance.
- Any places on the Tasmanian Heritage Register (maintained by the Tasmanian Heritage Council) which may be affected by the proposal.
- Any places listed on local government planning scheme heritage schedules, which may be affected by the project.
- An assessment of the vulnerability of the site to natural risks (e.g. flooding, earthquake, fire, strong winds etc).
- Information on the existing major transport access routes to the site, including present use by log trucks and other heavy vehicles.
- The relationship of the Derwent Link Road to the Southwood Resources - Huon project.
- The sources of timber to be processed, including type of timber and location.

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- A locality map or maps of appropriate scale showing:
 - boundaries of the project site;
 - land tenure (private/public) of land in the vicinity of the site;
 - land zoning (Planning Scheme or Interim Order) of the project site and all land within a 1.0km radius of the site;
 - details of any planning scheme amendments/rezoning necessary for the lodgement of permit applications with Council;
 - topography, watercourses etc.;
 - access and cartage routes (existing and proposed);
 - any existing or proposed (i.e. plans lodged with Council) houses in the vicinity of the development site which could potentially be adversely affected by the project;
 - the location of any land proposed to be irrigated with wastewater.

2.2 Consideration of Alternatives and Justification for the Preferred Options

Prudent and feasible alternatives that could satisfy the objectives of the project should be discussed in sufficient detail to make clear the reasons for preferring certain options and rejecting others. The reasons behind the choice of the preferred option should be explained, including the environmental, technical, social, economic and other criteria influencing the choice of the preferred options and a comparison of the expected adverse and beneficial effects at local, regional, state and national levels. Groups or communities adversely or beneficially affected by the various alternatives should be identified. Where appropriate, other sections of the DPEMP should be referenced, to avoid duplication. Specific alternatives to be examined include:

- alternative sites;
- alternative forms of transport, for example rail;
- alternative transport routes for all products coming to or leaving the site, including the construction of bypasses;
- alternative port locations and associated transport routes;
- alternative sources of energy/power with regard to the power station; and
- alternative configuration, design and construction options for the project.

The alternative of not proceeding with the project should also be discussed, with reference to the environmental, social and economic implications for both the short and long term.

2.3 Project Description

This section should provide a full description of the proposed project, including any necessary associated infrastructure development. The following must be included:

- The amount of wood and woodwaste material to be imported to the project site. This must include the identification of the supply areas (private/Crown and general locality), and quantities from these supply areas of wood and woodwaste to be processed. The wood and woodwaste needed to supply the activities at the project site should be discussed in the context of the current harvesting rates in the region and statewide.

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- The quantity and type of wood used in each facility and the outflow of product and waste from each facility should be described along with flows of product and waste between facilities.
- A description of the nature and quantity of other raw materials to be used in each facility should be included. For example, all sources of fuel that will be used in the power station should be described.
- Detailed plan(s) of the proposed Southwood Resources - Huon and wastewater irrigation site(s) at an appropriate scale showing, where relevant:
 - existing vegetation;
 - topography and watercourses/swamps;
 - landform modifications associated with the development of the site;
 - access roads (proposed or existing);
 - the proposed location of buildings, major items of equipment and plant, raw material receive and handling areas, log stockpiles, chip loaders and stockpiles and product storage and dispatch facilities;
 - all effluent and stormwater collection and treatment facilities, and storage dams; and
 - facilities and equipment associated with the irrigation of wastewater.
- A description of the activities to be carried out during the construction and operational phases. This should include a step-by-step description of the production process and the major items of equipment or facilities to be used, from the point of entry of raw materials to the site to the final dispatch of products.
- A timetable for construction, commissioning and decommissioning of individual facilities and the overall project.
- Arrangements for the storage on the site of raw materials and products should be included.
- A full description of the locations for all point sources of emissions to air, land and water. The nature and quantities of all wastes (including solid wastes) must be described, along with any treatment or pre-treatment processes provided on or off the site. A description must be provided of the present receiving environments into which these wastes will be discharged. This will be used as a benchmark against which comparisons can be made in the future and must include:

The atmospheric environment that could be potentially affected by the project;

- Any receiving waters;
- Local groundwater characteristics; and
- Noise characteristics of the project site and the area surrounding the site that could potentially be adversely affected by the project.

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- The location of any solid waste disposal sites on and off the project site where waste will be disposed of and the potential adverse effect this disposal will have. If the disposal site is off the project site, this should include the effect of the use of the disposal site on the projected operational life of the disposal site.
- The projected hours of operation of the various processes at the project site (hours per day/days per week etc). Hours of operation during construction should also be detailed.
- Arrangements for the transport of raw materials to the site and woodchips and other products from the site, including proposed transport routes and transport times, should be described. The nature and number of truck movements, which will occur on a daily basis, should be estimated and details of the times of truck movements provided. Significant changes in the pattern (numbers and/or times) of heavy vehicle movements on public roads should be described. Other changes to vehicle movements as a result of the project should also be described.
- A description of any public infrastructure development required (roadworks, power supply etc.) to support the development.
- The source, quantity and quality of water which may be consumed in the processes, and approvals required (where appropriate) for water extraction. Contingencies for drought conditions should be detailed.
- The quantity of water that will be consumed during each activity, the source of the water (including reuse of wastewater), and any infrastructure required to supply water to the project site.
- A general description of port facilities that will be required to enable the export of woodchips and other products, and the arrangements for the transport of chips and products to the wharf and storage prior to export. Details of the expected frequency and duration of ship loading and the routes used for the transport of chips and other products to the wharf and times of transport should be included.

The Tasmanian Government has established a forests practices system to regulate the environmental effects of forest harvesting in Tasmania. Forest practices and forest harvesting have also gone through an assessment and accreditation process as part of the Tasmanian Regional Forest Agreement. The forest practices system is designed to ensure that environmental impacts are minimised, and the further assessment of the environmental impacts of harvesting of raw materials to supply the Southwood Resources - Huon project is outside the scope of the Board's assessment. However, a description of the supply of wood and woodwaste raw materials for the project should be provided with reference to the Regional Forest Agreement (RFA) and the Forest Practises Act in order to give an outline of the overall context of the project.

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This section should describe how the following issues are dealt with under the RFA and Act:

- Any listed threatened species or communities within the supply areas;
- Any Ramsar listed wetlands within or in the near vicinity of the supply areas;
- Any World Heritage Areas within or in the near vicinity of the supply areas;
- Any listed sites within the supply areas on the Tasmanian Heritage Register;
- Any areas within the supply areas identified as having Aboriginal heritage significance;
- Sites on the Interim List or Register of the National Estate within or in the near vicinity of the supply areas;
- High Quality Wilderness Areas as mapped for the RFA within or in the near vicinity of the supply areas;
- Any areas within the supply areas that are identified by the RFA Private Land CAR Reserve Program as priorities for reservation for nature conservation purposes or as containing under-reserved forest types; and
- The implications of wood supply and its subsequent use on greenhouse gas emissions.

2.4 Social and Economic Aspects

The following information should be provided on the social and economic aspects of the project:

- Total capital investment for the project;
- Employment opportunities during both the construction and operation phases;
- Extent to which raw materials and related services will be sourced locally;
- Proposals to enhance or provide additional community services or facilities.

This section should also describe the existing social and economic environment that may be affected by the project, including information on the following:

- A summary of the social/demographic characteristics of the population living in areas which may be affected by the project, including transport related to the project, identifying any special characteristics which may make people more sensitive to effects from the project.
- An overview of the health status of the population living in areas which may be affected by the project, including transport related to the project, with a view to identifying any specific health characteristics which may make these people more sensitive to effects from the project than might otherwise be expected.
- A summary of the characteristics of the local and regional economy (e.g. existing employment trends or land values).
- Community attitudes to the project.

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3. ENVIRONMENTAL MANAGEMENT PLAN

3.1 General

This section should identify and evaluate potential environmental effects associated with the project and measures to avoid or mitigate adverse effects. For each effect or combination of related effects, the evaluation should be presented in the following format:

- **Existing conditions** - where relevant, an outline of the pertinent existing conditions relevant to that effect (with cross-referencing where appropriate to earlier sections).
- **Performance requirements** - define the environmental performance requirements to be achieved for that effect. See below for further information.
- **Potential effects** - an outline of all of the potential environmental effects of the project (positive and negative) in the absence of special control measures. The pre-construction, construction, commissioning, operation, maintenance and decommissioning phases of the project and infrastructure use and development must be considered.
- **Avoidance and mitigation** measures - a description and list of the measures proposed to avoid or mitigate potential adverse effects in order to achieve the environmental performance requirements (such as through pollution control technology or management practices). Outline the cost of these measures. Any compensatory actions proposed for unavoidable residual adverse effects should be identified.
- **Assessment of effects** - an assessment of the overall effects of the development on the environment after allowing for the implementation of proposed avoidance and mitigation measures. This should include an evaluation of the significance of effects and comparison with state, national and international regulations and standards. Any net environmental benefits likely to result from the project should be identified.

Note that although this section of the guidelines outlines issues that should be addressed in the document, it should not be interpreted as excluding from consideration other matters deemed to be significant or matters that emerge as significant from environmental studies, public comments or otherwise during the course of the preparation of the DPEMP.

Identification and Evaluation of Environmental Effects

Predictions and evaluations of environmental effects should be based on scientifically supportable data. The methodologies used or relied on should be referenced, together with the relevant research and investigations supporting them. Assumptions, simplifications and scientific judgements should be stated clearly and the nature and magnitude of uncertainties should also be clearly defined. Where relevant, the choice of a particular methodology over alternative methodologies should be explained. Where effects are not quantifiable, they should be adequately described.

The evaluation of potential environmental effects should identify worst case consequences, the vulnerability of the affected environment to the potential effects and the reversibility of the effects. Potential cumulative effects also need to be addressed. Interactions between biophysical, socio-economic and cultural effects should be identified. The representation of the above information on maps, diagrams, site plans and photographs is recommended.

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Performance requirements

Performance requirements should be identified for each environmental effect and evidence provided to demonstrate that these can be complied with. These may be standards or requirements specified in legislation, codes of practice, state policies, or determined by agreement with the approving authorities. Industry best practice standards, such as the *Tasmanian Sawmill Environmental Code of Practice* 1995, should be referred to where appropriate.

It should be demonstrated by comparative analysis of international experience and trends that the project will use a combination of technology, processes, and management practices that will ensure that the environmental performance of the project is consistent with the principles of best practice environmental management.

Unsupported assertions that performance requirements will be achieved will not be considered adequate.

Consideration of alternatives

Where there are clear, alternative avoidance or mitigation measures for a particular adverse environmental effect, the alternatives should be reviewed and the preferred option justified.

Mitigating adverse effects

Where adverse environmental effects are identified after avoidance measures have been adopted, the proposed measures to reduce the effects (e.g. pollution control equipment, treatment processes, management practices) should be described in detail. The extent to which they will overcome the anticipated effects should be specified.

Where pollution control equipment and/or treatment processes are key factors in achieving satisfactory environmental performance, contingencies in the event of breakdown or malfunction of the equipment or processes should be discussed. It should be demonstrated that the maintenance of pollution control equipment can be provided for without causing performance requirements to be exceeded.

Where measures to control effects are necessary, but are not the responsibility of the proponent, this should be indicated together with any information regarding the commitment by the responsible party to implement the measures. Any influence the proponent may bring to bear to ensure that the necessary measures are implemented should be identified. For example, if plant maintenance or the operation of a section of the plant which has potential for adverse environmental effects is not to be the responsibility of the proponent then this should be identified and the relevant details of the lease or other documentation defining responsibility included.

Details of procedures and instructions to employees (including contractors) on minimising adverse environmental effects of activities, as well as employee induction and education programmes to ensure an appropriate response to operational environmental concerns, should be included in relevant sections.

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Compensating for unavoidable adverse effects

If adverse residual environmental effects from the project are considered unavoidable despite the adoption of best practice environmental management avoidance and mitigation measures, then proposals to compensate for such effects should be detailed. For example, if the loss of conservation values, community assets or amenities is considered unavoidable, measures to compensate for the conservation values to be lost, or the community assets or amenities to be affected should be proposed. Any compensatory actions proposed must be demonstrated to be 'real' actions. That is the actions must have a measurable compensatory effect that is equitable to the actual adverse effect of the project, and the actions must be ones that would not have otherwise occurred.

Sustainable development objectives

It should be demonstrated that the project is consistent with objectives as required by the relevant Commonwealth and Tasmanian statutes and policies, including the National Strategy for Ecologically Sustainable Development, and the Tasmanian Resource Management and Planning System.

Waste management hierarchy

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of consistent with the waste management hierarchy. That is, in decreasing order of desirability:

- waste avoidance;
- waste recycling/reclamation;
- waste re-use;
- waste treatment to reduce potentially adverse effects; and
- waste disposal.

Referencing

Where appropriate, refer to information provided in earlier sections to minimise duplication.

3.2 Site Wide and Off-Site Issues

The environmental issues associated with each activity need to be addressed separately. However, site wide issues and off-site issues which include transport, social and economic effects, and noise, air and water emissions from the project as a whole, should be addressed in this section.

3.2.1 Air Emissions

General

Based on the air emissions from each facility defined below, this section should identify potential effects of the project on the local, regional and global air environment, measures to

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avoid and mitigate any possible adverse effects, and assess the overall effects on the air environment following implementation of the proposed avoidance and mitigation measures.

The dispersion of emissions beyond the property boundary should be discussed in relation to local meteorology, particularly in relation to worst case atmospheric conditions, regional ambient air quality and the location of existing and proposed residences, and the location of any public reserves, or access areas. The assessment of effects associated with air emissions must be supported by appropriate predictive modelling.

Performance requirements to be achieved should also be discussed along with both point and fugitive sources during construction and operation.

Emissions from power station and heat plants

The effect of burning wood in the power station and in the heat plants associated with the veneer mill and sawmill compared to the current practice of burning woodwaste on the forest floor should be discussed. An estimate of the proportion of woodwaste on the forest floor that will be used in the power station and heat plants should be stated as well as how much wood will still be burnt in the forest.

Emissions from vehicle movements

Air emissions associated with vehicle movements are to be addressed in more detail in Section 3.2.4 (Transport).

3.2.2 Noise Emissions

This section should identify the predicted noise levels at selected domestic premises and other sensitive areas that may be adversely affected by noise from the project as a whole and assess the effect of these levels. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background conditions and modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

The issue of noise effects relating to vehicle movements are to be addressed in more detail in Section 3.2.4 (Transport).

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3.2.3 Irrigation of Wastewater

Where wastewater is to be re-used for the purposes of irrigation, an irrigation management plan must be provided. It needs to be shown that the wastewater will not give rise to adverse off-site environmental effects or degradation of groundwater or irrigated land.

The issues that should be addressed include:

- The level of contamination in the water to be irrigated;
- The quantity of water to be irrigated;
- The suitability of the irrigation site, based on soil type, geology, groundwater depth, slope etc, for irrigating the proposed volume and quality of water;
- The effect of climatic factors on the proposed irrigation. For example, the capacity of the land to absorb irrigation water after storm events.
- The construction and capacity of the wastewater storage dam. It must be demonstrated that the capacity of the dam is suitable for predicted wastewater production and rainfall on the site.

A monitoring and review programme to determine any adverse effect caused by the irrigation should be provided and should include details of any pre-commissioning monitoring/studies. The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is also required.

3.2.4 Transport

This section should contain an evaluation of the potential for truck and other transport activities associated with transporting personnel and materials to or from the project site to give rise to public health and safety, and environmental effects, including noise and air emissions, dust and vibration. Each of the activities on the facilities site will in some way add to these effects to varying degrees. As such, it is required that the transport issue be initially addressed in this section for all the activities on the site, and then again for the greatest potential for transport effects associated with the project is likely to be from the individual facilities within their own section of the Environmental Management Plan. The transport of woodchips to a port facility for stockpiling and dispatching.

The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on all affected roads. To allow a meaningful comparison to be made, the manner in which vehicles are grouped in this study should be stated;
- the changes that will result from the implementation of the project as planned, including the number, size and times of truck, and other vehicle movements. This should include the consideration of employees/contractors travelling to and from the site during construction and operation and any other changes to current road usage;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc. that will be affected;

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- noise, vibration, dust (including dust from woodchips during transport) and atmospheric effects due to vehicle movements, along with their effect on local populations;
- public safety issues, particularly whether school buses, pedestrians, tourists etc. use the roads, and an assessment of the road surface, bridges, sight distances and side accesses;
- the effect of the increased truck traffic on road maintenance programmes and the need to increase maintenance or acceleration of maintenance programmes on any local roads affected by the project; and
- changes to cultural characteristics or lifestyles, due to changes of transportation patterns.

In addition to the above, a road safety audit or assessment for transport related issues through Ranelagh should be provided.

Predicted noise levels and air emissions due to vehicle movements are to be included. Where appropriate, predicted effects are to be supported by on-ground measurements of background conditions and modelling. Methodologies and monitoring locations are to be agreed to by the Director of Environmental Management.

Measures that will or can be taken to mitigate the potential for adverse effects due to vehicle movements should be detailed, including any proposed upgrading of roads as part of the project, the timing of any such works and details of the residual effects as a result of the implementation of these mitigation measures.

3.2.5 Infrastructure Provision

This section should identify potential effects on any significant off-site or infrastructure facilities and/or the need to construct additional infrastructure or off-site facilities, identify measures to avoid and mitigate any possible adverse effects due to these facilities, and assess the overall effects following implementation of the proposed avoidance and mitigation measures.

This should include the supply of power to and from the site, supply of water to the site, wastewater disposal pipe networks, fire and emergency response facilities and service roads to and from the site. If major excavation or other earthworks directly associated with the project are to occur off-site, these areas and any adverse effects that could be caused by the excavations should also be described.

Any adverse effects likely to result from the extraction of water for the project from the Huon River, including the consideration of in-stream environmental values and downstream water users, should also be assessed in this section. Long term seasonal flow characteristics of the river should be considered in this assessment.

For infrastructure that is to be included in the permit application, sufficient detail should be provided to enable any adverse effects of such infrastructure to be assessed and permit conditions issued if necessary. For example, the consideration of visual effects and

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conservation, archaeological and cultural heritage issues must be included in the assessment of the provision of such infrastructure. Any interruptions to public services should also be detailed.

For infrastructure that will be dealt with in a separate permit application, enough information should be provided to give an overview of any adverse effects of such infrastructure or details of studies that will be undertaken when an application is lodged.

3.2.6 Social and Economic Issues

This section should contain the following information on the social and economic effects of the project:

- The effects on local and State labour markets for both the construction and operational phases of the facility, presented according to occupational groupings of the workforce. Employment numbers should be stated as full-time equivalents. Skills and training opportunities should also be discussed.
- The effects on upstream/downstream industries, both locally and for the State, including the effect on other timber processing sites (such as the Triabunna woodchip mill and local sawmills).
- The effects on public revenue and expenditure at Local, State and Commonwealth Government level, including Government Business Enterprises.
- Community infrastructure effects, including recreational, cultural, health and sporting facilities and services.
- Community demographic effects as a result of population changes (cultural background, occupation, incomes etc.).
- Community disruption, and changes to cultural characteristics or lifestyles, including the effect of transport routes.
- Effects on land values, and demand for land and housing, including the effect of transport routes.
- Effects on land management and productivity (during and after construction).
- Effects on the local, regional, state and national economies.
- Long term effects if the facility does not proceed.

An assessment must also be made of the potential effects the project may have on recreational and tourism activities in the region, including bushwalking, horseriding, fishing, local tourism ventures (such as Snowy Range Trout Farm), boating, public vehicular use of forest roads, scavenging for speciality timbers and the potential for positive effects such as development/promotion of tourism route circuits.

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3.2.7 Health Impact Assessment

It should be noted that, in accordance with Section 74(5) of the *Environmental Management and Pollution Control Act* 1994, the Director of Public Health has required the potential health impacts of the development to be assessed.

As such, this section should identify all potential health risks or impacts associated with the project, or health benefits, and where appropriate identify measures to prevent or mitigate potentially significant health risks. This assessment must include, as a minimum, consideration of air emission ground level concentrations and their effects on health, the control of biological hazards (especially legionnaire's disease) in relation to cooling towers, evaporative coolers or the like, as well as transport effects on potentially affected residents.

Any relevant performance objectives, to be achieved to ensure that there is minimal potential for adverse health effects associated with the project, should be given. The implications for future land use and human health should also be addressed. Positive health effects should also be discussed.

3.2.8 Greenhouse and Ozone Issues

The potential effects of the project on the enhanced greenhouse effect should be reviewed. The review should include the following:

- An assessment of the project in terms of the National Greenhouse Strategy;
- The total annual greenhouse gas emissions to arise from the operation of the project, including transport, and the net contribution of the project to the enhanced greenhouse effect;
- Details of any feasible alternative ways of providing energy for the project, transport of materials to and from the project, or otherwise implementing the project so as to have a lesser adverse effect on the enhanced greenhouse effect, and the justification for not adopting these alternatives.

Any use of ozone depleting substances in the project (such as in refrigeration or firefighting) should be identified and justified. Compliance with the relevant provisions of the *Environmental Management and Pollution Control Act 1994* should be demonstrated.

3.3 Log Segregation Yard

A detailed description of operations in the log segregation yard must be given, from raw material receipt, to product packaging and/or dispatch.

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3.3.1 Air Emissions

The most significant potential sources of air emissions from the yard should be described, including:

- dust from stockpiles of raw material, product or waste.
- dust from yard areas particularly where mobile equipment may be used.

Measures for preventing or mitigating emissions should be described.

3.3.2 Wastewater Emissions

All waste emissions to water (including to groundwater) must be assessed, including:

- log washing waters and log storage yard run-off;
- on-site equipment (including vehicle) cleaning.;
- stormwater runoff from paved and unpaved areas;
- firewater.

The management of sewage, if necessary, should also be addressed.

In each instance the volumes of wastewater generated, the method of collection and treatment, the quality before and after treatment, and the point(s) of discharge or reuse should be identified. Management procedures for the removal or reuse of stormwater from bunded areas must also be described.

Provisions for the diversion of uncontaminated stormwater away from areas where contamination may occur should be detailed.

Where wastewater is to be re-used for the purposes of irrigation, it needs to be shown that the wastewater from this facility will not give rise to adverse off-site environmental effects or degradation of groundwater or irrigated land. Assessment of the irrigation of wastewater from the whole project is to be addressed in Section 3.2.3.

3.3.3 Noise Emissions

This section should identify all major sources of noise (fixed and mobile) and determine the associated noise emission levels. The predicted noise levels to be experienced at the boundary of the yard, existing background noise, and the operating hours of equipment and machinery at the site must be provided and any adverse effects assessed. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background noise and noise modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and

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topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

3.3.4 Waste Disposal

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of, consistent with the waste management hierarchy.

The source, quantities and nature of all solid wastes and liquid wastes (if not addressed in other sections) from the proposed yard must be described, together with associated management strategies. The method of handling and reuse and/or disposal of wood wastes must be described. The collection and reuse of waste oil from vehicle and machinery maintenance must also be addressed. Wherever possible, beneficial reuse of all wastes generated on the site should be pursued.

Any controlled waste, as defined in the *Environmental Management and Pollution Control Act 1994*, that will be generated should be identified. The quantities, method of storage and disposal for each controlled waste should be described.

3.3.5 Hazardous Materials

All potentially hazardous materials (including fuels) must be identified. The handling of these materials should be outlined, including the quantities of such materials, the type of storage and its location. Compliance with the requirements of other authorities (e.g. the *Dangerous Goods Act 1998*) should be demonstrated where applicable.

Identify any safety management requirements for the protection of human health, including the health and safety of the community outside the boundary of the premise.

Detail contingency plans for when control measures/equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures. This must include measures to protect groundwater and soil from contamination by spillages etc, and safety procedures. It must be shown that the contingency plans are consistent with any local or regional response plans.

3.3.6 Visual Effects

Provide details (including illustrations, photographs and other graphic representations) of the appearance of the yard from all significant vantage points, including major roads, residential areas, tourist facilities and lookouts (including from World Heritage Areas and Hartz Mountain), and provide an assessment of how this might affect the visual quality objectives

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for the area. Identify any measures proposed to minimise adverse visual effects of the project (such as height, size, design, colour, location etc.).

3.3.7 Energy Use

The energy use for the yard should be quantified, together with details of measures that will be undertaken to reduce the overall energy demands of the operations.

3.3.8 Truck and other Transport Movements

This section should identify and evaluate the potential for vehicle movements, including trucks transporting raw materials to the site, or product from the site, to give rise to adverse effects associated with noise, air emissions, dust or vibration.

The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on the affected roads;
- the changes that will result from the implementation of the project as planned, including the number, size and times of truck and other transport movements;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc that will be affected.

Predicted noise levels and air emissions due to transport movements are to be included. Where appropriate, predicted impacts are to be supported by on-ground measurements of background conditions and modelling. Methodologies and site locations for the measurements must be approved by the Director of Environmental Management.

Proposed measures to reduce the potential for adverse effects must be detailed.

3.3.9 Fire Fighting and Emergency Services

This section should assess the potential for operations in the yard to cause the ignition of fires and describe the methods proposed to minimise the fire risk. A Fire Fighting and Emergency Management Plan must be prepared for the yard to ensure that there is adequate emergency management provisions to respond to emergencies and fire break-outs on the site. This plan, and emergency management facilities, must be compatible with plans and facilities developed for the adjoining industries, and where appropriate, Forestry Tasmania's fire services and other local emergency authorities.

3.3.10 Biodiversity and Conservation Issues

This section should identify any adverse effects the processing yard may have on:

- flora and vegetation communities, wildlife habitat, wilderness values and other conservation values; and
- fauna, including effects on species, communities and habitats of local, regional or national significance, together with measures to preserve their integrity.

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Particular reference should be made to rare and endangered species and non-listed species of conservation significance, which may be affected by the project.

The ability of significant flora and fauna to withstand any increased pressure resulting from the project should be discussed and measures proposed to mitigate or compensate for adverse effects.

Identify any effects the yard may have on other species, sites or areas of landscape, aesthetic, wilderness, scientific, geoconservation or otherwise special conservation significance, and measures proposed to avoid, mitigate or compensate for adverse effects. Reference should also be made to existing formal or informal reserves, which may be affected by the project.

Detail means of minimising the introduction of pests, weeds and plant diseases as a result of the project.

3.3.11 Archaeological and Cultural Heritage

Any adverse effects of the yard on Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance should be provided. Details should be provided of the manner in which individual features of archaeological and cultural heritage significance will be managed. Reference should be made to the appropriate application of protection, conservation, adaptive re-use and presentation measures. Any aboriginal heritage material identified must be reported to the Director of National Parks and Wildlife and dealt with in accordance with the *Aboriginal Relics Act 1975*.

The advice of the Tasmanian Heritage Council should be sought with regard to effects on non-Aboriginal sites of historic cultural heritage. Any approvals required under the *Historic Cultural Heritage Act 1995* should be identified.

3.3.12 National Estate

Identify any adverse effects of the project on the National Estate values of any sites listed or interim listed on the Register of the National Estate. Detail any measures proposed to avoid or mitigate these effects.

3.3.13 Health and Safety Issues

Review any health and safety issues relating to employees, site visitors and the public which have not been addressed in other sections.

Security arrangements to prevent unauthorised access to dangerous areas of the sites should be detailed.

It must be demonstrated that occupational health and safety issues have been taken into account in the planning of the project, including the analysis of alternatives, and that compliance with the *Workplace Health and Safety Act 1995* will be achieved. Safety

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management systems to be used during construction and operational phases should be described.

3.3.14 Constraints on Surrounding Land Use

This section should identify any potential adverse effects of the project in terms of constraints it may place on current or future land uses, including access requirements. It should identify measures to avoid or mitigate any possible adverse effects.

The following issues should be addressed:

- Effects on tourist or recreation activities, such as camping areas, picnic areas, walking tracks, horse riding tracks etc.;
- Effects on commercial and recreational fishing activities;
- Effects on other commercial activities;
- Reference should be made to existing formal reserves that may be affected by the project.

3.3.15 Decommissioning and Rehabilitation

A conceptual decommissioning and rehabilitation plan for the log segregation yard should be outlined.

3.3.16 Monitoring and Review

This section should provide an outline of a monitoring and review program for the project. The program should be designed to meet the following objectives:

- Monitoring compliance with emission standards and other performance requirements specified in the DPEMP.
- Assessing the effectiveness of the performance requirements and environmental safeguards in achieving environmental quality objectives.
- Assessing the extent to which the predictions of adverse environmental effects in the DPEMP have eventuated.
- Assessing compliance with commitments made in the DPEMP.

The monitoring program should include details of any pre-commissioning monitoring/studies. The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is required.

Proposals for the post-commissioning review of the DPEMP are required.

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3.4 Sawmill

A detailed description of the sawmill operations must be given, from raw material receipt, to product packaging and/or dispatch.

3.4.1 Air Emissions

The most significant potential sources of emissions from the sawmill should be described, including:

- dust from yard areas particularly where mobile equipment may be used.
- dust from stockpiles of raw material, product or waste.
- fugitive emissions from within the plant area.
- particulate and flue gas emissions from fuel burning, including odour.

The measures to prevent/control these emissions so as to comply with appropriate performance requirements should be detailed. Particulate emissions and flue gas emissions from the boiler stacks must be specifically addressed.

Note that an impact assessment in relation to air emissions from the site as a whole is required under Section 3.2.1.

3.4.2 Wastewater Emissions

All waste emissions to water (including to groundwater) must be assessed, including:

- log washing waters and log storage yard run-off.
- on-site equipment (including vehicle) cleaning.
- boiler blow-down associated with the on-site heat plant.
- stormwater runoff from paved and unpaved areas.
- firewater.

The management of sewage, if necessary, should also be addressed.

In each instance the volumes of wastewater generated, the method of collection and treatment, the quality before and after treatment, and the point(s) of discharge should be identified. Changes in water temperature must be specifically considered. Management procedures for the removal or reuse of stormwater from bunded areas must also be described.

Provisions for the diversion of uncontaminated stormwater away from areas where contamination may occur should be detailed.

Where wastewater is to be re-used for the purposes of irrigation, it needs to be shown that the wastewater from this facility will not give rise to adverse off-site environmental effects or degradation of groundwater or irrigated land. Assessment of the irrigation of wastewater from the whole project is to be addressed in Section 3.2.3.

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3.4.3 Noise Emissions

This section should identify all major sources of noise (fixed and mobile) and determine the associated noise emission levels. The predicted noise levels to be experienced at the boundary of the sawmill site, existing background noise, and the operating hours of equipment and machinery at the site must be provided and any adverse effects assessed. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background noise and noise modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

3.4.4 Waste Disposal

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of consistent with the waste management hierarchy.

The source, quantities and nature of all solid wastes and liquid wastes (if not addressed in other sections) from the proposed sawmill, including the heat plant, must be described, together with associated management strategies. The method of handling and reuse and/or disposal of wood wastes must be described. The collection and reuse of waste oil from vehicle and machinery maintenance must also be addressed. Wherever possible, beneficial reuse of all wastes generated on the site should be pursued.

Any controlled waste, as defined in the *Environmental Management and Pollution Control Act 1994*, that will be generated should be identified. The quantities, method of storage and disposal for each controlled waste should be described.

3.4.5 Hazardous Materials

All potentially hazardous materials (including fuels and boiler additives) must be identified. The handling of these materials should be outlined, including the quantities of such materials, the type of storage and its location. Compliance with the requirements of other authorities (e.g. the *Dangerous Goods Act 1998*) should be demonstrated where applicable.

Identify any safety management requirements for the protection of human health, including the health and safety of the community outside the boundary of the premise.

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Detail contingency plans for when control measures/equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures. This must include measures to protect groundwater and soil from contamination by spillages etc, and safety procedures. It must be shown that the contingency plans are consistent with any local or regional response plans.

3.4.6 Visual Effects

Provide details (including illustrations, photographs and other graphic representations) of the appearance of the sawmill from all significant vantage points, including major roads, residential areas, tourist facilities and lookouts (including from World Heritage Areas and Hartz Mountain), and provide an assessment of how this might affect the visual quality objectives for the area. Identify any measures proposed to minimise the visual effects of the project (such as height, size, design, colour, location etc.).

3.4.7 Energy Use

The energy use for the sawmill should be quantified, together with details of measures that will be undertaken to reduce the overall energy demands of the operations.

3.4.8 Truck and other Transport Movements

This section should identify and evaluate the potential for vehicle movements, including trucks transporting raw materials to the site, or product from the site, to give rise to adverse effects associated with noise, air emissions, dust or vibration.

The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on the affected roads;
- the changes that will result from the implementation of the project as planned, including the number, size and times of effect movements;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc that will be affected.

Predicted noise levels and air emissions due to transport movements are to be included. Where appropriate, predicted effects are to be supported by on-ground measurements of background conditions and modelling. Methodologies and site locations for the measurements must be approved by the Director of Environmental Management.

Proposed measures to reduce the potential for adverse effects must be detailed.

3.4.9 Fire Fighting and Emergency Services

This section should assess the potential for operations relating to the sawmill to cause the ignition of fires and describe the methods proposed to minimise the fire risk. A Fire Fighting and Emergency Management Plan must be prepared for the sawmill to ensure that there is

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adequate emergency management provisions to respond to emergencies and fire break-outs on the site. This plan, and emergency management facilities, must be compatible with plans and facilities developed for the adjoining industries, and where appropriate, Forestry Tasmania s fire services and other local emergency authorities.

3.4.10 Biodiversity and Conservation Issues

This section should identify any adverse effects the sawmill may have on:

- flora and vegetation communities, wildlife habitat, wilderness values and other conservation values; and
- fauna, including effects on species, communities and habitats of local, regional or national significance, together with measures to preserve their integrity.

Particular reference should be made to rare and endangered species and non-listed species of conservation significance, which may be affected by the project.

The ability of significant flora and fauna to withstand any increased pressure resulting from the project should be discussed and measures proposed to mitigate or compensate for adverse effects.

Identify any effects the sawmill may have on other species, sites or areas of landscape, aesthetic, wilderness, scientific, geoconservation or otherwise special conservation significance, and measures proposed to avoid, mitigate or compensate for adverse effects. Reference should also be made to existing formal or informal reserves, which may be affected by the project.

Detail means of minimising the introduction of pests, weeds and plant diseases as a result of the project.

3.4.11 Archaeological and Cultural Heritage

Any adverse effects of the sawmill on Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance should be provided. Details should be provided of the manner in which individual features of archaeological and cultural heritage significance will be managed. Reference should be made to the appropriate application of protection, conservation, adaptive re-use and presentation measures. Any aboriginal heritage material identified must be reported to the Director of National Parks and Wildlife and dealt with in accordance with the *Aboriginal Relics Act 1975*.

The advice of the Tasmanian Heritage Council should be sought with regard to effects on non-Aboriginal sites of historic cultural heritage. Any approvals required under the *Historic Cultural Heritage Act 1995* should be identified.

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3.4.12 National Estate

Identify any adverse effects of the project on the National Estate values of any sites listed or interim listed on the Register of the National Estate. Detail any measures proposed to avoid or mitigate these effects.

3.4.13 Health and Safety Issues

Review any health and safety issues relating to employees, site visitors and the public which have not been addressed in other sections.

Security arrangements to prevent unauthorised access to dangerous areas of the sites should be detailed.

It must be demonstrated that occupational health and safety issues have been taken into account in the planning of the project, including the analysis of alternatives, and that compliance with the *Workplace Health and Safety Act 1995* will be achieved. Safety management systems to be used during construction and operational phases should be described.

3.4.14 Constraints on Surrounding Land Use

This section should identify any potential adverse effects of the project in terms of constraints it may place on current or future land uses, including access requirements. It should identify measures to avoid or mitigate any possible adverse effects.

The following issues should be addressed:

- Effects on tourist or recreation activities, such as camping areas, picnic areas, walking tracks, horse riding tracks, etc.
- Effects on commercial and recreational fishing activities.
- Effects on other commercial activities.
- Reference should be made to existing formal reserves that may be affected by the project.

3.4.15 Decommissioning and Rehabilitation

A conceptual decommissioning and rehabilitation plan for the sawmill should be outlined.

3.4.16 Monitoring and Review

This section should provide an outline of a monitoring and review program for the project. The program should be designed to meet the following objectives:

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- Monitoring compliance with emission standards and other performance requirements specified in the DPEMP.
- Assessing the effectiveness of the performance requirements and environmental safeguards in achieving environmental quality objectives.
- Assessing the extent to which the predictions of environmental effects in the DPEMP have eventuated.
- Assessing compliance with commitments made in the DPEMP.

The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of The monitoring program should include details of any pre-commissioning monitoring/studies. sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is required.

Proposals for the post-commissioning review of the DPEMP are required.

3.5 Veneer Mill

A detailed description of the veneer manufacturing process must be given, from raw material receipt, to product packaging and/or dispatch.

3.5.1 Air Emissions

The most significant potential sources of emissions from the veneer mill should be described, including:

- gaseous emissions from the veneer mill.
- fugitive emissions within the plant area.
- dust from stockpiles of raw material, product or waste.
- dust from yard areas particularly where mobile equipment may be used.
- particulate and flue gas emissions from fuel burning, including odour.

The measures to prevent/control these emissions so as to comply with appropriate performance requirements should be detailed. Particulate emissions and flue gas emissions from the boiler stacks must be specifically addressed.

Note that an impact assessment in relation to air emissions from the site as a whole is required under Section 3.2.1.

3.5.2 Wastewater Emissions

All waste emissions to water (including to groundwater) must be assessed, including:

- wastewater from soaking vats, if relevant.
- log washing waters and log storage yard run-off.
- boiler blow-down associated with the on-site heat plant.
- on-site equipment (including vehicle) cleaning.
- stormwater runoff from paved and unpaved areas.
- firewater.

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The management of sewage, if necessary, should also be addressed.

In each instance the volumes of wastewater generated, the method of collection and treatment, the quality before and after treatment, and the point(s) of discharge should be identified. Changes in water temperature must be specifically considered. Management procedures for the removal or reuse of stormwater from bunded areas must also be described.

Provisions for the diversion of uncontaminated stormwater away from areas where contamination may occur should be detailed.

Where wastewater is to be re-used for the purposes of irrigation, it needs to be shown that the wastewater from this facility will not give rise to adverse off-site environmental effects or degradation of groundwater or irrigated land. Assessment of the irrigation of wastewater from the whole project is to be addressed in Section 3.2.3.

3.5.3 Noise Emissions

This section should identify all major sources of noise (fixed and mobile) and determine the associated noise emission levels. The predicted noise levels to be experienced at the boundary of the veneer mill site, existing background noise, and the operating hours of equipment and machinery at the site must be provided and any adverse effects assessed. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background noise and noise modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

3.5.4 Waste Disposal

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of; consistent with the waste management hierarchy.

The source, quantities and nature of all solid wastes and liquid wastes (if not addressed in other sections) from the proposed veneer mill, including the heat plant, must be described, together with associated management strategies. The method of handling and reuse and/or disposal of wood wastes must be described. The collection and reuse of waste oil from

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vehicle and machinery maintenance must also be addressed. Wherever possible, beneficial reuse of all wastes generated on the site should be pursued.

Any controlled waste, as defined in the *Environmental Management and Pollution Control Act 1994*, that will be generated should be identified. The quantities, method of storage and disposal for each controlled waste should be described.

3.5.5 Hazardous Materials

All potentially hazardous materials (including fuels and boiler additives) must be identified. The handling of these materials should be outlined, including the quantities of such materials, the type of storage and its location. Compliance with the requirements of other authorities (e.g. the *Dangerous Goods Act 1998*) should be demonstrated where applicable.

Identify any safety management requirements for the protection of human health, including the health and safety of the community outside the boundary of the premise.

Detail contingency plans for when control measures/equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures. This must include measures to protect groundwater and soil from contamination by spillages etc, and safety procedures. It must be shown that the contingency plans are consistent with any local or regional response plans.

3.5.6 Visual Effects

Provide details (including illustrations, photographs and other graphic representations) of the appearance of the veneer mill from all significant vantage points, including major roads, residential areas, tourist facilities and lookouts (including from World Heritage Areas and Hartz Mountain), and provide an assessment of how this might affect the visual quality objectives for the area. Identify any measures proposed to minimise the visual effects of the project (such as height, size, design, colour, location, etc).

3.5.7 Energy Use

The energy use for the veneer mill should be quantified, together with details of measures that will be undertaken to reduce the overall energy demands of the operations.

3.5.8 Truck and other Transport Movements

This section should identify and evaluate the potential for vehicle movements, including trucks transporting raw materials to the site, or product from the site, to give rise to adverse effects associated with noise, air emissions, dust or vibration.

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The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on the affected roads;
- the changes that will result from the implementation of the project as planned, including the number, size and times of truck and other transport movements;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc that will be affected.

Predicted noise levels and air emissions due to transport movements are to be included. Where appropriate, predicted effects are to be supported by on-ground measurements of background conditions and modelling. Methodologies and site locations for the measurements must be approved by the Director of Environmental Management.

Proposed measures to reduce the potential for adverse effects must be detailed.

3.5.9 Fire Fighting and Emergency Services

This section should assess the potential for operations relating to the veneer mill to cause the ignition of fires and describe the methods proposed to minimise the fire risk. A Fire Fighting and Emergency Management Plan must be prepared for the veneer mill to ensure that there is adequate emergency management provisions to respond to emergencies and fire break-outs on the site. This plan, and emergency management facilities, must be compatible with plans and facilities developed for the adjoining industries, and where appropriate, Forestry Tasmania s fire services and other local emergency authorities.

3.5.10 Biodiversity and Conservation Issues

This section should identify any adverse effects the veneer mill may have on:

- flora and vegetation communities, wildlife habitat, wilderness values and other conservation values; and
- fauna, including effects on species, communities and habitats of local, regional or national significance, together with measures to preserve their integrity.

Particular reference should be made to rare and endangered species and non-listed species of conservation significance, which may be affected by the project.

The ability of significant flora and fauna to withstand any increased pressure resulting from the project should be discussed and measures proposed to mitigate or compensate for adverse effects.

Identify any effects the veneer mill may have on other species, sites or areas of landscape, aesthetic, wilderness, scientific, geoconservation or otherwise special conservation significance, and measures proposed to avoid, mitigate or compensate for adverse effects. Reference should also be made to existing formal or informal reserves, which may be affected by the project.

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Detail means of minimising the introduction of pests, weeds and plant diseases as a result of the project.

3.5.11 Archaeological and Cultural Heritage

Any adverse effects of the veneer mill on Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance should be provided. Details should be provided of the manner in which individual features of archaeological and cultural heritage significance will be managed. Reference should be made to the appropriate application of protection, conservation, adaptive re-use and presentation measures. Any aboriginal heritage material identified must be reported to the Director of National Parks and Wildlife and dealt with in accordance with the *Aboriginal Relics Act 1975*.

The advice of the Tasmanian Heritage Council should be sought with regard to effects on non-Aboriginal sites of historic cultural heritage. Any approvals required under the *Historic Cultural Heritage Act 1995* should be identified.

3.5.12 National Estate

Identify any adverse effects of the project on the National Estate values of any sites listed or interim listed on the Register of the National Estate. Detail any measures proposed to avoid or mitigate these effects.

3.5.13 Health and Safety Issues

Review any health and safety issues relating to employees, site visitors and the public which have not been addressed in other sections.

Security arrangements to prevent unauthorised access to dangerous areas of the sites should be detailed.

It must be demonstrated that occupational health and safety issues have been taken into account in the planning of the project, including the analysis of alternatives, and that compliance with the *Workplace Health and Safety Act 1995* will be achieved. Safety management systems to be used during construction and operational phases should be described.

3.5.14 Constraints on Surrounding Land Use

This section should identify any potential adverse effects of the project in terms of constraints it may place on current or future land uses, including access requirements. It should identify measures to avoid or mitigate any possible adverse effects.

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The following issues should be addressed:

- Effects on tourist or recreation activities, such as camping areas, picnic areas, walking tracks, horse riding tracks etc.;
- Effects on commercial and recreational fishing activities;
- Effects on other commercial activities;
- Reference should be made to existing formal reserves that may be affected by the project.

3.5.15 Decommissioning and Rehabilitation

A conceptual decommissioning and rehabilitation plan for the veneer mill should be outlined.

3.5.16 Monitoring and Review

This section should provide an outline of a monitoring and review program for the project. The program should be designed to meet the following objectives:

- Monitoring compliance with emission standards and other performance requirements specified in the DPEMP.
- Assessing the effectiveness of the performance requirements and environmental safeguards in achieving environmental quality objectives.
- Assessing the extent to which the predictions of environmental effects in the DPEMP have eventuated.
- Assessing compliance with commitments made in the DPEMP.

The monitoring program should include details of any pre-commissioning monitoring/studies. The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is required.

Proposals for the post-commissioning review of the DPEMP are required.

3.6 Wood Fibre (Woodchip) Production Facility

A detailed description of the wood fibre (woodchip) production facility must be given, from raw material receipt, to product dispatch.

3.6.1 Air Emissions

The most significant potential sources of air emissions from the woodchip operations should be described, including:

- dust generated during the chipping process;
- dust from stockpiles of raw material, product or waste;
- dust from yard areas particularly where mobile equipment may be used.

Measures for preventing or mitigating emissions should be described.

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3.6.2 Wastewater Emissions

All waste emissions to water (including to groundwater) must be assessed, including:

- log washing waters and log storage yard run-off;
- on-site equipment (including vehicle) cleaning;
- stormwater runoff from paved and unpaved areas;
- firewater.

The management of sewage, if necessary, should also be addressed.

In each instance the volumes of wastewater generated, the method of collection and treatment, the quality before and after treatment, and the point(s) of discharge should be identified. Management procedures for the removal or reuse of stormwater from bunded areas must also be described.

Provisions for the diversion of uncontaminated stormwater away from areas where contamination may occur should be detailed.

Where wastewater is to be re-used for the purposes of irrigation, it needs to be shown that the wastewater from this facility will not give rise to adverse off-site environmental effects or degradation of groundwater or irrigated land. Assessment of the irrigation of wastewater from the whole project is to be addressed in Section 3.2.3.

3.6.3 Noise Emissions

This section should identify all major sources of noise (fixed and mobile) and determine the associated noise emission levels. The predicted noise levels to be experienced at the boundary of the operation, existing background noise, and the operating hours of equipment and machinery at the site must be provided and any adverse effects assessed. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background noise and noise modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

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3.6.4 Waste Disposal

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of, consistent with the waste management hierarchy.

The source, quantities and nature of all solid wastes and liquid wastes (if not addressed in other sections) from the proposed operation must be described, together with associated management strategies. The method of handling and reuse and/or disposal of wood wastes must be described. The collection and reuse of waste oil from vehicle and machinery maintenance must also be addressed. Wherever possible, beneficial reuse of all wastes generated on the site should be pursued.

Any controlled waste, as defined in the *Environmental Management and Pollution Control Act 1994*, that will be generated should be identified. The quantities, method of storage and disposal for each controlled waste should be described.

3.6.5 Hazardous Materials

All potentially hazardous materials (including fuels) must be identified. The handling of these materials should be outlined, including the quantities of such materials, the type of storage and its location. Compliance with the requirements of other authorities (e.g. the *Dangerous Goods Act 1998*) should be demonstrated where applicable.

Identify any safety management requirements for the protection of human health, including the health and safety of the community outside the boundary of the premise.

Detail contingency plans for when control measures/equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures. This must include measures to protect groundwater and soil from contamination by spillages etc, and safety procedures. It must be shown that the contingency plans are consistent with any local or regional response plans.

3.6.6 Visual Effects

Provide details (including illustrations, photographs and other graphic representations) of the appearance of the woodchip operation from all significant vantage points, including major roads, residential areas, tourist facilities and lookouts (including from World Heritage Areas and Hartz Mountain), and provide an assessment of how this might affect the visual quality objectives for the area. Identify any measures proposed to minimise the visual effects of the project (such as height, size, design, colour, location etc.).

3.6.7 Energy Use

The energy use for the woodchip operation should be quantified, together with details of measures that will be undertaken to reduce the overall energy demands of the operations.

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3.6.8 Truck and other Transport Movements

This section should identify and evaluate the potential for vehicle movements, including trucks transporting raw materials to the site, or product from the site, to give rise to adverse effects associated with noise, air emissions, dust or vibration.

The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on the affected roads;
- the changes that will result from the implementation of the project as planned, including the number, size and times of truck and other transport movements;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc. that will be affected.

Predicted noise levels and air emissions due to transport movements are to be included. Where appropriate, predicted effects are to be supported by on-ground measurements of background conditions and modelling. Methodologies and site locations for the measurements must be approved by the Director of Environmental Management. Proposed measures to reduce the potential for adverse effects must be detailed.

3.6.9 Fire Fighting and Emergency Services

This section should assess the potential for operations relating to the woodchipper to cause the ignition of fires and describe the methods proposed to minimise the fire risk. A Fire Fighting and Emergency Management Plan must be prepared for the wood fibre operation to ensure that there is adequate emergency management provisions to respond to emergencies and fire break-outs on the site. This plan, and emergency management facilities, must be compatible with plans and facilities developed for the adjoining industries, and where appropriate, Forestry Tasmania's fire services and other local emergency authorities.

3.6.10 Biodiversity and Conservation Issues

This section should identify any adverse effects the woodchip facility may have on:

- flora and vegetation communities, wildlife habitat, wilderness values and other conservation values; and
- fauna, including effects on species, communities and habitats of local, regional or national significance, together with measures to preserve their integrity.

Particular reference should be made to rare and endangered species and non-listed species of conservation significance, which may be affected by the project.

The ability of significant flora and fauna to withstand any increased pressure resulting from the project should be discussed and measures proposed to mitigate or compensate for adverse effects.

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Identify any effects the operation may have on other species, sites or areas of landscape, aesthetic, wilderness, scientific, geoconservation or otherwise special conservation significance, and measures proposed to avoid, mitigate or compensate for adverse effects. Reference should also be made to existing formal or informal reserves, which may be affected by the project.

Detail means of minimising the introduction of pests, weeds and plant diseases as a result of the project.

3.6.11 Archaeological and Cultural Heritage

Any adverse effects of the woodchip operation on Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance should be provided. Details should be provided of the manner in which individual features of archaeological and cultural heritage significance will be managed. Reference should be made to the appropriate application of protection, conservation, adaptive re-use and presentation measures. Any aboriginal heritage material identified must be reported to the Director of National Parks and Wildlife and dealt with in accordance with the *Aboriginal Relics Act 1975*.

The advice of the Tasmanian Heritage Council should be sought with regard to effects on non-Aboriginal sites of historic cultural heritage. Any approvals required under the *Historic Cultural Heritage Act 1995* should be identified.

3.6.12 National Estate

Identify any adverse effects of the project on the National Estate values of any sites listed or interim listed on the Register of the National Estate. Detail any measures proposed to avoid or mitigate these effects.

3.6.13 Health and Safety Issues

Review any health and safety issues relating to employees, site visitors and the public which have not been addressed in other sections.

Security arrangements to prevent unauthorised access to dangerous areas of the sites should be detailed.

It must be demonstrated that occupational health and safety issues have been taken into account in the planning of the project, including the analysis of alternatives, and that compliance with the *Workplace Health and Safety Act 1995* will be achieved. Safety management systems to be used during construction and operational phases should be described.

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3.6.14 Constraints on Surrounding Land Use

This section should identify any potential adverse effects of the project in terms of constraints it may place on current or future land uses, including access requirements. It should identify measures to avoid or mitigate any possible adverse effects.

The following issues should be addressed:

- Effects on tourist or recreation activities, such as camping areas, picnic areas, walking tracks, horse riding tracks etc.
- Effects on commercial and recreational fishing activities.
- Effects on other commercial activities.
- Reference should be made to existing formal reserves that may be affected by the project.

3.6.15 Decommissioning and Rehabilitation

A conceptual decommissioning and rehabilitation plan for the woodchip operation should be outlined.

3.6.16 Monitoring and Review

This section should provide an outline of a monitoring and review program for the project. The program should be designed to meet the following objectives:

- Monitoring compliance with emission standards and other performance requirements specified in the DPEMP;
- Assessing the effectiveness of the performance requirements and environmental safeguards in achieving environmental quality objectives;
- Assessing the extent to which the predictions of environmental effects in the DPEMP have eventuated;
- Assessing compliance with commitments made in the DPEMP.

The monitoring program should include details of any pre-commissioning monitoring/studies. The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is required.

Proposals for the post-commissioning review of the DPEMP are required.

3.7 Wood-fired Power Station

A detailed description of the power station operations must be given, from raw material receipt, to the supply of steam and distribution of electrical power.

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3.7.1 Air Emissions

The most significant potential sources of air emissions from the power station should be described, including:

- particulate and flue gas emissions from fuel burning, including odour.
- dust from stockpiles of raw material, product or waste.
- dust from yard areas particularly where mobile equipment may be used.

The measures to prevent/control these emissions so as to comply with appropriate performance requirements should be detailed. Particulate emissions and flue gas emissions from the boiler stacks must be specifically addressed.

Air emissions must also be described in terms of public health effects (both positive and negative) and should extend to aspects of the proposed plant such as cooling tower emissions and other air emission sources from the project site. Any land, which might be affected by these emissions at any time, should be clearly identified.

Note that an impact assessment in relation to air emissions from the site as a whole is required under Section 3.2.1.

3.7.2 Wastewater Emissions

All waste emissions to water (including to groundwater) must be assessed, including:

- cooling water.
- boiler blowdown.
- run-off from fuel stockpile.
- on-site equipment (including vehicle) cleaning.
- stormwater runoff from paved and unpaved areas.
- firewater.

The management of sewage, if necessary, should also be addressed.

In each instance the volumes of wastewater generated, the method of collection and treatment, the quality before and after treatment, and the point(s) of discharge should be identified. Changes in water temperature and dissolved oxygen levels must be specifically considered. Management procedures for the removal or reuse of stormwater from bunded areas must be described.

The environmental risks associated with plant malfunction or breakdown must also be analysed.

Provisions for the diversion of uncontaminated stormwater away from areas where contamination may occur should be detailed.

Where wastewater is to be re-used for the purposes of irrigation, it needs to be shown that the wastewater from this facility will not give rise to adverse off-site environmental effects or

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degradation of groundwater or irrigated land. Assessment of the irrigation of wastewater from the whole project is to be addressed in Section 3.2.3.

3.7.3 Noise Emissions

This section should identify all major sources of noise (fixed and mobile) and determine the associated noise emission levels. The most significant noise emissions will be associated with boiler plant and turbine operations, effects due to these operations and steam releases and safety equipment operations should be assessed. The predicted noise levels to be experienced at the boundary of the power station site, existing background noise, and the operating hours of equipment and machinery at the site must be provided and any adverse effects assessed. Where appropriate, predicted noise effects are to be supported with on-ground measurements of background noise and noise modelling.

All noise monitoring locations and methodologies are to be agreed to by the Director of Environmental Management. Monitoring locations should be shown on a suitably scaled map. The potential for nuisance due to tonal components in the noise emissions should also be considered together with the influence of adverse meteorological conditions and topographic features. The potential for noise emissions to affect wildlife and livestock should also be assessed.

Measures to avoid and mitigate any possible adverse effects should be described. An assessment should be made of the expected reductions in noise levels as a result of these measures.

3.7.4 Waste Disposal

For each waste (gas, liquid and solid) it should be demonstrated that all reasonable and practicable measures have been taken having regard to best practice environmental management to avoid producing that waste, or to reduce the amount of waste that should be disposed of; consistent with the waste management hierarchy.

The source, quantities and nature of all solid wastes and liquid wastes (if not addressed in other sections) from the proposed power station must be described, together with associated management strategies. The method of handling and reuse and/or disposal of wood wastes must be described. The collection and reuse of waste oil from vehicle and machinery maintenance must also be addressed. Wherever possible, beneficial reuse of all wastes generated on the site should be pursued.

Any controlled waste, as defined in the *Environmental Management and Pollution Control Act 1994*, that will be generated should be identified. The quantities, method of storage and disposal for each controlled waste should be described.

3.7.5 Hazardous Materials

All potentially hazardous materials (including fuels and boiler additives) must be identified. The handling of these materials should be outlined, including the quantities of such materials,

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the type of storage and its location. Compliance with the requirements of other authorities (e.g. the *Dangerous Goods Act 1998*) should be demonstrated where applicable.

Identify any safety management requirements for the protection of human health, including the health and safety of the community outside the boundary of the premise.

Detail contingency plans for when control measures/equipment breakdowns or accidental releases to the environment occur, including proposed emergency and clean-up measures. This must include measures to protect groundwater and soil from contamination by spillages etc., and safety procedures. It must be shown that the contingency plans are consistent with any local or regional response plans.

3.7.6 Hazard Analysis and Risk Assessment

This section should contain a risk assessment based on a hazard analysis, incorporating a Hazard and Operability study. The hazard analysis should systematically identify all major hazard events (internal and external) associated with the construction, operation, maintenance and decommissioning of the power station to people and the environment. A preliminary risk assessment should be conducted, based on appropriate standards, to identify all credible risks associated with specific hazard events identified in the hazard analysis.

The preliminary risk assessment should identify measures to avoid and mitigate potential adverse effects. A quantified risk assessment should be conducted if the preliminary risk assessment indicates that risks above the acceptable criteria, as published by the NSW Department of Urban Affairs and Planning and community expectation, may extend beyond the site boundary.

The following issues should be addressed:

- Identify hazard events with the potential to cause a major accident or significant effect on people or the environment. This should include consideration of the risks posed by major malfunction or incident associated with the operation of all steam raising and power generating plant.
- Identify high-risk locations and facilities.
- Describe technical and management safeguards to be employed to assess and minimise the likelihood of occurrence and the consequences of identified hazard events.
- The objectives and management principles to be adopted for the preparation of a detailed emergency plan (including emergency response and recovery/cleanup procedures - consultation with the relevant emergency services should be undertaken).

3.7.7 Visual Effects

Provide details (including illustrations, photographs and other graphic representations) of the appearance of the power station from all significant vantage points, including major roads, residential areas, tourist facilities and lookouts (including from World Heritage Areas and Hartz Mountain), and provide an assessment of how this might affect the visual quality

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objectives for the area. Identify any measures proposed to minimise the visual effects of the project (such as height, size, design, colour, location etc.).

3.7.8 Energy Use

The energy use for the power station should be quantified, together with details of measures that will be undertaken to reduce the overall energy demands of the operations.

3.7.9 Truck and other Transport Movements

This section should identify and evaluate the potential for vehicle movements, including trucks transporting raw materials to the site, or product from the site, to give rise to adverse effects associated with noise, air emissions, dust or vibration.

The evaluation should take into account:

- present traffic patterns and heavy vehicle movements on the affected roads;
- the changes that will result from the implementation of the project as planned, including the number, size and times of truck and other transport movements;
- design capacities of the affected roads;
- the present noise environment of the residences, townships etc that will be affected.

Predicted noise levels and air emissions due to transport movements are to be included. Where appropriate, predicted effects are to be supported by on-ground measurements of background conditions and modelling. Methodologies and site locations for the measurements must be approved by the Director of Environmental Management.

Proposed measures to reduce the potential for adverse effects must be detailed.

3.7.10 Fire Fighting and Emergency Services

This section should assess the potential for operations relating to the power station to cause the ignition of fires and describe the methods proposed to minimise the fire risk. A Fire Fighting and Emergency Management Plan must be prepared for the power station to ensure that there is adequate emergency management provisions to respond to emergencies and fire break-outs on the site. This plan, and emergency management facilities, must be compatible with plans and facilities developed for the adjoining industries, and where appropriate, Forestry Tasmania's fire services and other local emergency authorities.

3.7.11 Biodiversity and Conservation Issues

This section should identify any adverse effects the power station may have on:

- flora and vegetation communities, wildlife habitat, wilderness values and other conservation values; and
- fauna, including effects on species, communities and habitats of local, regional or national significance, together with measures to preserve their integrity.

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Particular reference should be made to rare and endangered species and non-listed species of conservation significance, which may be affected by the project.

The ability of significant flora and fauna to withstand any increased pressure resulting from the project should be discussed and measures proposed to mitigate or compensate for adverse effects.

Identify any effects the power station may have on other species, sites or areas of landscape, aesthetic, wilderness, scientific, geoconservation or otherwise special conservation significance, and measures proposed to avoid, mitigate or compensate for adverse effects. Reference should also be made to existing formal or informal reserves, which may be affected by the project.

Detail means of minimising the introduction of pests, weeds and plant diseases as a result of the project.

3.7.12 Archaeological and Cultural Heritage

Any adverse effects of the power station on Aboriginal and non-Aboriginal sites of archaeological and cultural heritage significance should be provided. Details should be provided of the manner in which individual features of archaeological and cultural heritage significance will be managed. Reference should be made to the appropriate application of protection, conservation, adaptive re-use and presentation measures. Any aboriginal heritage material identified must be reported to the Director of National Parks and Wildlife and dealt with in accordance with the *Aboriginal Relics Act 1975*.

The advice of the Tasmanian Heritage Council should be sought with regard to effects on non-Aboriginal sites of historic cultural heritage. Any approvals required under the *Historic Cultural Heritage Act 1995* should be identified.

3.7.13 National Estate

Identify any adverse effects of the project on the National Estate values of any sites listed or interim listed on the Register of the National Estate. Detail any measures proposed to avoid or mitigate these effects.

3.7.14 Health and Safety Issues

Review any health and safety issues relating to employees, site visitors and the public which have not been addressed in other sections. Measures to prevent or mitigate biological hazards (such as legionnaire's disease) in the cooling towers must be detailed.

Security arrangements to prevent unauthorised access to dangerous areas of the sites should be detailed.

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It must be demonstrated that occupational health and safety issues have been taken into account in the planning of the project, including the analysis of alternatives, and that compliance with the *Workplace Health and Safety Act* 1995 will be achieved. Safety management systems to be used during construction and operational phases should be described.

3.7.15 Constraints on Surrounding Land Use

This section should identify any potential adverse effects of the project in terms of constraints it may place on current or future land uses, including access requirements. It should identify measures to avoid or mitigate any possible adverse effects.

The following issues should be addressed:

- Effects on tourist or recreation activities, such as camping areas, picnic areas, walking tracks, horse riding tracks etc.
- Effects on commercial and recreational fishing activities.
- Effects on other commercial activities.
- Reference should be made to existing formal reserves that may be affected by the project.

3.7.16 Decommissioning and Rehabilitation

A conceptual decommissioning and rehabilitation plan for the power station should be outlined.

3.7.17 Monitoring and Review

This section should provide an outline of a monitoring and review program for the project. The program should be designed to meet the following objectives:

- Monitoring compliance with emission standards and other performance requirements specified in the DPEMP.
- Assessing the effectiveness of the performance requirements and environmental safeguards in achieving environmental quality objectives.
- Assessing the extent to which the predictions of environmental effects in the DPEMP have eventuated.
- Assessing compliance with commitments made in the DPEMP.

The monitoring program should include details of any pre-commissioning monitoring/studies. The sites to be sampled, sampling procedures, the parameters to be analysed, the frequency of sampling and the format and frequency of reporting is required. A monitoring programme summary table, and a site plan showing sampling locations is required.

Proposals for the post-commissioning review of the DPEMP are required.

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3.8 Cumulative and Interactive Effects

This section should contain a summarised assessment of the potential cumulative effects of the project. Interactions between biophysical, socio-economic and cultural effects should be discussed.

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4.0 SUMMARY OF COMMITMENTS

This section should contain a consolidated tabular summary of each of the commitments made in the DPEMP. The summary should specify when the commitment is to be implemented, specify who is responsible for the commitment, and refer to the section where the commitment is detailed.

The summary will provide a basis for the preparation of conditions to be attached to a permit, should a permit be granted.

5.0 CONCLUSION

This section should draw together the critical environmental effects, both positive and negative, of the project and present a balanced overview of the net environmental effects of the project, and the extent to which any adverse effects on the environment can be satisfactorily avoided, mitigated, remediated or compensated. The conclusion should describe how the project meets the objectives of Tasmania s Resource Management and Planning System and complies with relevant Tasmanian State Policies.

6.0 REFERENCES

Details of authorities consulted, reference documents, etc. should be listed in this section.

7.0 APPENDICES

As a means of improving readability of the document, all detailed technical information which provides the basis of the DPEMP should be included in appendices. The salient features of the appendices should be included in the main body of the DPEMP.

Environmental Management System

Environmental Policy

Approved by the Board August 2000.

Forestry Tasmania's business is sustainable production and delivery of forest goods and services from State forest. We aim to be an internationally competitive forest land manager, with operations based on sustainable, multiple use forest management. We are committed to developing a world class forest resource.

Forestry Tasmania is committed to continual improvement in the conduct of its environmental management practices and ensuring that environmental management is based on sound scientific principles and ongoing research and takes account of community expectations.

To achieve these objectives our policy is to:

- Conduct operations to meet or exceed relevant environmental legislative and regulatory requirements and standards;
- Identify and adopt environmentally sound best practice in sustainable forest management, waste minimisation and prevention of pollution;
- Implement a comprehensive environmental management system, compatible with internationally recognised standards, which includes regular reviews of environmental performance and incorporates an audit system;
- Clearly define and communicate environmental responsibilities to our employees and to support them with training to ensure that those responsibilities are fulfilled;
- Encourage and facilitate compliance with our environmental standards by users of State forests, suppliers and contractors; and
- Communicate with the Tasmanian community our environmental practices and performance.

Evan R. Rolley Managing Director

September 2000.

Forestry Tasmania

Phase One Consultation Report
For Proposed
Southwood Resources — Huon Project

5 February 2001

Prepared by Corporate Communications (Tas) Pty Ltd

This document is confidential and commercial-in-confidence

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Appendices

Appendix A	Draft Issues Report
Appendix B	Community Consultation Framework
Appendix C	Consultation Materials

1. Introduction

Forestry Tasmania is proposing to establish an investment ready-site in the Southern State Forests, to facilitate the development of an Integrated Timber Processing Centre in the region. The project is titled Southwood Resources — Huon.

Prior to Huon Valley Council development approval being sought for the proposal, Forestry Tasmania determined that extensive community consultation be undertaken to provide information to key stakeholders, to seek input from the community to identify key issues and concerns to assist in facilitating the development of strategies to address any stakeholder issues and concerns that may arise.

Through this program, Forestry Tasmania has successfully achieved its ongoing commitment to consult with stakeholders immediately affected by the proposed development, in the first instance, and to provide information on the proposal to the wider Tasmanian community.

In May 2000, Corporate Communications (Tas) Pty Ltd prepared and submitted a community consultation framework to assist Forestry Tasmania with this consultation.

The consultation program emphasised open and honest communication with all interested parties and affected stakeholders.

The initial stage of consultation was undertaken from 11 September 2000 through to 31 December 2000. This report evaluates this first phase of the consultation. It includes a description of the consultation materials prepared, activities undertaken, a summary and analysis of the comments received, recommendations for the future of the development and further strategies for addressing stakeholder needs.

While the vocal minority opposed to the project did attempt to hijack the consultation and had some initial success in preventing genuinely interested community members from gaining information, presentations to community groups, direct contact with stakeholders and general public communication ensured that the program reached the widest possible audience.

2. Community Consultation Program

Forestry Tasmania recognised that the proposed development project would impact on key stakeholders, in particular local residents.

A comprehensive community consultation program was developed which offered open and honest communication with all interested parties and affected stakeholders. This program is based on the premise that the provision of maximum information encourages greater understanding and appreciation of the project. The program combines public awareness activities with the basic direct communication tools used in community consultation programs.

The program was developed following initial meetings between Corporate Communications and the project team, a site tour and the preparation of a draft issues report (attached as Appendix A to this document).

The community consultation program is divided into key phases:

Phase One: Provision of information to stakeholders and issues identification
Phase Two: Community participation (advisory groups and focus groups)
Phase Three: Planning approval process

This report focuses on the outcomes of Phase One of the community consultation.

In summary, Phase One included the following activities:

- Public information sessions outlining the project concept in regional centres including Judbury (twice), Ranelagh, Huonville, Geeveston and Dover.
- A staffed information stand at the Huon Valley Show
- Addressing nineteen registered community groups throughout the Huon Valley municipality.

Methods of information distribution have included direct mail, newspaper advertisements and street signage, where appropriate.

Opportunities for the community to provide feedback have included provision of comment forms at community meetings, a freepost service, email and a telephone inquiry line.

The complete consultation framework for Phase One is attached as Appendix B to this document.

In addition, Forestry Tasmania will continue to keep residents and other affected stakeholders updated throughout the lodgement of the Development Approval Application and throughout construction (subject to development approval).

3. Consultation Activities Undertaken

The following summary describes the consultation activities undertaken from September 2000 to 1 January 2001.

Information Sessions with local residents

In the Huon district, six resident information sessions were conducted between October and December 2000. These sessions included information for residents to view (display panels, project information) and also provided stakeholders with the opportunity to ask questions of project team members and submit comment forms to the project.

Project opponents made concerted efforts to undermine the effectiveness of the community information sessions. The same 15 to 20 activists attended virtually all the sessions and sought to turn the presentations into public debates on the forestry industry and forest practices. While this activity initially dissuaded some people genuinely seeking information by attending the sessions, information was provided through other mediums and at later community group meetings.

The information sessions were successful in introducing the project to local residents and providing a forum for the distribution of detailed information and the encouragement of public comments and submissions.

Community Group meetings with local residents

Some 19 community group meetings were attended during the three-month consultation period.

This included organised community groups (information provided by Huon Valley Council), local businesses and other business organisations. Presentations usually included a slide presentation, then a question and answer session with project team.

Council Briefings

Members of Forestry Tasmania's Southwood Resources - Huon Project team briefed the Mayor of Huon Valley, Ald. Greg Norris on two occasions and conducted a briefing for the full Council.

Ongoing consultation

Forestry Tasmania will continue to provide information to and seek comment from all affected stakeholders. Consultation will be maintained throughout and following the planning and construction period.

4. Systems Established and Consultation Materials Prepared

To provide information to key stakeholders, Corporate Communications, in conjunction with Forestry Tasmania, established the following consultation systems and prepared the following consultation materials, which were used extensively during Phase One of the consultation.

Copies of these materials are attached to this document in Appendix C.

Project Database

A database was established to record community/stakeholder comments regarding the project. The database included details such as name, address, contact telephone numbers and comment. The Community Consultation Coordinator categorised comments both by issue (eg environmental, economic, consultation and so on) and if it was supportive, in opposition or neutral towards the project. Analysis of the comments received is included in Section 6 of this report.

Community Inquiry Line

A community inquiry line was established (Telephone: 6224 4557) which provided community members/stakeholders direct access to the Community Consultation Coordinator to provide comment, request further information or ask project questions.

Reply Paid Post

A free post service was also established through a Hobart GPO Box number. This enabled stakeholders to return comment forms, free of charge.

Direct Mail/Posters/Envelopes

Several direct mail letters were prepared and distributed to local residents during Phase One. These letters contained invitations to local residents to attend project information sessions and/or provided information updates.

- An invitation to residents dated 3 November 2000 to attend an information session at Dover Multi-purpose Health Centre on 14 November 2000 was distributed to 500 residents in Dover. Posters were designed and erected in Dover shop windows advertising the above information session.
- An invitation to 580 Geeveston residents dated 15 November 2000 to attend an information session on 28 November 2000 at the Forest & Heritage Centre. Posters were also designed and erected in Geeveston shop windows advertising the above information session.
- In December 2000, a letter was distributed to 3,800 residents in the Huon Municipality to enclose the Wood Centre brochure and provide an update on the project.

- 5000 To the Householder project information envelopes were also prepared and distributed.

Advertising and Editorial

Advertisements were prepared and placed in the *Huon News* on 27 September and 4 October 2000 to advertise information sessions to communities in Judbury, Ranelagh and Huonville. Additional media coverage of upcoming meetings was also included in news items in *Huon News* prior to the information sessions. Editorial material was also provided to all Tasmanian media.

An advertisement was also placed in the Cygnet Classifieds advertising the information sessions at both Dover and Geeveston.

Project Brochures/Display Panels

Feedback from community groups was used to further develop project display and information materials. For example, the question and answer section in the Wood Centre brochure included questions asked at community group meetings. Approximately 3,000 brochures entitled *The Facts* were produced for distribution at consultation meetings.

Comment form

Comment forms were prepared and distributed at all information sessions, with an invitation to return the forms by freepost. Approximately 5,000 forms were distributed, of which 220 comment forms (approximately 4%) were returned by concerned stakeholders. For the purposes of this report, 110 comment forms were received from the Huon Municipality.

Examples of the above items are included in Appendix C of this report.

5. Feedback Received

A database was established to record all comments received during the first phase of consultation. During the consultation 131 comments were registered with the project from, or relating to, the Huon Municipality. Of these comments, 64 supported the project, 54 opposed the project and 13 were neutral. Feedback received included:

Comment Forms

A total of 110 comment forms were received from interested stakeholders in the Huon Municipality for the period 11 September 2000 to the end of December 2000. The majority of these forms were received from local residents.

Emails

Thirteen emails were received regarding the ITPS, 10 emails opposed the project, two were supportive and one was neutral.

Letters

Four letters were received from the Huon Municipality, two were negative and two were supportive.

Telephone/Meeting contact

A further 137 respondents contacted the project via the telephone inquiry line or by registering on the mailing list at community group meetings. Many of these callers submitted written comments, or were seeking information on the project. Approximately an equal number of expressions of support and expressions of opposition to the project were received by telephone.

Letters to the Editor

During the consultation period some 14 letters to the editor of *The Mercury* were published from the Huon Municipality. Furthermore, 20 letters to the editor of the Huon News were also published. These were composed by 24 authors; this demonstrates that one author may have been responsible for multiple letters (eg W. Wright published five letters in the period).

Of these letters, nine were supportive, 24 were opposed and one was neutral.

6. Issues Identified by Respondents

The following section outlines the issues raised by respondents during the consultation. These issues were all identified by Corporate Communications (Tas) Pty Ltd in its draft issues report, prior to commencement of the consultation.

The following issues were identified through the comment forms, emails and written submissions received.

The table below summarises the issues raised. All issues received were divided into 10 categories and the number of Supportive, Opposed and Neutral comments received from the Huon Municipality relating to each issue is also included. A full explanation, and example from each issue category is outlined below.

Issue	Supportive	Opposed	Neutral	TOTAL
Community Impacts	2	14	2	18
Consultation	2	11	2	15
Contact	0	0	2	2
Economic	1	2	3	6
Environment	0	22	2	24
Infrastructure	4	0	0	4
Opposition	0	4	0	4
Route Options	7	1	1	9
Support	48	0	0	48
Transport	0	0	1	1
TOTAL	64	54	13	131

The above table illustrates that the majority of issues raised by opponents to the project were environment and community impact issues. However, the highest number of comments received in one category was messages of support for the project.

Based on submissions and input received, wide level discussions with stakeholders conducted by the community consultation consultants and the project team and anecdotal community comments, it is considered that the project enjoys considerable public support in the Huon Municipality.

It is an accepted fact in community consultation that those opposed to a proposal will loudly, actively and repeatedly express that opposition. People in support of a proposition and those who are satisfied with the decision-making processes are less likely to state a view or become involved. Despite this truism, based on the participation in, and feedback to, this consultation process in the Huon Municipality, supporters of the Southwood Resources - Huon Wood Centre Project outnumber opponents to the development by a significant margin.

The following defines each issue category and includes examples of the types of comments received, however it is not necessarily indicative of the number or strength of comments received.

1. COMMUNITY IMPACTS

The category community impact relates to perceived impacts upon community lifestyle, impacts of noise, visual amenity, etc. This is a key issue raised by opponents to the project and requires further analysis by project team to determine suitable solutions/recommendations.

An example of the types of comments received regarding community impacts is as follows:

I m concerned about community division. Also concerned about logs trucks on the roads in the area, worried about devaluation of my property, possible overpopulation of the area, and the damage to native species of flora and fauna valley wide.

2. CONSULTATION

Several comments regarding the community consultation process were received from opponents to the project. Respondents felt aggrieved that public meetings were not held to allow opponents to voice their concerns in a public forum. Some respondents also criticised the consultation materials.

I think that there was not a forum for residents to ask questions and the pictorial presentation was unrealistic. I think that the full story is not being shown to residents.

3. CONTACT

Two respondents asked to be registered on the mailing list for receipt of information.

4. ECONOMIC

Issues raised in this category focused on the costs associated with the project, potential investors and where the profits will go. This issue attracted a range of supportive, opposed and neutral comments.

This project raises a couple of questions regarding employment, structure of dam, what wood will be used to fuel the plant, and how much tax payers money will the project cost - ie infrastructure costs.

5. ENVIRONMENT

The majority of opponents to the project raised issues relating the environment. Concerns included possible pollution from the power station, water pollution from site run-off, and opposition to existing forestry practices and the impacts to flora and fauna.

If these are our forests and this is our community I would like to see us take charge of our own resources and realise their true worth. Should be looking for high quality timber products rather than woodchipping and burning it off for power. Solar and wind power is totally self-sustainable and renewable on a daily basis. Worried about the smoke pumping machine.

6. INFRASTRUCTURE

Three respondents, who support the project, raised some concerns over the infrastructure associated with the project, such as roads and the port.

I believe that if all promises by Forestry are kept, it will be a 'reasonable' project - but I would like the port to be near Geeveston as it would be less disruptive to surrounding communities, cause less trouble, shorter, cheaper and there will be less protest.

7. OPPOSITON

Some respondents expressed outright opposition to the project without outlining specific reasons.

We don t want the development here in any way, shape, or form. It is a disgrace of a proposal on all grounds.

8. ROUTE OPTIONS

Mixed responses were received regarding the route options for the project. Many respondents suggested alternative routes or outlined reasons why particular routes should not be chosen.

I support the project subject to the following: woodchips should be transported via Forestry Roads not via Margate to Electrona and Wood products to be shipped out of Hobart should be transported via North Huon Rd avoiding Glen Huon and Huonville.

9. SUPPORT

A high number of responses were received which supported the project. Comments ranged from Go for it to more detailed messages of support:

I am supportive of the project. I think it will be good for employment and business in the community. Good on you for having a go and trying to create employment for Tasmania!

10. TRANSPORT OPTIONS

Only one comment was received regarding the number and types of trucks to pass through the Huon area. This issue appears to be a minor concern in the Huon Municipality.

I have four main concerns: 1. Excessive noise of trucks (especially engine brake noise) 2. Possible structural damage to their home by trucks, as it is built on 1m soil, rest clay plan 3. Closeness of trucks to homes after widening of road and 4. Devaluation of property due to above.

NB: The comments reproduced above are not verbatim.

7. Recommendations

After reviewing and analysing the comments raised by stakeholders in the consultation period between 11 September 2000 and 31 December 2000, Corporate Communications (Tas) Pty Ltd makes the following recommendations:

1. Ongoing Contact With Stakeholders

To counteract the assumption that the project is a *fait accompli*, Forestry Tasmania should continue to consult with stakeholders in the Huon Municipality throughout the remainder of the planning phase of the project. Ongoing brochures and direct mail letters, in particular to respondents on the mailing list should continue to be distributed at regular intervals. Ongoing updates in *Huon News* will also prove useful to the project.

Ongoing contact and communication will also reinforce and strengthen the solid base of support already established in the region.

2. Display and Access to Information

Forestry Tasmania should again undertake public information displays once the DA has been lodged with local Council. Similarly the EMP should also be available for public viewing as many concerns centre on the environmental impacts of the project.

3. Margate/Electrona Consultation Report

This document is intended to be viewed in conjunction with the Final Consultation Report for the proposal to develop a small-scale wharf development at Electrona. The Southwood Resources — Huon project intends to export wood fibre via Electrona. It is anticipated that the Electrona report will be finalised by late January 2001. To date many opponents to the project have registered concerns with the community consultation coordinator regarding the proposed route via Sandfly Road and the environmental implications for North West Bay. Some respondents have also expressed concerns regarding the consultation process currently in place. There appears to be confusion over Hobart Ports Corporation, Department of Infrastructure Energy and Resources and the Forestry Tasmania's roles in the consultation process.

It is important that communication is stepped up regarding these transport associated issues and that a clearer consultation program be implemented to alleviate respondents' concerns.

8. Conclusion

Based on the outcomes of the consultation, it is evident that a vocal minority is dominating the media and project input channels for the proposed Southwood Resources — Huon project. Nevertheless it is considered that the proposal enjoys considerable community support.

It must be accepted that people who oppose or who feel strongly aggrieved by the development proposal will strongly and actively express that opposition, while those who are supportive and satisfied with the planning and approval process are less likely to express their views.

As can be seen from the comments received, the redevelopment is supported by a significant number of respondents from the Huon area. Therefore, the project must continue to encourage and seek support from the region to ensure that the vocal minority do not dictate the project's outcomes.

By undertaking such a comprehensive consultation program in the pre-planning application phase of the project, Forestry Tasmania has demonstrated its willingness to listen to stakeholder concerns. Forestry Tasmania must ensure that the level of support for the project will continue to increase as the project continues to undertake extensive and ongoing consultation with all key stakeholders to ensure that the best development is achieved for all the community.

Based on submissions and input received, wide level discussions with stakeholders conducted by the community consultation consultants and the project team and anecdotal community comments, the Southwood Resources - Huon Wood Centre Project currently enjoys considerable public support in the Huon Municipality, with supporters of the proposal outnumbering opponents to the development by a significant margin.

APPENDIX A: DRAFT ISSUES REPORT

APPENDIX B: COMMUNITY CONSULTATION FRAMEWORK

APPENDIX C: CONSULTATION MATERIALS

Research Report
Issues and Stakeholder Analysis
August 2000

Prepared by
Corporate Communications (Tas) Pty Ltd

The following document outlines background information, positive issues and negative issues for key points along the preferred route between the proposed Electrona small port operation and proposed Huon ITPS.

The document is divided into five key areas as follows:

- Electrona Port
- Margate Community
- Sandfly Road
- Huon Highway Route
- Huon ITPS Site (incorporating Ranelagh & Judbury)

Within each of these five areas, positive and negative issues have been identified. These issues have been divided into the following categories:

- **Environmental Issues** — incorporates flora and fauna impacts, marine and coastal impacts, soil impacts etc.
- **Human Issues** — noise, visual amenity, safety, devalued community lifestyle etc.
- **Commercial/Economic issues** — impacts on business, employment etc.
- **General Issues** — all other issues not related to the above categories such as traffic management

This document was compiled from secondary research sources including Council documentation, relevant websites, meeting notes and a site tour with Dario Tomat (Whetstone) and Helen Taylor (Forestry Tasmania).

1.0 Electrona

1.1 *Positive Messages and General Background*

- Majority of basic infrastructure already in place, with the exception of the wharf and storage area.
- Wood-products wharf with limited port operation. Relatively small-scale operation — initially only 7 to 10 ships per year.
- Therefore Port will initially sit empty for approximately 420 days per year with only few employees conducting maintenance on site (similar to Triabunna).
- New wharf will be constructed and will be aligned to 12 metre depth contour. (Exact dimensions will be provided in conceptual engineering plan (layout proposal as submitted to Council). Shiploader will be constructed on it. It will be a T-shaped wharf that may be utilised by Fuglsang Shipbuilders in addition to other local industries.
- Two woodchip stockpiles will be put in place, cut into the existing bank (replace fold-up concrete shed on lower level). These stockpiles will not exceed the height of the existing shed on top level). (Note: Triabunna stockpiles are approximately 125m³ in volume whereas these stockpiles will probably be around 60m³).
- At present site is occupied by a number of tenants who will continue to operate from the site.
- All relevant environmental studies are being undertaken.
- Will be undertaking a DP/EMP - although not legally required. Therefore environmental factors and issues will be addressed as part of this process. Will ensure all consultation opportunities are provided and community needs adequately addressed.
- Environmental issues such as ballast water, seabed sediment, bilge water, tank washing oil spill, wash and noise to be satisfactorily addressed by HPC as part of the planning process
- Cost benefit analysis also being undertaken for Hobart Ports.
- Pothana Road has six houses located in the street. Five houses are privately owned and Hobart Ports owns the house closest to the site.
- Pothana Road requires work (widening, perhaps resealing for heavy vehicles).
- A slip road is being designed to accommodate vehicles turning into the site at the intersection with the Channel Highway.

1.0 Electrona

1.2 *Negatives*

Environmental Issues:

- May be contaminated soil issue (contaminated by previous operations) at site.
- Greens perception of Electrona as a woodchip port.
- Impacts on marine life at port — starfish contamination etc.
- Will port produce any air pollution — public may remember the silica plant production days.

Commercial/Economic Issues:

- Aquatas have fish farm located about 200 metres offshore directly in front of site. This is temporary set-up (and will probably be relocated in less than 12 months time). Hobart Ports Corporation is currently speaking to Aquatas about implications of deep-water wharf constructed at Electrona.
- Can Port Huon be used as an alternate port?

Human Issues:

- May be issue of visual amenity from properties located on opposite site of NW Bay (Howden and Conningham).
- Residents of Margate/Howden/Conningham may be concerned about noise and visual impacts of wharf when vessels loading 24 hours a day for two nights (but initially only 7 — 10 vessels per year).
- Noise concerns may be primarily centred on reversing noise of bulldozers maintaining woodchip piles during the day.
- Lights may be an issue during night loading (about 30 days per year) as they will be clearly visible from Conningham (Snug) area. However some residents may find it visually pleasing (?).
- Residents of Howden and Conningham concerned about chip bin noise at Electrona site (used to be with Silicon plant).
- Residents of Howden, Conningham and surrounding North West Bay areas may develop NIMBY outlook and perceived devalued community lifestyle amenity.
- Opposition by private homeowners along Pothana Road to reactivating of Port, road works and intersection upgrade.
- Community consultation issues — residents may not feel adequately informed.
- Construction of wharf will take 18 months and may be associated impacts such as noise (pile driving and reversing construction vehicles).

2.0 Margate Township

2.1 *Positive Issues/General Background*

- Upgrading works required on main road (Channel Highway) through township of Margate — road is State Highway and verges are owned by Kingborough Council.
- Local landowner and apple grower — Meredith family orchards appear to be supporters of Forestry Tasmania. Could be opinion leaders.
- Voluntary curfew from 7pm to 7am through township of Margate.
- 98 Value Management Plan for Businesses in Margate included consultation. Decision was that Margate township is OK for thoroughfare as decided by DIER — Flora Fox strongly advocates that Margate does not want to be bypassed. (Liz Anderson was present as was Flora Fox and other Kingborough Councillors). **Action:** Need to see results of this consultation and perhaps initiate contact with these people to make them friends of the project .

2.0 Margate Township

2.2 *Negatives*

Human Issues:

- May be issues associated with trucks passing through school zone at school start and finishing times (past Margate Primary school and local creche). No direct safety issues but there is safety concerns.
- General community safety issue (shoppers etc).
- Noise and vibration impacts and visual amenity of increased heavy vehicle flow through township.
- Trucks speeding through Margate is a concern held by Kingborough Council.
- Community Consultation issues — community may not feel involved in decision making process.

General Issue:

- Traffic Management problems as township based along Channel Highway — all strip shopping — but does have off-street parking in most instances (outside shops, school zone and Tavern).
- Traffic backing onto Channel Highway from strip shops.

3.0 Sandfly Road

3.1 Positive Messages and General Background

- Road is in OK condition and will require minor works to upgrade.
- Single lane carriageway.
- Landscaping will need to be addressed — trees and verges trimmed.
- Intersection has been upgraded to accommodate heavy vehicles.
- Relatively low population density.

3.0 Sandfly Road

3.2 *Negatives*

Human Issues:

- Many houses on acreage — obvious impact on visual amenity/noise issues of increased vehicle traffic (3 heavy vehicles per hour).
- Noise impact on livestock (some horses agisted in area).
- Residents of Allens Rivulet and Sandfly Road may develop NIMBY outlook and perceived devalued community lifestyle amenity.
- Impacts on Lower Longley Cricket Ground — increased traffic, safety impacts for children etc (Confirm that this is mainly used on weekends).
- Trucks speeding along Sandfly Road may be a concern for local residents.
- Community Consultation issues — community may not feel involved in decision making process.
- Childcare held daily at Christian Church, Sandfly Road, Margate.
- Recreational horse riding on Sandfly Road.
- Horse breeders/agistment also located in the area.

Economic/Commercial Issues:

- Find an alternative, less populated road.

General Issues:

- Junction of Sandfly Road and Huon Highway — major issue on outward journey with trucks turning across oncoming traffic. Need to investigate what traffic management solutions can be recommended. Ideal would be fly-over but obviously too costly. What other solutions are there?
- Huon Valley Council elections approaching in October — issues may arise if Greens take control of local Government.
- Perception that demolition order from Kingborough Council for Lower Longley Cricket Clubhouse is linked to B-Doubles. However issue is not linked.

4.0 Huon Highway

4.1 *Positive Messages and General Background*

- No major alterations required as log trucks currently travel along same route on the way to Triabunna.
- Infrastructure — Huon Highway - already in place.
- Impact on number of heavy vehicles replacing log trucks (details to be confirmed)
- Does not pass through any major townships on way.
- Slip lanes required for turnoff.

4.2 *Negatives*

General Issue:

- Local Government elections in October for Huon Valley Council — may be used as angle for Greens.

5.0 Huon ITPS Site (Incorporating Ranelagh & Judbury)

5.1 *Positive Messages and General Background*

- Large reduction in log truck traffic passing through Huonville township (as they currently do from southern forests logging area on the way to Triabunna).
- Road to forest area cuts through private forest — with owner s permission.
- Better roads for Huon Valley community.
- No visual amenity issues for ITPS Site — as cannot see site from river.
- Site will be lit for night work — isolation ensures no lighting impacts on neighbours.
- Power generation at the site.
- No apparent endangered fauna/flora issues.
- Isolation ensures minimum impact on neighbours.
- Jobs — 200 direct construction and 200 full-time.
- Log transport on predominantly forestry roads
- Consistency of product delivered to customers and markets
- Efficient transport of prepared, market-ready product from the site.
- Minimum waste.
- Capacity to use and add value to all grades of wood, from quality sawlogs through to sawdust.

5.0 Huon ITPS Site (Incorporating Ranelagh & Judbury)

5.2 *Negatives*

Environmental Issues:

- Construction of sawmilling/woodchipping facilities within State forest/old growth issues.
- Fauna — wedge-tailed eagle nests?
- Bridge will be constructed over Huon River (which is not part of this project site but is in Growth Plan). River is used for kayaking at this point — may be linked to project by particular groups eg users of river (kayakers).

Commercial Issues:

- If take current Judbury/Ranelagh turnoff (past Huonville Showgrounds) then major works will be required — National Trust is involved and costs to shore up bridge will be very high.
- The Ranelagh/Judbury road is touted as tourist drive (ref Huon Valley Holiday publication).
- Road is still tourist road until well into private forest — travel to Lake Skinner/Snowy Range fishery via Dennison Forest Drive.
- Perceived effect on Triabunna including jobs, industrial actions if Triabunna feels threatened by lost production.
- If alternative route selected then three houses may have to be resumed at Ranelagh as they are very close to roadside.

Human Issues:

- Noise, visual amenity and devaluation of community life issues may arise for small quiet townships of Ranelagh and Judbury.
- Safety concerns again for townships — children/livestock on roads.
- At times route runs parallel to Huon River. On other side of river are several houses and alternative living residents who may have issues regarding noise, visual amenity and devaluation of community life due to heavy vehicles travelling back and forth.

General Issues:

- Approaching Huon Council election time and because it is a fragmented region, there are many small, vocal groups looking for soap boxes .

Community Consultation Framework for Southwood Resources — Huon Project

1.0 Background Research

1.1 *Initial Meetings*

Corporate Communications (Tasmania) Pty Ltd (CCTas), Forestry Tasmania (FT) and Hobart Ports Corporation (HPC) conducted initial meetings with the client to discuss issues, objectives timing, activities, project spokesperson, lines of communication, project team etc. Finalise administrative details including budget for project.

1.2 *Site Tours*

CCTas and FT conducted site tour of project area to assist with preparation of Issues Scoping document (see 1.3 below).

1.3 *Issues Report*

CCTas, in consultation with HPC and FT, is currently preparing an Issues Scoping Report which identifies the main anticipated issues. A key stakeholder list and appropriate key messages are also included in this document.

1.4 *Draft Project Procedures Checklist*

CCTas will prepare a consultation procedures checklist if more than one project personnel will be undertaking community consultation (eg at community information sessions or at mobile displays). This will ensure that all team members adopt a unified and consistent approach to consultation.

2.0 Establish Systems

2.1 Project Database

CCTas will set up a database to record community/stakeholder information and comments. The database will include details such as name, address, comment received. The database operator will also categorise each comment by both issue (ie environmental, human, commercial, etc) and by positive, negative or neutral. This will enable CCTas to both measure level of community concern about particular issues as well as gauge level of support/opposition to the project. Once comments and feedback forms start to flow into the project, the database set up will be reviewed and altered accordingly. For example, new issues may arise which will form a new category in the database. This information will assist in developing the community consultation program and the media relations activity. All information recorded in the database will be confidential and responses will be numbered and information released to the project will be in an aggregate form (ie no names and addresses).

2.2 Community Inquiry Line

The CCTas telephone number will initially be used as the community inquiry/feedback line. Depending upon the number of calls received a separate line may be established in due course.

2.3 Reply Paid Post

CCTas to establish a reply paid post feature via the existing GPO Number, to enable ease of response for stakeholders wishing to submit comment forms.

3.0 Community Consultation Materials

3.1 Brochures

FT has prepared two brochures for distribution to key stakeholders. The first brochure focuses on the project in general (ie a backgrounder) and the second brochure is for potential partners in the project. This material will be used as appropriate in the community consultation program.

3.2 Powerpoint Presentations

FT/HPC have prepared a powerpoint/flipchart presentation for briefings with local Councils and other interested stakeholders. This material can be amended and developed for specific consultation activities.

3.3 Q & As

FT, in conjunction with CCTAs, is currently preparing a list of possible Q&As which may be raised by key stakeholders and media.

3.4 Website

FT in conjunction with CCTAs will establish a project website providing details of the project, Q & As, project map and other relevant information. It will also feature a direct email link with the community consultation consultant as an additional channel for feedback.

3.5 Comment Forms

CCTAs will prepare feedback/comment forms which will include project title, date, name, address, phone number of respondent, space for comments and asks whether respondent would like to be included on the mailing list. Two variations will be prepared — one for use by CCTAs when answering telephone inquiries and one for use by stakeholders wishing to fill out their own comment forms.

3.6 Direct Mail Shells

CCTAs to prepare standard shell letters for direct mail purposes to advise stakeholders of meetings and/or invite them to briefings.

3.7 Project Maps

FT and HPC to provide CCTAs with a suitable and comprehensive project map for distribution to interested stakeholders.

3.8 *Other Materials*

As project progresses CCTAs will discuss the possibility of preparing the following consultation materials with FT and HPC, depending upon level of stakeholder interest and duration of project:

- Regular newsletter updating stakeholders of progress of project;
- Fact Sheets for distribution to media and interested stakeholders;
- Standard shell letters for correspondence/response to stakeholders (eg thanking them for their comments);
- Standard shell advertisements for placement in the press regarding upcoming community consultation briefings;
- Posters/signage/photos for use at meetings and mobile displays;
- Display panels of project facts for use at meetings and mobile displays;
- And any other materials as agreed between CCTAs/FT and HPC.

4.0 Community Consultation Activities

4.1 Local Council Briefings

The first stakeholder briefings to be undertaken will be with the local Councils involved in the project. HPC/FT and CCTas will attend briefing sessions with these Councils. The briefings will include a powerpoint presentation and Q & A session. If finalised, consultation materials will also be distributed at the meeting.

4.2 State Government Briefings

FT is arranging a Cabinet briefing when advised of a suitable date by the State Government. The briefing will include a powerpoint presentation, consultation materials (maps, brochures etc) and Q & A session. Further briefings will be arranged if necessary.

4.3 Ministerial Briefings

HPC, FT and CCTas will ensure that the Minister for the Department of Infrastructure Energy and Resources and any other relevant Ministers are always fully briefed of developments in the project. This will ensure they is not caught out by the media at any time.

4.4 Media Training

CCTas will arrange media training for project spokesperson and any other relevant project personnel if required. This will ensure that all spokespeople project consistent, unified messages at all times and the project is perceived to be credible and professionally managed.

4.5 Site Tours

HPC, FT and CCTas will arrange relevant site tours when necessary for interested/affected key stakeholders. FT will be responsible for conducting these tours.

4.6 Direct Mail Campaign

CCTas, in conjunction with FT and HPC will conduct an ongoing direct mail campaign (in particular once all stakeholders have been initially briefed) to ensure all parties are kept up-to-date with progress at all times.

4.7 Key Stakeholder Meetings

Once the project has been announced to the media and general public, HPC, FT and CCTas will arrange and attend key stakeholder meetings as required. All stakeholders must be contacted in the initial stages of

the project (possibly following the same timetable as the project development — eg Electrona first, then Margate community and so on).

Stakeholder meetings may take any of the following forms — one-on-one briefings with affected individuals, local business briefings, community group briefings (eg NW Bay Progress Association) and community information sessions.

Please note it is intended that public meetings be avoided at all costs. The project must seek to control its own consultation program and where possible initiate briefings proactively rather than responding reactively to stakeholder pressure (eg invitations to public meetings). CCTas will be responsible for seeking out proactive opportunities (such as Rotary meetings and other guest speaker opportunities) to encourage initial positive perceptions of the project.

As the project progresses through its stages, various groups will be contacted and fully briefed on a regular basis. All briefings will include a power point presentation, maps, brochures and a Q & A session. In the case of one-on-one briefings (such as those conducted with residents of Pothana Road) it is suggested that no more than two members of the project should attend.

4.8 *Community Information Days*

When required, community information days will be organised. This will provide members of the general community the opportunity to view the project plans and seek information regarding the project. The information days will include display panels, project maps, brochures and provide the community with the opportunity to complete and submit comment forms to the project. Relevant technical personnel will be on hand to answer community questions. The objective of these open days will be to gain complete, qualitative information about the views of community members regarding the project, in a relaxed atmosphere. Some basic catering should be provided.

CCTas will be responsible for determining suitable public information session opportunities (eg local school fairs, Huon Valley Show etc).

4.9 *Opinion Leader Research*

Once the initial round of stakeholder briefings has been conducted, CCTas will be responsible for undertaking opinion leader research. This will enable the project to develop a network of stakeholders who are supporters of the project. They will become liaisons between the company and the community and provide the project with up-to-date issues of concern and emerging issues of concern. This will also demonstrate to the community the project's commitment to working with all stakeholders.

4.10 Community Representative Groups

Representative groups will be established in local communities (eg Huonville and Electrona/Margate) to provide input to the project development and to provide a direct conduit to local communities.

4.11 Meeting Summaries.

Following all stakeholder meetings and one-on-one briefings, CCTas will prepare meeting summaries outlining the comments made by the stakeholders. These will be entered into the project database along with any formal comments made via feedback forms.

5.0 Media Relations Campaign

5.1 Proactive Media Campaign

CCTas, in conjunction with FT and HPC, will undertake a comprehensive media campaign including regular media briefings, preparation of media releases, general advertisements, feature articles and advertorials to ensure that the media is kept up to date of all developments. In this way, the project may avoid unnecessary negative publicity and maintain some degree of control over the publicity received. The issues raised through the community consultation program will drive, in part, the media relations program by ensuring that any areas of developing concern among the community are addressed promptly in the media.

5.2 Reactive Media Campaign

CCTas, in conjunction with HPC and FT, will be responsible for preparing shell media statements and preparing media releases on an ad hoc basis to respond to any media criticism as and when it arises.

5.3 Media Monitoring

CCTas will undertake regular media monitoring to ensure that all project personnel are kept up-to-date of emerging issues and current trends.

6.0 Reporting Function

6.1 Monthly Reports

On a monthly basis CCTas will prepare a report to be circulated to all parties regarding the consultation activities undertaken in the past month, the comments received and the level of support/opposition to the project. The report will also highlight areas of growing concern in the community and offer recommendations for addressing emerging or continuing issues.

6.2 Quarterly Reports

On a quarterly basis a further report will be prepared, summarising the monthly reports and charting progress of the project.

6.3 Spontaneous Reporting

CCTas will prepare reports on an as needs basis regarding all aspects of the project. If project personnel are planning a community information day in a particular area, a report can be prepared in advance showing community issues and concerns already gathered from stakeholders in that area. Furthermore, information can also be supplied for other reports (eg Ministerial reports) as needed.

Community Consultation Schedule Briefing Timetable

Stakeholder(s)	Briefing Date & Location	Briefing Summary
Judbury Progress Association Contact Ian Paul Ph 0407 660 213.	Monday 18 September 7pm	Judbury Hall, Judbury. Contact Ian Paul 0407 660 213
Huon Valley Regional Development Board (incorporates Huon/Enterprise Centre).	Tuesday, 19 September 7.30pm	Briefing at 30 Main Road, Huonville (offices just through the roundabout). Contact Stuart Thorne on 6264 8428
Geeveston Streetscape Group	Wednesday, 20 September 2pm	Briefing at Kermandie Lodge (pub at Kermandie). Contact Glenn Doyle on 6264 8435
Senator Bob Brown s Office	Thursday, 21 September 9am.	Briefing of Stephanie Callahan only at Bob Brown s offices Level 9, 1 Wharf Street, Hobart (Marine Board Building).
Huonville Business Association. Contact: Tim Tierney Tel: 6264 1055	Monday 25 September 8am Huon Valley Bistro (regular meeting)	Briefing at Huon Valley Bistro (as part of their regular meeting). Contact Tim Tierney 6264 1055
Snowy Ridge Trout Fishery	Monday, 25 September at 10.00am	Briefing with Rob Cleary and Susan Valance at Snowy River Fishery, Dennison River, Judbury.
Healthy Rivers Project	Tuesday, 26 September 4.00pm	At 30 Main Road Offices (Healthy River Offices). Contact Holly Terri-Ware 6264 8410
Huonville Lions Club	Tuesday, 26 September 6.30pm	Briefing at Apple Valley Tea House, Grove. Contact: Barbara Cordwell Tel: 6227 1658
Judbury Residents DT, AMc, AvE, TH, BG, 2 District FT personnel.	Saturday, 7 October 1.30pm — 4.30pm	Residents information session Ranelagh Hall — to be confirmed.
Ranelagh Residents DT, AMc, AvE, TH, BG, 2 District FT personnel.	Sunday, 8 October 11am — 3pm	Residents information session Huonville Municipal Hall To be confirmed.
Huonville Residents DT, AMc, AvE, TH, BG, 2 District FT personnel.	Thursday 12 October 7.30pm CANCELLED — see 25 October.	Briefing at Apple Valley Tea House, Grove. Contact John Allport 6264 1838 TBC

Stakeholder(s)	Briefing Date & Location	Briefing Summary
Huon Kingborough Tourism Operators DT & AMc	Tuesday, 17 October 10.30am	Contact Geoff Law No. 0409 944 891.
The Wilderness Society DT & HT	Thursday, 19 October, 6pm	Grand Hotel, Huonville (Contact Pip Shirley 6264 8407)
Huon Opportunities Group DT & AMc	Friday, 20 October 6pm	Cygnets RSL (Contact Robert Armstrong).
Cygnets RSL Members	Wednesday, 25 October 8pm	Huon Valley Council Chambers Contact John Allport 6264 1838
Huon Kingborough Tourism Operators DT & AMc	Tuesday, 31 October, 7.00pm	Briefing at 30 Main Road, Huonville Offices (Contact Holly Terri-Ware)
Huon Valley Landcare Advisory Group	Thursday, 2 November 7pm	Healthy Rivers Office, 30 Main Road (Contact Sarah Frankcombe)
Sarah Frankcombe s Group DT and JT to attend.		Sarah Frankcombe s house.
Judbury Residents Information Session	Monday, 6 November 7 — 9pm	Judbury Hall — Confirmed. Organised by support group in Judbury. Contact is Ian Paul.
Dover Residents Information Session	Tuesday, 14 November 7 — 9pm	Esperance Multi Purpose Health Centre, Chapman Avenue, Dover Confirmed.
Supporters Public Meeting	Monday, 20 November, 7pm.	Kermandie Pub, Kermandie. Confirmed.
Geeveston Residents Information Session	Tuesday, 28 November 7 — 9pm	Geeveston Heritage Centre. Confirmed.
Apex Club of Huon DT & AMc	Monday, 4 December 6.30 for 7pm	Crooked Cottage. Confirmed.
Tasmanian Chamber of Commerce & Industry DT & AMc	Thursday, 7 December 12pm	TCCI Offices. Confirmed

The following places have advised that NO BRIEFING REQUIRED

Apple & Pear Growers Association
Grove Store
Leslie Vale Progress Association
Huon Protection Group
Huon Senior Citizens

Notes for John — ad size will be 10cm x 12 cm advertisement.
Huon News require final version emailed as a pdf.
Deadline is 11am Monday.

Insert Southwood Resources Logo

YOU ARE INVITED

Residents and business-owners in the Huon Municipality are invited to attend any of the following information sessions about the proposed Southwood Resources — Huon project.

Venues, dates and times as follows:

Saturday	7 October	Judbury Hall	Between 9.00am and 12.00pm
Saturday	7 October	Ranelagh Hall	Between 1.30pm and 4.30pm
Sunday	8 October	Huonville Hall	Between 10.00am and 4.00pm

Get all the facts about the proposed integrated timber processing site in the Huon state forest as well as the proposed transport options.

Feel free to drop in and talk to members of the project team, or collect project information and read the display.

We look forward to seeing you there.

3 November 2000

TO THE HOUSEHOLDER

Dear Householder

RE: INVITATION

Southwood Resources — Huon is a proposal to develop an investment ready site in the Huon as a central processing point for timber harvested in the southern forests. Please find enclosed a brochure which outlines the project in more detail.

As part of this Wood Centre project, an extensive community consultation process has been implemented. This is to ensure that all concerns and suggestions raised by local residents, businesses and community groups are considered.

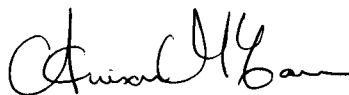
You and your family are invited to an open community information forum, as follows:

Date: Tuesday, 14 November 2000
Venue: Esperance Multi-Purpose Health Centre, Chapman Ave, Dover
Time: Between 7.00 and 8.00pm.

Feel free to stop by anytime between 7.00pm and 8.00pm to collect project information, view the display and chat with members of the Project Team about any queries you may have. Comment forms will also be available to enable you to register your views as part of the consultation process.

We look forward to seeing you and your family. If you are unable to attend and would like further information, please telephone the Community Consultation Coordinator on 6224 4557 or visit our project website at www.southwoodresources.com.au.

Kind regards



Allison McCann

**COMMUNITY CONSULTATION
COORDINATOR**



SOUTHWOOD

RESOURCES - HUON

15 November 2000

TO THE HOUSEHOLDER

Dear Householder

RE: INVITATION

Southwood Resources — Huon is a proposal by Forestry Tasmania to develop an investment-ready site in the Huon as a central processing point for timber harvested in the southern forests. Please find enclosed a brochure which outlines the project in more detail.

As part of this Wood Centre project, an extensive community consultation process has been implemented. This is to ensure that all concerns and suggestions raised by local residents, businesses and community groups are considered.

You and your family are invited to an open community information forum, as follows:

Date: Tuesday, 28 November 2000
Venue: Forest & Heritage Centre, Church Street, Geeveston
Time: Between 7.00 and 8.00pm.

Feel free to stop by anytime between 7.00pm and 8.00pm to collect project information, view the display and chat with members of the Project Team about any queries you may have. Comment forms will also be available to enable you to register your views as part of the consultation process.

We look forward to seeing you and your family. If you are unable to attend and would like further information, please telephone the Community Consultation Coordinator on 6224 4557 or visit our project website at www.southwoodresources.com.au.

Kind regards

Allison McCann

COMMUNITY CONSULTATION



SOUTHWOOD

RESOURCES - HUON

December 2000

TO THE HOUSEHOLDER

Dear Householder

RE: AN UPDATE ON THE WOOD CENTRE

As you will be aware, Southwood Resources — Huon is a proposal by Forestry Tasmania to develop an investment ready site in the Huon as a central processing point for timber harvested in the southern forests.

As part of this project, an extensive community consultation process started in September and will continue until Christmas 2000. This process is designed to ensure that all concerns and suggestions, raised by local residents, businesses and community groups.

We have been fortunate to meet with many community groups, individuals and members of the public at a variety of meetings and forums.

From the consultation so far, people have requested more information with some questions regularly being raised. It was also recently raised at a meeting in Port Huon that the community is seeking more information on the project and a unanimous decision handed down for the Project to distribute information as soon as possible.

Therefore, enclosed is a new brochure which addresses some of the questions and outlines the project for your information.

Additional public input will be sought for the environmental guidelines and management plan, as part of the planning approval process. Council's public consultation period for the development permit and environmental management plan is a minimum period of 28 days and is likely to take place early next year.

If you are yet to meet with the project team, or would like further information or briefings about the project, please telephone the Community Consultation Coordinator on 6224 4557 or visit our project website at www.southwoodresources.com.au or c/- GPO Box 1600, Hobart, Tasmania, 7001.

We would like to take this opportunity to thank community members who have attending briefings and/or provided a comment to the project so far and we look forward to continued contact throughout the remainder of the consultation process.

Kind regards

Allison McCann

**COMMUNITY CONSULTATION
COORDINATOR**

OPEN INFORMATION FORUM FOR DOVER RESIDENTS

Southwood Resources — Huon is the name of the value-adding wood centre planned to process wood from the Southern forests. The site is on State forest land near the Huon River. To find out more about the project, you are invited to:

When: Tuesday, 14 November 2000
Where: Esperance Multi-Purpose Health Centre, Chapman Ave, Dover
Time: Between 7.00 and 8.00pm.

Feel free to stop by anytime between 7.00pm and 8.00pm to collect project information, view the display and chat with members of the Project Team about any queries you may have. Comment forms will also be available to enable you to register your views as part of the consultation process.

We look forward to seeing you there.

OPEN INFORMATION FORUM FOR GEEVESTON RESIDENTS

Southwood Resources — Huon is the name of the value-adding wood centre planned to process wood from the Southern forests. The site is on State forest land near the Huon River. To find out more about the project, you are invited to:

When: Tuesday, 28 November 2000
Where: Forest & Heritage Centre
Church Street, Geeveston
Time: Between 7.00 and 8.00pm.

Feel free to stop by anytime between 7.00pm and 8.00pm to collect project information, view the display and chat with members of the Project Team about any queries you may have. Comment forms will also be available to enable you to register your views as part of the consultation process.

We look forward to seeing you there.

Southwood Resources - Huon

Summary of Resident Information Sessions Held in Huon Municipality in 2000

Date	Venue	Times	Approx Attendanace.
7 October 2000	Judbury Hall	9.00am — 12.00pm	60 attendees
7 October 2000	Ranelagh Hall	1.30pm — 4.30pm	60 attendees
8 October 2000	Huonville Municipal Hall	10.00am — 4.00pm	80 attendees
14 November 2000	Esperance Multipurpose Health Centre, Dover	7.00pm — 8.00pm	14 local residents
28 November 2000	Forest & Heritage Centre, Geeveston	7.00pm — 8.00pm	12 local residents

SOCIAL & ECONOMIC REPORT ON THE HUON VALLEY

for the Planning Submission on



the wood centre

July 2001.

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Executive summary

The biggest Tasmanian community concerns over the last decade are jobs and the economy.

Uncertainty about the future is particularly strong in the Huon Valley.

A major development project is now proposed that will bring forest-based manufacturing and processing opportunities back to the Huon Valley and breathe new life into an industry that has supported people in the area for 180 years.



Jetty at Raminea

Introduction

The history of the Huon Valley has demonstrated how a rural community remote from international markets, can succeed in developing and maintaining an international export presence. It also shows that even with the good fortune and the resources to have two staple industries that have lasted for 180 years, which are still relevant to international markets, it is not enough to sustain the regional economy and perceptions of social vitality.

Very little processing is conducted in the region and it has no significant manufacturing base.

Nearly 200 years after settlement and with a burgeoning salmon industry, the Huon Valley, once a centre of self-sufficiency, has few people employed in services to its industries (such as the seasonal fruit workers of the past) and in processing. Where once there had been nineteen dried apple factories only two remain (Franklin and Cygnet) ~ a result of scale and automation.

The wood centre, with an estimated direct employment base of 200-250 people, would have a long-term beneficial impact on the size and diversity of the manufacturing base in the region.

The factors affecting local industry, such as timber and apples, include changes in rural production and regional restructuring, and both have accelerated since the 1970s.

Advances in technology, including mechanisation and automation, resulted in the loss of most manual/low skill jobs in favour of greater capital. Mechanisation has resulted in an increased output per person employed and many traditional applications rendered obsolete, due to new materials.

The geography and topography of the region has structured the Huon Valley socially and economically. Modern transport can move products to markets, but only within the margins of cost/price sensitivity. However, the hills of Tasmania will always challenge scale economies in all forms of rural production. That other mainstay of quality Tasmanian produce, vegetables, could not compete with the mechanised economies of scale achieved on flat arable land in Victoria. The once key Tasmanian processing companies, Edgells and IXL Henry Jones & Co, passed through the stock market to become brands for produce elsewhere.

Tasmania continues to enjoy major competitive edges in key industries, resources and natural assets:

- disease-free status in cool temperate fruit production;
- disease advantages in salmon aquaculture;
- the National Competition Index (2000) rates Tasmania as first in forest resources and labour availability;
- high quality mineral prospectivity;
- competitively-priced, renewable electrical energy;
- a world-class conservation system ~ 40% of Tasmania's land area including 39% of forests are protected in formal and informal reserves.

The Policy Background

In Tasmania in the 1990s, industries with opportunity for growth were identified by State Government in the policy 'Tasmania ~ A Decade for Growth (1994)'. The Directions Statement (1996) contained specific development plans.

Forestry and forest-based industry and forested land conservation was the subject of: *The Regional Forest Agreement between the Commonwealth Government and the Tasmanian Government* (1997), the national *2020 Vision* for plantations and the *1998 Forestry Growth Plan*.

The State Government further consolidated approaches to industry development with the *Industry Development Plan 2000*, May 2000.

These policy frameworks for industry development are particularly relevant to the Huon Valley because:

- tree farming, plantation establishment (private and public) and nature-based tourism embrace both economic opportunities and community aspirations;
- a major industry development project is now proposed that will bring forest-based manufacturing and processing opportunities back to the Huon Valley.

The Local Economy

The Huon Valley contributes about 70% of the State's apple production valued at about \$30 million per annum. The bulk of the salmon industry is located in the Huon estuary and this has created a new small but highly productive processing sector generating employment for more than an estimated 170 people in the area (1999).

Forestry is still a major economic activity in the Huon Valley generating over 300 jobs. But the Huon Valley, the birthplace of hardwood pulp processing, has no significant forest product manufacturing base, yet produces some 16% of the State forest wood volume.

In 1999, the Huon Valley had an estimated total of 805 businesses, with 612 of them employing 1-9 people, in line with State trends.

It has a significant market share of regional tourism, with potential for further development of natural attractions and walks, fine food markets/country house promotion of its quality food products, and wineries.

Growth in tourism to the area has averaged more than 1% per annum above the overall tourism growth trend for the State in the last five years. Monitoring of selected forest visitor sites in the region also indicates consistent annual growth.

About 20% of total visitors to the State visit the Huon Valley each year (100,000). However, only 2,700 stayed overnight in the Huon Valley.

The wood centre development has the potential for 'industrial tourism' ~ as experienced by leading edge industries elsewhere ~ since it is targeted to showcase leading edge hardwood timber processing.

The Population Factors

While Tasmania's population declined 0.2% between June 1994 and June 1998, the Huon Valley municipality recorded a slight increase of 1.3% to 13,494. A noticeable trend for a population drift towards the major regional centre ~ Huonville ~ and an underlying loss in other Huon Valley localities is apparent. Increased commuting to work outside the valley has disguised the reduction in the local work base.

Public transport in the municipality is almost non-existent. There is a daily bus service to Hobart, other than at the weekend, and two taxis service the municipality.

The median age in 1991 was 32.0 years. In 1998, the median age was 35.4 years. This significant ageing trend demonstrates the loss of people in the 15 to 35 age groups.

The biggest Tasmanian community concerns over the last decade are jobs and the economy.

Uncertainty about the future is particularly strong in the Huon Valley. A national increase in concern for quality of life was noted in 1998. Amenity concerns result in part from an ageing population, increased resignation in the community that jobs will not materialise and increased uncertainty about the future.

The unemployment rate for the municipality equates to the average for Southern Statistical Divisions in 1996 and local community services indicate that a number of pockets of higher unemployment levels occur throughout the valley.

People leaving school at 16 years was 7.8% above the national average in 1996. While these figures are not uncommon in a rural area, they show a lack of opportunity for further education and reflect expectations arising from not having work prospects.

The Forest Industry

In 1991, the Forestry (Land Administration) Act set out the framework for a transition for forest-based industry to move from predominantly old growth forest resources to mainly regrowth forest and plantation resources by 2010.

The Regional Forest Agreement (RFA) between the Commonwealth and Tasmanian State Governments (1997) sets out the agreed use of forested land in the State, securing 39% of all forests in a world class, comprehensive, adequate and representative (CAR) conservation reserve system.



25 year regenerated forest ~ Arve

Executive summary

The Southern Forests, including regenerated forest, remains an outstanding regional feature and resource. Its timber industry, now about 180 years old, is still going strong and sawmills are increasingly efficient, but most of the wood from the Huon is processed everywhere but in the Huon Valley.

The Development

The wood centre will divert volumes of timber already harvested from State forest to new value adding processes. Once operational, the site is expected to directly employ between 200 and 250 people, contributing around \$40 million in purchases, wages and salaries each year to the regional economy. Some people from outside the region are likely to be employed at the wood centre and will in the majority of cases need to acquire local living provisions, buildings or purchase housing.

The first stage of development will create about 90 hectares of improved land on which rates would be paid ~ a direct injection of tens of thousands of dollars to the Huon Valley Municipality rate base.

About 90 properties could experience impacts due to altered traffic patterns. These impacts will be mainly noise, vibration, perceptions about safety and greater awareness of traffic. On the other hand, over 500 properties in Geeveston, Franklin and Huonville that are currently affected by log traffic will experience a major decrease in impact.

Through integrating a range of processes on one site, the forest industry is expected to make substantial productivity gains in a range of important areas:

- increased recovery of wood through new processes such as rotary peeling which is expected to recover up to 25% of pulpwood that is currently chipped;
- improved safety of forest workers and operations (activities such as log segregation that currently take place on forest landings will be reduced, more detailed segregation will be undertaken at the wood centre);
- improved product quality, including sawlog and veneer log supplies to local industries;
- transport efficiencies ~ all logs will be taken to the wood centre predominantly on forestry road and only market ready products will leave the site, thereby reducing log transport through urban areas; and
- complete wood residue management integration on the site, allowing sawdust and short wood pieces to be used in power generation. Much of the other organic waste on the site will be used in commercial compost production.

In addition to the direct employment and output of the businesses located on the site, the businesses will provide indirect benefits to the economy through such things as:

- increased contractor activities such as cartage of forest residues to the site;
- direct services to the site such as employee transport, food and cleaning services;
- ongoing maintenance and supply to the new processing businesses on the site;
- new carting for processed timber to market; and
- general economic stimulation to local businesses through greater employee expenditure.

The Centre for Regional Economic Analysis (CREA), in a report titled *The Contribution of Forest Industries to the Tasmanian Economy and the Impact of Alternative Forestry Strategies*, estimates an employment multiplier of 1.2 for the forest processing industry in Tasmania. That is for each job created in the industry another 1.2 jobs are created elsewhere in the Tasmanian economy.

Multipliers are not directly transferable to a single project. However, they do give an indication that this project can provide significant additional employment and economic benefits, equal to, or exceeding, direct employment, wages and output.

The project fits the traditional culture of the valley ~ living and working with the natural regional resources to create exports and wealth.

The proposed wood centre offers a plan whereby levels of investment not locally available, are used to develop businesses that generate regional employment, improve the community benefits from wood harvested in the area and add value to products locally made for global markets.

Introduction

Purpose of this study

Project Overview

A 'greenfield' development for a wood processing technopark is being prepared for planning approval and development application. The proposal will require rezoning about 90 hectares in State forest south of Judbury.

It is planned that this proposal be approved through normal planning procedures ~ to be investment-ready in order to attract development of contemporary wood processing.

The wood centre is planned to be a showcase for modern hardwood timber processing, integrating the production of a range of wood products and environmental site management so that all material is ultimately productively used and only market-ready products leave the site.

It is proposed that the wood from the Huon forests be processed within the Huon Valley.

The purpose

The purpose of this social and economic study is to investigate and profile the characteristics of the Huon Valley ~ its history, how it is placed in terms of social and economic wellbeing, its changing dynamics and the aspirations of its resident community.

People are more than statistics. Views and aspirations are framed by many things ~ some are accidents of nature ~ but things like trees and water are more than natural resources to the Huon Valley, they have significant economic and cultural impacts ~ like apples and wooden boats. The first remains a considerable regional economic force and a regional brand, the latter a cultural icon.

This investigation was undertaken to better understand:

- how the proposal for a wood centre sits within State economic, development and forest policy;
- how well it fits with the regional economy and infrastructure and what it could contribute to community aspirations and wellbeing.

Definition

For purposes of this study, the Huon Valley is defined as the current local government area, i.e. the Huon Valley Municipality.

Acknowledgements

There are many people and organisations to thank for their contributions, information, advice, time and interest, in the preparation of this study:

- The Huon Valley Regional Development Board
- Tasmania Police
- The Real Estate Institute of Tasmania
- The Department of Health & Human Services, Ms Jeanette Lewis
- The Community Centre ~ Kingborough, Ms B Searle for her guidance
- TASCOS ~ Mr V McCormack for his advice
- Mr Glen Doyle, Community Services Officer, Huon Valley Council
- Members of Huon Valley industries
- Business and community leaders from Cradoc, Huonville and Port Huon who provided advice and detail
- Residents of Geeveston, Huonville and Judbury who helped with focus groups
- EES Enterprises
- Corporate Communications, Ms A McCann, Community Consultation Coordinator
- Stephen Ott (research assistant)
- Andrew Wilson (research librarian).

Methodology

This social and economic report has been prepared to the requirements of the Department of Primary Industries, Water and Environment.

It is based on the study *Apple of the Isle...towards community regeneration* (Feb 2001), a compilation of publicly available data, focus groups, community views and data reviewed by community leaders. The economic data on the proposed wood centre was provided by Forestry Tasmania.

Review

This document has been reviewed by the consultants whose material was used and by the Southwood Community Advisory Group.

SECTION A

Socio-economic history & background

1. The history of the Huon Valley ~ European settlement to 2000

The Huon Valley is mantled by the Southern Forests. Its history and development has been irrevocably tied to trees ~ native vegetation and introduced fruit trees. The predominant natural resources of the area were, and still are, its forests and its waterways.

1804

Early explorers and surveyors varied in their opinions on the attractions of the area and the value of settling it, but overall, two features were most noted...

“Deputy Surveyor General Harris returned with discouraging reports of poor soil quality and the awesome nature of the vegetation.”⁽¹⁾

Huon pine

The Reverend Knopwood noted in his diary that one of these early expeditions returned from the Huon River bearing the first sample of Huon pine ⁽²⁾, destined to become an important local resource in the future.

1830

Whaling, which began in the Derwent Estuary in 1804 moved south to Bruny Island, Southport and Recherche Bay, leaving in its wake itinerants as early unofficial settlers.

The Hobart Town Gazette (13 February 1830)

announced “a bridle road having been opened up and completed from Hobarton to the River Huon, parties in search for land for location have now the power...”

1836-1840: European cultural origins

In 1836 the first settlements occurred, at Castle Forbes Bay with immigrants from the ship of the same name and with two land purchases (Clark and Price) at North Franklin.

Between 1837 and 1842, Lady Jane Franklin sponsored the development of the Franklin area through land purchases, a church and an education fund for tenant farmers.

The government identified locations for settlement, surveyed and offered land for sale, but most of these planned towns were under-subscribed and did not endure.

English, Irish and German immigrants settled in the valley. As with other colonies free-settled, villages dominated by like culture or religion emerged. Communities included Mormons, Seventh Day Adventists, Jehovah’s Witnesses ~ all strongly temperate influences ~ and Protestants and Catholics, forming enclaves such as Irish Town near Cygnet. Marriages between Protestant and Catholic gave rise to family controversy as late as the 1960s.



Apples

First fruit

Timber was the obvious resource and timber getting, the first industry.

Farms followed with farming consolidated in the 1830s. By 1840, enough grain was produced to sustain four flourmills, and with the potato crops the Huon region was self-sufficient.

The first experiments with fruit trees (circa 1838) proved successful to the point that fruit quickly surpassed potatoes as the main crop and was being exported to England in the 1840s.

SECTION A

Socio-economic history & background

1840-1850

Penal or probation settlements introduced from 1840 in areas such as Southport and Port Esperance (Dover) helped to open up the area. Prisoners worked out their sentences getting timber, making roads and clearing land, preparing the way for rural activities and often settling in the area on remission. From Lune River to Port Esperance, the entire forest had been gazetted as a naval timber reserve, preventing access and development in the Esperance area until the reserve status was revoked about this time.

The Victorian gold rush that threatened to take people from these early settlements also secured their future. The huge need for construction timber for the gold fields added impetus to timber getting and the Huon forests became an asset to Van Diemens Land and to those who stayed to husband and harvest it.

“The 1850s therefore proved the beginning of systematised timber getting in the region, which in turn created a secondary pattern of settlement still reflected in contemporary residence south of the Huon today.”⁽³⁾

The first people

“As the forest yielded to the tram and the axe, there was no place left for the original inhabitants to seek shelter from the invasion. The last encounters between settler and Aboriginal were now being made, but they were peaceful ones. Disease, not musket fire, had prevailed here.”⁽⁴⁾

Members of the South East tribe from Bruny Island visited Mosquito Point and Inlet Farm. Aborigines also camped at Mountain River and in 1853, the Judd family noted that up to 30 Aboriginal people would come to hunt and to hold their corroborees near the settlement (later the township of Judbury).

Pining

The pining industry operated in the Huon and Picton Valleys from 1840 to the 1870s when demand for the wood outstripped the west coast capacity. Pining had little influence on the settlement patterns of the valley. Huon pine was restricted in number and to rugged terrain. Pining was limited to areas where regular river floods could be used to transport felled logs out of the forests.

Coal mining

Attempts to extract coal were undertaken intermittently from 1870 onwards with mines at Catamaran, Strathblane, Ida Bay, Cygnet, Kaoota and Adventure Bay.

1870-World War 1: the pattern for population and development

This period consolidated the pattern of industry and settlement that is still a feature of the Huon Valley today.

Sawmills and settlement

The introduction of tramways in the 1850s facilitated timber access and transport, but new sawmills in the 1870s had a great impact on community development. In 1874, John Geeves introduced the region's first mechanised sawmill, creating Geeveston township. Settlements followed sawmills. Timber was exported to other states, to England and to British colonies, for example, as blue gum paving slabs to Shang Hai.⁽⁵⁾



Geeves family

Fruit growing and processing

Small fruits and apples grew so spectacularly that many small allotments along the regional waterways sustained families for up to 100 years until the 1950s, a factor that strongly influenced the size of land holdings and later, the ability to diversify income.

Fruit processing and packaging started by George Peacock in 1853 developed greatly in the 1890s through Henry Jones & Co., leading to a wider range of jobs. The 'fruit season' in this era was much longer than today, lasting four months.

The burgeoning industry led to an influx of seasonal workers ~ the fruit pickers and packers. In 1900, it was estimated that the population of the area doubled during the picking season.

While larger farms integrated fruit production with packing and off season made up the wooden packing cases with timber cleared from their land, the thriving timber industry supplied employment opportunities outside the fruit season ~ splitting palings, firewood, case wood, timber harvesting and transport.

Wooden boats and transport

Wood conquered water. Colonial Australia subverted the tyranny of distance and ocean into coastal commerce and international trade through an early burgeoning domestic wooden boat building industry. This industry was at its most prolific in the Huon Valley with the Wilson family of Port Cygnet, the outstanding boat builders for 75 years.

“In the early years of settlement small trading vessels were built in literally hundreds of places around Australia’s coastline. Anywhere there was a settlement on a sheltered bay or river, chances are that there was one or more vessels built by the pioneers. Even in the State of South Australia, where there is little or no natural timber of boat building quality, cutters and ketches were built from timber imported from Tasmania and Western Australia.”

“Of these areas, Hobart and the thickly wooded shores of the D’Entrecasteaux Channel, immediately to the south, saw the greatest concentration of wooden ship building in Australia.”⁽⁶⁾

The Huon Valley was dependent on water for transport. Boats were built locally at widespread locations. Timber companies and large apple growers commissioned their own boats. The ‘barge trade’ was a substantial part of the community, socially and economically.

Navigational access influenced settlement and the viability of communities. Many small towns in the Huon depended on the flat-bottomed and centreboard boats capable of clearing estuary sandbars and the mudflats of the Huon River.

From the 1880s to the 1930s, both sail and steam ships plied the waterways, taking out sand, coal, timber and fruit, and returning with commodities for the communities. In the Huon Valley, steam ships provided passenger services while two small steam ships a day were operated by IXL (Jones & Co.) during the fruit season and at least three boats a day took timber to Hobart.



Strathblane wharfe

“I’ve been up on that point there early in the morning and the first thing you’d see would be three or four barges come out of Esperance loaded, next thing you’d see four or five come down from out of the Huon (River). They’d have come up from Geeveston and them places, then later on about dinnertime you’d see four or five come up from out of Recherche or Southport. You wouldn’t believe how many you’d see of a day...”⁽⁷⁾
Bill Price, 1916, cutting wood on Simpsons Point, Bruny Island.

A bridge was first constructed over the Huon River in 1870, followed by government plans in 1885 for steam powered rail from Hobart to the Huon, later dropped in 1910.

The ‘super’ sawmills such as the Kermandie band mill started from the 1890s. While steam driven land transport in the Huon Valley was largely confined to forest and farm, portable steam engine technology gave rise to enduring and more sustainable small timber cutters. Initially servicing the fruit industry with cases, they would for decades to come, set up spot mills and cut the smaller and regrowth stands left by the big mills.

From 1920 onwards...internal combustion and electricity

World War I created a brake on industry and trade but introduced petrol and diesel technology, changing the structure of transport and industry in the Huon Valley. River trade towns all but disappeared.

“It (Franklin) became a ghost town when they improved the road to Hobart and the river trade stopped. But at that time, Franklin was the only town outside of Hobart with electric lights.”⁽⁸⁾ Jim Skinner, former warden for Huonville.

Hydro-electric power spread throughout the Huon Valley from the 1920s when the HEC “forcibly acquired” the council-operated plant behind Franklin, ultimately powering changes in fruit processing.

Coal mining continued at Catamaran until 1939 and in 1937 the Kaoota mine opened.

SECTION A

Socio-economic history & background

While the Great Depression bit and made times tougher, timber and fruit industry survived and the lorry prevailed. By the late 1930s road transport had all but decimated river trade, with produce loaded directly at the farm shed, unloaded at the port, and lorries often returning with paid freight. Huon apples were taken to a number of ports including Devonport, often because of waterfront strikes.

“The roads to Hobart were terrible... There was no bitumen at all. A trip took an hour and twenty minutes... Then when you got to the wharf you would sit there and wait for hours... There used to be strikes at Hobart on the waterfront and you couldn't cart anything down...” ⁽⁹⁾ Colin Oates, apple worker.

After the war

For decades, fruit prices remained stable with sustained production of processed apples throughout World War II. Post-war development reduced the availability of the itinerant labour needed to meet the intensive seasonal needs of the small fruit industry. This in turn led to a contraction of the Huon Valley small fruit industry that consisted mostly of raspberries and blackcurrants.

1970

Changes in international trade and old varieties of fruit led to significant structural, social and economic changes culminating in the orchard grubbing grants that ended in 1975. The Huon orchard industry was now 150 years old. The 1970s saw the start of a shift in employment and land ownership patterns brought about by the diminished scale of the fruit industry, reduced rural income in the valley and the increased mobility of road transport. Many of the small land holdings productive in the small fruit heyday were not big enough for contemporary rural production. People moved into the area for cheap land rather than for production.

Coal mining in the valley ended in 1971 with the closure of the Sandfly mine.

1980s

A new Huon Highway constructed in the 1980s added to the influx of newcomers commuting from jobs in Hobart to reside in the charm of the valley. The trip from Hobart to Huonville had been reduced to a mere 25 minutes. Lifestyle changes abounded.

Traditional industries could not supply many of the original residents with work and there was a steady outflow of residents to jobs outside the area. Later, in the 1990s, an improved North Cradoc Road from Cygnet changed the traffic and commuting patterns for the area from the Channel to the Huon Highway.

Massive changes in international trade and the growth of the services sector throughout the 1980s to 45% of the nation's GDP pushed rural Australia towards the breadline. The Huon Valley lacked a diversified manufacturing base, was produce export-oriented and a user, not generator of services.

1990-2000 and beyond

Waterways once again became a source of wealth and by the 1990s the region was the centre of a burgeoning salmon industry.

As in the past, the Huon Valley seems set on a path of specialised production of boutique export produce ~ fine foods ~ viticulture, cherries, salmon, specialty mushrooms and mineral waters. Industries today have unprecedented levels of technological support characterised by growth in technological services employment and delivery from sources remote to the users.



The Huon Valley remains without a manufacturing base. The fruit-processing base is reduced to two operations. Tasmanian Orchard Products, IXL Jones & Co. and others are long gone.

The Southern Forests, including regenerated forest, remains an outstanding regional feature and resource. Its timber industry, now about 180 years old, is still going strong and sawmills are increasingly efficient, but most of the wood from the Huon is processed elsewhere outside the Huon Valley.

2. The industries ~ how and why they changed

The trees are still here...

The most remarkable feature of the timber and apple industries in the Huon Valley is that they endured for so long ~ at this stage, both are 180 years old and remain key produce and sources of wealth for the region.

These industries have survived nearly two centuries of the most rapid change in the history of mankind ~ from colonial settlement with sail, axe and horse to fibre-optic technology.

The resources are still here ~ the great Southern Forests and the orchards ~ but the industries are in a very different form, the structure of production and employment having changed greatly.

Factors influencing industry and regional wealth

The key factor affecting industry including timber and apples has been all pervasive change that has accelerated since the 1970s.

Advances in technology including mechanisation and automation resulted in loss of most manual/low skill jobs and an increase in output per person.

Many of the advantages Australia had in Northern Hemisphere markets due to differing growing seasons, have been lost through hot-house production.

Labour costs and economies of scale achievable in countries with lower regulatory imposts have seen manufacturing and resource production move to those areas.

The small domestic market means that for many products, Tasmanian producers have had to service international markets. This capacity to export continues today. However, Tasmania's relative geographic remoteness from many markets has seen transport costs become key competitive inhibitors. Inefficiencies in shipping of some products, particularly when they pass through mainland ports, have compounded the problem. For Australian markets, Bass Strait has been regarded as a significant transport cost driver. International primary product and resource markets, together with foreign government access-to-market barriers, means that some of our products are excluded or rendered uncompetitive. This is further impacted due to the effects of trade blocks, such as the European Common Market, effectively excluding Tasmania from many traditional markets.

The greatest impact on international trade and the export of primary produce has been the inexorable progress towards "the global village" ~ globalisation.

In recent decades, these factors have affected all sectors of Australia's primary commodities and rural income. Tasmania has been affected, struggling throughout the 1980s and 1990s to achieve 1% per annum economic growth.

In the three years to 1995, rural Australia suffered an 80% decline in income, across all commodities, across the nation. Trade barriers, tariffs, structural adjustments to international trade relationships, markets, finance sectors, interest rates and an unfavourable exchange rate all took their toll. Reduced income has been matched with reduced services to rural Australia.

Changing apples. The 1980s and on...

"Look around the new orchards of the Huon today...But apple-growing in the Huon will never be quite the same again. The day of the 10-acre farm, which supported a family, is past. Between 1969 and 1976 close to 90% of the very small growers gave up. By the mid 1980s the three biggest growers in the Huon ~ Shields, Calvert Brothers and SD Reid and Sons ~ were producing close to a third of Tasmania's total packout."⁽¹⁰⁾

...when I first went to work on the land an orchard that produced 500 bushels to the acre was a very good orchard, and there were no problems about making a good living off it. Now we're up to 1000 bushels an acre and we find it difficult to make a living."⁽¹¹⁾ Jack Kile, former warden for Esperance.

1840 Exports established to England

1853 George Peacock introduced product processing ~ jam, pulp, preserves

1880 Dried and fresh apple export industry to England worth 20,000 pounds

1892 Henry Jones & Co. formed ~ achieved international export recognition ~ through orchard finance (land mortgages), product processing, transport and marketing, the company achieved a significant hold on the industry and impacted on the social and economic life of the Huon Valley community until the late 1960s

1940 Last apple boat leaves the Huon, replaced by trucks ~ Tasmania a leader in apple and pear science via CSIRO until the 1970s

SECTION A

Socio-economic history & background

- 1969-** Government orchard grubbing grant market adjustments to changing international trade (impact of European
1976 ~ Common Market, competition from New Zealand and South Africa, early awareness of potential in Asian markets leads to new apple varieties)
~ 90% of small growers leave industry
~ introduction of controlled atmosphere cool stores and contemporary mechanised production, shorter picking season, fruit stored until marketed then packed
~ demise of packing sheds and local processing
~ Port Huon closed
- 1977** TAMA established to better market fruit, the forerunner of changing marketing and delivery systems and growers associations
- 1980s** Shepparton (Victoria) and Albany (Western Australia) far out-produce 'The Apple Isle' ~ major centres for large scale growing and centralised fruit processing
- 1999-** The Tasmanian apple industry generates \$37.4 million gross value production ~ share of national production
2000 is 12.57%

Huon Valley timber industry changes

- c1804-** Land clearing for settlement and construction,
1850 'farms from forest'
- 1840s-** Mechanised steam mills ~ a principal power
1850 source for the next 100 years ~ accelerated the speed at which timber could be cut into useable size
- c1840-** Pining in the Huon and Picton Valleys
1870 (Huon pine)
- 1850s** Introduction of horse-drawn tramways ~ revolutionised log transport from forest to water
1874 The Geeves Brothers set up the first large scale steam driven mill south of the Huon River, leading to longer term mills
- 1898** Timber concessions introduced for corporate investment
~ companies such as the Huon Timber Company and Tasmanian Timber Company set up new 'super mills' like the Kermandie band mill
- 1899** Mechanised tramways using steam power
- 1900-** Depression and world war added to the demise of the super mills
- 1920** ~ small sawmills or "spot millers" use portable steam mills at hundreds of sites to recut the local forest and supply case timber
- c1920** The Huon Timber Company introduced North American aerial cable harvesting to the Southern Forests ~ the experiment ending in 1926
- 1926-** The start of large-scale timber concessions. *The Kermandie Wood Pulp and Paper Industry Act 1926* was introduced and The Tasmanian Paper Co Pty Ltd established an experimental pulp mill at Port Huon, pioneering the use of hardwood for pulp and papermaking, traditionally based on European softwoods
- 1940s*** The combustion engine ~ chainsaws and trucks ~ the start of dramatic technological changes to harvesting and transport of wood
- 1962-** Pulp made at Port Huon by APM
1982 for Australian processing
- 1970s** Private land clearing accelerated by pulpwood concessions, Forestry Commission warns in 1976 that the cutting rate is unsustainable
~ local sawmills remain but enter a period of contraction driven by technology and economy of scale, although outputs remain
- 1987** Green forest politics take effect ~ the State and Federal Governments negotiate on the Lemonthyme and Southern Forests resulting in the Helsham Agreement ~ the start of prolonged debate on forested land use
- 1989** Salamanca Agreement ~ industry relinquished forested land producing 30,000 cubic metres per year ~ the Huon Forest Products project was terminated
- 1991** Forest and Forest Industry Strategy enshrined in legislation after two years of public consultation
- 1986-** Pulp made again at Port Huon for Korea ~ finally closes ~ wood from the Huon Valley (saw and
1992 veneer logs, pulpwood) is taken elsewhere in Tasmania for processing ~ Triabunna, Hobart, Boyer

- 1997** The Regional Forest Agreement sets out conservation and sustainable use of forested land (public and private) in Tasmania
 ~ a world class forest conservation system in Tasmania ~ CAR ~ (comprehensive, adequate and representative) covers nearly 40% of Tasmania's land area including 39% of forests in conservation areas, not available for timber harvesting.
 Some 300,000 hectares of forest was transferred from production to conservation and the RFA set out guidelines for sustainable forest management, industry development and forest resource development, including \$67 million in funding for intensive forest management, plantation establishment and infrastructure development
- 1998** The Forestry Growth Plan introduced by Government to achieve world scale and quality in forest resources and contemporary wood processing development

3. Regional industry and its social and economic impact

Social impacts

From the start, timber getting in the Huon Valley created its own infrastructure, wooden boat building likewise and the fruit industry generated its processing services. Until the 1930s, the three were highly inter-related through resource, transport services and labour force. All three became world-renowned, a source of regional wealth and all three had major impacts on the social life of the Huon Valley.

As a source of wealth, these industries allowed the residents to develop many of their own community services ~ Franklin was the only town outside of Hobart in southern Tasmania with 'electric light', for example. They also engendered a regional culture and social vitality.

Wooden boat building

To the wooden boat industry we owe a legacy of world class vintage boats, a tradition of regattas and our State having the highest boat ownership per capita in the world in 1974.

Harry O'May lists more than 350 trading vessels between 10 and 560 tons, built between 1812 and 1947, in his book *Wooden Hookers of Hobart Town*.

Orchardists, sawmillers and sailors alike competed in a round of events that linked the towns, and the country to the city, culminating in the famed 'Cock of the Derwent' held in February at the Hobart Regatta:

"We used to take a fortnight off around Christmas and go to all the regattas down the Channel ~ each little place had their own regatta. There was one at Southport, all the yachts and barges possible would get there. From there we'd go to Esperance (Dover),...up to Port Cygnet, then Shipwrights Point...up the channel to Woodbridge...to Kettering."⁽¹²⁾ Alan Langford.



Shipwright at school of wooden boat building

The *May Queen* was a timber hooker (barge) built at Shipwrights Point at Franklin in 1867 for Chestermans' timber company. She started and ended her 106-year career (in 1973) freighting logs from the Raminea mill. She won at the Hobart Regatta eight times between 1882-1885 and again in 1946 (twice), 1949 and 1951.

Today, traditional wooden boat building skills are kept alive at the Shipwrights Point School of Wooden Boat Building, operated by STEPS, and supported by Forestry Tasmania.

Recreation and festivals

The Huon Valley built its own community facilities for more than a 130 years. Isolation meant that communities "did for themselves," with residents establishing tennis clubs, bowls clubs and competitions between the towns. Today, Cygnet continues to host a major national country hard-court tennis tournament every Australia Day long weekend.

After World War II, RSL clubs rapidly became new social centres and community venues. The Huon Valley today contains 17 community halls, many of them below current health and building standards. Apple festivals were a feature of the valley. The Taste of the Huon and the Huon Show now promote the valley's produce.

From the timber industry, Tasmania has that unique exhibition sport ~ woodchopping ~ and the region produced its share of champion axemen.

SECTION A

Socio-economic history & background

Economic diversity

Services

The sheer wealth in the Huon Valley region generated flow-on effects to other sectors ~ mechanical services and supplies, financial, agricultural supply and services. Cygnet in 1970 demonstrates this point.

In 1970, Australia had the highest number of bank branches per capita in the world with one bank branch per 2,000 people. Yet Cygnet, with less than 2,000 people, enjoyed the services of three banks, three hotels, an RSL club and three service stations on a main street little more than a hundred metres long.

It is likely that, even had the level of regional wealth prevailed, this level of services would not have survived, being subject to the impacts of technology, globalisation and corporate change within their own industries.

In the three years to 1995, Australian banking shed 30,000 jobs due to corporate downsizing and the growth of electronic financial services. Rural Australia, on its knees, was the first to see and feel the impacts.

Tourism

Post-war, with modern bus transport, a spin-off in tourism developed. Tasmania was promoted as “The Apple Isle” and the pretty Huon Valley with all its hills, waterways and apple blossom lining the roads, was a focus. The blossom was some three months ahead of the peak summer season, but nevertheless, coach lines benefitted from the influx of interstate tourists using the Bass Strait ferry service. From this time, the “fly-drive” and “self-drive” tourism sectors also developed as a significant market for Tasmania and the Strait ferry services evolved.

It is difficult to quantify the impact and attraction of ‘the apple valley’ on tourism and the benefits of tourism to the valley at those times. This form of tourism was developing as the apple industry entered the period in which 90% of the small growers closed down. The bulk of visits were only hours, the coach passing through and the tourists accommodated largely outside the area.

By the 1980s Tasmanian tourism had dropped “the Apple Isle” in favour of “the Treasure Island” and by 1987 a cartoon rendition of the ‘Tassie Devil’ had created 94% national awareness for Tasmania, but trend figures on visits to the State were down.

Eco-tourism

The fight for the further conservation of forests highlighted the Huon region and the Southern Forests when the furore at Farmhouse Creek became an international incident coinciding with heightened awareness and concern for natural and wilderness values in western society.

Tasmania lost a battle with the Commonwealth government, giving up 198,000 hectares of forest and receiving \$50 million in Helsham compensation funds. Some of these funds were invested in forest tourism facilities known as the Forest and Heritage Centre and the Arve Loop (1990). The Huon Valley was the first region in Tasmania to see such development. By 2000, Tasmania had yet to see any strong eco-tourism benefits on the scale of those generated by the Daintree Forest (Qld).

4. Summary ~ the structural legacy that created today's Huon Valley

The history of the Huon Valley has demonstrated how a rural community remote from international markets can succeed in developing and maintaining an international export presence. It also shows that even with the good fortune and the resources to have two staple industries that have lasted for 180 years which are still relevant to international markets, it is not enough to sustain regional economic and perceptions of social vitality.

Very little processing is conducted in the region and it has no significant manufacturing base.

Nearly 200 years after settlement and with a burgeoning salmon industry, the Huon Valley, once a centre of self-sufficiency, has fewer people employed in services to its industries (such as the seasonal fruit workers of the past) and in processing. Where once there had been nineteen dried apple factories only two remain (Franklin and Cygnet) ~ a result of scale and automation.

Experiments using modern transport and technology to service specialised niche markets for high quality produce ~ for instance, strawberries grown and flown directly to Japan ~ have come and gone. The influx of newcomers into the region since the 1970s has brought in new ideas. But many of them have been executed at the 'cottage' industry level, the players being primarily attracted to a rural lifestyle, with 40% by 1994 deriving their income from paid work elsewhere. Others are retirees and many of the rest achieve a subsistence income or rely on government support.

There is little local or domestic market from which to launch or to sustain development.

Australia represents just less than 2% of the international finance sector and in the days of globalisation, the money goes where the best profits can be extracted, as technology makes many forms of production possible outside the boundaries of the best naturally occurring resources. There have also been significant international social, economic, environment and trade negotiations, acknowledged, but not discussed in this report.

The geography and topography of the region has structured the Huon Valley socially and economically. Modern transport can move products to markets but only within the margins of cost/price sensitivity. However, the hills of Tasmania will always challenge economies of scale in all forms of rural production. That other mainstay of quality Tasmanian produce, vegetables, could not compete with the mechanised economies of scale achieved on flat arable land in Victoria. The once key Tasmanian processing brands, Edgells and IXL Jones & Co., have passed through the stock market to become brands for produce elsewhere.

The hills and the fruit industry pattern of small land holdings in the Huon Valley that prevail to this day have largely prevented effective diversification by farmers to other forms of income by achieving economies of scale in dairy, beef, or sheep production.

The geographically widespread location of the many small low-density communities also significantly challenges the cost/efficiency of providing modern community services.

SECTION B:

The Huon Valley today ~ social & economic status

1. Local and regional economy

1.1 Tasmania's business environment

(All items* in this section: source *Tasmania's Business Environment*, Tasmania Development and Resources, August 1996.)

Where the Huon Valley has been is not necessarily predictive of where it is going. Community aspirations and market places change. To distinguish future development trends from past historical patterns, the local Huon Valley economy is best considered within the context of Tasmania's regional state economy and business environment. In 1996, agriculture, manufacturing and electricity contributed more to the Tasmanian economy, relative to the rest of Australia.*

Exports

Exports contribute more to Tasmanian gross state product (GSP) than in Victoria, New South Wales and South Australia. They are traditionally based on resource products (mining, forestry) worth \$920.7 million in 1994/5, while food and beverage exports totalled \$398 million.* On average these exports are more significant in the Tasmanian economy compared to the other Australian States.

*(Figures are not available for apple and fruit processing. (i) Source: ABS Cat No 8221.6 Manufacturing Industry Tasmania, Dec 1997)

Manufacturing

Manufacturing is the second largest industry sector in Tasmania contributing some 15% or more to GSP. Of this, forest based wood and paper product manufacturing (ANZIC Classes) is the second largest for:

Employment	3,774 people	17.1% of total manufacturing
Wages and salaries	\$133.1 million	19.7%
Turnover	\$1.1 billion	23.2%

and, has the largest industry gross product at \$525.4 million or 29.1% of total manufacturing. (i)

The food, beverage and tobacco-manufacturing sector is Tasmania's largest manufacturing base. In 1996 it employed 5,532 people with \$157.9 million in wages and salaries and a turnover of \$1.346 billion. Of this, meat and meat products is a major contributor with 1,077 employed and a turnover of \$158.4 million, compared to seafood processing with 535 people employed and a turnover of \$176 million. (i)

Competitive advantages

Tasmania continues to enjoy major competitive edges in key industries, resources and natural assets:

- disease-free status in cool temperate fruit production;
- disease advantages in salmon aquaculture;
- the National Competition Index (2000) rates Tasmania as first in forest resources and labour availability;
- high quality mineral prospectivity;
- competitively priced, clean energy;
- a world-class conservation system ~ 40% of Tasmania's land area including 39% of forests protected in formal and informal reserves.

HUON VALLEY PROFILE

ABS 1996 Census and 1996 Business Register

12,907 people – 4,727 households, average 2.7 people per household (2.6 for Tas)

63.2% aged 15 to 64, 10.6% aged 65+ and 26.2% less than 15

50.8% male, 49.2% female

57.5% married, 25.8% never married, 7.3% divorced, 6.2% widowed

61.3% adult incomes less than \$15,500 per annum
37.0% adult income \$15501 - \$52,000 per annum
1.7% adult income more than \$52,001 per annum

86.5% speak English at home

4,486 employed, 679 unemployed

Agriculture/forestry/fishing employs 1,056 people

18.5% households rent, 29.4% purchasing home, 52% own home outright

7% homes with no motor vehicles

36.7% households couples with children
27.2% couples without children

9.5% single parents, 19.9% lone persons

Development influences and policies

Throughout the 1990s, Commonwealth and State Government policies influenced development and rural economies. Corporatisation of telecommunications, energy, transport, health and other services combined with 'user pays' principles and an ageing population changed the structure and employment levels of services traditionally supplied by government.

Table 1: Industry Growth Employment/Output ~ Forecast 1995-2003

Sector	Employment %	Output %
Agriculture, forestry and fishing	1.8	2.8
Mining	-4.7	4.3
Manufacturing	-0.7	2.8
Electricity, gas and water	-3.8	2.9
Construction	2.3	3.7
Retail trade	3.6	4.2
Transport and storage	0.1	2.7
Communication	2.3	6.9
Finance and insurance	2.4	3.1
Health and community services	3.4	3.1
Cultural and recreational services	3.1	4.0

(Source: Monash-Syntec, Tasmania's Business Environment, Tasmania Development and Resources, Aug 1996)

This table outlines predictions for industry growth in Tasmania to 2003 and demonstrates growth in output combined with growth in employment is more likely in service sectors, whereas growth in output with declining employment is more likely in industries impacted by increased technological development.

In Tasmania in the 1990s, industries with opportunity for growth identified by State Government in the policy *Tasmania ~ A Decade for Growth* (1994) included:

- agriculture, processed food and beverages;
- aquaculture and fishing;
- forestry and forest products;
- manufacturing;
- mineral processing and mining;
- tourism;
- services ~ including education and business services.

Further impetus was given to these sectors through *The Directions Statement* (1996) that contained specific development plans. Forestry and forest-based industry and forested land conservation was the subject of the *Regional Forest Agreement between the Commonwealth Government and the Tasmanian Government*, the national *2020 Vision* for plantations and the *1998 Forestry Growth Plan*.

These policy frameworks for industry development are particularly relevant to the Huon Valley because:

- tree farming, plantation establishment (private and public) and nature-based tourism embrace both economic opportunities and community aspirations;
- a major industry development project is now proposed that will bring forest-based manufacturing and processing opportunities back to the Huon Valley.

The State Government further consolidated approaches to industry development with the *Forest Industry Development Plan 2000*, May 2000.

SECTION B:

The Huon Valley today ~ social & economic status

The valley within the State

Table 2: 1996 Census: Huon Valley within Tasmania's 43 Statistical Local Areas

Item	Rank	%	No	\$
Huon Valley				
~ couple families with dependent children	21	41.9	1,504	
~ proportion of full-time workers	34	63.0		
~ ranked by unemployment rate	12	12.8	682	
~ median weekly household income	29			476

(Source: ABS Cat No: 2017.6, Family and Labour Force Characteristics 1996)

1.2 Key industry trends

Fruit

Tasmania produces 80% of Australia's export apples but has only 12.57% share of national production. The Huon Valley contributes about 70% of the State's apple production valued at about \$30 million per annum. Espalier techniques and the introduction of apple varieties such as Fuji, have improved productivity and market share in exports to Asia.



Cherries

Salmon ~ aquaculture

The gross value of salmon production increased from \$48 million in 1993/94 to \$67 million in 1994/95, representing a 39.6%* increase and by 2000 the industry was worth an estimated \$130 million annually. The bulk of the salmon industry is located in the Huon estuary and this has created a new small but highly productive processing sector generating employment for more than an estimated 170 people in the area (1999).

(*Dept Primary Industry and Fisheries Annual Report, 1994/95)

Forestry, wood and paper manufacturing

There has been particular attention over the last decade to the productivity and employment trends in this sector. It has been argued that resource based industries such as forestry are "sunset industries" and that they are decreasing in value because they are "shedding jobs."

Nevertheless, forestry is still a major economic activity in the Huon Valley, generating over 300 jobs. Forestry Tasmania employs 74 people directly (a 7% growth since 1996) and many more people through contract. Sawmills employ about 60 workers and private forests the balance.

As a proportion of total State manufacturing industries, wood and paper had:

- employment 2.5 times the national average
- wages and salaries 3.1
- turnover 4.1
- industry gross product 4.7

(Source: ABS Cat No 8221.0 manufacturing Industry ~ Australia, Oct 1997)

Wood manufacturing in the Huon is not benefiting from this value adding.

Today, the Huon Valley, the birthplace of hardwood pulp processing, has no significant forest product manufacturing base yet produces some 16% of the State forest wood volume.* The value of timber sawn at Huon sawmills is about \$6 million per annum, while over \$14 million of wood is sold for processing elsewhere.

(*Not including firewood ~ Forestry Tasmanian Three-Year Wood Production Plan, 2000)

Businesses

In 1995/96 small businesses in Tasmania accounted for over 55% of total state employment. The largest category, employment size group of 5-19, represented 29.2% or 4,897 businesses and 36.6% of employment or 41,107 people.

(Source: State Portraits of Australian Business, 1996 – Table 3.1 page 15)

In 1999, the Huon Valley had an estimated total of 805 businesses, with 612 of them employing 1-9 people, in line with State trends.

(ABS Cat No 1362.6, 1999)

Table 3: Distribution of Businesses in the Huon Valley

Area by postcode	Total businesses
Huonville	446
Franklin	47
Cygnets	137
Geeveston	131
Dover	80

(Source: ABS 1996 Census, ABS 1996 Business Register – Eighty20 Copyright Invisible Hand Corp Pty Ltd)

1.3 Employment

Table 4: Huon Valley Employment Profile ~ People 15 yrs and Over

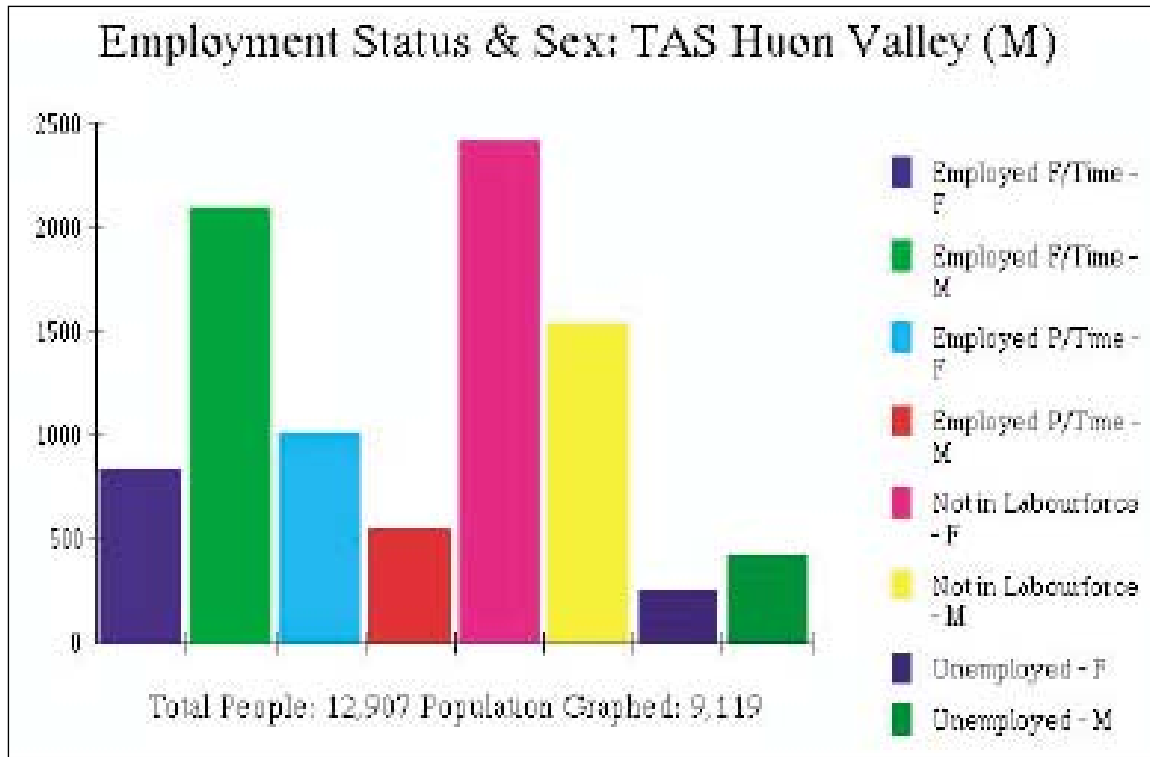
	Employed	Unemployed	Not in labour force	% Unemployment rate		Total population
				15-24 yrs	15 yrs	
1991	4,374	879	3,454			8,851
1996	4,647	682	3,949	22.7	12.8	9,505

(Source: ABS Cat No 2795.6, 1991 Census, ABS Cat No 2017.6, 1996)

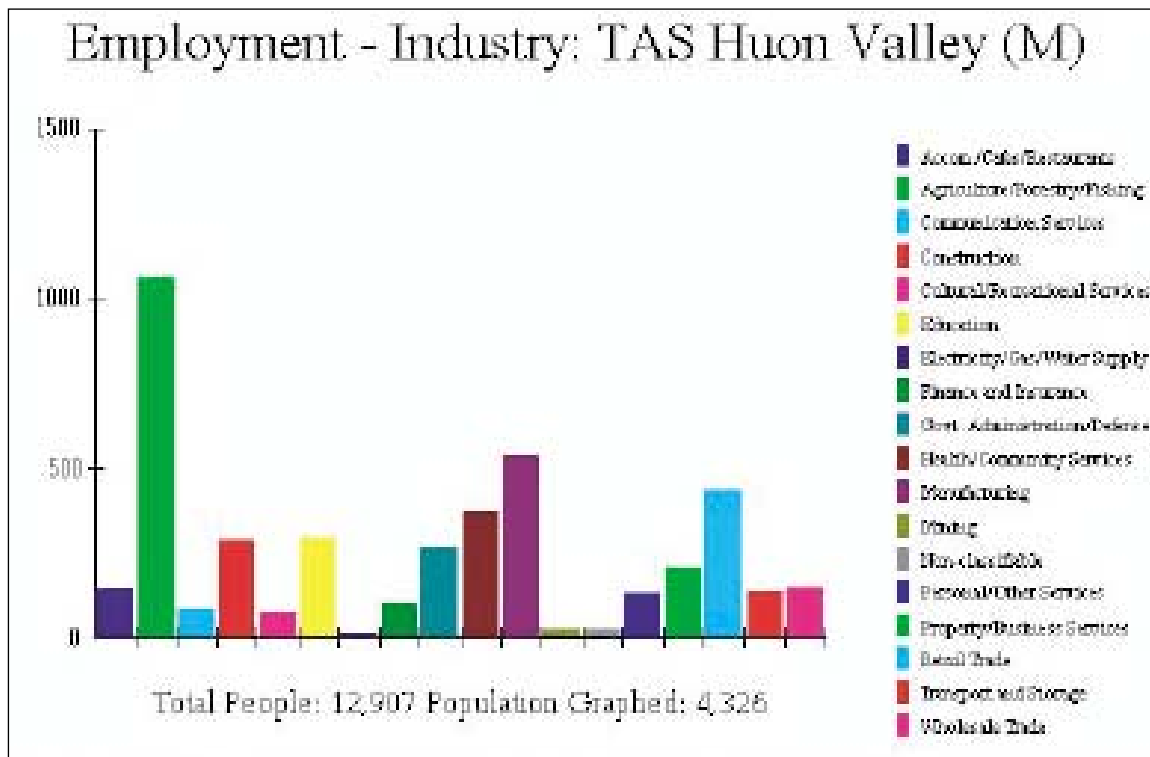
While the unemployment rate for the municipality equates to the 22.9% average for Southern Statistical Divisions (Tas) in 1996, local community services indicate that a number of pockets of higher unemployment levels occur throughout the valley.

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The Huon Valley today ~ social & economic status



(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)



(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)

1.4 Construction approvals

Throughout the 1990s, forecasts for the real estate industry and constructions trends have been generally discouraging. Declining population and lack of economic growth have been cited as the reasons. New activity in the Huon Valley has been generally stable since 1997 as figures from the *Huon Valley Council Annual Report 1999/2000* show.

Table 5: Huon Valley Planning & Construction Permits Comparison

Item	99/00	98/99	97/98	96/97
Total building permits	233	224	221	201
Total building value	\$8.7m	\$6.0m	\$8.8m	\$5.5m
Total planning permits	152	134	134	119
Total subdivision permits	58	37	53	62
Developments (planning permits)				
Dwellings	37	24		
Units	1	4		
Additions	28	19		
Garages/sheds	17	14		
Commercial buildings	8	19		
Industrial buildings	3	4		
Other	52	50		
Total	146	134		

(NB: No explanation for variance between 146 and 152 planning permits in 199/00 - did proceed?)

1.5 Recreation and tourism

Entertainment, hospitality, food and recreation businesses serve a number of market segments, domestic and itinerant (visitors to the area). The following business types are included in this profile, called "R & T" and their distribution is shown in Table 6.

Amusement centres	Backpackers accommodation	Caravan and tourist parks
Convention/conference venues	Guest houses	Hotels, private hotels, motels
Nightclubs/discos	Outdoor activities/supplies	Restaurants
Take away food	Theatres and cinemas	Travel agents

Table 6: Distribution of Recreation and Tourism Businesses in the Huon Valley

Area by postcode	No of R & T businesses	Total businesses	% R & T
Huonville	16	446	3.59
Franklin	7	47	14.89
Cygnnet	5	137	3.65
Geeveston	4	131	3.05
Dover	3	80	3.75

(Source: ABS 1996 Census; ABS 1996 Business Register ~ Eighty20 Copyright 1996 Invisible Hand Corp Pty Ltd)

An estimated total of 531,00 holiday visitors (not intrastate) came to Tasmania in 1999/00, a 1.5% increase on 1998/99:

- 42.9% of visitors booked with a travel agent and 30.7% booked with an airline;
- total visitor spending on accommodation was an estimated \$557.9 million;
- 221,300 of all visitors used a rental car;
- 35% visit January to March.

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When in Tasmania, visitors like to:

~ visit national parks	54.7%	~ visit gardens	29.7%
~ browse at markets	49.1%	~ bushwalk ~ under 2 hrs	28.4%
~ visit historic houses	38.3%	~ visit casinos	24.0%
~ view wildlife	34.3%	~ bushwalk ~ up to full day	18.3%
~ visit antique shops	33.6%	~ visit wineries	15.7%

Table 7: 1999/00 Tourism in the Huon Valley

Town	Visitor Numbers	% of total Tas visitors	% passed through	% stopped looked around	% stayed overnight
Huonville	101,500	19.1	8.6	8.9	1.6
Geeveston	49,000	9.2	5.5	3.5	0.3
Dover	45,900	8.6	4.3	2.4	2.0

Only about 2,700 visitors stayed overnight in the three centres mentioned. They stayed an average of 4.1 nights in Huonville, 6.3 in Geeveston and 2.9 in Dover.

In the Huon Valley region:

- 18,400 (3.5% of visitors) went to the Hartz Mountains World Heritage Area;
- 14,900 (2.8% of visitors) went to the Arve Forest Road Drive.

No natural area or other attraction in the Huon Valley was in the State top ten visited.

(Source: all the above information ~ Tourism Tasmania Visitor Survey 1999/00)

From this data, it can be seen that the Huon Valley has a significant market share of regional tourism with potential for development of natural attractions and walks, fine food markets/country house promotion of its quality food products and wineries.

The Huon Valley actively promotes tourism and the Council operates a tourism marketing office.

Growth in tourism to the area has averaged more than 1% per annum above the overall tourism growth trend for the State in the past five years. Monitoring of selected forest visitor sites in the region also indicates consistent annual growth.

2. Population distribution and trends

2.1 Population

The population for the Huon Valley was 12,150 in 1991, up from 9,859 in 1976. The estimated residential population at 30 June 1998 was 13,494. While Tasmania's population declined 0.2% between June 1994 and June 1998, the Huon Valley municipality recorded a slight increase of 1.3%.

(Source: ABS Cat No 1362.6, 1999, ABS Cat No 2795.6 1991 Census)

From 1991 to 1996, the population distribution through Huon Valley localities and urban centres varied marginally as follows:

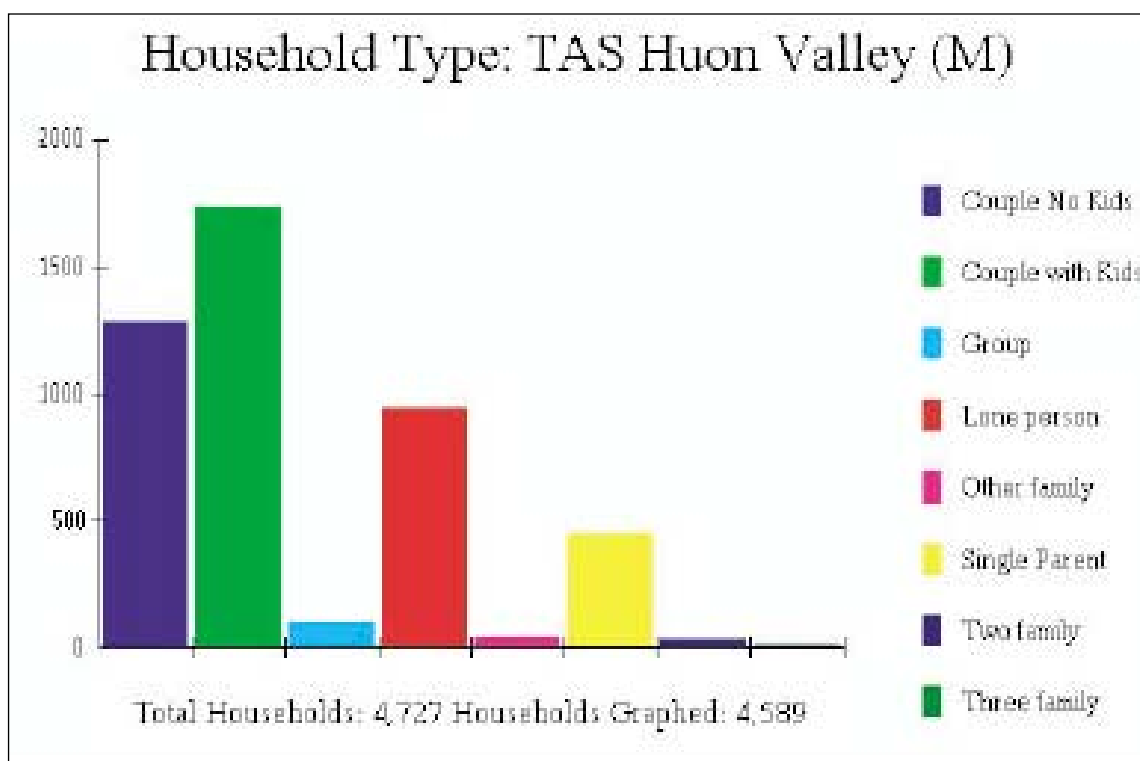
Table 8: Population Distribution by Locality (L)/Urban Centre in the Huon Valley

Locality	Total persons 1991	Total persons 1996	Variance
Cygnnet (L)	924	851	-7.9%
Dover (L)	521	481	-7.7%
Franklin (L)	462	454	-1.7%
Geeveston (L)	826	778	-5.8%
Huonville-Ranelagh	1,524	1,718	+12.7%
Total	4,257	4,282	

(Note: the localities and urban centre figures do not represent the total area)

(Source: ABS Selected Characteristics Urban Centres & Localities 2016.6 1996)

This table shows a slight trend for a population drift towards the major regional centre Huonville and an underlying loss in other Huon Valley localities, despite an influx to the northern end of the valley. Increased commuting to work outside the valley has disguised the reduction in the local work base.



(Source: ABS 1996 Census, ABS 1996 Business Register – Eighty20 Copyright Invisible Hand Corp Pty Ltd)

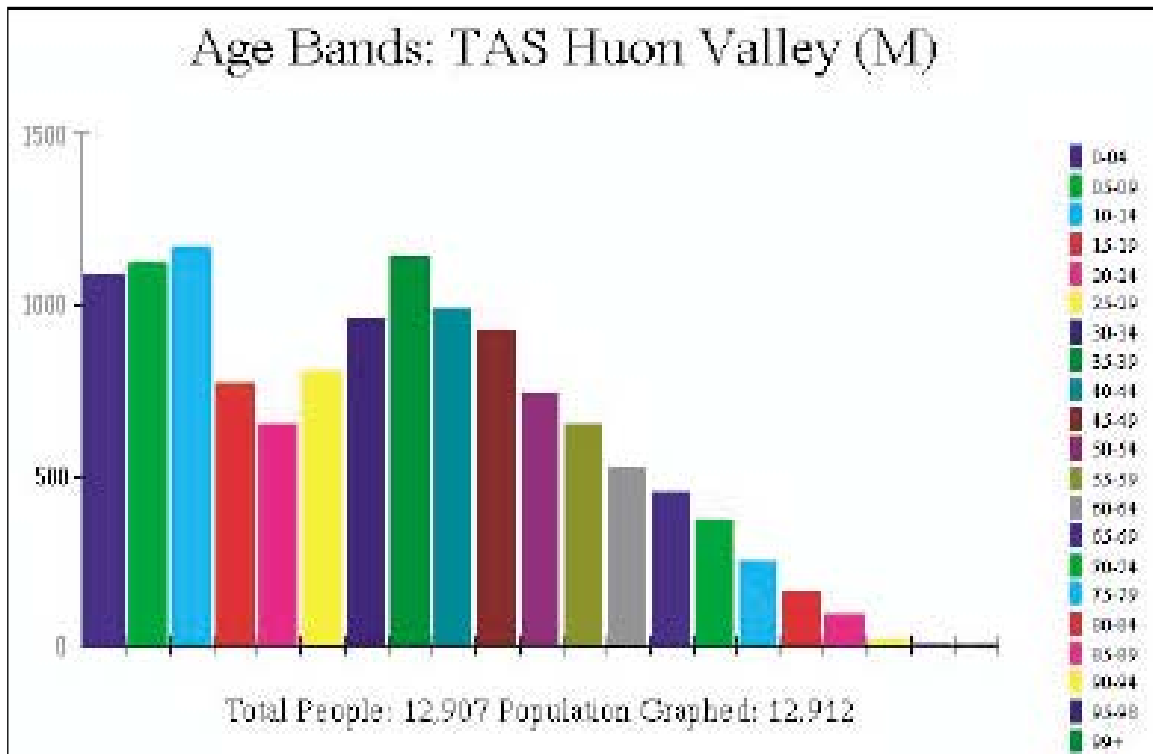
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2.2 Age trends

Between 1976 and 1991, the Huon Valley population was characterised by a slight predominance of males to females. The median age in 1991 was 32.0 years, average in comparison to other municipalities.

In 1998, the median age was 35.4 years and the estimated population was 13,494. Unlike many other areas, males continued to dominate at just under 51% of the population. The age bands shown for the area support local perceptions that people in the 15-35 year group are less likely to remain in the area.



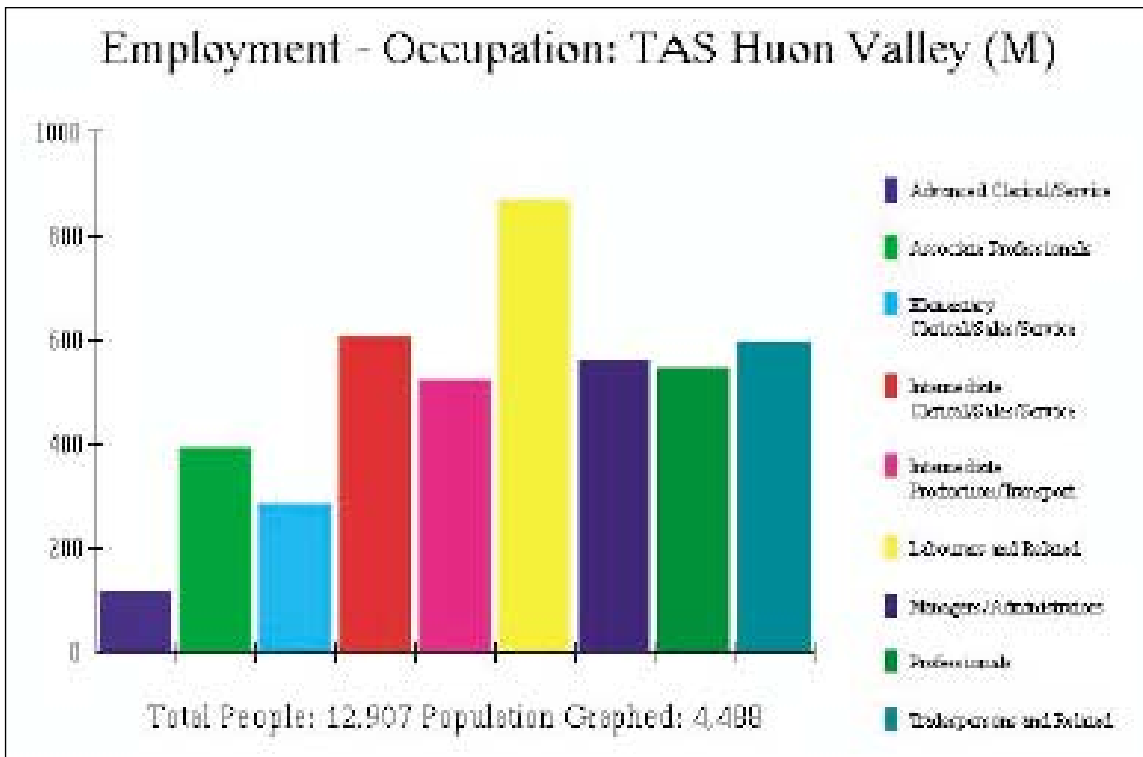
(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)

2.3 Occupation and employment status

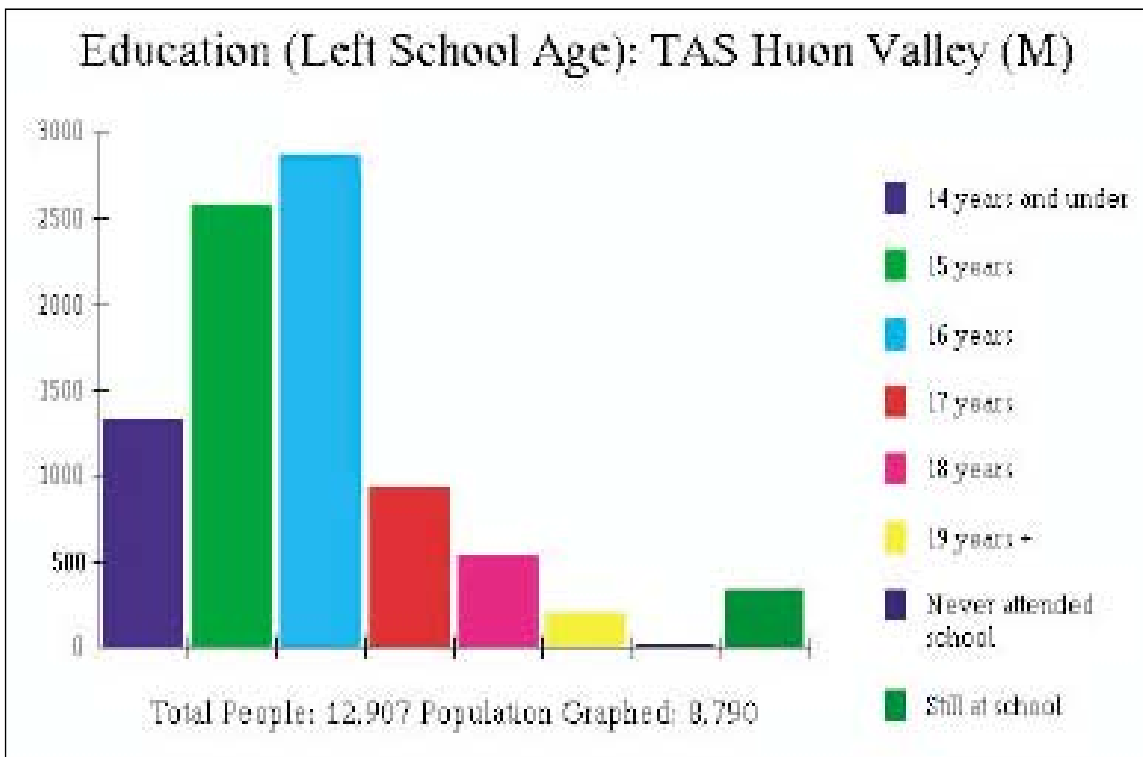
The largest single occupation group is 'labourers and related' (more than 800 persons) reflecting the area's strong reliance on agriculture, forestry and fishing, with clerical, sales/service, transport/production, managers/administrators and professional occupation groups falling between 500 and 600 persons each, accounting for the bulk of occupations.

The outstanding education characteristic of the Huon Valley is that people leaving school at 16 years was 7.8% above the national average in 1996. 1996 ABS figures for localities typifies this. Huonville/Ranelagh ~ 950 persons of 1,261 left school at 16 years or under and in Geeveston, 442 of 581 persons.

While this trend is not uncommon for rural areas, it reflects diminished expectations arising from limited work prospects (op cit T.Tierney).



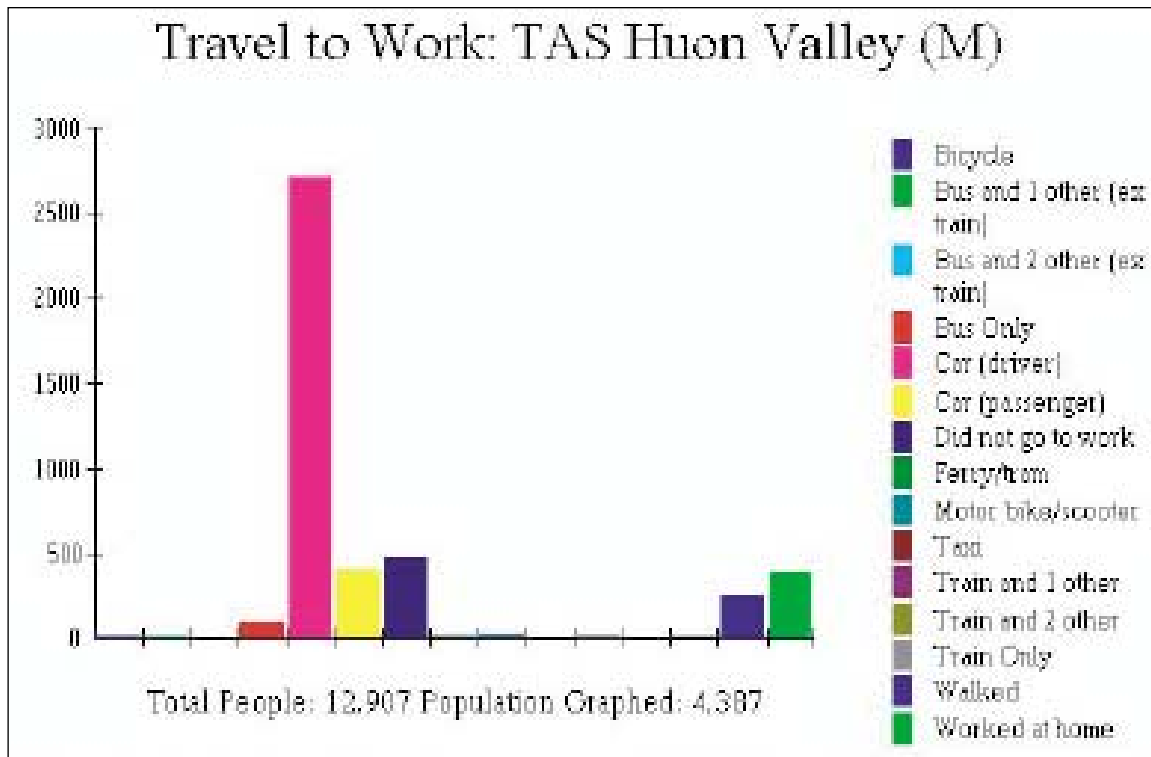
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(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)

Public transport in the municipality is almost non-existent. There is a daily bus service to Hobart, other than at the weekend, and two taxis service the municipality. You drive or you stay at home.

3. Social indicators and community wellbeing

3.1 Unemployment

The estimated unemployment rates in 1996 for the Huon Valley municipality were:

- ~ 12.8% persons aged 15 years and over
- ~ 22.7% persons aged 15-24 years.

These are average unemployment rates, compared to other southern statistical divisions in Tasmania, which are trending down (improving) on 1991:

1996	1991		
12.5%	16.2%	15 years and over	~ total southern average
22.9%	27.4%	15 to 24 years.	

(Source: ABS Cat No 2017.6, 1996 Census)

Table 9: Profile of Unemployment by Locality ~ 1996

Locality	% ~ aged 15 years or more	% ~ aged 15-24 years
Cygnnet	19.4	12
Dover	26.2	8.8
Franklin	17.9	14.5
Geeveston	24.1	13.7
H'ville/R'lagh	16.1	9.8

(Source: ABS Cat No 2016.6, 1996)

However, there remains a strong perception within the mainstream community that unemployment is a key issue, with many residents expressing two concerns in interviews:

- keeping their children at school to completion; and
- the drift of younger people out of the region, to get work.

This is likely to be exacerbated by current national economic forecasts predicting unemployment rates to reach 6% by the end of 2001.

3.2 Income and home ownership

Out of 43 Tasmanian statistical local areas in 1996, the Huon Valley ranked:

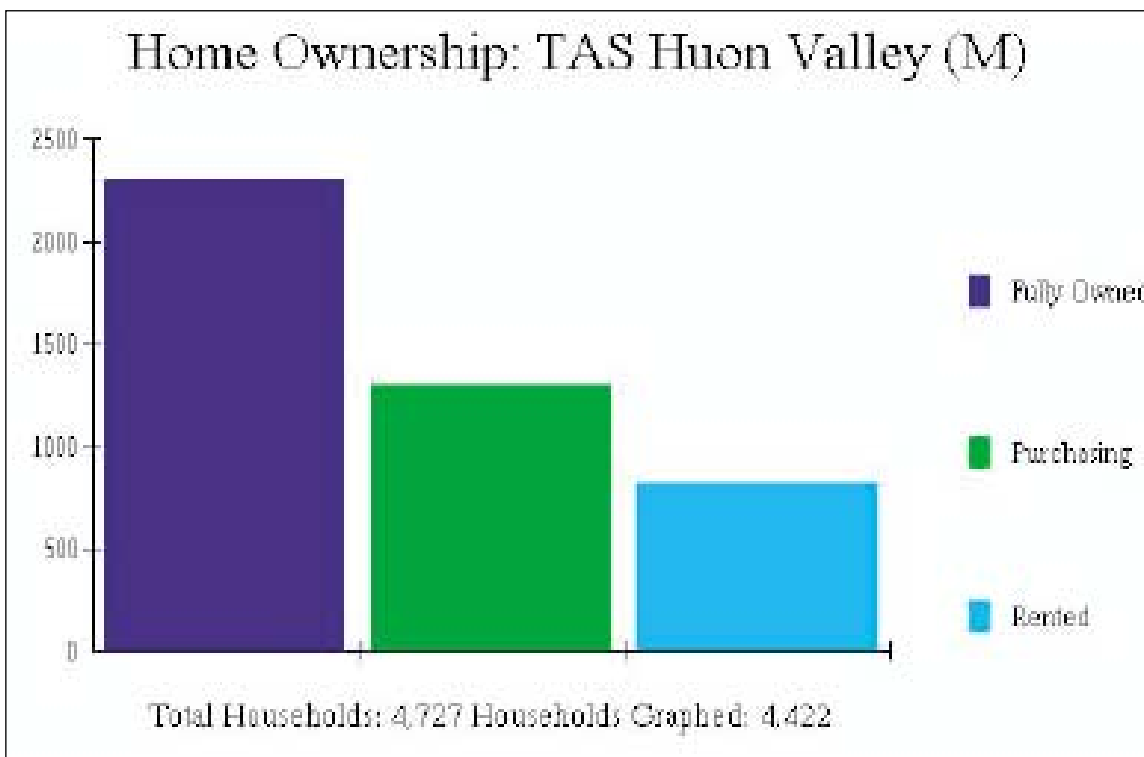
• 21	couple families with dependent children	41.9%	(1,504)
• 29	median household weekly income	\$476-00	
• 34	proportion of persons working full-time	63.0%	
• 12	unemployment rate	12.8%	(682 persons)

(Source: ABS Cat No 2017.6, 1996)

Based on the 1996 Census, the Huon Valley indicators are:

- household income to \$36k per annum averaged 6.1% above the national average;
- household income over \$51k was 6.1% below the national average;
- home ownership ~ fully owned ~ was 7.7% above the national average;
- households with no vehicle or one vehicle ~ 5% below national average;
- households with two vehicles ~ 6.2% above national average.

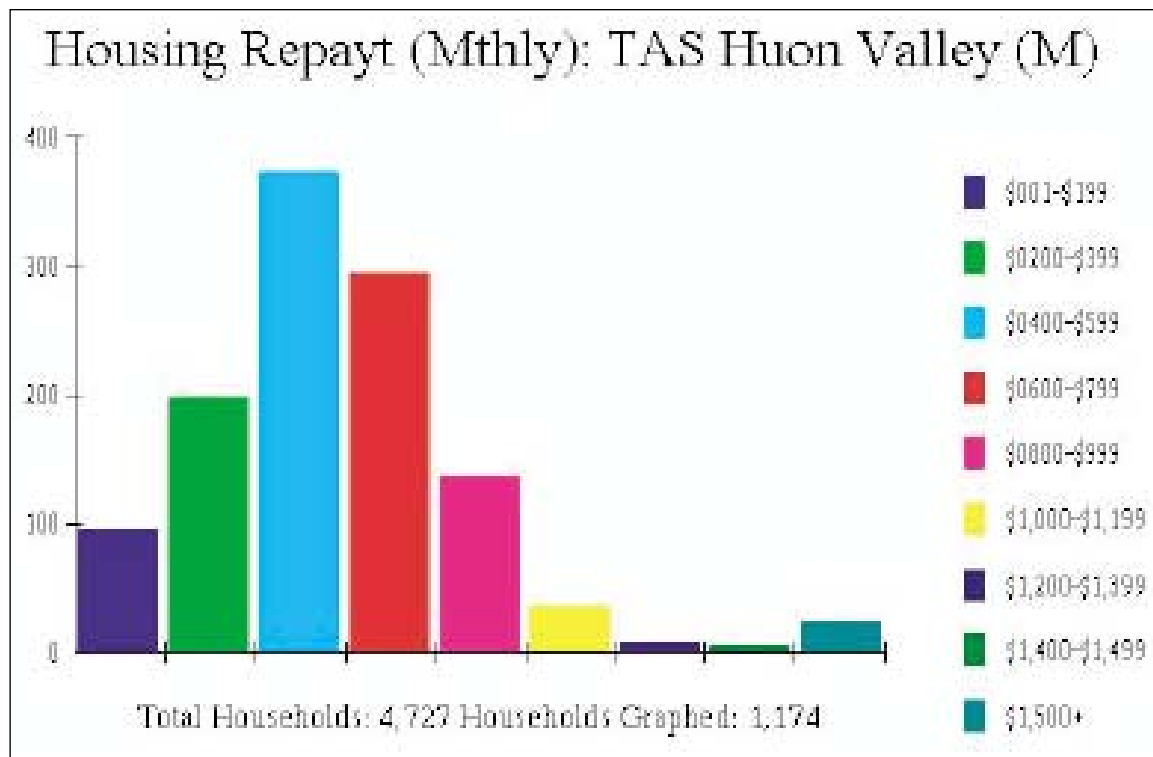
More than 90% of dwellings are separate houses and rented homes fall 10.2% below the national average.



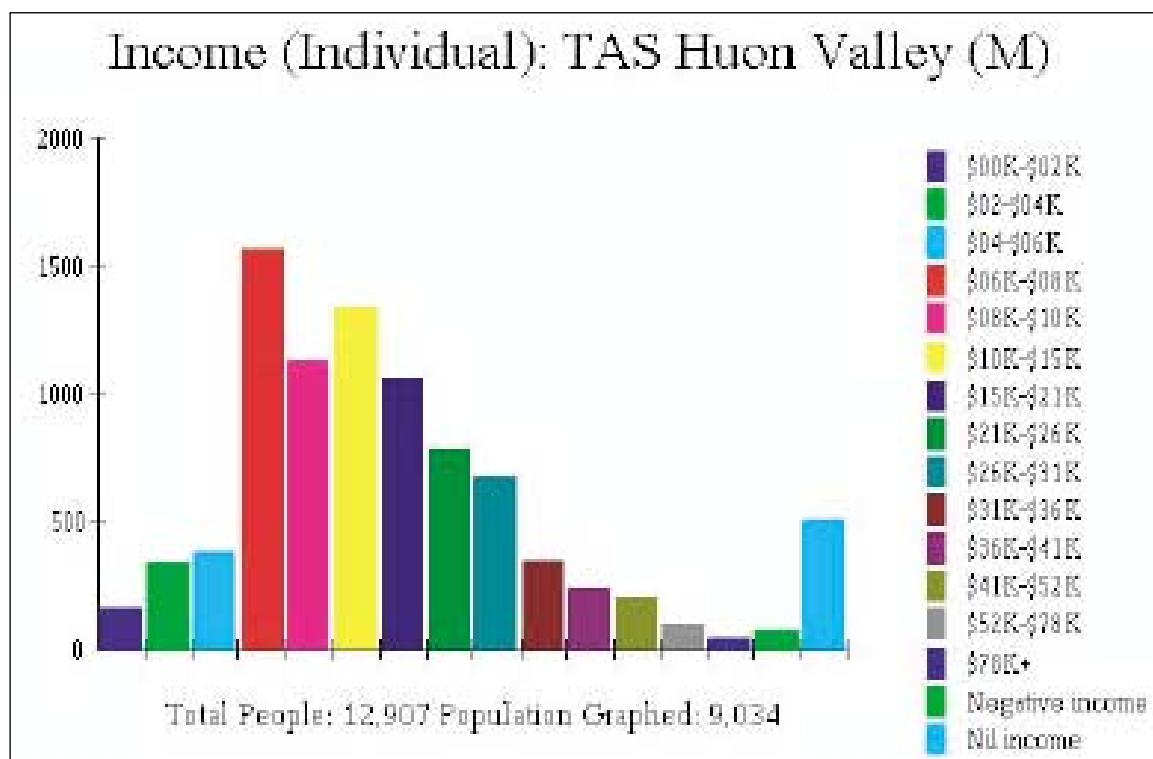
(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)

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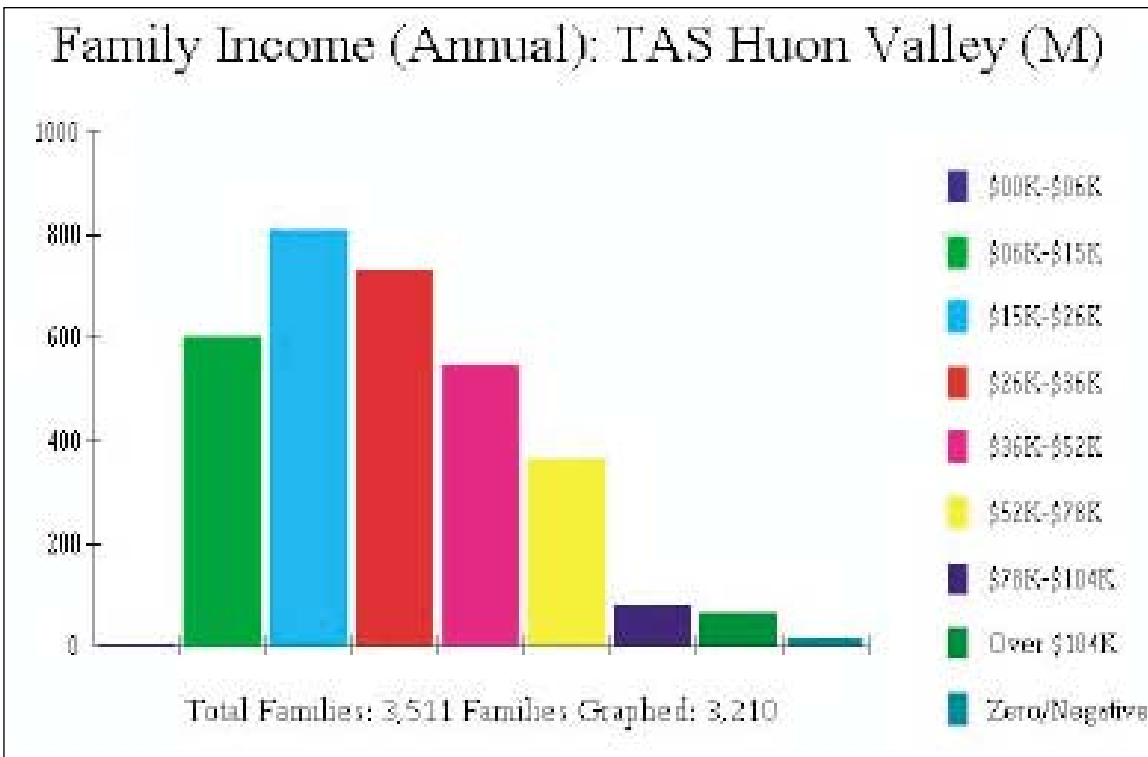
The Huon Valley today ~ social & economic status



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(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)



(Source: ABS 1996 Census, ABS 1996 Business Register – Eighty20 Copyright Invisible Hand Corp Pty Ltd)

3.3 Real estate trends

Second homebuyers, comprising more than 50% of buyers between 1996 and 2000 (inclusive), dominate the real estate market for houses in the Huon Valley. First homebuyers are the second largest market at 29-33.8% over the same period.

Land typically sells more quickly than housing stock in the Huon Valley. As with the bulk of Tasmania, the region is well stocked with residential properties on the market.

Based on the figures supplied by The Real Estate Institute of Tasmania, the level and value of housing stock on the market, as indicated by median sale prices, is relatively stable over that period although sale figures seem to have a two yearly flux.

Median prices of land sales have declined in value from an average of around \$24k from 1996-1999 to \$16k for 2000.

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Table 10: Real Estate Trends in the Huon Valley

HOUSE

Year	Median sale price	Median days on market	Number of sales
1996	\$82,000	121	75
1997	\$77,500	171	110
1998	\$71,000	188	99
1999	\$73,000	169	145
2000	\$81,000	125	93

LAND

Year	Median sale price	Median days on market	Number of sales
1996	\$26,500	147	31
1997	\$22,500	331	22
1998	\$27,000	191	18
1999	\$20,000	206	34
2000	\$16,000	48	41

BUYER PROFILE

Buyer profile: (Houses only)	1996	1997	1998	1999	2000
Second home buyer	57.0%	57.3%	54.5%	52.5%	51.7%
Retiree	3.2%	4.0%	3.6%	4.0%	6.9%
Investor	8.6%	10.7%	9.1%	13.1%	2.8%
First home buyer	29.0%	21.3%	30.9%	21.2%	33.8%
Developer	1.1%	1.3%	0.9%	5.0%	2.8%
No answer	1.1%	5.3%	0.9%	4.0%	2.1%

(Source: Real Estate Institute of Tasmania, 2001)

3.4 Community health and vitality

The following indicators were taken from ABS Cat No 1362.6 ~ Regional Statistics Tasmania, 1999:

Table 11: Centrelink Benefits ~ Per 1000 Persons ~ Huon Valley

(number of persons shown in brackets)

Newstart allowance	Youth allowance	Age pension	Disability support/pension	Single parent payment	Carer payment
67.8 (915)	21.9 (296)	87.1 (1,176)	48.5 (655)	27.2 (367)	3.9 (53)

There are no outstanding statistical variances for the Huon Valley compared to the averages for other local government areas in southern Tasmania. However, community health services are provided in the region from the Kingston Community Health Centre (outside the municipality) and there is a perception that the system change to Centrelink has possibly made things more difficult for a few rural families without vehicles.

Table 12: Road Accident Fatalities and Injuries ~ Huon Valley

Item	1996	1997	1998
Fatalities	2	1	4
Serious injuries	21	26	17
Minor injuries	27	30	33
Total	50	57	54

(Source: ABS Regional Statistics Tasmania 1362.6)

The major factor for accident rate appears to be population base. Waratah/Wynyard, another rural area with a similar population of 13,954 had total accidents for these years of 75, 48 and 61 respectively.

Licensed gaming premises and machines

In August 1998, the Huon Valley had three licensed gaming premises with 35 machines. This is compared to four gaming premises and 56 machines for Waratah/Wynyard.

Table 13: Tasmanian Crime Statistics 1997-2000

Suburb	1997/98	1998/99	1999/00	Total
Geeveston	99	62	66	227
Huonville	190	159	149	498
Judbury	13	8	3	24
Ranelagh	25	14	19	58

Offences included: Offences against the person
 Assault
 Offences against property
 Burglary of motor vehicles
 Burglary of private premises

(Source: Tasmania Police ~ January 2001)

The crime rate for Huon Valley was an estimated 4.7% per capita in 1999 and 5.7% per capita in 2000. The last estimated Tasmanian State crime rate per capita was 13.24% in 1998 (Tasmanian Police, 2001) and in 1998 the national per capita crime rate was 7.0% (Australian Yearbook 2000).

Community, health and education services

Out of the 26 communities by postcode in the Southern Tasmanian Statistical Division, Huonville (ranked 4), Cygnet (8), Geeveston (10), Franklin (11) and Dover (13) are in the top fifty percentile for community, health and education services.

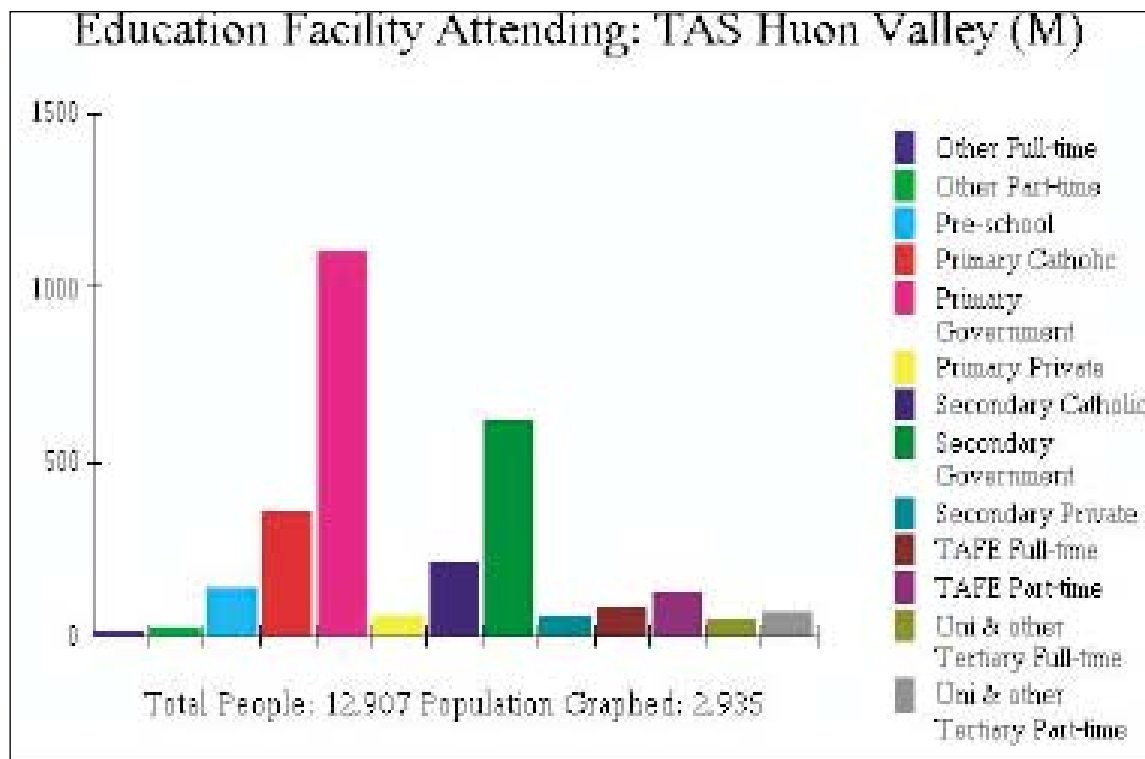
These are defined as:

Alternative health	Business colleges	Child care centres	Chiropractors
Churches/temples	Community centres	Dentists	Fire brigades
Hospitals, private and public	Libraries, public	Medical practitioners	Naturopaths
Nursing homes	Optometrists	Osteopaths	Physiotherapists
Podiatrists	Relaxation therapy	Retirement homes	Schools (all types)

(Source: 1996 Census ~ Eighty20 copyright)

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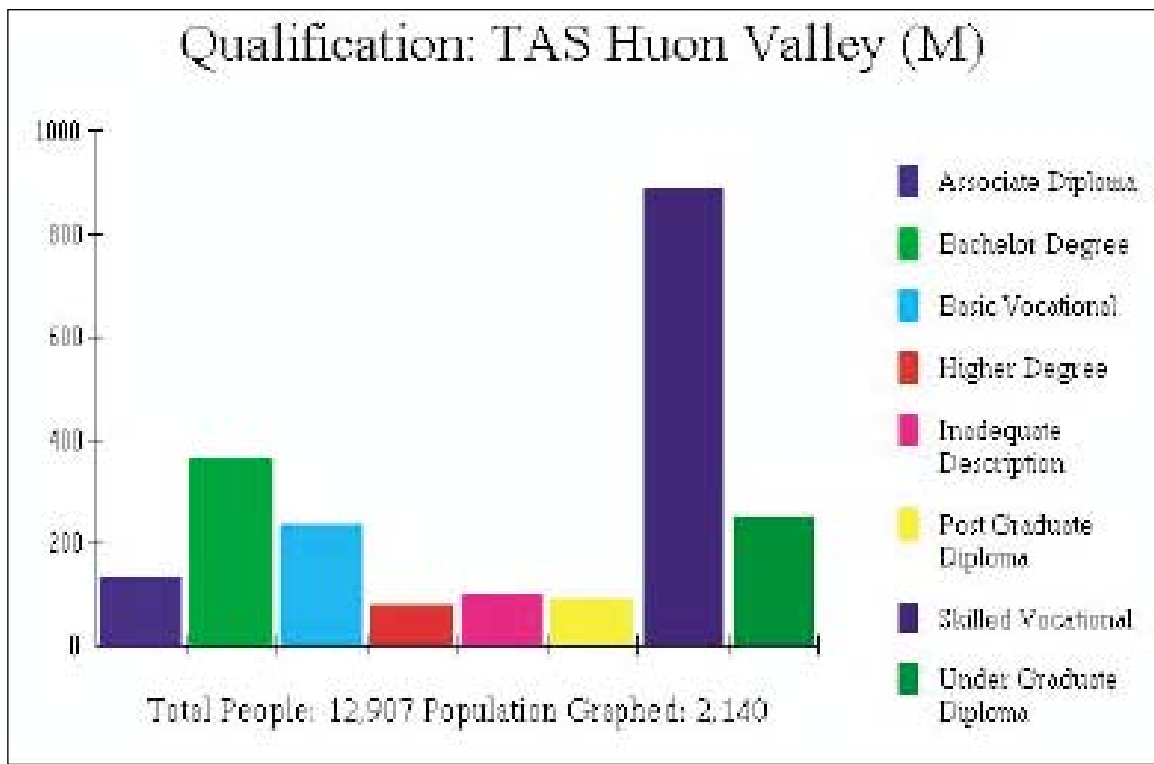
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Educational services generally are available through to secondary school level within the municipality.

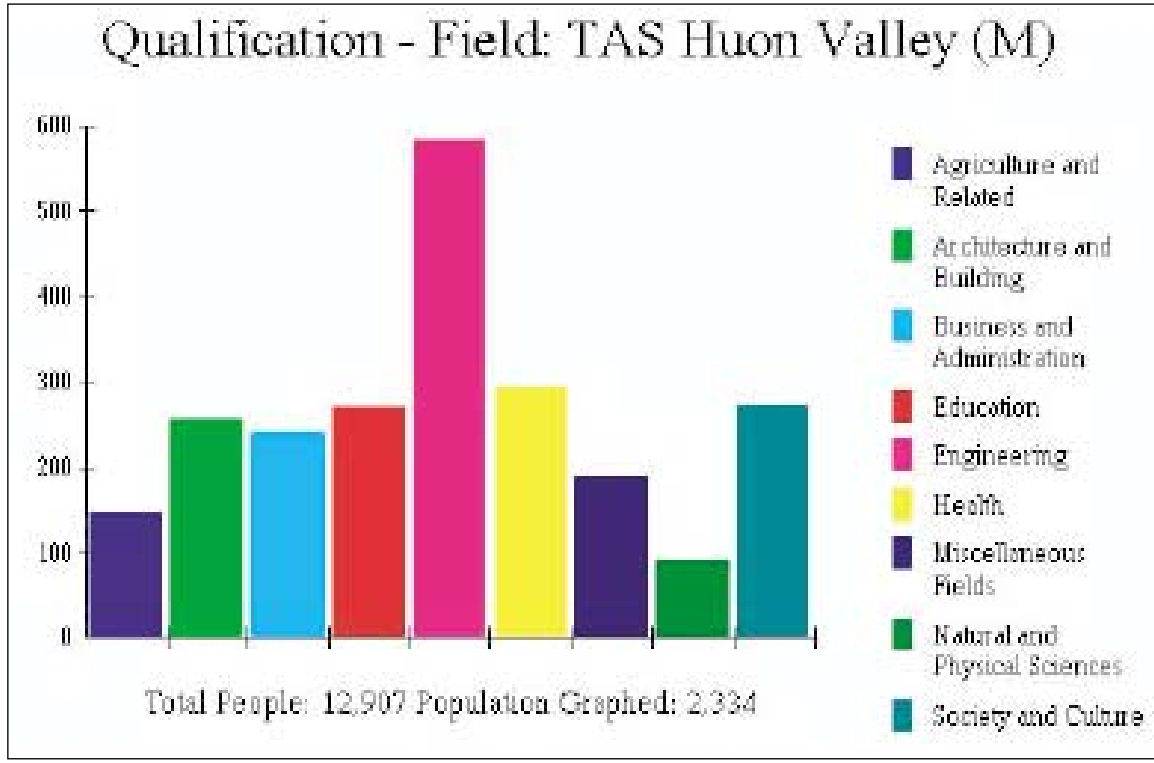
The Wooden Boat School, Adult Education and the University of the Third Age all provide post-secondary and continuing education for the community.

The type of educational qualifications and the fields those qualifications are held in are shown in the following graphs.

Beyond Year 10, students have to travel to Hobart for continuing education or use distance learning courses.



(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)



(Source: ABS 1996 Census, ABS 1996 Business Register ~ Eighty20 Copyright Invisible Hand Corp Pty Ltd)



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The Huon Valley today ~ social & economic status

Health patterns ~ indicators

Tasmania has an unusually high incidence of some respiratory conditions, particularly asthma and some allergic responses, compared to the national average, despite lower population density and 'cleaner' air.

The table below indicates that the incidence of hospital admission for respiratory conditions in the Huon Valley is below the Tasmanian average, both overall and for most specific conditions.

**Table 14: Average Age-standardised Hospital Admission Rates (per 100,000 population)
Huon Valley and Tasmania as a Whole ~ 1994-98**

Disease	Huon Valley	Tasmania as a whole	Statistically significant
Acute respiratory infections	300.5	319.8	No
Asthma	157.6	230.8	Yes
Pneumonia & influenza	151.7	186.8	Yes
Chronic obstructive pulmonary disease & allied conditions	221.4	369.3	Yes
Diseases of the respiratory system	1,040.4	1,350.3	Yes

(Source Department of Health 2001)

Note:

1. For this table, rates were adjusted for age to facilitate comparisons between populations that have different age structures. We used the direct standardisation method in which age-specific rates were multiplied against a reference population (the World Standard Population). This effectively removes the influence of age structure on the summary rate that is described as the age-standardised rate.
2. Confidence intervals for the rates were calculated assuming that cases followed a poisson distribution. Rates were considered significantly different only if their 95% confidence intervals did not overlap.

Health and wellbeing

In *The First Results of the Healthy Communities Survey 1998*, the Department of Health and Human Services found a correlation between higher levels of employment, income, financial capacity and adequate housing with higher levels of self-assessed good health. However, people aged between 18 and 24 years and over 75 years do not report better health with higher incomes. Those with primary school education as their highest education level assess their health as "considerably poorer" than those with graduate qualifications.

Tasmanians in rural areas also assess their health as slightly poorer than people in urban areas and people who assessed their housing as very inadequate report poorer self-assessed health and lower levels of satisfaction with quality of life.

76% of Tasmanians rate health as the most important factor in quality of life; followed by the ability to perform activities of daily living (72%); relationships with partner (67%); personal safety (66%); relationships with children (65%); and living in a clean environment (65%). (*Appendix A: Healthy Communities Survey, Quality of Life*). Persons with lower incomes and labour force status and less adequate housing are more likely to report access to health services, transport and housing, personal safety, "a government you can trust" and "living in a clean environment" as very important. This variation of perception is also illustrated in the Huon Valley.

TASCOS is coordinating a network in the Huon Valley, Hobart and George Town for the medium to long term unemployed, seeking awareness at the community and political levels and a voice with government. The Huon Valley group has up to 20 people involved and "they don't see Southwood as something positive for the community or that relates to them.". Potential for employment is not as relevant to them as the potential 'threat' to the environment.

This is at odds with the 'traditional majority'. Recent studies by students from the Department of Geography (University of Tasmania) have been quoted in the area as evidence supporting perceptions that there are "two communities" ~ the changing population over the past twenty years creating a concentration of alternative/quality of life values in the northern end of the valley, and the traditional.

3.5 Voluntary community groups

As with other communities, the Huon Valley has a number of service clubs and groups providing opportunities for social interaction and contribution to community wellbeing.

Rotary, Lions and Apex clubs are active in the valley and such groups play an essential supporting role in meeting community social welfare needs.

Long-term traditional recreation clubs such as bowls, tennis and football continue to be well supported by respective township populations and the new arrivals of the past two decades have added to the diversity of cultural, self-help and lifestyle groups. Such groups include localised playgroups, thespians, fitness, U3A and craft groups.

Like other rural communities, groups have been formed servicing a range of local environment programs such as the Healthy Rivers Project, Landcare and others.

The vitality, diversity and longevity of voluntary community groups are greatly assisted by diversity and affluence within the regional economy and local population. New business and new residents are significant factors.

SECTION C

The wood centre ~ the proposal and its impacts

1. The proposal ~ policy framework

As outlined on page 11, policies for forestry, forested land use and forest-based industry development exist at Commonwealth and State Government levels. Forestry is a sector targeted in this State throughout the 1990s for development, through both specific forest policies and general economic development policies.

In 1991, *The Forestry and Forest Industry Strategy* set out the framework for a transition for forest-based industry to move from predominantly old-growth forest resources to mainly regrowth forest and plantation resources.

The Forestry Growth Plan of 1998 sets out a 20 year blueprint for development of forest resources and the wood processing sector:

- to create a world-scale, world-class forest resource (basically to double quality wood production through intensive forest management of regrowth forests and plantations establishment over the next 20 years); and
- to develop a contemporary, diversified and world-competitive wood processing sector.

This plan published an opportunity for investors in a merchandiser/chipper/flitch mill integrated with a rotary peeling plant, new road infrastructure in the Huon and a joint study of wood exports from a proposed port at Electrona. (Forestry Growth Plan 1998, Appendix B.) The development plan is described in the Southwood Resources ~ Huon Project Description.

The Regional Forest Agreement (RFA) between the Commonwealth and Tasmanian State Governments (1997) sets out the agreed use of forested land in the State, securing 39% of all forests in a world class, comprehensive, adequate and representative (CAR) conservation reserve system. Access to the extensive research undertaken as part of the RFA is available at State libraries and through the Public Land Use Planning Commission website.

Impacts of state policies on the proposed project

1.1 Conservation and sustainable forested land use

Table 15: Land Use ~ Huon District Forests

Land tenure	Area hectares	% Total
Reserved ~ <i>National Parks & Wildlife Act 1970</i>	503,600	66
Private land	125,500	17
Multiple use State forest	115,800	15
State forest reserves and other areas	7,300	1
Other Crown Land	10,700	1

(Source: Forestry Tasmania, 1999)



The proposed wood centre features processes that will better use a wider range of wood qualities, thereby increasing productive use and reducing residues.

It is estimated to process on average 838,000 tonnes of timber per year. This level of harvesting is within the limits set by the RFA and will come from currently defined wood production forests. No additional areas of forest will be harvested. Greater volumes of wood will be recovered for processing from coupes, rather than being left and burnt in the forest. The current maximum amount of merchantable residues left on coupes is 5% and most of this could be recovered through new processing technologies proposed to be established at the wood centre. Another 200-300 tonnes per hectare of currently unmerchantable forest residues are also estimated to be available.

1.2 Wood processing and manufacturing impacts

There is little manufacturing based in the Huon Valley, very little wood processing and there has been no pulpwood-based manufacturing since the closure of the Port Huon pulp mill. The proposed wood centre, with an estimated direct employment base of 200-250 people and up to five value-adding processes, would have a long-term beneficial impact on the size and diversity of the manufacturing base in the region.

Presently, the Huon Valley supplies 16% by volume of wood (not including firewood) produced from State forest. None of the pulpwood and no more than 20% of the sawlogs are processed in the region.

1.3 Wood processing employment impacts

It is estimated that there are less than 10 sawmills, including small operators, in the Huon Valley. Only two sawmills process 5,000 tonnes or more of sawlogs. Sawmills in the region tend to purchase mature wood rather than regrowth. The Southwood Resources project is not expected to impact on the current status of the local sawmillers. Existing and prospective commercial contracts between sawmillers and Forestry Tasmania in the Huon Valley will continue to be honoured.

Forestry Tasmania has long-term wood supply agreements with the Triabunna woodchip operation and these agreements will be honoured.

Harvesting, transport and silvicultural contracting is likely to be stable in the longer term due to the operations of the wood centre. The increased volumes of wood retrieved for processing, particularly residues, will offset the reduced log cartage out of the region. Processed products will need to leave for export markets by road from the wood centre.

The major direct effect on wood processing employment will be in the estimated 200-250 people working on the site. The occupational range (using ABS profile) is likely to be a mix of 20% basic vocational, 65% skilled vocational and 15% diploma or degree.

1.4 Employment catchment

Residents have pointed out that the proposed site is close to mid point between Dover and Cygnet and perceive this to be the natural catchment from which to source employees for the project. Local perceptions about distance to work are commensurate with the geography of the region ~ a Cygnet resident commutes some 65kms to work in Hobart, via the Huon Highway. Travel from Cygnet to the proposed site is 50kms. Travel from Geeveston and Huonville is approximately 20kms and 30kms respectively.

2. Community attitudes

2.1 Community aspirations and forest politics

Community aspirations

The biggest Tasmanian community concerns over the last decade have been jobs and the economy. In open (not a specified field) surveys, concern about the environment was low, being overshadowed by issues such as safety, childcare and health services.

SECTION C

The wood centre ~ the proposal and its impacts

Statewide surveys conducted in 1994 and 1999 provide an insight into community concerns and perceptions of industry, in Tasmania:

Table 16: Tasmanian Community Surveys ~ Industry and Development

Issue:	% Jan 1994	% Dec 1999
Most important issue in Tasmania at present?	N/A	
The economy generally		25.4
Environment		5.9
Employment		54.0
Education		7.3
Health		7.5
Tasmanian economy improving or worsening over the last year?		
Improving	32.2	22.3
Staying the same	38.5	36.4
Worsening	27.2	41.3
Which of the following areas of business is the MOST important to Tasmania at present?		
Large manufacturing, mining	10.0	17.7
Forestry & forest products	12.3	9.5
Agriculture	19.6	13.1
Tourism	49.9	50.8
Other	1.2	8.8
		Technology
Which will be the most important in TEN years time?		
Large manufacturing and mining	8.8	12.9
Forestry and forest products	8.9	10.8
Agriculture	18.3	9.8
Tourism	55.4	19.9
Other	0.5	46.6
		Technology
Overall, do you think the future for Tasmania is bright?		
Yes	67.4	52.5
No	26.6	27.1
Other/unsure	6.1	20.4

(Sources: Are Large Businesses Bad? Volpato ~ DOXA, Jan 1994 Forests are More Than Trees Volpato, Dec 1999)

These surveys, using the same methodology and tracking the same questions over time, reflect the community's increasing uncertainty about the future. This uncertainty is particularly strong in the Huon Valley where the main industry sector and employment base is agriculture, fishing, farming and forestry and where there is little significant manufacturing.

Tasmanians at the end of 1999 consider tourism the most important sector, followed by large manufacturing and mining. They anticipate strong growth in technology, surprisingly coupled with a major decline in the importance of tourism. The most stable trends are for agriculture and forestry.

A national increase in concern for quality of life was noted in 1998. (*ANU Reporter*, Australian National University). Amenity concerns result in part from an ageing population, increased resignation in the community that jobs will not materialise and increased uncertainty about the future. Their impact on perceptions on quality of life has been discussed in Section B, 3.4.

Forest politics and the wood centre community consultation process

Decades of debate about forestry land use culminated in the Commonwealth national Regional Forest Agreement program which cost \$100+ million over five years. In Tasmania, some \$6.8 million was spent on an extensive range of more than 20 nominated social and economic studies and over 30 environmental, cultural and heritage studies, as part of the RFA process.

These studies over two years, followed an exhaustive range of federal and State inquiries into the forests and forest industries (listed Appendix D ~ Studies of Tasmanian Forests).

(The RFA reports are available from public libraries and the Public Land Use Commission.)

Apart from agreeing on the areas of forested land for production and conservation, significant social and economic opportunities were identified in resource and industry development studies.

Table 17: Community Perceptions ~ Forest and the Environment in Tasmania, 1999

Issue	% Tas	% Aus	Source
Management of forests improving	65	47	UMR Research
Balance between environment & forest industry			June 1999
~ about right	35	32	national survey
~ favours environment	25	19	
~ favours forest industry	30	33	
Benefits linked to forestry development			
~ export income	62	N/A	Volpato Dec 1999 Tasmanian survey
~ new jobs	56		
~ new markets for Tasmanian products	54		
~ training	53		
~ community benefits	52		
Forest industries are vitally important to Tasmania	86		
Tas organisations improving "doing their job"			
~ Forestry Tasmania	81		
Tasmania's natural beauty "best seen"	81		
Forests better protected than 10 years ago	60		
Organisations ~ "a lot of confidence in" ~ Tas Uni	77		
~ Police	75		
~ Forestry Tasmania	73	(59.4% in 1994)	

The community consultation on the wood centre project had the objectives of:

- ~ creating the best possible opportunities for the community to gain accurate information in a neutral environment;
- ~ encouraging representative community participation, particularly to 'tease out' the views of the 'silent majority' on the project;
- ~ keeping the process focussed on the project, not on the forests;
- ~ minimising 'politicising' a standard, legal project planning process.

Opponents' disruption of the consultation process had the following impacts:

- ~ reluctance by some community members to get involved with the public information sessions:
"I still feel upset that they had to use a megaphone to stop us getting information from the Forestry people ~ it was embarrassing ~ people in the Huon are not like that" (Source: EES Enterprises, Focus Group Dec 2000)
- ~ early high media coverage of misinformation ~ "just a woodchip mill" etc leading to community confusion over the nature of the proposal
- ~ inclusion of issues that are not germane to the project such as forest management, plantation and 1080 poison.

Throughout the process, the project has been developed against a political background of local government and forthcoming federal elections.

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The wood centre ~ the proposal and its impacts

2.2 Methodology

Schedule of public information and community consultation activities:

The following schedule shows that the development of the wood centre proposal has been in the public domain for a long time and each stage has been publicised:

Date	Action	Media
November 1998	The Forestry Growth Plan (announced by Deputy Premier) industry, local government and media briefed	media, brochure Internet
December 1998	Study into wood fired power Expressions of interest ~ Rotary peeling Merchandiser/flitch mill New road infrastructure starts ~ inc Huon/Plenty road for southern processing project	media advertised, brochure media, Internet
February 1999	The Forests and Forest Industry Council Report on log segregation	media Mr T Ryan appointed to review log segregation
March-Sept 1999	progress reports ~ Forestry Growth Plan Projects, roads	media
December 1999	Ryan Report released New Forestry Initiatives (Deputy Premier) Wiltshire segregation trials	media, Internet media, Internet, brochure media, Internet
September 2000	Southwood Resources ~ Huon wood centre proposal announced ~ industry and local govt briefings ~ public information sessions start ~ special web-site established for information and comment ~ invitations direct mailed	media, brochure, web-site media, advertised, brochure, external consultant PowerPoint and display public comment forms
October 2000	Expression of interest ~ Regrowth sawmill for project	industry briefing, media
December 2000	Formation of a regional advisory group Wood centre info brochure to all Huon households Focus groups ~ community concerns and aspirations	via Huon Valley residents/businesses direct mail residential groups consultant sociologist
January 2001	Draft environmental guidelines released for public input ~ 3 week public info campaign ~ public tours of site	media, press advertisements weekly press stories on project advertised public notices
March 2001	~ road options	Value Management Workshop

2.3 Public information process

(Source: Corporate Communications ~ Phase One Community Consultation Report for the Southwood Resources/Huon Project)

Phase one: provision of information to stakeholders and issues identification.

Activities in the Huon Valley included:

- public information sessions outlining the project concept at regional centres in Judbury;
- (twice), Ranelagh, Huonville, Geeveston and Dover;
- a staffed information stand at the Huon Show;
- meetings with 19 registered community groups throughout the municipality.

Systems used:

- a project database to record community comments and sort issues by area;
- community enquiry line (ph 6224 4557) and an e-mail hot button for community consultation on a dedicated project website;
- reply paid post service, envelopes and comment forms;
- mail invitations and advertisements in Public Notices section to promote attendance.

Table 18: Issues Identified by Huon Respondents ~ Public Information

Issue	Supportive	Opposed	Neutral	Total
Community impacts	2	14	2	18
Consultation	2	11	2	15
Contact (request to be on mailing list)	0	0	2	2
Economic	1	2	3	6
*Environment	0	22	2	24
Infrastructure	4	0	0	4
Opposition ~ unspecified	0	4	0	4
Route options	7	1	1	9
Support	48	0	0	48
Transport	0	0	1	1
Total	64	54	13	131

* includes forest management protest

2.4 Community consultation

The nature of the issues identified were:

Community impacts	perceived impacts upon community lifestyle, impacts of noise, visual amenity
Consultation	mostly from opponents to the project ~ many aggrieved that public meetings were not held to allow opponents to voice their concerns in a public forum; some criticism of the consultation materials
Economic	costs associated with the project, potential investors, where the profits will go, employment
Environment	possible pollution from power station, water pollution from site, opposition to forestry practices
Infrastructure	amenity concerns with roads and port
Route options	many suggestions for alternate routes; reasons why particular routes should not be chosen
Support	good for employment or business.

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Response:

These issues are being resolved with the community as follows:

Community impacts, amenity issues, infrastructure and route options

- ~ value management workshop on road options
- ~ refer to regional advisory group
- ~ focus group follow up

Environment concerns

- ~ referred to the regional advisory group together with request to review Draft Environmental Planning Guidelines and submit findings to EMPCA

2.5 Focus groups

In focus groups conducted in the Huon Valley (Huonville, Geeveston, Franklin, Judbury) in December 2000 (EES Enterprises), relating to the wood centre proposal, participants:

- ~ expressed fear and uncertainty about changes the project might bring to the valley but also revealed a yearning for an exciting "something" which could lift the depressed spirit of the valley;
- ~ felt cautious about trusting outsiders with "their" valley but were prepared to work in partnership with proponents of the wood centre if the partnership arrangements had continual and genuine 'local involvement and input'
- ~ expressed pride in the valley's history of achievements in timber and fruit growing.

The key findings were:

- respondents "insisted that the Huon was where they wanted to live," but the valley "is not what it used to be." Feelings of nostalgia for the days of prosperity, jobs aplenty, local services such as banks and transport and "a resignation that those days were gone forever;"
- a desire for the project to provide skills and job training, coupled with concerns to keep their children in school to completion;
- the project must not threaten the perceived clean, green and natural beauty values of the valley;
- a substantial amount of apprehension based on misinformation and a genuine desire for more and continuing information, particularly at the level of "what it would mean in everyday life" and "what sort of jobs would there be for us;"
- specific community amenity and information issues identified in the public information process were confirmed at a local level.

Response:

- Forestry Tasmania and EMPCA introduced a new opportunity for public input, additional to the statutory planning process, with the release of the *Draft Environmental Management Guidelines* for public scoping, on 13 January 2001. (Comment period close: 2 Feb 2001);
- a full-time Community Liaison Officer was appointed to the Huon District to assist with public information at the regional level and the provision of public information relating to issues raised by the community will be ongoing;
- free public information bus tours of the site and forest were advertised in the press, to date over 500 people have visited the site on a bus tour;
- a public information campaign with press ads and features on the main concerns ~ wood-fired power generation, rotary peeling, environmental management of the site ~ were arranged with *The Mercury* and *The Huon News*;
- community amenity issues, particularly road transport (route options, noise, safety etc) have been referred to specialists to survey and review with the respective residents.

2.6 Value management workshop

A value management workshop was conducted in conjunction with 14 residents from the area potentially impacted from Judbury to the Huon Highway. The objective was to identify which route options were preferred.

The outcomes from the workshop as agreed by the participants were:

Outcomes and agreements

- It was agreed that the traffic of heavy vehicles should be reduced through Huonville.
- North Huon Road was considered by the majority to be the safer route and Lollara Road junction with Huon Highway safer than the Glen Road junction.
- Forestry Tasmania has been asked to investigate a route from Southwood to Huon Highway near Franklin.
- Forestry Tasmania to do more work on the various options at Ranelagh and take this back to the Ranelagh community for consultation.
- Some participants were opposed to both North Huon Road and Glen Huon Road options.
- Although the consultation process was regarded favourably it was understood that it would be difficult to satisfy everyone.
- The communication plan developed at the workshops for transport options should be implemented. This plan includes distribution of regular information to the community directly.
- A manned public display in a shop front in Huonville should be set up to keep residents informed of the latest developments for the wood centre.
- Forestry Tasmania and Dept of Infrastructure, Energy and Resources to reconvene the group to discuss options.

(Source: Global Value Management, Transport Options Judbury to Huon Hwy, April 2001)

Response:

- Forestry Tasmania in consultation with the Huon Valley Council has developed a number of options for routes through Ranelagh;
- a process for discussing and resolving the various options with the community;
- other transport options continue to be reviewed depending on the final outcome of the destination port.

2.7 Regional advisory group

Huonville solicitor, Mr Tim Tierney, has convened an independent regional advisory group, representative of the community. Mr Tierney now chairs the group that is independently reviewing community issues associated with the wood centre project and advising Forestry Tasmania in this area.

The Southwood Community Advisory Group has reviewed the *Draft Environmental Management Guidelines* in relation to site environmental issues. The terms of reference for the regional advisory group are attached in Appendix C.

3. Impact on local and regional economy

3.1 Forestry Tasmania's existing contribution

Forestry Tasmania directly employs 74 people in the Huon Valley, one of the five forest districts in the State. The district office is located in Geeveston together with a works depot and Island Specialty Timbers outlet.

A significant level of operational work is undertaken by contract.

Harvesting involves 15 contracting firms and a total of about 150 people. Five firms employing about 25 people undertake silviculture contracts and contracts such as land clearing. Road building involves another five firms and about 20 more people.

In total, about 1,000km of forestry roads have been built and are maintained by Forestry Tasmania in the district. These roads are generally accessible to the public. The most famous is the Arve Road providing access to the forest and the Tahune Reserve. Unlike national parks, no fees are payable by tourists visiting the area. The costs are met largely by the forest industry. Forestry's total capital assets in the district are in excess of \$114 million.

(Source: Forestry Tasmania, Huon District 2001)

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3.2 Direct impacts

The Southwood Resources ~ Huon site will use volumes of timber already harvested from State forest for new value adding processes.

Investment in the site is expected to be around \$110m, employing 200 people in the construction phase.

Once operational the site is expected to directly employ between 200 and 250 people, contributing around \$40 million in purchases, wages and salaries each year to the regional economy.

3.3 Economic contribution & employment

The Huon Valley regional economy is expected to benefit in a number of ways from the establishment of the wood centre:

- ~ the potential influx of up to 40 new families to the area to work at the site
- ~ employment opportunities for local trade, construction and service providers in the construction phase of \$110 million
- ~ opportunities for local businesses in the maintenance and servicing of the site facilities
- ~ opportunities for local supply ~ from trade to retail
- ~ new jobs for locals and new income for businesses in the valley generally.

The following table sets out the key parameters for the site.

Table 19: Estimate of Capital, Employment and Production

Business	Initial costs (estimated)	Ongoing employment	Production value (\$M)	Wages & salaries ¹ (\$M)
Merchandising yard	\$4m	30-40	-	\$1.3
Rotary peeling plant	\$35m	110-130	\$24.5	\$4.1
Sawmill	\$10m	30-40	\$18	\$1.2
Wood fibre processing	\$5m	8-15	\$21	\$0.4
Power generation	\$45m	20-30	\$15	\$0.9
Site management	\$10m	5	-	\$0.2
Total	\$110m	203-260	\$78.5m	\$8.1m

Based on midpoint employment level multiplied by 1998-1999 average wage and salary for Tasmanian log sawmilling and timber dressing manufacturing, from ABS 8221.6.

NB: figures do not include wages oncosts ~ superannuation, payroll tax, & workers compensation insurance.

The economic contribution detailed in the above table will have a significant positive effect on the local and regional economy.

The amount of value adding to timber in the Huon Valley will increase from less than \$10 million per year to about \$79 million per year. Allowing for expenditure outside the region, it is expected that \$40 million per year will be injected into the Tasmanian economy directly from the site.

The majority of the income earned by employees will boost the local and regional economy of the Huon Valley and sustain business confidence.

In terms of employment there will be new jobs available to local people and many of these jobs will provide opportunities for local people to acquire new skills. Table 20 provides a detailed breakdown of the employment profile at the wood centre.

It is expected that not all of the available 200-250 ongoing jobs will be filled locally. People from outside the region are likely to be employed at the Southwood Resources ~ Huon site and will in the majority of cases need to acquire local living provisions and build or purchase housing. This has the potential to strengthen prices in the local real estate market.

Table 20: Estimates of Employment Categories

Rotary Peel Veneer Employment Categories

Activity	Operational	Supervision	Support	Management	Administration	Totals
	2	4	1	3	11	21
Block infeed	2	2	Quality control	Operations management	Sales and administration	7
Lathe	2	2	Stores	Corporate Management		5
Clipper	3	3	Security			11
Green chain	10	1	Logistics			2
Chipper/cleanup/relief	2					4
F/Lift ~ Green end	4					8
Dryer infeed	8					12
Dryer outfeed	12					4
Chipper/cleanup/relief	4					12
F/Lift ~ Dry end	12					1
Face composer	1					6
Core builders	6					2
Composed sheet handling	2					8
Press/crate/store	8					4
Steam plant	4					6
Day trades	6					1
Knife grinder	1					8
Shift tradesmen	8					4
N/S Leading Hand	4					6
Totals	99	4	6	6	11	126

Rotary Peeled Veneer

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Merchandising Yard Employment Categories

Activity	Operational	Supervision	Support	Management	Administration	Totals
Merchandising Yard (Manual Operation)	Unload and spreading	1 Yard Manager	1 Quality control	2	1 Sales and administration	7
	Log making	12 Shift Foreman	2 Stores	1 Corporate management	1	16
	Processing	6	Security	3		9
	1st fleet prestack	1				1
	2nd fleet stack	1				1
	Loading	1				1
	Totals	22	3	6	2	2

Woodfibre Employment Categories

Activity	Operational	Supervision	Support	Management	Administration	Totals
Woodfibre Processing	Log receiptal	2 Shift Supervisor	2	Operations management	1 Sales and administration	7
	Chipper operator	2	Loader operators	2		4
	Hopper coordinator	2	Quality control	2		4
Totals	6	2	4	1	2	15

Regrowth Sawmill Employment Categories

Activity	Operational	Supervision	Support	Management	Administration	Totals	
Sawmill	Log wash operator	1	1	1	2	3	
	Headrig saw operators	1	1	1		3	
	Edger & resaw operators	1	1	2		4	
	Chippercanter operator	1		1		2	
	Board stackers	7		2		9	
	Kiln operator	1				1	
	Destackers	7				7	
	Thickneser operator	1				1	
	Warehousing & dispatch personnel	2				2	
	Totals	22	3	7	2	3	37

Fuelwood and Power Station Employment Categories

Activity	Operational	Supervision	Support	Management	Administration	Totals
Fuelwood Processing	Fuel wood Processing	8	5	2	1	1
	Boiler Attendants	5		5		
	Control room	5		5		
Totals	18	5	12	1	1	37
Grand Totals	167	17	35	12	19	250

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Notes on employment category estimates

R.P.V. employment

- Information sourced from a model produced by Raute, plant manufacturer.

Merchandising yard employment

- Information has been extrapolated from manpower utilisation currently employed in the Murupara based Kajavala Forestry Limited central processing yard in New Zealand.

Sawmill employment

- Employment estimates have been partially structured and extrapolated on the South African based Sappi Timber Industries-Lomati Sawmill (plantation wood) as well the schematic process flow diagram.

Woodfibre employment

- Employment estimates have been based on advice from Gunns Ltd as well the schematic process flow diagram.

Power station employment

- Employment estimates have been based on advice from similar sized plants in America and Sweden as well as the schematic process flow diagram.

3.4 Impacts on public revenue and expenditure

There will be effects on public revenue and expenditure at the local, State and federal levels as set out in the following table.

Table 21: Expected Sources of Public Revenue and Expenditure

Government level	Source of revenue	Source of expenditure	
Local Government	Building permits	Road maintenance	
	Rates	Service provision	
	Service provision		
State Government	Payroll tax	Road upgrades	
	Land tax	Road maintenance	
	Stamp duties		
	Licence fees and registration fees		
Commonwealth Government	Income tax		
	Goods and Services tax		
	Licence fees		
	Fuel excise		
Government Business Enterprises:			
	Hobart Ports Corporation	Sales of product	Infrastructure
	Aurora Energy Forestry Tasmania	Service provision	Service provision

3.5 Industry sector productivity gains

The wood centre will showcase a modern integrated hardwood processing approach that is a first for Australia. Instead of the bulk of the wood from the Huon being processed outside the area, all grades of wood could be value-added at the one local site in the forest.

The wood centre is designed to act as a central catchment and integrated processing centre for the wood harvested in the Huon forests. Through integrating a range of processes on one site, the forest industry is expected to make substantial productivity gains in a range of important areas:

- ~ increased recovery of wood through new processes such as rotary peeling which is expected to recover up to 25% of pulpwood that is currently chipped;
- ~ improved safety of forest workers and operations (activities such as log segregation that currently take place on forest landings will be reduced), more detailed segregation will be undertaken at the wood centre;

- ~ improved product quality, including sawlog and veneer log supplies to local industries;
- ~ transport efficiencies ~ all logs will be taken to the wood centre predominantly on forestry road ~ only market ready products will leave the site, thereby reducing log transport through urban areas; and
- ~ complete wood residue management integration on the site, allowing sawdust and short wood pieces to be used in power generation. Much of the other organic waste on the site will be used in commercial compost production.

Forest and land management ~ no additional forest to be harvested

Productivity gains will be achieved through improved use of wood from areas already available for harvesting. There will be no increase in the area of forest harvested, rather, an increased amount of wood will be recovered for processing. The amount of forested land available for sustainable timber harvesting is governed by the Regional Forest Agreement over the next 15 years.

The site of the proposed wood centre, while in State forest is not on productive forest land. Originally thought to be a "grassy *Eucalyptus globulus*" colony during the RFA process, the site was scheduled for conservation. However, subsequent ground inspection of the site showed that the vegetation was a combination of *Eucalyptus obliqua* and *Eucalyptus amagdalyna*, which is well reserved in conservation reserves.

Other productivity issues

Forest residues and their management has been a cost to the forest industry and a concern to both the industry and the community. Sawmills use sawdust and off cuts in drying kilns or supply it to other businesses (eg industry boilers). However, this does not adequately address the issue of unmillable material (branches, wood with defects and/or extensively charcoaled sections of logs or dead standing trees).

Post harvesting forest residues are left on the forest floor. Current treatment is to burn this material as part of the regeneration process. This provides a clear seed bed for re-establishment of eucalypts in wet forest. In plantations, spacing between stems is important so more extensive clearing and windrowing is undertaken.

Regeneration burning is of increasing concern to the forest industry because of risks and the negative public perceptions that are triggered. While the collection of forest residues for use in the power station will significantly reduce the fuel load in future, techniques such as mulching are also being trialed to minimise the need to burn.

Much unusable wood is currently burnt for no productive gain. Yet in Tasmania's suburbs, wood has been used by industry for firing bricks, drying wood, fruit, foodstuff smokehouses and laundry boilers. In western economies that are environmentally and technically advanced, such as the United States of America and Sweden, wood-fired power generation technology and wood-fired cogeneration plants are accepted, using current, modern combustion technology.

3.6 Indirect impacts

In addition to the direct employment and output of the businesses located on the site, indirect benefits are likely to be achieved through things such as:

- ~ increased contractor activities such as cartage of forest residues to the site;
- ~ direct services to the site such as employee transport, food and cleaning services;
- ~ ongoing maintenance and supply to the new processing businesses on the site;
- ~ new carting for processed timber to market; and
- ~ general economic stimulation to local businesses through greater employee expenditure.

In 1991, the Centre for Regional Economic Analysis (CREA) prepared a report titled *The Contribution of Forest Industries to the Tasmanian Economy and the Impact of Alternative Forestry Strategies*. This study, based on input/output modelling of the State's economy, estimated an employment multiplier of 1.2 for the forest processing industry. That is, for every job directly created, a further 1.2 jobs were indirectly created elsewhere in the Tasmanian economy.

A more recent study *Forest Resource use options in Tasmania: Economic implications* (1997) completed by ABARE as part of the Regional Forest Agreement calculated employment and output multipliers based on changes to the agricultural, forest and fisheries sector. The output multiplier was estimated as 1.2 in the short run and 2.5 in the long run. The employment multiplier was estimated to be 1.7 in the short run and 3.1 in the long run.

It is noted that these multipliers are not directly transferable to a single project as they are sectorial multipliers, not project multipliers, and they are focussed on changes to resource usage, not specifically manufacturing of that resource.

However, they do give an indication that this project can provide significant additional employment and economic benefits, equal to, or exceeding, direct employment, wages and output.

SECTION C

The wood centre ~ the proposal and its impacts

4. Social impacts

4.1 Community amenity

Direct impacts

The wood centre project will significantly decrease the number of trucks carrying logs out of the Huon Valley. It is proposed to transport logs mostly on forestry roads to the centre within State forest. Only processed material will leave the site and connect with the State highway network. This is expected to decrease the impact of traffic on residents of the Huon Valley.

However, about 90 properties could experience an increase in impacts due to altered traffic patterns. These impacts will be mainly noise, vibration, perceptions about safety and greater awareness of traffic. On the other hand, over 500 properties in Geeveston, Franklin and Huonville that are currently affected by log traffic will experience a major decrease in impact from this source.

The project fits the traditional culture of the valley ~ living and working with the natural regional resources to create exports and wealth. For some people, this represents a negative impact, particularly for those who aspire to a lifestyle based on natural or intrinsic values (for example, landscape values as opposed to rural value) ~ while deriving an income elsewhere or supported by welfare.

The clash of values with traditional residents and the measures taken by a small number of 'newcomers' to promote their values as the majority community view causes some concern in the traditional majority of the community. This type of opposition accompanied the introduction of salmon farming in the region a decade ago.

Greater employment opportunities increase the diversity of occupation and skills, assisting regional aspirations for 'community regeneration.' Once established, the new employment base will inject significant additional cashflow into the community, bringing direct benefits to the retail and services sectors.

Opportunities from such a development could attract new families into the valley and potential for the younger people to find meaningful employment, relieving some of the pressure of the perception that there is little choice but to leave the valley.

The development will create about 50 hectares of improved land on which rates would be paid, providing a direct injection of tens of thousands of dollars to the Huon Valley rate base.

Indirect impacts

Establishment of a number of processing businesses each with an annual turnover of about \$20 million adds impetus to economic diversity through support services and infrastructure, the development of which also benefits other local businesses.

Strong interest has been expressed in the potential for new tourism circuits ~ a Geeveston/Huonville loop and a direct link to the Derwent Valley ~ on forestry roads (despite the prospect of meeting log trucks or seeing forestry operations).

The wood centre development has the potential for 'industrial tourism' ~ as experienced by leading edge industries elsewhere ~ since it is to showcase leading edge hardwood timber processing. The potential for this was raised by a number of valley residents in the focus groups and in the public information site tours.

4.2 Roads and transport ~ safety

The Huon Highway is the artery of the region, connecting the population centres from Dover to Huonville and through the improved North Cradoc Road, Cygnet to Hobart and the rest of the world, for trade, commuting, services and goods.

All produce flows down the lateral roads to the highway and nearly every product truck in the region passes through the Huonville CBD. Traffic accident statistics do not show any significant variance with areas of similar characteristics in regional Tasmania. Accident statistics indicate a major factor is population density.

Heavy vehicle traffic in Tasmania benefits from the training provided through the Road Transport Industry Training Group. The change in wood flow patterns from predominantly the south to from the west of Huonville is unlikely to change the already low accident rate for heavy vehicles.



Log truck

However, the new traffic pattern will require appropriate measures on the roads to be used, including:

- ~ appropriate alignment of junctions;
- ~ road upgrades, especially provision of shoulder areas;
- ~ provision of footpaths in populated areas;
- ~ improved bus pull-off areas;
- ~ screening of noise-sensitive areas with vegetation;
- ~ improving driveway alignments where required;
- ~ managing truck movement schedules to avoid sensitive times such as school bus times.

The key residential concerns of noise and vibration have been addressed in Section 5.1 Integration and mitigation.

Overall, additional provisions include:

- ~ speed limits;
- ~ limited hours of operation;
- ~ 'micro-sealing' sections of roads.

Managing the noise aspects is discussed more fully in the transport section of the Environmental Management Plan.

4.3 Skills training

The Huon Valley is well served by a successful training organisation ~ STEPS. Since a development of the size and diversity of the wood centre represents significant opportunities for a skilled and trained workforce, discussions are well advanced with STEPS on the services they could provide to investors in the wood centre.

These services are envisaged as working two ways ~ providing new skills needed for the operations and retraining of the existing available workforce. Post-secondary training in a range of skills can be provided within the Huon Valley, including integration of preparatory skills with secondary schools, bridging courses and advanced training for specialised technology.

This approach seems to be well aligned with community aspirations related to transition and bridging training for the valley's young people.

5. Community services

5.1 Integration and mitigation

Forestry Tasmania will respond to the solutions presented through the resident workshops on advice from the Regional Advisory Group, The Huon Valley Council and the Department of Infrastructure, Energy and Resources.

Such solutions include:

- safety provisions for transport and the community
 - ~ additional pedestrian and amenity provisions such as footpaths or walking tracks and road improvements, speed limits;
 - ~ safe school bus stops and collection points;
 - ~ scheduling of truck movements for noise, school bus safety and recreation access to some forestry roads such as the new Huon-Plenty link road;
- assisting the Huonville community with safe, off-road youth recreation development options;
- agreeing to solutions directly with residents where private property is impacted
 - ~ acquisition issues;
 - ~ amenity issues, e.g. safe driveway access;
 - ~ noise control, e.g. screen planting.

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The wood centre ~ the proposal and its impacts

5.2 Services

Resolution of development impacts will include the maintenance and possible improvement, for safety reasons, of residential services.

The employment catchment has been defined as Dover to Cygnet, with 50% or more vocational skilled and skilled labour opportunities locally.

The anticipated geographic spread of the workforce together with the levels of services identified in the municipality (community, health, recreation, education) indicate that existing community services in the area are adequate and that the impact of the project would be to maintain the existing levels of community service. The key change may be introduction of targeted post-secondary courses that support the skill base at the wood centre.

Should the wood centre project be developed to full first stage capacity, it is envisaged that construction will take a year or more and employment on the final operational site is estimated to be 200-250. Further processing of veneer and woodfibre into plywood and medium density fibreboard in future will create a doubling in these employment numbers.

However, it is anticipated that new business services could develop to service the operational and technical needs of the wood centre site and manufacturing processes ~ mechanical, electrical, light engineering and specialised waste management systems maintenance.

5.3 Housing

Real estate figures for the area show that there is plenty of land and residential stock on the market and a significant opportunity for rental. It is anticipated that with the movement of some new people into the area, together with improved local employment opportunities, a medium-term growth in residential construction (new dwellings and alterations and additions) could occur.

5.4 Infrastructure

Forestry Tasmania is a major provider of rural firefighting services in the area and maintains a substantial length of forestry roads in the region. These services will be maintained.

The current road infrastructure maintained by Forestry Tasmania in the municipality is over 1000km. Forestry Tasmania also provides the management of about 7,800 hectares of formal forest reserves and 23,000 hectares of informal forest reserves.

5.5 Recreation and tourism

Forestry roads and facilities also service commercial tourism activities such as rafting, horse riding and guided tours, while recreationists and self-drive visitors are provided with BBQ, camping and nature walks at no charge. Regional forest tourism at selected sites has grown on average by 5% per annum in terms of visitor numbers.

Forestry Tasmania provides tourism infrastructure such as the Arve Road Loop (three visitor facilities), the Huon Pine Walk, Tahune Forest Reserve and supports the Forest and Heritage Centre. A new major attraction ~ the Airwalk at Tahune ~ has recently opened and already attracts many tourists.

Forest tourism and recreation are promoted in the context of 'working forests' not wilderness. The major access to the popular Tahune Forest Reserve goes through 27km of the Arve Road regrowth forests. All of this forest has produced timber and is now in a regrowth phase. Forestry roads have been generally available for public access except where there are active forest operations. The Huon-Plenty link, constructed with Forestry Tasmania and RFA funding, is new forestry road infrastructure, with the capacity to deliver logs in bulk to a wood centre as now proposed. This forestry road has also been perceived as a potential benefit to tourism, and access on a managed basis is being developed.

SECTION D

Likely long-term effects ~ if the proposal does not proceed

1. Timber industry

Should the wood centre proposal not proceed, then current conditions in the forest based industry sector will prevail and substantially deteriorate over time. One of the larger sawmills in the Huon Valley region, at Dover, closed at the end of 2000 ~ indefinitely and possibly permanently ~ unable to attract the necessary wage earning workforce and struggling with the change in log quality. The uncertain future makes investment in the upgrade of sawmills like this unlikely in current conditions.

The main regional impacts of an integrated timber-processing site not proceeding will be:

- ~ continued inability by industry to process the bulk of unused wood currently burned in the forest and the continued level of open fuel reduction burning;
- ~ the continuing loss of opportunity to add value and recover more wood from harvesting and log segregation operations with consequent inefficiencies remaining in the supply of wood to local sawmills and industry;
- ~ inability to attract potential investors and new, more efficient, value-added wood processing technologies to the area;
- ~ opportunities to recover an estimated additional \$20 million per annum or more from pulp logs as rotary peeled veneer products will be forgone; and
- ~ Tasmania, which has a world competitive advantage in the growing of forest resources, will be unable to secure its place in international markets because of an inability to upgrade timber-processing technology to achieve economy of scale and produce market-relevant products;
- ~ loss of forestry jobs as the sector inevitably contracts due to declining profitability without new value adding processes.

2. Forestry and forest industry

The proposed wood centre ~ based on integrated timber processing ~ is a well-researched, innovative and feasible plan to transform hardwood processing into a contemporary, diversified industry.

Radiata pine is an international standard in wood processing and wood products. With shorter rotations and worldwide adoption, it is fast becoming a universal plantation timber. These factors, together with the predominance of naturally occurring softwoods in the Northern Hemisphere where the bulk of western populations and economies exist, have generated a rapid advance in the processing of softwoods.

This situation has been slow to develop in the Australian hardwood industry; particularly more diversified processing of eucalypts. The spread of hardwood plantations throughout the world has been driven by the shortfibre advantages of eucalypts for paper production, where the bulk of research and development has occurred.

Tasmania, being well endowed with natural forest resources, has been able to sustain a hardwood forest-based industry with little change, resulting in a legacy characterised by two main features:

- ~ from European settlement to the 1960s, Tasmania enjoyed the luxury of continued selective harvesting, taking the best and most easily processed logs, with the result that much of the wood production forest now available to industry is lower grade resource (poorly formed, infested, burnt); and
- ~ hardwood processing has not kept pace with the developments in softwood processing in many cases, and has lacked investment in research and development, using traditional technology that has changed little in the last century.

The Forestry Growth Plan 1998 was introduced to address these two features: improving quality and scale of forest resources through intensive forest management and plantation establishment, and developing world competitive wood processing industry through attracting investment in contemporary technology and production.

The impetus to develop value-added diverse processing of hardwood resource will be lost should the wood centre not proceed.

3. Contractors ~ private sector

In the area of contracting ~ harvesting and road transport ~ Tasmania is competitive and has contributed significantly to innovations in the development of equipment now used in international forest based industry. The Ro-tree cultivator and the Easyloader log trailer systems are two pieces of equipment currently exported from this State.

Contracting is a vital and progressive part of the forest-based industry in Tasmania and is private sector based. In 1994/95, The Australian Finance Conference, representing the major finance houses, estimated that the four major lenders had more than \$400 million invested in this sector in Tasmania ~ their leading marketplace, per capita, in the country.

SECTION D

Likely long-term effects ~ if the proposal does not proceed

Now, with the introduction of intensive forest management, private sector contracting has expanded to include forest growing ~ site preparation, planting and pruning. This sector has grown since 1998, with 300 private sector contractors now employed around the State.

The Huon Valley contains a number of long-term contracting businesses in forestry. Many are currently involved in the transport of logs to be processed outside the area, and changed traffic flow of logs to a regional wood centre would bring new efficiencies to these associated businesses.

Efficiencies in harvesting and transport of product as well as reduction in regeneration burning will not be achieved if the wood centre does not proceed.



Private sector contractor

4. Local manufacturing base

Wood and paper products form the second largest manufacturing base (ANZIC classes) in Tasmania (refer Section A, 1.1). As has been shown, this is predominantly pulp and paper based, with little diversification. The Huon Valley was the first to develop and to lose a paper pulp processor, leaving it with no pulpwood based manufacturing, demonstrating the impact of lack of diversity and ongoing investment in research and development.

This situation prevails in the industry around the State. The Huon forests supply a significant proportion of the State forest wood production and although not processed locally, the lack of processing diversity overall is a long-term threat to regional employment. Like other industries, it is cost-sensitive ~ especially in relation to transport ~ and the proposed wood centre aims to package the wood resource, the processing and the product transport within one region ~ the Huon Valley.

A local manufacturing base in the Huon Valley would be more robust, larger and diversified with the presence of a range of wood processing enterprises, possibly leading to localised plant and equipment manufacture and maintenance. Without the wood centre, the existing forest-based industry would become increasingly insecure.

5. Employment and social wellbeing

The history of the Huon Valley has shown that no community can have all its apples in one basket. Spreading risk and pursuing diversification are important to economic, community and personal growth. The proposed wood centre could employ up to 200 people in the construction phase and longer term, 200-250 in operations on the site. The relationship between income, education, housing and employment status on self-assessed health and quality of life has been outlined in Section B, 3.4, Community health and vitality.

Feedback from the Huon Valley community has highlighted some peoples' desire for a project that has a long-term future ~ they do not want a development that ultimately leaves behind empty buildings and unemployed people. It is proposed to apply for five processing permits for the wood centre in the short term, with an additional four in the longer term. The product mix leaving the site will increasingly be higher value, with the aim of phasing out raw export woodfibre completely. The selection of these industries is a best estimate, based on world-market demand and wood product opportunities that are most suited for the natural hardwood forest resource.

Security for investment is sought through diversification into products for which there are currently long-term trends in demand. This is important because the level of investment required in these processes is substantial and traditionally, the wood processing industry has invested for production cycles of twenty years or more. The pulp mill at Port Huon lasted for more than 50 years despite its challenging markets.

Without the wood centre, investment in local wood processing is unlikely to arise. This will mean that regional improvement in employment will be foregone, returns on wood will not improve and value-adding locally to wood products destined for world markets will not be achieved. It is likely that young people will continue to leave the Huon Valley in search of other employment opportunities.

The proposed wood centre offers a plan whereby levels of investment not locally available are used to develop businesses that generate regional employment, improve the community benefits from wood harvested in the area and add value to products locally made for global markets.

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Social and economic

Notes: sources for tables stated below each table and in the text are not included here. Special assistance has been supplied for this study by the following organisations and is not publicly available in published form:

Statistical data and graphs sourced through Eighty20 (copyright 1996 Invisible Hand Corporation using ABS 1996 Census data) were supplied with the assistance of the Huon Valley Regional Development Board.

The Real Estate Institute of Tasmania kindly compiled the information on the Huon Valley property market ~ page 24.

Tasmania Police kindly supplied the data on crime appearing on page 25.

Publications

Page	Reference	Source
10, 11	*	Tasmania's Business Environment, Tasmania Development & Resources, Aug 1996
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19		Healthy Communities Survey 1998 ~ The First Results, Department of Health and Human Services, Tasmania
21, 22		The surveys quoted are commissioned information not available for publication, although excerpts have been publicised in 1995 and 1999. <i>Are Large Businesses Bad?</i> R Volpato, DOXA, Jan 1994. <i>National Forest Industry Survey</i> UMR Research, June 1999. <i>Forests are More Than Trees</i> R Volpato, Dec 1999
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Appendix A: Healthy Communities Survey ~ Quality of Life Indicators

	% Respondents		Net Difference
	'Very Important'	'Very Satisfied'	
Relationship with children	91	64	-27
Relationship with partner	88	61	-27
Health	79	35	-44
Ability to perform activities of daily living	76	47	-29
Personal safety	69	44	-25
Living in clean environment	68	28	-40
Overall standard of living	61	37	-24
Housing	60	57	-3
Friendships	58	47	-11
Sense of achievement	55	32	-23
Having governments one can trust	55	12	-43
Access to health care services	55	26	-29
Access to transport	51	37	-14
Having fun	46	50	4
Employment situation	46	30	-16
Personal appearance	44	30	-14
Amount of money	42	21	-21
Time to do things you want to	42	22	-20
Pets	39	48	9
Respect or recognition given	38	28	-10
Sex life	36	37	1
Amount of pressure	35	24	-11
Body weight	35	15	-20
Opportunity for leisure	33	25	-8
Level of education	28	28	0
Religious beliefs	22	39	17
Involvement in arts	17	23	6
Involvement in community activities	9	21	12
Involvement in ethnic activities	3	22	19

(Source: Healthy Communities Survey, Tasmania 1998 p62)

Note: 'missing' and 'not applicable' responses excluded from the analysis.

Appendix B: Forestry Growth Plan ~ Public Information

SOUTHWOOD COMMUNITY ADVISORY GROUP

Terms of reference:

This group will:

- review community and business concerns
- provide advice to Forestry Tasmania on regional development impacts
- provide comment on proposed approaches to mitigating community issues
- propose recommendations to enhance the proposed community benefits from the development
- identify and comment on related community concerns
- assist identification of "offsets" that might be provided where impacts cannot be mitigated
- principally focus on issues within the Huon Valley but may need in that context to comment on related issues.

Time:

Timely advice to be provided from December 2000 to June 2002, with the key stages being:

- submission for planning approval
- the associated public commentary period
- the environmental management planning period, including public input to the draft environmental management guidelines.

Consultation and liaison:

The advisory group will liaise with representatives from the community and provide advice for input to Forestry Tasmania, local government and planning authorities, specialists and the project community consultation consultant.

The Group major role is to report to Forestry. The Group will avoid participation in media debate or directly participate in the planning process.

The Group will participate as a party in the planning process.

Group via the Chairperson or other authorized may make public comment on an agreed position of the group.

Members of the Group are free to participate personally in media debate or the planning process provided they do so without claiming any association with the Group.

Confidentiality

The minutes of the Group will be a public document and made available for public review.

The correspondence of the Group to Forestry;

- will be not released by the Group into the public domain unless otherwise resolved by the Group and that resolution is communicated to Forestry at the time.
- may be released by Forestry into the public domain unless otherwise resolved by the Group and that resolution is communicated to Forestry at the time.
- if so released by Forestry into the public arena, unless otherwise authorised by the Group, extracts may not be quoted by Forestry selectively unless the complete copy of the particular correspondence is included with the document.

The correspondence of Forestry to the Group;

- will only be information that Forestry regards as in the public domain.

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HO 53/1-AB
23rd August 2000

Forestry Tasmania
79 Melville St
HOBART TAS 7000

Attenti Mr Dario Tomat
on:

Dear Sir,

**R PRELIMINARY GEOTECHNICAL ASSESSMENT
E: PROPOSED INTEGRATED FOREST PRODUCTS YARD
HUON DISTRICT**

This letter presents our report on a geotechnical assessment completed for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers.

If you have any questions related to this report or we can be of further assistance, please do not hesitate to contact Mr Barry Weldon or the undersigned.

**For and on behalf of
COFFEY GEOSCIENCES PTY LTD**

DAN O'TOOLE

Distribution: Original held by Coffey Geosciences Pty Ltd
1 Copy Coffey Geosciences Pty Ltd Library
3 Copies Forestry Tasmania

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3. RESULTS OF ASSESSMENT	2
4. CONCLUSIONS	4

FIGURES

- 1 FORESTRY TASMANIA: GEOTECHNICAL ASSESSMENT PROPOSED INTEGRATED TIMBER PROCESSING YARD**

Important information about your Coffey Report

APPENDIX

- A** Explanation sheets - soil descriptions (2 pages)
- B** Engineering logs TP1 to TP12

1. INTRODUCTION

This report presents the results of a preliminary geotechnical assessment undertaken by Coffey Geosciences Pty Ltd (Coffey) for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers. Mr D Thomat of Forestry Tasmania following a submission by Coffey to Dr J McCambridge at SEMF Holdings Pty Ltd commissioned the assessment (ref HO 53.1(P)-AA dated 11th July 2000).

It is understood that Forestry Tasmania plan to develop an integrated forest products site in a 40ha area. The development will include log storage and sorting facilities, saw, veneer and woodchip mills, in addition to an on-site power station plant that will be fed by waste from these operations.

Forestry Tasmania provided an excavator to excavate a number of test pits on the 11th August 2000. The preliminary assessment comprised a desktop review of available information, a series of test pits and reconnaissance of the geology and geomorphology of the area.

2. BACKGROUND INFORMATION

The proposed Huon integrated forest products site is located on a low ridge, trending roughly North-South. The dominant vegetation is button grass and tea tree. A recently constructed road and former access tracks to gravel deposits cross the proposed site. The light grey to white quartzite gravel has apparently been quarried for road construction materials.

The proposed Huon site is mapped on the Geological Atlas 1:250,000 digital series Geology of Southeast Tasmania produced by Mineral Resources Tasmania (1999 edition) as Permian Age siltstone and sandstone deposits. More detailed information is provided in a report to Forestry Tasmania (Huon Forest District) prepared by Mr C Sharples in November 1994 entitled, *Geomorphic Values Survey: Barnback Block, Huon Forest District*.

In that report, Sharples confirms the underlying bedrock geology as Permian marine siltstones and sandstones. He mapped the edge of a fluvio-glacial terrace escarpment that encircles the ridge and described the surface deposits as Pleistocene glacio-fluvial deposits of cobble and boulder grade. The glacio-fluvial landforms of the Weld Plains are shown by Sharples on Map Four as potentially vulnerable features of geoconservation significance in the Barnback block. The glacio-fluvial landforms include the high level terrace remnants at 484850mE 5233600mN, which is roughly centred on the proposed integrated forest products site. The landforms are classified by Sharples as *Representative at the State level* and *Outstanding at the Regional level* and he considered them to be "... vulnerable to degradation of specified values if disturbed by specific

activities". Sharples infers that the specific activity is excavation as he goes on to state that the terrace remnants are "... *vulnerable to excavation; some quarrying has already taken place – features are still in good condition but future quarrying should be monitored to ensure important features are preserved.*"

A trench like feature that was encountered during preliminary assessment of the access road across the proposed site, marks the edge and head scarp region of a major rockslide that occurred in the past. Some of the tension cracks associated with the movement were revealed during construction of the road to the Huon River crossing downstream from its confluence with the Arve River. A power station is proposed on the terrace remnant at the southern end of the ridge above the old landslide feature. The landslide feature does not appear to extend upslope to the terrace remnant.

3. RESULTS OF ASSESSMENT

The reconnaissance geomorphologic mapping confirms that the site is located predominantly on a terrace that almost encircles a North-South trending ridge. The slope on the terrace is gentle with local slopes up to 9°. The edge of the terrace is embayed in places and slopes may steepen up to 14°. Around the eastern and southern edge of the terrace, an escarpment slope of about 28° to 32° leads to the relatively narrow modern floodplain of the Huon River.

An old rockslide has occurred on the slope below the terrace remnant at the southern end of the project site. During the present site assessment no new evidence of slope instability was observed at the terrace or ridge level. However, the natural vegetation of tea tree and button grass can be deceptive and provide the illusion of a relatively even ground surface especially when viewed from above. Test pit locations consequently were selected to provide a range of topographic settings and were not confined to the terrace remnant on the ridge.

A total of eleven test pits were excavated on the proposed site. The approximate locations are shown on Figure 1. Engineering logs are presented in the Appendix and are preceded by descriptive terms and symbols used in their preparation.

In general the proposed site is underlain by alluvial and glacio-fluvial deposits that comprised:-

Unit 1: Silty SAND to Sandy GRAVEL, dark grey to black, subrounded quartzite gravel, roots and rootlets, organic.

Unit 2: Sandy GRAVEL to Gravelly SAND, light grey to white, subrounded quartzite gravel, some cobbles.

Unit 3: Silty GRAVEL to SAND, dark brown to black, subrounded quartzite gravel, sometimes cemented.

Unit 4: Gravelly CLAY to Sandy GRAVEL, mottled yellow-orange-brown, subrounded quartzite gravel, trace cobbles

Unit 5: Silty CLAY to Sandy SILT, extremely weathered siltstone rock with soil-like properties.

Unit 6: SILTSTONE, orange – grey, distinctly weathered siltstone rock with rock mass defects.

Unit 1 has a peaty characteristic, is the topsoil horizon and should be easily removed by grader or bulldozer blade and backhoe or excavator bucket. The material should be stockpiled for landscaping and re-spreading as topsoil.

Unit 2 is generally a gravel product that is medium dense to dense and has an estimated allowable bearing capacity of 200kPa. It has a distinctive light grey to white colour and in the past the material has been quarried for road construction purposes. The gravel was not sampled for laboratory testing during this investigation but was visually assessed as suitable for road base-course gravel and as a base for extensive areas of hard standing, paved areas and concrete floors that may be required for the various timber processing buildings. Where levelling is required, consideration should be given to stockpiling the material for re-laying as a founding material. The unit is usually underlain by a dark brown to black silty gravel to cemented sand that could be used as a visual marker to indicate the vertical extent of the material. Dozer or grader blade and backhoe or excavator bucket should be able to excavate Unit 2 materials. Unsupported long term cut and fill batters in this material should not be made any steeper than 1.5:1 (H:V) and should be topsoiled to encourage revegetation to reduce potential surface erosion.

Unit 3 is a dark coloured layer, it is usually thin and appears to contain organic material. It is unlikely to be useful as a road construction material. It is cemented in places and if the overburden materials are stripped to this layer, it is expected to form a trafficable crust that will generally prevent the ingress of surface water to lower levels. To assist surface drainage, it may be necessary to rip through this layer to provide egress of water to lower layers. The Forestry Tasmania nursery at Perth had drainage problems associated with a hardpan layer and it is believed that deep ripping and / or the installation of deep drains was necessary to overcome the drainage problems. Unit 3 is estimated to have an allowable bearing capacity of 250kPa. The cemented nature of the unit may allow steep unsupported long term cut and fill batters but the unit is generally thin (depth range of 0.1 to 0.3m) and cut and fill batter slopes of 1.5:1 (H:V) or flatter are recommended.

Unit 4 is variable in composition but is considered to represent Pleistocene age glacio-fluvial gravels. An attempt was made at test pit 3 to assess the depth of this layer but the unit continued beyond the limit of the excavator reach at about

4.8m below ground surface. The unit comprises medium dense to dense gravel and very stiff gravelly clays. The estimated allowable bearing capacity is 200kPa. Depending on the composition, the gravelly portions of the unit are expected to be suitable as sub-base gravel whereas the clayey portions should be suitable as a selected fill. Long term unsupported cut and fill batters in this material should be constructed at 1.5:1 (H:V) or flatter. Some of the access road fills have been constructed from this unit at 1:1 batter slopes and are showing evidence of erosion. In other places, tension cracks have developed in the shoulder and shallow slumps and landslides can be expected in some fill batters between test pit locations 5 and 6 approximately. The tension cracks are likely to have been caused by settlement due to inadequate compaction at the edge of the fill.

Unit 5 was extremely weathered siltstone rock that has an estimated allowable bearing capacity of 150 to 200kPa. The material is expected to be suitable for use as fill. Excavations in this unit are expected to be achieved using excavator bucket or bulldozer ripper and blade. Long term cut and fill batter slopes should be constructed at 2.5:1 (H:V) or flatter in this material.

Unit 6 is distinctly weathered siltstone rock. This unit was encountered in test pit 9 that was located in a hollow and had the lowest elevation of all test pits. It is unlikely that the proposed development on the terrace level will encounter this material. In this material, long term cut batter slopes will be controlled by defects in the rock mass and an assessment of slope stability should be undertaken if the unit is exposed in any excavations. The unit is expected to require ripping prior to excavation. Fill batter slopes of 1:1 should be possible in this unit.

Throughout the study area there is evidence of quarrying and areas have been stripped of Unit 1, and Unit 2 has been quarried and removed from parts of the study area. Units 5 and 6 are considered to be in-situ weathered Permian bedrock. Remnant bedding planes in test pit 6 dip to the south southwest at about 45° and provide support for a northwest – southeast trending fault inferred at this location by Sharples. The bedding in test pit 9 dips towards the southwest to west southwest at between 5° and 15° and is consistent with dips and direction recorded on the Geological Atlas.

4. CONCLUSIONS AND RECOMMENDATIONS

This preliminary geotechnical assessment indicates that the proposed integrated forest products development site is located on a glacio-fluvial terrace situated on a north south trending ridge that is underlain by Permian age sedimentary rocks. Apart from the organic topsoil layer, these materials have an estimated allowable bearing capacity of 200kPa or higher and from a geotechnical aspect the site is considered suitable for the proposed development.

Sharples has indicated that the glacio-fluvial terraces have potential geoconservation value. It is concluded that the development has the potential to further devalue the geoconservation potential of the site. In order to develop the proposed integrated forest products yard it will be necessary to document and record the soil profiles.

The light grey to white quartzite gravel/sand of Unit 2 is assessed as a natural sub base to base course gravel suitable for use beneath standing areas, paved areas and concrete floors. It should be carefully managed during earthworks with provision being made to quarry and stockpile any excess material for use as a base course elsewhere on the project site, or as a road construction material.

If the project proceeds further on this site, Coffey are able to assist with the development of a program to document and record the soil profiles and other morphological and geological factors that may be of interest from a geoconservation point of view. It is recommended that additional geotechnical investigations be undertaken for structures located toward the southern or river end of the terrace above the area where a rockslide has been identified in the Permian bedrock to assess the footing conditions for any proposed future structures in this area.

Should you have any queries regarding the above please do not hesitate to contact either Barry Weldon or the undersigned.

For and on behalf of
COFFEY GEOSCIENCES PTY LTD

DAN O'TOOLE

REFERENCE:

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HO 53/1-AB
23rd August 2000

1

APPENDIX A

EXPLANATION SHEETS - SOIL DESCRIPTIONS

Information

important information about your **Coffey** Report

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.



Important information about your **Coffey** Report

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design toward construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.



HO 53/1-AB
23rd August 2000

4

APPENDIX B

ENGINEERING LOGS – TP1 to TP12

Soil Description

Explanation Sheet (1 of 2)



DEFINITION:

In engineering terms soil includes every type of unconsolidated or partially consolidated inorganic or organic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand at its field condition or in water it is described as a soil. Other materials are described using rock descriptor terms.

CLASSIFICATION SYMBOL & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (USCS) as shown in the table on Sheet 2.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (DI)
Very loose	Less than 10
Loose	10 - 15
Medium Dense	15 - 20
Dense	20 - 25
Very Dense	Greater than 25

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
		60 mm to 200 mm
Gravel	coarse	20 mm to 60 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	400 µm to 2.36 mm
	medium	200 µm to 400 µm
	fine	75 µm to 200 µm

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION OF MINOR COMPONENT %
Trace of	Presence just detectable by feel or eye, but not proper test table or its different to general properties of primary component.	Coarse grained soils: < 3% Fine grained soils: < 15%
With some	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 3 - 12% Fine grained soils: 15 - 35%

MOISTURE CONDITION

- Dry** Looks and feels dry. Cohesive and cemented soils are hard, friable or powdery. Uncemented granular soils run freely through hands.
- Moist** Soil feels cool and dampened in colour. Cohesive soils can be moulded. Granular soils tend to clump.
- Wet** As for moist but with free water forming on hands when handled.

SOIL STRUCTURE

	ZONING	CEMENTING
Layers	Continuous across exposure of sample.	Weakly cemented
Lenses	Discontinuous layers of lenticular shape.	Moderately cemented
Pockets	Irregular inclusions of different material.	Effort is required to break up the soil by hand in air or water.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAMED STRENGTH q_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 - 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 - 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 - 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 - 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	-	Crumbles or powders when scraped by thumbnail.

GEOLOGICAL ORIGIN

- WEATHERED IN PLACE SOILS**
- Extremely weathered material** Structure and fabric of parent rock visible.
- Residual soil** Structure and fabric of parent rock not visible.
- TRANSPORTED SOILS**
- Aeolian soil** Deposited by wind.
- Alluvial soil** Deposited by streams and rivers.
- Colluvial soil** Deposited on slopes (transported downslope by gravity).
- Fill** Man-made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.
- Lacustrine soil** Deposited by lakes.
- Marine soil** Deposited in ocean basins, bays, beaches and estuaries.

Explanation Sheet (2 of 2) – Soil Description

SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60 mm and sowing fractions on sediment mass)			USC	PRIMARY NAME		
COARSE (GRAVEL) SOILS More than 50% of material will pass 60 mm or larger than 2.0 mm	GRAVELS More than half of coarse fraction is larger than 2.0 mm	CLEAN GRAVELS (Little or no fines)	GW	GRAVEL		
		Predominantly one size or a range of sizes with more intermediate sizes missing	GP	GRAVEL		
		Non-plastic fines (for identification procedures see ML below)	GM	SILTY GRAVEL		
		Plastic fines (for identification procedures see CL below)	GC	CLAYEY GRAVEL		
SANDS More than half of coarse fraction is smaller than 2.0 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes missing	SW	SAND		
		Predominantly one size or a range of sizes with some intermediate sizes missing	SP	SAND		
		Non-plastic fines (for identification procedures see ML below)	SM	SILTY SAND		
		Plastic fines (for identification procedures see CL below)	SC	CLAYEY SAND		
IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm						
FINE (SILT) SOILS More than 50% of material will pass 60 mm & smaller than 0.075 mm	SILTS & CLAYS Liquid limit less than 25	DRY STRENGTH	CLASTICITY	TOUGHNESS		
		None to Low	Quick to slow	None	ML	SILT
		Medium to High	None	Medium	CL	CLAY
	SILTS & CLAYS Liquid limit greater than 25	Low to medium	Slow to very slow	Low	OL	ORGANIC SILT
		Low to medium	Slow to very slow	Low to medium	OH	SILT
		High	None	High	CH	CLAY
Medium to high	None	Low to medium	OH	ORGANIC CLAY		
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, sponge feel and frequently by fibrous texture		FI	PEAT		

• Low plasticity - Liquid Limit W_L less than 25% • Medium plasticity - W_L between 25% and 50%

COMMON DEFECTS IN SOIL

TERM	DEFINITION	DIAGRAM
FRITTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub-parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub-parallel to layering. May be open or closed. The term "discontinuity" may be used for irregular joints <0.2m in length.	
SHEARED ZONE	Zone in silty soil with roughly parallel near planar, curved or undulating boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lensoidal or wedge shaped blocks.	
SHEARED SURFACE	A near planar, curved or undulating, smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very slow) has occurred along the surface.	

From the BS5391, Annex 3, Box 1.

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Subsidiary, fine, loose, angular or as one of a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by dense packing of grains. May contain organic matter.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	
FILLED SEAM	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cut through a soil mass. Formed by infilling of open joints.	

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Test Pit 1



Test Pit 2



Test Pit 3



Test Pit 4



Test Pit 5



Test Pit 6



Test Pit 7



Test Pit 8

Coffey Environmental Pty Ltd

Engineering log - *Therapsid*

Site: *Point of View*

Project: *Point of View*

Client: *Point of View*

Date: *23/08/2000*

Time: *10:00*

Location: *Point of View*

Operator: *Point of View*

Observer: *Point of View*

Weather: *Point of View*


Soil: *Point of View*

Rock: *Point of View*


Vegetation: *Point of View*

Notes: *Point of View*


Test Pit 9



Test Pit 10



Test Pit 11



Coffey

Coffey Geosciences Pty Ltd ACN 058 281 818

Excavation No. **TP1**
Sheet **1 of 1**
Office Job No.: **H053/1**
Date started: **11.8.2000**
Date completed: **11.8.2000**
Logged by: **KdeC**
Checked by: *[Signature]*

Coffey

Engineering log - Excavation

Client: **Forestry Tasmania**
Principal:
Project: **Integrated Timber Processing Yard, Huon**
Test pit location:

equipment type and model: CA7 325B		Pit Orientation: Easting in N 1. Surface	
excavation dimensions: 3m long 1.5m wide		Nothing in bottom	

excavation information			material substance				structure and additional observations	
method	penetration	support	depth	depth	material	moisture		
1 2 3		water	FL	log	description	content		
				0.0	SM SILTY SAND, fine to medium sand, black to dark grey, low liquid limit silt, roots and roots, organic	M	MS	
				0.5	GM GRAVEL, fine to coarse (20mm - 40mm), light grey, subrounded quartzite, low liquid limit silt to coarse sand fines	M to W	MD-D	
				1.0	SM GRAVELLY SAND, fine sand, light grey to white, trace of low liquid limit silt, subrounded quartzite gravel fine to coarse (20mm - 40mm), trace of siltstone (20mm - 250mm)	M	MS	
				1.5	GM SILTY GRAVEL, fine to medium subrounded quartzite gravel, dark brown to black low liquid limit silt fines, organic	M to D	MD-D	
				1.5	CL GRAVELLY CLAY, medium plasticity clay, mottled yellow-orange-brown, trace of red. Fine to medium sand and fine to coarse subrounded quartzite gravel, trace of siltstone	SS-LS		included pocket of grey clay measured at 120cm with Pocket Penetrometer
Test pit TP1 terminated at 2.25m								
Sketch								

method
1) natural exposure
2) cutting excavation
BH backhoe bucket
SH shovel blade
R ripper
E excavator

support
S shoring
H all
penetration
1 2 3
resistance
range is
refined

water
water level
on date shown
water inflow
water outflow

notes, samples, tests
U_u undisturbed sample 100mm diameter
U_d undisturbed sample 50mm diameter
D disturbed sample
V vane shear (SPV)
F_s bulk sample
E environmental sample
R refusal

classification symbols and soil description based on unified classification system

Moisture
D dry
M moist
W wet
Wp plastic limit
W_L liquid limit

consistency/liquidity index
VS very soft
S soft
F firm
SS stiff
VH very stiff
H hard
Fh fissile
VL very loose
L loose
MD medium dense
D dense
VD very dense

Coffey Geosciences Pty Ltd ACN 056 255 518

Engineering log - Excavation

Client: **Forestry Tasmania**

Principal:

Project: **Integrated Timber Processing Yard, Huon**

Test pit location:

Excavation No. **TP2**

Sheet 1 of 1

Office Job No.: **HO53/T**

Date started: **11.8.2000**

Date completed: **11.8.2000**

Logged by: **KifeC**

Checked by: *[Signature]*

equipment type and model		CAT 225B		Pit Orientation		Facing		in		R.L. Surface		
excavation dimensions		4m long, 1.5m wide		Facing		in				datum		
excavation information				material substance								
method	penetration	support	water	soils samples, tests, etc.	depth	graphic log	classification symbol	material	moisture condition	consistency	plasticity index	structure and additional observations
1 2 3					RL			soil type: plasticity or particle characteristic, colour, secondary soil matrix components.				
					0.5		SP	SILTY SAND, fine to medium sand, black to dark grey, angular quartz gravel (5mm to 200mm), roots & organic	MW	MC		Water trickling into test pit through sandy gravel layer
							GP	SANDY GRAVEL, fine to medium sand with quartzite gravel (5mm to 200mm), pale grey				
					1.0		GS	GRAVELLY SAND, medium graded sand to irregular dark brown to black sand, angular gravel and cobbles	M	MO-D		
							CL	SANDY CLAY, medium to high plasticity clay, some fine sand, mottled orange yellow-brown		St-VIe		
							SP	SANDY, fine to medium, orange		MC		
					1.0		GP	SANDY GRAVEL, medium sand, mottled orange-brown-grey, angular gravel (5mm-70mm) and cobbles (up to 100mm), pockets of orange high plasticity clay				
Test pit TP2 terminated at 2.1m												
Sketch												

method

H natural exposure

X existing excavation

(H) backfill bucket

b bulldozer

M made

open

excavator

support

S shoring

H H

penetration

1 2 3

water level or table shown

water inflow

water outflow

soils, samples, tests

U_u undisturbed sample 50mm diameter

U_d undisturbed sample 50mm diameter

D disturbed sample

V vane shear (kPa)

St_u bulk sample

E environmental sample

R refusal

classification symbols and soil description based on unified classification system

excavations

D dry

M moist

W wet

Wp plastic limit

W_L liquid limit

consistency/plasticity index

VS very soft

S soft

F firm

St stiff

VS_h very stiff

H hard

Fh firm

FL very loose

L loose

MO medium dense

D dense

VD very dense

Form GSD 3.3 Issue 3 Nov 02

TERRIST, MOSSLOP, COFFEY/DOC 25/08/00

Coffey Geosciences Pty Ltd ACN 056 225 516

Engineering log - Excavation

Client: **Forestry Tasmania**
Principal:
Project: **Integrated Timber Processing Yard, Huon**
Test pit location:

Excavation No: **TP3**
Sheet: 1 of 3
Office Job No: **HO53/1**
Date started: **11.8.2000**
Date completed: **11.8.2000**
Logged by: **KdeC**
Checked by: *[Signature]*



equipment type and model	CAT 325B	Pit Orientation	Facing	m	R.L. Surface				
excavation dimensions	10m long	1.5m wide	Heading	m	datum				
excavation information		material substance							
method	penetration	notes	depth	classification	material	moisture	consistency	hardness	structure and
1 2 3	support	samples, tests, etc	RL	depth	soil type, plasticity or particle characteristics, colour, secondary and minor components	condition	already made	MPa	additional observations
				0.0	BU SILTY SAND, fine to medium sand, black to dark grey, low liquid limit silt, roots and twigs, organics	M	MO		
				0.5	SW GRAVELLY SAND, fine to medium sand, pale grey, angular to subrounded quartzite gravel (10 to 20mm)		MO-C		
				0.8	SP SAND, fine to medium, cemented in places, dark brown to black		ME		
				1.0	CLAY MEDIUM PLASTICITY, mottled orange-yellow-brown, trace of fine sand		VE		
				1.2	SP SANDY GRAVEL, angular quartzite gravel and cobbles (up to 100mm) in matrix of fine sand, mottled orange yellow to red. Some pockets of red, low liquid limit silty material		MO		
				1.5					
				2.0					
				2.5					
				3.0					
Sketch									
method	support	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/ plasticity index					
A natural exposure	G shoring	U ₅₀ undisturbed sample 50mm diameter		VS very soft					
E existing excavation	H sill	U ₁₀₀ undisturbed sample 100mm diameter		S soft					
B backhoe bucket	penetration	D disturbed sample		F firm					
M bulkhead shield	1 2 3	V vane shear (kPa)		St stiff					
R roller	no resistance	Sw bulk sample		VEB very stiff					
E excavator	rigging to ground	E environmental sample		H hard					
	water	R refusal		Fb brittle					
	water level on site shown			VL very loose					
	water inflow			L loose					
	water outflow			MO medium dense					
				D dense					
				VD very dense					

Form GSD 1.1 (Rev 1) (Rev 2) 11/01/00 HO53/1-AB 23/08/00

Coffey Geosciences Pty Ltd ACN 096 330 018		Excavation No. TP3	
Engineering log - Excavation		Sheet 2 of 3 Office Job No.: HO53/1	
Client Forestry Tasmania		Date started: 11.8.2000	
Principal:		Date completed: 11.8.2000	
Project: Integrated Timber Processing Yard, Huon		Logged by: KdeC	
Test pit location:		Checked by: <i>[Signature]</i>	

equipment type and model: CAT 325B		Pit Orientation: Easting in		R.L. Surface: Mean													
excavation dimensions: 10m long 1.8m wide		Facing: in		Return: in													
excavation information			material substance														
method	penetration	notes	material	moisture	consistency/												
1 2 3	support	water	soil type plasticity or particle characteristics, colour, secondary and minor components.	condition	density index												
		tests samples, tests, etc			hardness												
		RL			penetration												
		depth metres			meter												
		depth log															
		classification system															
structure and additional observations																	
<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">3.0</td> <td style="width: 10%; text-align: center;">4.0</td> <td style="width: 10%; text-align: center;">4.5</td> <td style="width: 10%; text-align: center;">5.0</td> <td style="width: 10%; text-align: center;">5.5</td> <td style="width: 10%; text-align: center;">6.0</td> </tr> <tr> <td colspan="6" style="text-align: center;"> Test pit TP3 is installed at 4.0m </td> </tr> </table>						3.0	4.0	4.5	5.0	5.5	6.0	Test pit TP3 is installed at 4.0m					
3.0	4.0	4.5	5.0	5.5	6.0												
Test pit TP3 is installed at 4.0m																	
Sketch																	

method N natural exposure X existing excavation SH backhoe bucket B bulldozer blade H ripper S available	support D shoring N nil penetration water water level on site shown water inflow water outflow	notes, samples, tests U ₁ undisturbed sample (10cm diameter) U ₂ undisturbed sample (15cm diameter) D disturbed sample V vane shear (SPU) S ₁ bulk sample S environmental sample R refusal	classification systems and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VS ₈₅ very stiff H hard P ₈₅ plastic VL very loose L loose MD medium dense D dense VD very dense
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Coffey Geosciences Pty Ltd ACN 090 338 018		Excavation No. TP4	
Engineering log - Excavation		Sheet 1 of 1	
Client: Forestry Tasmania		Office Job No.: HO53/1	
Principal:		Date started: 11.8.2000	
Project: Integrated Timber Processing Yard, Huon		Date completed: 11.8.2000	
Test pit location:		Logged by: KdeC	
		Checked by: <i>[Signature]</i>	
equipment type and model: CA7 305B		Pit Orientation	Easting: m
excavation dimensions: 6m long, 1.8m wide			R.L. Surface
		Nothing: m	datum:
excavation information		material substance	
method	notes	material	structure and additional observations
1 3 3	notes, samples, tests, etc.	soil type, plasticity or particle characteristics, colour, secondary and minor components.	moisture content, consistency, density index, SPT, penetration, etc.
	depth (metres)		
	0.5	SP SILTY SAND, fine to medium sand, black to dark grey, low liquid limit soil, roots and rootslets, organics.	
	0.5 - 1.0	GP SANDY (GRAVEL), angular quartzite gravel and cobbles (up to 100mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit, silty material.	
	1.0 - 1.5	SP SAND, fine to medium, cemented in places, dark brown to black.	
	1.5 - 2.0	ML to CL SILTY CLAY, medium plasticity clay, mottled orange, yellow & brown, trace of fine silt.	
	2.0 - 3.0	CL GRANULY CLAY, medium plasticity clay, mottled yellow-orange-brown, trace of red, fine to medium sand and fine to coarse subrounded quartzite gravel, trace of cobbles.	
	3.0	Test pit TP4 terminated at 1.8m.	
Sketch			
method	notes, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index
H	calical auger	U _u undisturbed sample 50mm diameter	VS very soft
X	ending excavation	U _d undisturbed sample 50mm diameter	S soft
SH	backhoe bucket	D disturbed sample	F firm
W	sublayer blade	V vane shear (kPa)	St stiff
R	rope	St _s bulk sample	VS _s very stiff
E	excavate	E environmental sample	H hard
		R refusal	Fa friable
			WL very loose
			L loose
			ME medium dense
			D dense
			VD very dense

Coffey Geosciences Pty Ltd ACN 028 326 516

Engineering log - Excavation

Client: **Forestry Tasmania**

Principal:

Project: **Integrated Timber Processing Yard, Huon**

Test pit location:

Excavation No: **TP5**

Sheet: 1 of 1

Office Job No.: **HO53/1**

Date started: **11.8.2000**

Date completed: **11.8.2000**

Logged by: **KdcC**

Checked by: *[Signature]*

equipment type and model: CAT 325B		Pit Orientation		Easting: m	R.L. Surface
excavation dimensions: 4.5m long 1.8m wide				Northing: m	datum
excavation information			material substance		
method	penetration	depth	water	notes samples, tests, etc	material
1 2 3		RL	depth metres	graphic log classification symbol	soil type, plasticity or particle characteristics, colour, secondary and minor components
1					SLTY SAND, fine to medium sand, dark to dark grey, low liquid limit soil, roots and nodules, organic
					GP SAND, fine to medium, cemented in places, dark brown to black
					SPNDY GRAVEL, rounded to subangular quartz gravel, pale grey medium to fine sand
					SANDY GRAVEL, rounded to subangular quartz gravel, dark brown medium to fine sand, cemented in places
					SPNDY GRAVEL, quartz gravel and cobbles up to 10mm, medium sand and pockets of clay, reddish orange, red and yellow
					Test pit TP5 terminated at 2.0m
Sketch					

method

N natural exposure

X existing excavation

S sackhole bucket

D surface block

H spade

E excavator

support

S shoring

R rd

penetration

no resistance

resistance

water

water level on date of test

water inflow

water outflow

notes, samples, tests

U₁₀ undisturbed sample 10mm diameter

U₂₀ undisturbed sample 20mm diameter

D disturbed sample

V very clean (SP)

Zk bulk sample

E environmental sample

R ref. soil

classification symbols and soil description based on unified classification system

moisture

D dry

M moist

W wet

Sp plastic limit

Sl liquid limit

consolidability index

VS very soft

S soft

F firm

St stiff

VS_c very stiff

H hard

Fs friable

VL very loose

L loose

MS medium dense

D dense

VS_c very dense

Coffey Geosciences Pty Ltd ACN 204 308 516		Excavation No. TP8	
Engineering log - Excavation		Sheet 1 of 1 Office Job No. HO53/T	
Client Forestry Tasmania		Date started: 11.8.2000	
Principal		Date completed: 11.8.2000	
Project Integrated Timber Processing Yard, Huon		Logged by: KdeC	
Test pit location:		Checked by: <i>[Signature]</i>	

Equipment type and model: CAT 325D		Pit Orientation:		Facing: n	R.L. Surface
Excavation dimensions: 3.5m long 1.5m wide				Heaving: n	datum

excavation information			material substance				moisture condition	consistency/clayey index	test results - number	structure and additional observations
method	penetration (mm)	notes, samples, tests, etc	depth (m)	classification symbol	material	moisture condition				
1	2.0		0.0	SM	SILTY SAND: fine to medium sand, black to dark grey, low liquid limit silt, roots and roots, organics	M	MO		Extremely weathered silts and clays, oriented clays and bedding, orientation 10240 degrees 20447 degrees. (Magnetic dip direction and size)	
			0.5	GC	CLAYEY GRAVEL: medium to light plasticity clay, pale yellow-brown to light brown, angular quartz gravel (20mm-100mm)					
			1.0	ML to CL	SILTY CLAY: low plasticity clay with silt fines, mottled orange to grey, some remnant dropstones		VS++			
Test pit TP8 terminated at 1.5m										
Sketch										

method 1 natural exposure 2 existing excavation 3 surface bucket 4 bulldozer blade 5 rope 6 excavator	support S showing M not penetration 1 2 3 4 1-2-3-4 water level on date shown water inflow water outflow	notes, samples, tests U _u undisturbed sample 50mm diameter U _s undisturbed sample 100mm diameter D disturbed sample V vane shear (kPa) Na soil sample E environmental sample R refect	classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit Wl liquid limit	consistency/clayey index VS very soft S soft F firm SF stiff VS+ very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
---	--	--	--	---

Coffey Geosciences Pty Ltd ACN 008 335 518

Engineering log - Excavation

Client: **Forestry Tasmania**
Principal:
Project: **Integrated Timber Processing Yard, Huon**
Test pit location:

Excavation No. **TP7**
Sheet 1 of 1
Office Job No.: **HO53/1**
Date started: **11.8.2000**
Date completed: **11.8.2000**
Logged by: **KdeC**
Checked by: *[Signature]*



equipment type and model: CAT 325B Pt Orientation: Existing: m R.L. Surface
excavation dimensions: 1.2m long, 1.0m wide: Netting: at datum

excavation information				material substance				moisture condition	consistency/ density index	hardness/ penetration	structure and additional observations
method	penetration	support	notes	depth	classification	material	classification symbol				
1 2 3			samples, tests, etc	RL	depth	soil type, plasticity or particle characteristics, colour, secondary and minor components					
					0.5	CLAY SAND: fine to medium sand, dark brown to black, angular to rounded quartz gravel (5mm to 60mm), subangular to rounded cobbles up to 180mm	SM	M	SD		
					0.5	CLAYEY GRAVEL: medium plasticity, reddish orange-red to yellow rounded cobbles up to 180mm, angular gravel 20mm to 60mm, some fine sand to silt	GC				
					1.0	SANDY GRAVEL: rounded, coarse gravel (10mm) and fine gravel (5mm - 10mm) in angular to subangular medium to coarse sand, reddish orange-red, pale grey to white at base of pit	GP				
Test pit TP7 terminated at 1.0m											

Sketch

<p>method</p> <ul style="list-style-type: none"> N natural exposure X existing excavation SH backhoe bucket OS open stake OP open T excavator 	<p>support</p> <ul style="list-style-type: none"> S shoring SI sill <p>penetration</p> <ul style="list-style-type: none"> 1 2 3 <p>water</p> <ul style="list-style-type: none"> water level on date shown water inflow water outflow 	<p>notes, samples, tests</p> <ul style="list-style-type: none"> U₁₀ undisturbed sample 100mm diameter U₁₅ undisturbed sample 150mm diameter D disturbed sample V vane shear (kPa) Sk bulk sample E environmental sample R refusal 	<p>classification symbols and soil descriptions based on unified classification system</p> <p>structure</p> <ul style="list-style-type: none"> D dry M moist W wet Wp plastic limit W_L liquid limit 	<p>consistency/density index</p> <ul style="list-style-type: none"> VS very soft S soft F firm St stiff VSB very soft W hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Form HO53/1 used 11 Nov 00
TP7TP7 - KOSKOSU, COFFEY LTD 23/08/00

Coffey Geosciences Pty Ltd ACN 090 238 518		Excavation No: TP8	
Engineering log - Excavation		Sheet: 1 of 1 Office Job No: HO53/T	
Client: Forestry Tasmania		Date started: 11.8.2000	
Principal:		Date completed: 11.8.2000	
Project: Integrated Timber Processing Yard, Huon		Logged by: KdeC	
Test pit location:		Checked by: <i>[Signature]</i>	

equipment type and model: CAT 325B		Pit Orientation: Easting in		R.L. Surface: datum	
excavation dimensions: 3.0m long 1.5m wide		Notting: in		datum:	

method	penetration	suction	water	notes samples, tests, etc	depth meters	graphic log	classification symbol	material soil type, plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	sPTs	structure and additional observations
							SM	SLTY SANDS fine sand, pale grey, rounded gravel (60mm) and small angular quartz gravel, roots	M	L		
					0.5		SL	SANDY SILT, fine sand & silt, dark brown to black, some roots		MO		
					1.0		GP	SANDY GRAVEL, fine sand, orange-red (upper layer) to medium grained & pale yellow-grey (bottom of pit)				
Test pit TP8 terminated at 1.5m												
Sketch												

method N: natural exposure E: existing excavation B: backhoe bucket S: surface blade R: roller E: excavator	support S: shoring H: nil excavation 1: no resistance 2: resistance 3: partial 4: full water level or data shown water inflow water outflow	notes, samples, tests U ₁₀ : undisturbed sample 100mm diameter U ₅₀ : undisturbed sample 50mm diameter D: disturbed sample V: vane shear (SPT) Ds: bulk sample E: environmental sample R: refusal	classification symbols and soil description based on unified classification system moisture D: dry M: moist W: wet Wp: plastic limit W _L : liquid limit	consistency/density index VS: very soft S: soft F: firm SF: stiff VSt: very stiff H: hard Fh: friable VL: very loose L: loose MD: medium dense D: dense VD: very dense
--	--	---	---	---



Coffey Geosciences Pty Ltd ACH 098 300 018

Excavation No. TP9

Engineering log - Excavation

Client: **Forestry Tasmania**

Principal: **Integrated Timber Processing Yard, Huon**

Test pit location:

Equipment type and model: **CAT 328B** Pit Orientation: **Easting is** R.L. Surface

Excavation dimensions: **2.2m long 1.5m wide** Notting: **is** datum

Sheet: **1 of 1**

Office Job No.: **HO53/1**

Date started: **11.8.2000**

Date completed: **11.8.2000**

Logged by: **KdcC**

Checked by:

Coffey

excavation information				material substance				structures and additional observations											
method	penetration	moisture	water	soils samples, tests, etc	depth R.L.	depth metres	graphic log classification symbol	material	moisture condition	consistency/density index	hardness/penetration								
1	2	3	4	5	6	7	8	soil type, plasticity or particle characteristics, colour, secondary and minor components			MPa								
					0.0		MS	SLTY SAND, fine to medium sand, black to dark grey, no liquid limit set, roots and rootslets, eucalypt	MS	L									
					0.5		MS	SLTY SAND, fine sand and silt, dark grey to black, angular quartz gravel (20mm-100mm), rootslets	MS										
					1.0		GC	CLAYEY GRASS, medium plasticity clay, mottled orange-red yellow, angular to subangular gravel, some fine sand	U										
					1.5		SL	SANDY SILT, low liquid limit silt with fine sand, pale grey to orange, weathered pale grey shales	VS										
Test pit TP9 terminated at 1.5m																			
					1.5														
					2.0														
					2.5														
					3.0														
Observations in extremely weathered shales 248115 & 23905 (roughly dip direction and dip angle)																			
Sketch																			
<table border="1"> <tr> <th>method</th> <th>soils, samples, tests</th> <th>classification symbols and soil description based on unified classification system</th> <th>consistency/density index</th> </tr> <tr> <td> 1) surface exposure 2) ending elevation 3) backhoe bucket 4) bulldozer blade 5) cone 6) excavator </td> <td> 7) shoring 8) pit 9) undisturbed sample 50mm diameter 10) undisturbed sample 100mm diameter 11) disturbed sample 12) vane shear (kPa) 13) bulk sample 14) environmental sample 15) refect </td> <td> moisture D dry M moist W wet Wp plastic limit Wl liquid limit </td> <td> 16) very soft 17) soft 18) firm 19) stiff 20) very stiff 21) hard 22) brittle 23) very brittle 24) loose 25) medium dense 26) dense 27) very dense </td> </tr> </table>												method	soils, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index	1) surface exposure 2) ending elevation 3) backhoe bucket 4) bulldozer blade 5) cone 6) excavator	7) shoring 8) pit 9) undisturbed sample 50mm diameter 10) undisturbed sample 100mm diameter 11) disturbed sample 12) vane shear (kPa) 13) bulk sample 14) environmental sample 15) refect	moisture D dry M moist W wet Wp plastic limit Wl liquid limit	16) very soft 17) soft 18) firm 19) stiff 20) very stiff 21) hard 22) brittle 23) very brittle 24) loose 25) medium dense 26) dense 27) very dense
method	soils, samples, tests	classification symbols and soil description based on unified classification system	consistency/density index																
1) surface exposure 2) ending elevation 3) backhoe bucket 4) bulldozer blade 5) cone 6) excavator	7) shoring 8) pit 9) undisturbed sample 50mm diameter 10) undisturbed sample 100mm diameter 11) disturbed sample 12) vane shear (kPa) 13) bulk sample 14) environmental sample 15) refect	moisture D dry M moist W wet Wp plastic limit Wl liquid limit	16) very soft 17) soft 18) firm 19) stiff 20) very stiff 21) hard 22) brittle 23) very brittle 24) loose 25) medium dense 26) dense 27) very dense																

From: BGC 3.7 Issue 3 Dec 97
 TESTPIT LOGS (SPL) COMPANY (EST 20 08 98)

Coffey Geosciences Pty Ltd ACN 004 333 518

Excavation No. **TP11**

Engineering log - Excavation

Sheet 1 of 1

Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *[Signature]*



exc. sheet type and model		CAT 325B		Pit Orientation:		Easting		m		R.L. Surface:		
excavation dimensions:		3m long		1.5m wide		Northing		m		datum:		
excavation information				material substance								
method 1 2 3	penetration support	notes samples, tests, etc.	depth metres	depth m	depth m	classification symbol	material		moisture condition	consistency density index	penetration index	structure and additional observations
							soil type	plasticity or particle characteristics, colour, secondary and minor components				
				0.0		SM	SLTY SAND, fine to medium sand, black to dark grey, low liquid limit silt, roots and roots, organics					
				0.5		SW	GRAVELLY SAND, medium sand with angular to subrounded quartz gravel (5mm to 60mm), pale grey					
				1.0		SM	SLTY SAND, fine to medium sand, dark grey to brown, angular quartz gravel (~40mm)					
				1.5		SW to SM	GRAVELLY SAND, medium sand, orange to pale brown, subrounded to angular quartz gravel and rounded cobbles (50mm to 125mm)					
				2.0			Test pit TP11 terminated at 1.5m					
Sketch												
method		support		notes, samples, tests		Classification symbols and soil description based on unified classification system				consistency index		
<ul style="list-style-type: none"> 1) manual exposure 2) existing excavation 3) backhoe bucket 4) backhoe blade 5) roller 6) excavator 		<ul style="list-style-type: none"> S standing H soil 		<ul style="list-style-type: none"> U₅₀ undisturbed sample 50mm diameter U₁₀₀ undisturbed sample 100mm diameter D disturbed sample V vane shear (V₉₀) S_u bulk sample C environmental sample R refusal 		<ul style="list-style-type: none"> US very soft S soft F firm St stiff StB very stiff H hard Fs friable VL very loose L loose MD medium dense D dense VD very dense 				<ul style="list-style-type: none"> moisture D dry M moist W wet Wp plastic limit WL liquid limit 		

Form GS-1.2 Issue 1 Rev. 2
11/08/00 - HO53/1 - Coffey Geosciences Pty Ltd

		Lab.No.:	4493	4494	4495	4496
		Sample Id.:	Arve	Arve	Huon	Huon
Method	Analyte	Units / Sampled On :	10/10/00 11:35	28/09/00 12:40	10/10/00 11:30	28/09/00 12:30
1001-Water	pH		5.4	5.6	5.6	5.8
1004-Water	TDS	mg/L	63	53	56	52
1005-Water	TSS	mg/L	<10	<10	18	<10
1101-Water	Alkalinity HCO3	mg/L CaCO3	8	10	11	27
1103-Water	Chloride	mg/L	14	15	13	11
	Nitrate	mg/L	<0.03	<0.03	<0.03	<0.03
	Sulphate	mg/L	2.1	2.2	1.9	1.8
1109-Water	Hardness	mg CaCO3/L	12	13	15	26
1154-Water	Langelier Index		-4.5	-4.3	-4.3	-3.6
1301-Water	Fe (Total)	g/L	754	522	664	281
1302-Water	Ca (Total)	mg/L	1.98	2.14	2.65	5.2
	K (Total)	mg/L	0.72	0.7	0.66	0.49
	Mg (Total)	mg/L	1.63	1.78	1.93	3.25
	Na (Total)	mg/L	7.58	8.04	6.87	6.24
1353-Water	Silica, Molybdate Reactive	mg/L	8.4	9.8	6.6	6.3

**Revised botanical resources survey of the site proposed for
the Huon Integrated Timber Processing Yard, Glen Huon,
southern Tasmania.**

Report prepared for SEMF Holdings Pty. Ltd., Hobart.

January 2001

Dr Richard W. Barnes



Biological Consultants

*3/312 Davey Street
South Hobart
Tasmania, 7004*

SUMMARY

A site, approximately 65 hectares in size, to the west south-west of Glen Huon in southern Tasmania has been proposed by Forestry Tasmania to be the site for the construction of the Huon Integrated Processing Yard. The site is located to the north of the confluence of the Huon and Arve Rivers on Weld Road. The centre of the site is a flat plateau surrounded by gentle slope to steep slopes that lead down to the Huon River to the south and east, and Kings Creek to the west.

The plateau, which constitutes the majority of the site, is dominated by *Leptospermum glaucescens* - *Hibbertia procumbens* heathland growing on sand or muck peats that overlay a Permian quartzite bedrock (siliceous). The margin of the heathland and slopes just off the top of the plateau are dominated by a heathy *Eucalyptus amygdalina* woodland and forest growing on a quartzite bedrock (siliceous), the forest component being comparable to the Regional Forest Agreement community of *E. amygdalina* forest on sandstone (see also *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995)). The forest, woodland and heathland on the site are traversed by numerous roads (in various conditions of repair), tracks and cut lines. There are several disused quarries across the plateau, with most of these regenerating back to heathland with small intermittent copses of stunted *E. amygdalina*. Shrubby wet to dry forest dominated by *Eucalyptus obliqua* occurs in the drainage lines and steeper slopes on the boundary of the proposed development.

Leptospermum glaucescens - *Hibbertia procumbens* heathland is adequately reserved within the Tasmanian Reserve System (Kirkpatrick and Harris 1999; S. Harris pers. comm.). *Eucalyptus amygdalina* forest on sandstone is a high priority for conservation under the Regional Forest Agreement Private Land Reserve Program, but is not a priority for conservation on public land (e.g. State Forest). Wet and dry *Eucalyptus obliqua* forest is well reserved in Tasmania. There is no requirement for the forest or non-forest communities located within the boundary of the proposed development site to be reserved on public land.

No plant species of local, statewide or national conservation significance were located on the site during the survey. A record of the orchid species *Caladenia alata*, which is listed in the Tasmanian *Threatened Species Protection Act 1995* (rare; Schedule 5), indicates a population

of this species occurs to west of the proposed development site. No plants of this species were located within the boundary of the proposed development.



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1. Introduction

The site proposed for the construction of the Huon Integrated Timber Processing Yard is located on Weld Road, approximately 12 kms west south-west of Glen Huon in southern Tasmania (Figure 1). The site overlooks the Huon River to the south and east, the Weld Plains to the west and the Arve Plains to the south-west on the southern side of the Huon River.

Forestry Tasmania has proposed that the site be developed to incorporate a log segregation yard, sawmilling/timber recovery operation, rotary peeled veneer mill, woodchip mill, wood-fired power station, wood waste composting operation and a site-wide communal waste water reuse operation. At present the site is covered by relatively intact native vegetation which would be predominantly cleared to accommodate the above infrastructure. The conservation status of this native vegetation, at both the individual species and entire plant communities level, was the focus of this study.

The aims of this survey and report were to:

- (i) identify and record the native and introduced plant species present on the site;
- (ii) define the distribution of plant communities;
- (iii) locate any species of conservation significance on the site and comment on their distribution and status; and
- (iv) to comment and provide recommendations on plant species and communities of conservation significance, if present.

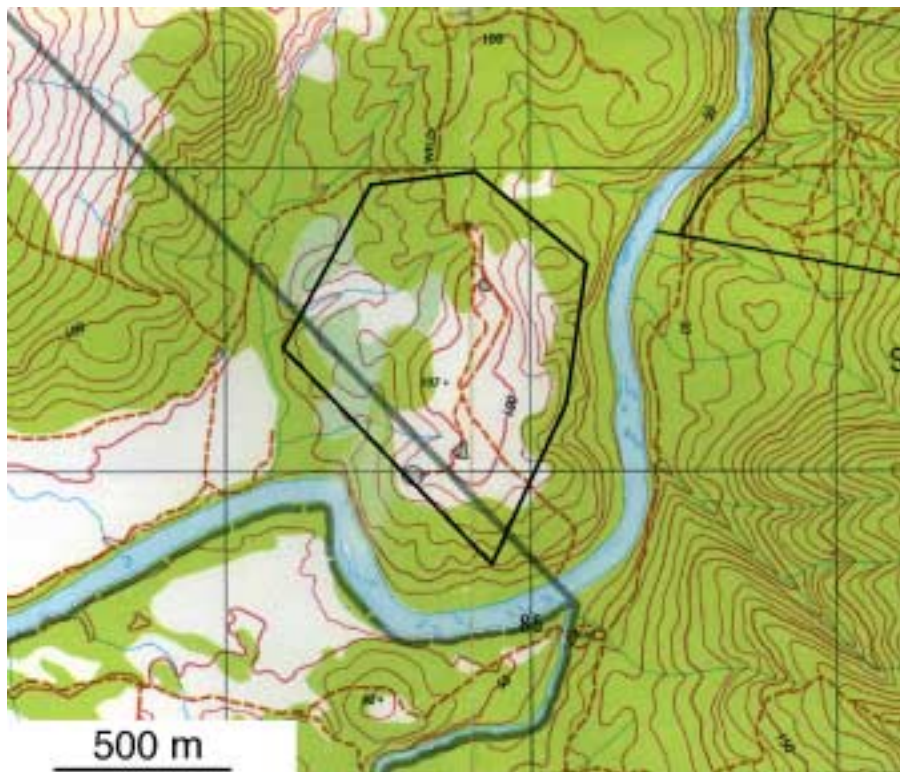


2. Methodology

2.1 Study area and survey techniques

The proposed development site is located west south-west of Glen Huon in southern Tasmania, on the northern side of the Huon River (Figure 1). The site is approximately 65 hectares in size and is bisected by Weld Road (centroid AMG coordinates 484800E 5233300N; Glen Huon 1:25 000 Tasmapi sheet). The altitude of the site varies between 60 and 105 m above sea level, with the centre of the site being a flat plateau surrounded by gentle slopes to the west, south and east that become steeper towards the Huon River.

Figure 1. Section of the Glen Huon topographic mapsheet showing the location of the proposed development site (solid black line) for the Huon Integrated Timber Processing Yard in southern Tasmania



The bedrock geology is mainly Permian metamorphosed sandstones (quartz) that have eroded to produce friable sandy soils occasionally with a deep (>1 m) overlying organic muck peat. Soils derived from Jurassic Dolerite occur around the edge of the proposed development site, particularly along the eastern and southern boundaries. The site has been heavily disturbed in some areas through quarrying activities, and more recently during the construction of access roads and tracks.

The proposed development site and surrounding area was surveyed on three separate occasions. The first was conducted on the 26th of August 2000 to record the plant species and communities present within a 40 hectare site that was the original extent of the development (see Barnes 2000). Sampling was conducted using quadrats of approximately 10 by 10 metres in size arbitrarily located in representative sections of each plant community. Species within each quadrat were recorded as present or specimens were collected for *ex situ* identification. Data was collected on a TASFORHAB style datasheet using standard Braun-Blanquet categories for species dominance. A second survey was conducted on the 2nd of December 2000 to specifically survey for the rare orchid species *Caladenia alata* which has been recorded previously to the west of the proposed development site. The third survey was conducted on the 13th of January 2001 to survey the plant species and communities on an additional area (approx. 25 hectares) that was added to the extent of the proposed development. This report is based on the data collected from all three surveys.

Plant communities were described in accordance with those listed in the *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995) or by Kirkpatrick *et al.* (1995), with other relevant codes/categories listed beneath each community type (e.g. Regional Forest Agreement (1997) forest classification). Plant species identification follows The Students Flora of Tasmania (Curtis 1963, 1967; Curtis and Morris 1975, 1994) and nomenclature follows Buchanan (1999). Fern taxonomy, distribution and common names follow Garrett (1996). It must be noted that some plants (e.g. some species within Orchidaceae and Asteraceae) would not have been present in an identifiable life cycle stage during the site survey so the species list presented in this report must be considered a minimum for the site.



The distribution of each plant community within, and on the margin of, the proposed development site is shown in Figure 2.

2.2 Previous studies and observations

A botanical survey with quadrat samples has been made within the proposed development site by Ms Karen Zeigler (Forestry Tasmania) as part of an environmental assessment for the construction of the access road into the area. The data from this previous survey were available for this study (accessed through Forestry Tasmania).

A search of the GTSPOT database (conducted by Forestry Tasmania) indicated that there have been no previous records of rare and/or threatened plant species made from within the boundary of the proposed development site. A record of the rare orchid species *Caladenia alata* (winged caladenia; Orchidaceae) was made by Mr David Zeigler in 1996 to the south-west of the site, on the margin of the Huon River (Figure 2). The species is listed as rare in the Tasmanian *Threatened Species Protection Act 1995* and is a priority 1 forest species in the *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995).

2.3 Conservation status of plant species and communities

Plants species considered to be rare and threatened are those listed in the Tasmanian *Threatened Species Protection Act 1995* and/or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Rare and/or poorly reserved forest communities are those listed in the Regional Forest Agreement (1997) as needing further reservation or protection on public and/or private freehold land. The conservation status of plant communities according to Kirkpatrick *et al.* (1995), the *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995) and the *Vegetation Management Strategy for Tasmania* (2000) are also detailed where relevant.

3. Plant communities



The distribution of the three plant communities present on the proposed development site is detailed in Figure 2. Plant species located in the development site are listed in Appendix 1 and the data sheets for the quadrat samples are in Appendix 2.

3.2 *Leptospermum glaucescens* - *Hibbertia procumbens* heathland

Regional Forest Agreement Community Code: Not applicable (non-forest community).

Vegetation Management Strategy (2000) Code: Lowland and intermediate heath (Hh).

The flat plateau that constitutes the majority of the proposed development site is dominated by a heathland mosaic that would be best described as a facies of *Leptospermum glaucescens* - *Hibbertia procumbens* heath (see Kirkpatrick *et al.* 1995). The dominant species include *Leptospermum glaucescens* and *L. scoparium* to 2.5 m tall with a diverse array of heaths and ground covers including *Epacris lanuginosa*, *E. impressa*, *Selaginella uliginosa*, *Hibbertia procumbens*, *Pteridium esculentum*, *Leucopogon ericoides*, *Amperea xiphoclada*, *Sprengelia incarnata*, *Restio hookeri*, *Bauera rubioides* and *Patersonia fragilis*. Small copses of stunted *Eucalyptus amygdalina* trees (<10 cm dbh) to 3 (-5) m tall dot the heathland in the better drained areas and along the disused tracks. Small narrow bands of this community type occur down the western slopes off the top of the plateau and are mainly associated with drainage lines.

The heathland is traversed by numerous roads and tracks in various conditions. There are also several disused quarry sites located in the heathland, with at least two of these regenerating back to heathland dominated by *Bauera rubioides*, *Hibbertia procumbens*, *Leptospermum glaucescens* and *Lepidosperma filiforme*. No woody or herbaceous weeds were located anywhere in the heathland during the survey.

No rare and threatened plant species were located in the heathland at the time that the survey was conducted (see **4.1 Significant botanical areas** for more details). This plant community is considered to be adequately reserved in the Tasmanian Reserve System by Kirkpatrick and Harris (1999), with it occurring within at least the South Bruny Island and Tasman National Parks and the Southport Lagoon Conservation Area.



3.2 Heathy *Eucalyptus amygdalina* open forest and woodland on sandstone

Regional Forest Agreement Community Code: *Eucalyptus amygdalina* forest on sandstone (forest component) and non-forest (woodland component).

Vegetation Management Strategy (2000) Code: *Eucalyptus amygdalina* forest on sandstone and *E. amygdalina* woodland.

The slopes leading down to the Huon River from the plateau are dominated by heathy *Eucalyptus amygdalina* open forest and woodland on a quartzite substrate (siliceous). The forest component of this community is comparable to the *E. amygdalina* forest on sandstone community described in the *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995) and the Regional Forest Agreement (1997). The forest component generally occurs as a transitional community between the heathland/*E. amygdalina* woodland and the *E. obliqua* forest that occurs on perimeter of the proposed development site. The proportion of forest to woodland is low, with the forest component mainly restricted to the southern and north-eastern areas of the site. At the southern end of the site, the forest mainly occurs between the new road and a second track that was cut from this road to the south-eastern corner of the site. In the north-eastern corner this forest type occurs just off the top of the plateau and extends down the slope onto the flats that lead down to the Huon River.

For both the woodland and forest the canopy trees are commonly between 3 and 12 (-15) m tall with some of the larger trees possessing prominent fire scars at the base of the trunk and numerous dead branches in the upper crown. Seedlings and saplings of *E. amygdalina* are occasional across the site and often form small, dense stands in areas of high disturbance regimes (i.e. besides tracks and in the disused quarries). The canopy coverage within the forest is variable and ranges between 40 and 70%, while for the woodland it can be as low as 5%. In some areas there is a component of *E. obliqua* in the forest but this species rarely attains more than 35% dominance.

The understorey for both the woodland and forest is a mosaic of heaths, tea-trees and small shrubs in the better drained areas while *Gymnoschoenus sphaerocephalus*, *Melaleuca*



squarrosa and *M. squamea* dominate on the deeper, poorly drained peats. Common understorey species include *Epacris impressa*, *E. lanuginosa*, *Leptospermum scoparium*, *L. glaucescens*, *Aotus ericoides*, *Patersonia fragilis*, *Hibbertia procumbens*, *Empodisma minus*, *Sprengelia incarnata*, *Bauera rubioides*, *Lepyrodia tasmanica*, *Gonocarpus tetragynus*, *Leucopogon ericoides*, *Restio hookeri*, *Schoenus lepidosperma*, *Selaginella uliginosa* and *Pteridium esculentum*. Small trees of *Banksia marginata*, *Allocasuarina zephyrea*, *Acacia terminalis* and *A. mucronata* var. *mucronata* to 2 m tall occur throughout the understorey.

As with the heathland, this forest/woodland community is dissected by several roads, tracks and cut lines, and has been disturbed quite extensively in some areas by sand and gravel extraction activities. No woody or herbaceous weeds were located anywhere in the heathland during the survey.

No rare and threatened plant species were located in the heathland at the time that the survey was conducted. Refer to **4.1 Significant botanical areas** for details on the conservation status of this plant community.

3.3 *Eucalyptus obliqua*-*Melaleuca squarrosa*-*Monotoca glauca* forest (OB0111)

Regional Forest Agreement Community Code: *Eucalyptus obliqua* dry forest/*E. obliqua* wet forest.

Vegetation Management Strategy (2000) Code: *Eucalyptus obliqua* dry forest/*E. obliqua* wet forest.

The lower slopes of the plateau are dominated by *Eucalyptus obliqua* forest with a midstorey of both wet and dry tree and shrub species. This forest type generally marks the transition to deeper and more moist soils and includes the areas at the west, south and north of the proposed development site. Midstorey shrubs are occasional throughout the forest and are more abundant in the drainage lines which have presumably been less frequently burnt than the drier ridgelines and upper slopes. Common species in the drainage lines include *Acacia terminalis*, *A. dealbata*, *A. melanoxylon*, *Melaleuca squarrosa*, *Monotoca glauca*, *Bauera rubioides*, *Hibbertia empetrifolia* and *Gleichenia dicarpa*. The drier ridgelines and north to



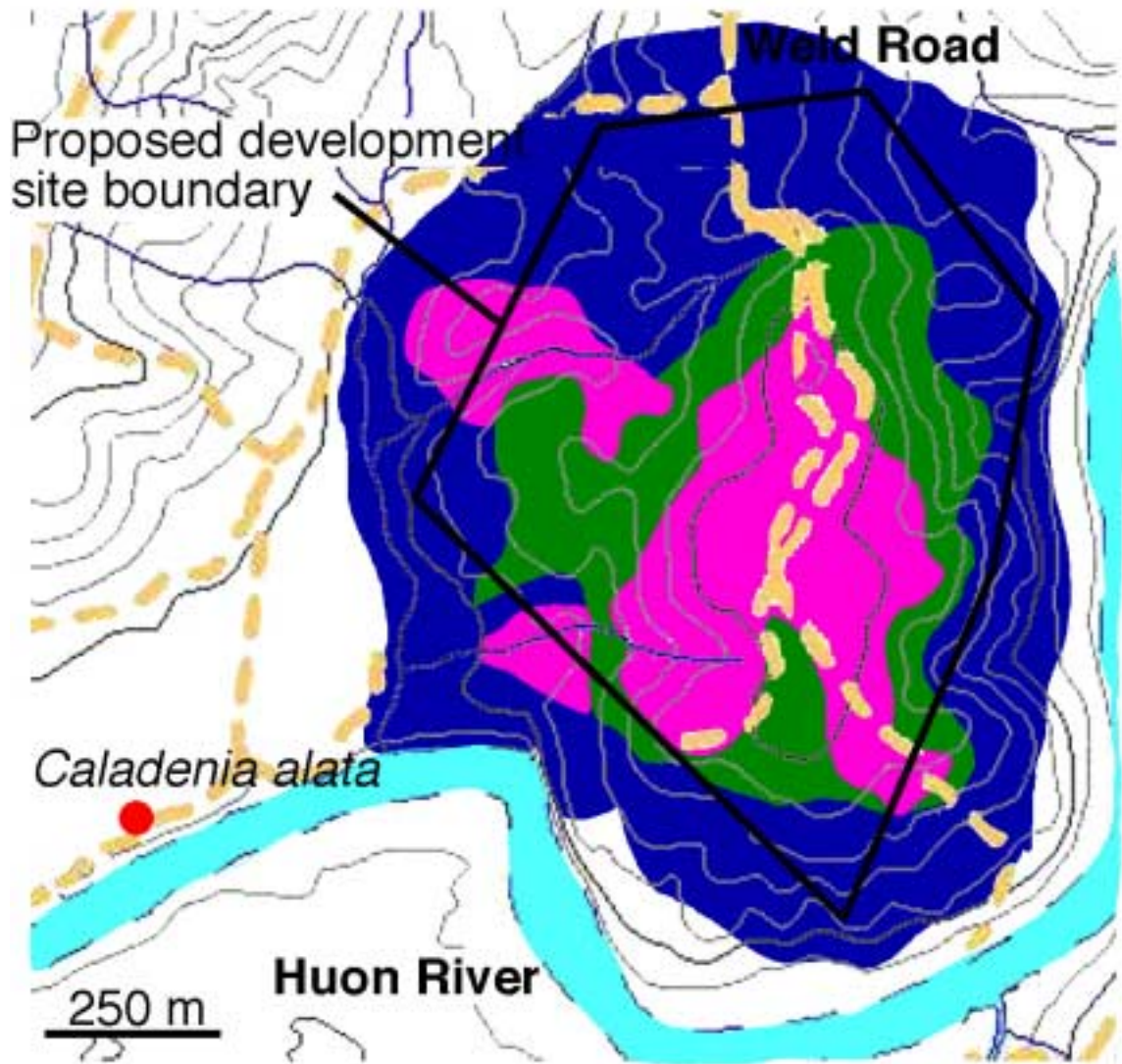
north-east facing slopes are dominated by *Pteridium esculentum*, *Epacris impressa*, *Leucopogon ericoides*, *Daviesia ulicifolia*, *Lomatia tinctoria*, *Dianella tasmanica* and *Banksia marginata*. This forest type grades into a wetter, more shrub dominated community along the riparian zone of the Huon River to the south and east with *E. obliqua* as the canopy dominant. Towards the riparian zone of the Huon River wet forest species such as *Nematolepis squamea*, *Gaultheria hispida*, *Cenarrhenes nitida*, *Anopterus glandulosus* and *Pittosporum bicolor* become more common.

With the exception of a few roads and cut lines, this forest has not been impacted upon by the quarrying activities further upslope and it appears to be free of any woody or herbaceous weeds. No rare and threatened plant species were located in this forest at the time that the survey was conducted. Dry to wet *Eucalyptus obliqua* forest is well reserved within the Tasmanian Reserve System and does not require additional reservation on public or private land under the Regional Forest Agreement (1997).



Figure 2. Map showing the distribution of plant communities within and around the proposed development site.

The location of a known *Caladenia alata* (winged caladenia) population is shown.



Key to plant communities

- Pink: 3.1 *Leptospermum glaucescens* - *Hibbertia procumbens* heathland
- Green: 3.2 *Eucalyptus amygdalina* forest and woodland on sandstone
- Dark Blue: 3.3 *Eucalyptus obliqua*-*Melaleuca squarrosa*-*Monotoca glauca* forest (OB0111)





4. Potential Impact of Development

4.1 Significant Plant Communities

The construction of the timber processing yard will have a large impact on the native vegetation in the proposed development site as most of it will have to be cleared for the construction of infrastructure. A single plant community of some conservation value was recorded within the boundary of the site.

Eucalyptus amygdalina forest on sandstone has been identified as a high conservation priority in a number of different sources (see Table 1). As this forest generally occurs in the central region of the proposed development site the majority of it would presumably be cleared for site construction. Any forest that may remain after the development of the site may be impacted upon by the activities of the yard through erosion run-off and the introduction of soil-borne pathogens (e.g. *Phytophthora cinnamomi*). With the change in boundary from the original report by Barnes (2000) it is very unlikely that any areas of this plant community within the boundary of the development site will remain in an undisturbed condition once the site has been fully developed.

Table 1. Conservation status of *Eucalyptus amygdalina* forest on sandstone

Source	Status and notes
<i>Forest Botany Manual - Nature Conservation Region 10B</i> (Duncan and Johnson 1995)	Priority B* community.
RFA Private Land Reserve Program	Very high priority for conservation.
Vegetation Management Strategy for Tasmania (2000)	Very high priority for conservation.



* indicates that the plant community is un-reserved or poorly reserved on a regional basis, but is reserved elsewhere in Tasmania. A Forest Practices Unit botanist should be contacted when a priority B community has been identified in a Timber Harvesting Plan.

Under the Regional Forest Agreement (1997), *E. amygdalina* forest on sandstone does not require further reservation on public land. However, the RFA Private Land Reserve Program has subsequently identified this forest type as having high conservation priority on private freehold land and the Forest Practices *Forest Botany Manual - Nature Conservation Region 10B* (Duncan and Johnson 1995) identifies the forest community as having regional conservation significance. Therefore, based on this it is recommended that:

¥ any development (including vegetation clearance and the construction of infrastructure) that takes place on the site should preferably be concentrated away from this forest type. However, this may not be practical given the distribution of the community within the site.

4.2 Significant Plant Species

No rare and threatened plant species were located within, or near, the boundary of the proposed development site during the survey.

No plants of the rare orchid species *Caladenia alata* that have previously been recorded to the south-west of the site (Figure 2) were located within the boundary of the site during any of the three surveys. The species is considered to be rare and of conservation significance (see Table 2). Mr David Ziegeler recorded this species in 1996 on the margin of the Huon River (Figure 2) in a similar habitat to that which occurs within some areas of the development site. A survey in December of the site did not yield any populations of the species within the development site and therefore no recommendations are made for this species.

Table 2. Conservation status of *Caladenia alata* (winged caladenia)

Source	Status and notes
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Tasmanian <i>Threatened Species Protection Act 1995</i>	rare
<i>Forest Botany Manual - Nature Conservation Region 10B</i> (Duncan and Johnson 1995)	Priority 1* species
Regional Forest Agreement (1997)	Not listed as a priority species

* indicates that the species is un-reserved or poorly reserved on a statewide basis, and/or has a very high regional conservation significance. A Forest Practices Unit botanist must be contacted when a priority 1 species has been identified in a Timber Harvesting Plan.

5. Discussion and Conclusions

No plant species of local, statewide or national conservation significance were located on the site during any of the three vegetation surveys. One plant community of some conservation value was located within the boundary of the proposed development site: *Eucalyptus amygdalina* forest on sandstone. Although this plant community is now considered to be poorly reserved there is no legal requirement for it to be further reserved on public land. Therefore, based on the general findings of the botanical surveys and literature search undertaken for this report there appears to be no botanical issues that would prevent the construction of the processing yard at the proposed site on Weld Road.



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Appendix 1: Higher plant species recorded at the proposed Huon Integrated Timber Processing Yard development site, Glen Huon, southern Tasmania.

+ denotes the species was present in that community type (numbers refer to the above text).

		Community number	3.1	3.2	3.3
<u>Angiospermae</u>					
<u>Dicotyledonae</u>					
Apiaceae	<i>Hydrocotyle hirta</i>				+
Asteraceae	<i>Cassinia aculeata</i>				+
	<i>Gnaphalium</i> sp.		+	+	
	<i>Lagenifera stipitata</i>		+	+	
	<i>Senecio linearifolius</i>				+
Casuarinaceae	<i>Allocasuarina zephyrea</i>		+	+	
Cunoniaceae	<i>Bauera rubioides</i>		+	+	+
	<i>Eucryphia lucida</i>				+
Dilleniaceae	<i>Hibbertia empetrifolia</i>				+
	<i>Hibbertia procumbens</i>		+	+	+
Droseraceae	<i>Drosera pygmaea</i>		+	+	+
	<i>Drosera peltata</i>				+
Epacridaceae	<i>Epacris impressa</i>		+	+	+
	<i>Epacria lanuginosa</i>		+	+	
	<i>Epacris tasmanica</i>		+	+	
	<i>Leucopogon ericoides</i>		+	+	+
	<i>Lissanthe strigosa</i>				+
	<i>Monotoca glauca</i>			+	+
	<i>Sprengelia incarnata</i>		+	+	
Ericaceae	<i>Gaultheria hispida</i>				+
Escalloniaceae	<i>Anopterus glandulosus</i>				+
Euphorbiaceae	<i>Amperea xiphoclada</i>		+	+	+
Fabaceae	<i>Aotus ericoides</i>		+	+	+
	<i>Daviesia ulicifolia</i>				+
	<i>Bossiaea cinerea</i>			+	
	<i>Bossiaea prostrata</i>				+
	<i>Oxylobium ellipticum</i>			+	+
	<i>Pultenaea juniperina</i>				+
Haloragaceae	<i>Gonocarpus micranthus</i>		+		
	<i>Gonocarpus tetragynus</i>		+	+	+
	<i>Gonocarpus teuroides</i>				+
Lauraceae	<i>Cassytha glabella</i>		+		
	<i>Cassytha pubescens</i>		+	+	+
Mimosaceae	<i>Acacia dealbata</i>				+
	<i>Acacia melanoxylon</i>				+



	<i>Acacia mucronata</i> var. <i>mucronata</i>	+	+	+
	<i>Acacia riceana</i>			+
	<i>Acacia terminalis</i>			+
Myrtaceae	<i>Eucalyptus amygdalina</i>	+	+	+
	<i>Eucalyptus obliqua</i>		+	+
	<i>Leptospermum glaucescens</i>	+	+	+
	<i>Leptospermum lanigerum</i>		+	+
	<i>Leptospermum scoparium</i>	+	+	+
	<i>Melaleuca squamea</i>	+	+	
	<i>Melaleuca squarrosa</i>	+	+	+
Pittosporaceae	<i>Pittosporum bicolor</i>			+
Proteaceae	<i>Banksia marginata</i>	+	+	+
	<i>Lomatia tinctoria</i>		+	+
	<i>Persoonia juniperina</i>	+	+	+
Rosaceae	<i>Acaena novae-zelandiae</i>		+	+
Rubiaceae	<i>Coprosma hirtella</i>			+
	<i>Coprosma quadrifida</i>			+
Rutaceae	<i>Nematolepis squamea</i>			+
Santalaceae	<i>Exocarpos cupressiformis</i>			+
	<i>Leptomeria drupacea</i>		+	+
Stylidiaceae	<i>Stylidium graminifolium</i>	+	+	+
Thymeleaceae	<i>Pimelea humilis</i>			+
	<i>Pimelea linifolia</i>		+	+
Tremandraceae	<i>Tetratheca labillardieri</i>			+
Violaceae	<i>Viola hederacea</i>	+	+	+

Monocotyledonae

Cyperaceae	<i>Baumea juncea</i>	+		
	<i>Gahnia grandis</i>	+	+	+
	<i>Gahnia radula</i>	+	+	
	<i>Gymnoschoenus sphaerocephalus</i>	+	+	
	<i>Isolepis fluitans</i>	+		
	<i>Lepidopserma concavum</i>	+	+	
	<i>Lepidosperma filiforme</i>	+	+	
	<i>Lepidosperma laterale</i>			+
	<i>Schoenus lepidosperma</i>	+	+	
Iridaceae	<i>Diplarrena moraea</i>		+	+
	<i>Patersonia fragilis</i>	+	+	
Juncaceae	<i>Luzula densiflora</i>			+
Liliaceae	<i>Dianella revoluta</i>			+
	<i>Dianella tasmanica</i>			+
	<i>Drymophila cyanocarpa</i>			+
Orchidaceae	<i>Glossodia major</i>	+	+	
Poaceae	<i>Danthonia</i> sp.			+
	<i>Poa labillardierei</i> var. <i>labillardierei</i>			+
Restionaceae	<i>Empodisma minus</i>	+	+	+
	<i>Hypoleana fastigiata</i>	+		



<i>Leptocarpus tenax</i>	+	+	+
<i>Lepyrodia tasmanica</i>	+	+	+
<i>Restio complanatus</i>	+		
<i>Restio hookeri</i>	+	+	

Pteridophyta

Blechnaceae	<i>Blechnum nudum</i>			+
	<i>Blechnum watsii</i>			+
Dennstaedtiaceae	<i>Pteridium esculentum</i>	+	+	+
Dicksoniaceae	<i>Dicksonia antarctica</i>			+
Dryopteridaceae	<i>Polystichum proliferum</i>			+
Gleicheniaceae	<i>Gleichenia dicarpa</i>	+	+	+
	<i>Gleichenia microphylla</i>			+
Lycopodiaceae	<i>Lycopodium deuterodensum</i>			+
Schizaeaceae	<i>Schizaea fistulosa</i>	+	+	
Selaginellaceae	<i>Selaginella uliginosa</i>	+	+	+



Appendix 2. Species data sheets for quadrats sampled at the proposed development site

Braun-blanket coverage scores used in data sheets

+	trace coverage
1	<1% cover
2	1-5% cover
3	6-25% cover
4	26-50% cover
5	51-75% cover
6	76-100% cover



Huon Integrated Timber Processing Yard,

Huon/Arve River Junction:

Fauna Assessment

Report Prepared for

SEMF Holdings Pty Ltd

45 Murray St, Hobart, Tasmania

April 2001

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Executive Summary

Seven (7) species of conservation significance are known or are likely to occur in the area of the proposed development. The majority of these species (6 of 7) do not occur in habitat likely to be significantly impacted by the proposed development. However, within the area where the major component developments are proposed, the Mt Managna stag beetle (*Lissotes menalcas*: Vulnerable TTSPA) may occur in wet *E. obliqua* forest on the southern and eastern margins of the development zone. Where significant clearing of wet *E. obliqua* forest is likely to occur during the development, a search should be conducted for *L. menalcas* to ascertain if the species is present in the area to be cleared. If the species is found to be present, it will be necessary to apply for a permit to destroy threatened wildlife before clearing can occur. In general, any indirect effects from clearing of vegetation on the ridge (such as through runoff and erosion) which might impact on wet forest, riparian and river habitats should also be minimised.

Introduction

This report provides a fauna impact assessment of the area proposed for the integrated timber processing yard (Forestry Tasmania) at the junction of the Arve and Huon Rivers.

Methods

Fauna Records

The fauna species known to be present at the site, or likely to be present based on suitable habitat and/or nearby records, were obtained from a PWS GIS/GTSPOT information search (Ray Brereton, Parks and Wildlife Service), by consulting the Tasmania's Threatened Species Fauna Handbook (Bryant and Jackson 1999; 25k mapsheets: Glen Huon and Lonnavele), and through consultation with relevant experts.

Habitats

Broad vegetation/fauna habitats were based on the vegetation communities described in the Revised Botanical Resources Survey of the site (Barnes 2001a) plus the Addendum to that report (Barnes 2001b).

Site Survey

The site was visited on 27 August 2000. All major habitat types were inspected.

Assessment of Conservation Status

Fauna species were classified according to their threatened species and conservation status. The relevant lists are schedules 3, 4 and 5 of the Tasmanian Threatened Species Act 1995 (endangered, vulnerable, and rare), the Environment Protection and Biodiversity Conservation Act 1999, and the non-statutory invertebrate list (Invertebrate Advisory Committee 1994) and vertebrate list (Vertebrate Advisory Committee 1994) of species considered to be at risk.

Results

Habitats

Three vegetation units were identified by Barnes (2001):

1. *Leptospermum glaucesens*-*Hibbertia procumbens* heathland
2. Heathy *Eucalyptus amygdalina* open forest and woodland on sandstone
3. *Eucalyptus obliqua* — *Melaleuca squarrosa*-*Montoca glauca* dry-wet forest

The heathland community occurs over the flat ridge north of the Huon/Arve River junction, while the heathy *E. amygdalina* community is a transitional zone between the moor and the tall wet *E. obliqua* forest along the banks of the Huon and Arve Rivers and major drainage lines. The proposed timber yard is to be sited largely within the heathland and woodland communities, although at its extremities the site will extend into the *E. obliqua* forest zone, particularly on the southern and eastern margins of the site (see Fig. 2 in Barnes 2001a)

Fauna Species

A list of the principal vertebrate fauna species known from or likely to occur in the area is provided in Appendix 1. A thorough sampling of invertebrate fauna was not attempted, and the distribution and taxonomy of invertebrate species is considered to be too poorly known to provide a meaningful list of species likely to occur at the site.

Six vertebrate species of conservation significance are known or are likely to occur in the area, while an additional invertebrate species of conservation significance is known from the area and is likely to occur at the site. These species are listed below.

Species	Listed	Listing	Identification
<i>Aquila audax fleayi</i> habitat	TTSPA	Vulnerable	Record from region, potential
	EPBCA	Endangered	
<i>Lathamus discolor</i>	TTSPA	Vulnerable	Potential (post-breeding) habitat
	EPBCA	Endangered	

<i>Accipiter novaehollandiae</i>	TTSPA	Rare	Potential habitat
<i>Dasyurus maculatus</i>	EPBCA VAC	Vulnerable RM	Potential habitat
<i>Dasyurus viverrinus</i>	VAC	URS	Potential habitat
<i>Prototroctes maraena</i>	TTSPA	Vulnerable	Potential habitat
<i>Lissotes menalcas</i>	TTSPA	Vulnerable	Record from region, potential habitat

Discussion

Impacts of Proposed Development on Fauna Species — General

The proposed development will entail substantial clearing of the heathland and to a lesser extent the open forest/woodland habitats within the site boundary, and inevitably this clearing will cause the destruction and or/displacement of both vertebrate and invertebrate fauna resident within the habitat to be removed. However, the extent of heathland/woodland habitat to be cleared is of relatively limited extent, and the proposed development is not considered likely to have a significant impact on the fauna communities of the general area.

Potential Impacts on Species of Conservation Significance

Aquila audax fleayi

The Tasmanian subspecies of the wedge-tailed eagle occurs in the general region; however, the nearest recorded nest-site is 8-9 km distant, and the development will not have an impact on known nest sites (B. Brown PWS pers. comms). There is tall forest on the slope to the east of the development site which could potentially be suitable for wedge-tailed eagles. However, the slope is very exposed to the prevailing westerlies and is unlikely to support a nest site.

Given the low likelihood for any adverse impacts on *A. audax fleayi*, referral of this species to Environment Australia under the EPBC Act is not recommended.

Accipiter novaehollandiae

The grey goshawk nests in all types of wet forests, particularly along watercourses, although blackwood swamp forest and wet forest where blackwoods occur are the preferred habitat (Bryant and Jackson 1999). Widespread clearing and fragmentation of streamside forest poses a significant threat to the species. However, as the proposed development is to be contained within the moorland zone, no direct impacts are likely on this species.

Lathamus discolor

The swift parrot has been recorded to the east of the proposed development site on coastal *E. globulus*, and may potentially utilise *E. obliqua* within the area as a post-breeding food supply (R. Brereton PWS pers. comm.). However, as the proposed

development is to be contained largely within the heathland/woodland zones, no significant impacts are likely on this species.

Given the low likelihood for any adverse impacts on *L. discolor*, referral of this species to Environment Australia under the EPBC Act is not recommended.

Dasyurus maculatus and *Dasyurus viverrinus*

The spotted-tailed quoll (*Dasyurus maculatus*) is primarily a wet forest species which may also utilise woodland and heath, while the eastern quoll (*Dasyurus viverrinus*) is most common in areas with a mosaic of native forest/woodland and pasture. Both quoll species may occur in the area. However, as the proposed development will entail the clearing of a relatively limited area within the heathland/woodland zones, any impacts on these species are likely to be minimal.

Given the low likelihood for any adverse impacts on *D. maculatus*, referral of this species to Environment Australia under the EPBC Act is not recommended.

Prototroctes maraena

The Australian Grayling occurs in the lower-middle reaches of rivers and streams in Tasmania. The species is likely to occur in the Huon River in the region of the proposed development. However, as the proposed development is to be contained within the heathland/woodland zones and at some distance from the riverbank and associated riparian vegetation, no significant impacts are likely on this species. Any indirect effects of runoff/erosion from clearing of vegetation on the ridge which might impact on the riparian vegetation and river should be minimised.

Lissotes menalcas

The Mt Mangana stag beetle is known to occur in the region (Bryant and Jackson 1999; Meggs and Taylor 1999). The species inhabits rotting logs on the floor of wet *E. obliqua*, *E. regnans* and *E. globulus* forest. Clearing of wet forest is considered to pose a significant threat to the species (Bryant and Jackson 1999).

The area of *E. obliqua* forest within the site boundary and likely to be affected by the proposed development is relatively small. Furthermore, the *E. obliqua* forest within the site boundary represents a transition between dry forest to the wetter forest along the riparian zone of the Huon River (Barnes 2001a). The dryer end of the forest spectrum is not likely to provide optimal habitat for *L. menalcas*, and clearing of this dryer *E. obliqua* forest is not considered to pose a significant threat to *L. menalcas*.

However, where the site boundary extends into wet *E. obliqua* forest, there is the potential for clearing of this vegetation type to negatively impact on *L. menalcas*. Where significant clearing of wet *E. obliqua* forest is likely to occur during the development, **a search should be conducted for the Mt Mangana stag beetle (*L. menalcas*) to ascertain if the species is present in the area to be cleared.** If the species is found to be present, it will be necessary to apply for a permit to destroy threatened wildlife before clearing can occur.

In general, any indirect effects of runoff/erosion from clearing of heathland/woodland vegetation on the ridge which might impact on the wet *E. obliqua* forest along the Huon River and other drainage lines should be minimised.

Acknowledgements

Bill Brown provided advice on wedge-tailed eagle and grey goshawk nests. Drs R. Taylor and P. McQuillan gave advice on the Mt. Mangana stag beetle. Ray Brereton provided advice on swift parrots.

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Appendix 1. List of principal vertebrate fauna species known or likely to be present at the site.

Mammals

Eastern quoll	<i>Dasyurus viverrinus</i>
Spotted tailed quoll	<i>Dasyurus maculatus</i>
Tasmanian devil	<i>Sarcophilus harrisii</i>
Southern brown bandicoot	<i>Isodon obesulus</i>
Long-nosed potoroo	<i>Potorous tridactylus</i>
Ringtail possum	<i>Pseudocheirus perigrinus</i>
Brushtail possum	<i>Trichosurus vulpecula</i>
Tasmanian pademelon	<i>Thylogale billardierii</i>
Common wombat	<i>Vombatus ursinus</i>
Swamp rat	<i>Rattus lutreolus</i>

Reptiles

Tiger snake	<i>Notechis scutatus</i>
Metallic skink	<i>Niveoscincus metallicus</i>

Birds

Brush bronzewing	<i>Phaps elegans</i>
Green rosella	<i>Platycercus caledonicus</i>

Swift parrot	<i>Lathamus discolor</i>
Tree martin	<i>Cecropis nigricans nigricans</i>
Grey Shrike-thrush	<i>Colluricincla harmonica harmonica</i>
Grey fantail	<i>Rhipidura fuliginosa albiscapa</i>
Superb fairy-wren	<i>Malurus cyaneus cyaneus</i>
Scarlet robin	<i>Petroica multicolor</i>
Flame robin	<i>Petroica phoenicea</i>
Tasmanian thornbill	<i>Acanthiza ewingii</i>
Yellow throated honeyeater	<i>Lichenostomus flavicollis</i>
Cresecent honeyeater	<i>Phylidonyris pyrrhoptera inornata</i>
Black currawong	<i>Sterpera fuliginosa</i>
Forest raven	<i>Corvus tasmanicus tasmanicus</i>
Boobook owl	<i>Ninox novaeseelandiae</i>
Grey goshawk	<i>Accipiter novaehollandiae</i>
Wedge tailed eagle	<i>Aquila audax fleayi</i>

Addendum to original report:

Stephen Mallick
July 2001

Impact of proposed Huon timber yard and associated traffic on fauna species

Traffic changes associated with the proposed timber processing yard at the Huon-Arve River junction are likely to have a significant impact on vertebrate fauna along the feeder road. The potential impact of increased roadkills along the section of road including Lonnavaile Road (Judbury to Denison Road junction), Denison Road (to Weld Road Junction) and Weld Road to timber yard site should be assessed by:

1. A preliminary survey of habitats along the road to delineate any hotspots where vertebrate roadkills are likely to be high, and/or where a threatened species or species of conservation significance is at an increased risk of roadkill. Where such hotspots are identified, measures should be considered to ameliorate the putative increased risk of roadkills. Such measures may include culverts for movement of wildlife, education of drivers regarding roadkill hotspots, reduced traffic speed through danger zones (particularly at night), and signage to warn drivers of wildlife on road.
2. Regular (weekly) monitoring of roadkills during the first two years operation of the timber processing yard, with a central database set up to record the species and location of all roadkills. Ideally, the job of monitoring should be delegated to specified Forestry Tasmania staff members who traverse the road regularly. Once identified and recorded, roadkills should be removed from the road to avoid scavenging by other animals, and recounting of the roadkill during subsequent surveys. Monitoring of roadkills should provide information on any hotspots where roadkills are an ongoing problem. Once identified, these hotspots should be considered for remedial actions, as above.

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62212

FOREST PRACTICES BOARD



Inquiries : D. Gaughwin
Phone : 63 365384
Fax : 63 365466
Our ref : 58948
Your ref :



P.O. Box 180,
Kings Meadows, Tas. 7249

10-8-00

Dario Tomat
Project Officer
Forestry Tasmania

Archaeological Survey for DP and EMP

Dario,

Please find attached a copy of the archaeological survey report on the above site. You will note that while the area has low potential for the recovery of Aboriginal sites I am recommending a further survey after ground disturbance. Please advise when this occurs.

Denise Gaughwin
Senior Archaeologist

Forest Practices Unit**ARCHAEOLOGICAL SURVEY REPORT**

(OFFICE USE ONLY)

SURVEY NUMBER: 25

This report assessed by DG

Date 2-5-00

A 1:25 000 MAP SHOWING THE LOCATION OF THE SURVEY, WHERE YOU ACTUALLY SURVEYED AND ANY SITES LOCATED SHOULD BE APPENDED

Please return completed form to
Senior Archaeologist Forest Practices Unit PO Box 180 Kings Meadows TAS 7249

REPORT BY DENISE GAUGHWIN Date 04-Aug-00

Address PO Box 180, Kings Meadows, 7249

SURVEY LOCATION (Please attach a 1: 25 000 map) **THIS IS MUST KNOW INFORMATION**

Map (1: 25 000) District/Company: FORESTRY TASMANIA

COUPE NAME/NUMBER/
NAME OF ROAD

Integrated Processing Yard

POTENTIAL ZONE
(if State forest)

MODERATE

State reason for zoning

flats above major River

Operation type/(s)

1: Processing yard

2:

3:

REASON FOR SURVEY

The area will be impacted upon by the development. Need to assess potential for location of Aboriginal sites

ARCHAEOLOGICAL BACKGROUND (include references to other work)

Moore 1997 Southern forests report. This survey did not locate sites in any similar locations.

SURVEY DESCRIPTION (note whether road line, coupe etc)

Road line verges and all currently disturbed areas.

ESTIMATED AREA COVERED (Give area in hectares)

1 h

ESTIMATED TIME SPENT ON ACTUAL SURVEY (in minutes)

45 mins

RESULTS

ENVIRONMENT AND VISIBILITY CONDITIONS ENCOUNTERED

area is quartz/quartzite soils with low scrubby vegetation. It is quite exposed at the end of, and well above, the Weld Plains. It is within 150 m of the Huon River located on a spur well above the river.

RESULTS

2. ARCHAEOLOGICAL FINDINGS

(NOTE: if you find a site, a site recording form should be completed and submitted)

Grid references should be provided here.

No Aboriginal sites were located.

ALL ABORIGINAL SITES ARE PROTECTED UNDER THE ABORIGINAL RELICS ACT 1975.

EVALUATION AND RECOMMENDATIONS

The area is not considered to have high potential for the recovery of Aboriginal sites. After the area has been cleared and prior to construction of the facility, a further survey should be undertaken. Visibility will be at a maximum at that time.

SOUTHWEST
RESERVATION
AREA

FOREST

WELD

PLAINS

PLAINS

PLAINS

CROWN LAND

STATE

FOREST

UPPER
PLAINS

ARVE

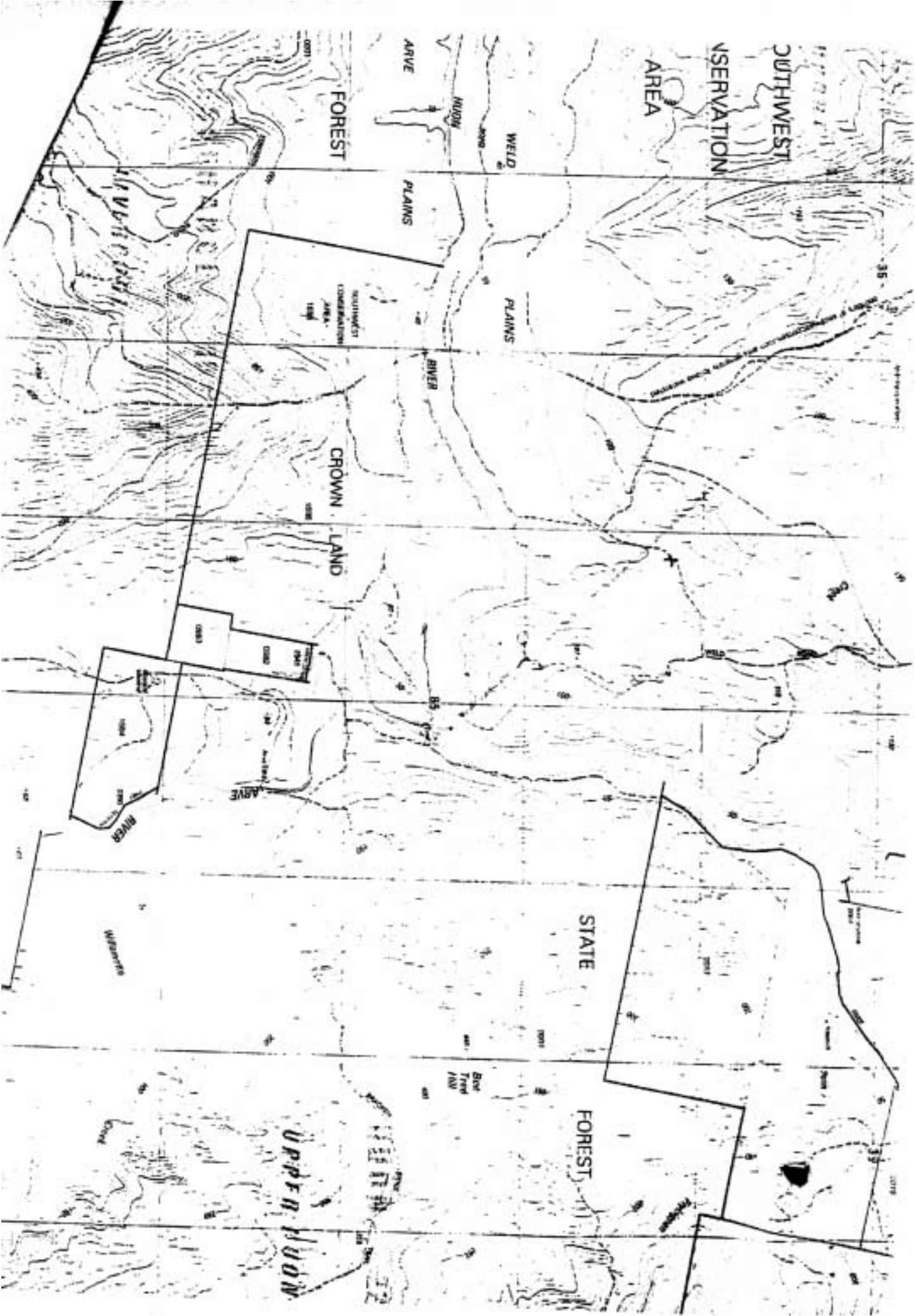
PLAINS

RIVER

ARVE

WINDY

Box
Twp
14N
14W



**Aboriginal Cultural Heritage Survey:
Integrated Timber Processing Site**

**A report prepared for:
SEMF Holdings PTY LTD
South East Tasmanian Aboriginal Corporation
& the Tasmanian Aboriginal Land Council**



**Report prepared by
P. Scotney
Heritage Officer/Cultural Heritage Consultant
January 2001**

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1. Introduction/Background
 - 1.1 Introduction
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 - 6.2 Summary
 - 6.3 Discussion
7. Recommendations
8. Resources

Attachments: TASI Access form
Forestry Report
Southwood Public Information Sheet September 2000

Map sheet 8211
1:100 000

Note: The Location of any Aboriginal sites contained in this report are confidential.

1. Introduction Background

1.1 Introduction

This report is structured within the Tasmanian Aboriginal @d Council guidelines for survey report. For further or more comprehensive information in regards to this survey please contact the author.

Environment and planning documentation for this project is yet to be completed and submitted for approval.

1.2 Background

SEMF Holdings Pty Ltd have been commissioned by Forestry Corporation to organise and manage a Cultural Heritage Survey as part of the approval process for the proposed development of an integrated timber processing site (ITPS). The greenfield site is situated in the Huon. The site location and approximately development boundary is as shown on the attached site location plan.

The majority of the 73 hectare site is undeveloped, remaining under low scrub or wet sclerophyll forest. Numerous tracks and disused quarries are located across the site. The existing track to the former quarries has been upgraded and extended to the nearby Huon River as a part of the Weld Road upgrade and extension. (Note: Works and approvals associated with the road upgrades have been progressed and are outside this development application).

The previous concept plan for the site (Hepper, 1997) detailed the following regarding Aboriginal Cultural Heritage;

"Prior to settlement, the North West Bay region was within the territory of the South East Tribe which was possibly of up to 10 bands with a total population of 400-500 people. Food for the tribe was sourced from the seashore and bush".

1.3 General Development Description:

The main purpose of this development is to provide a centralised location for timber processing to improve the management of forestry resources, and enable greater recovery of material from the forest floor during harvesting, as well as from processing operations.

In brief the following proposal is to include the following processing facilities;

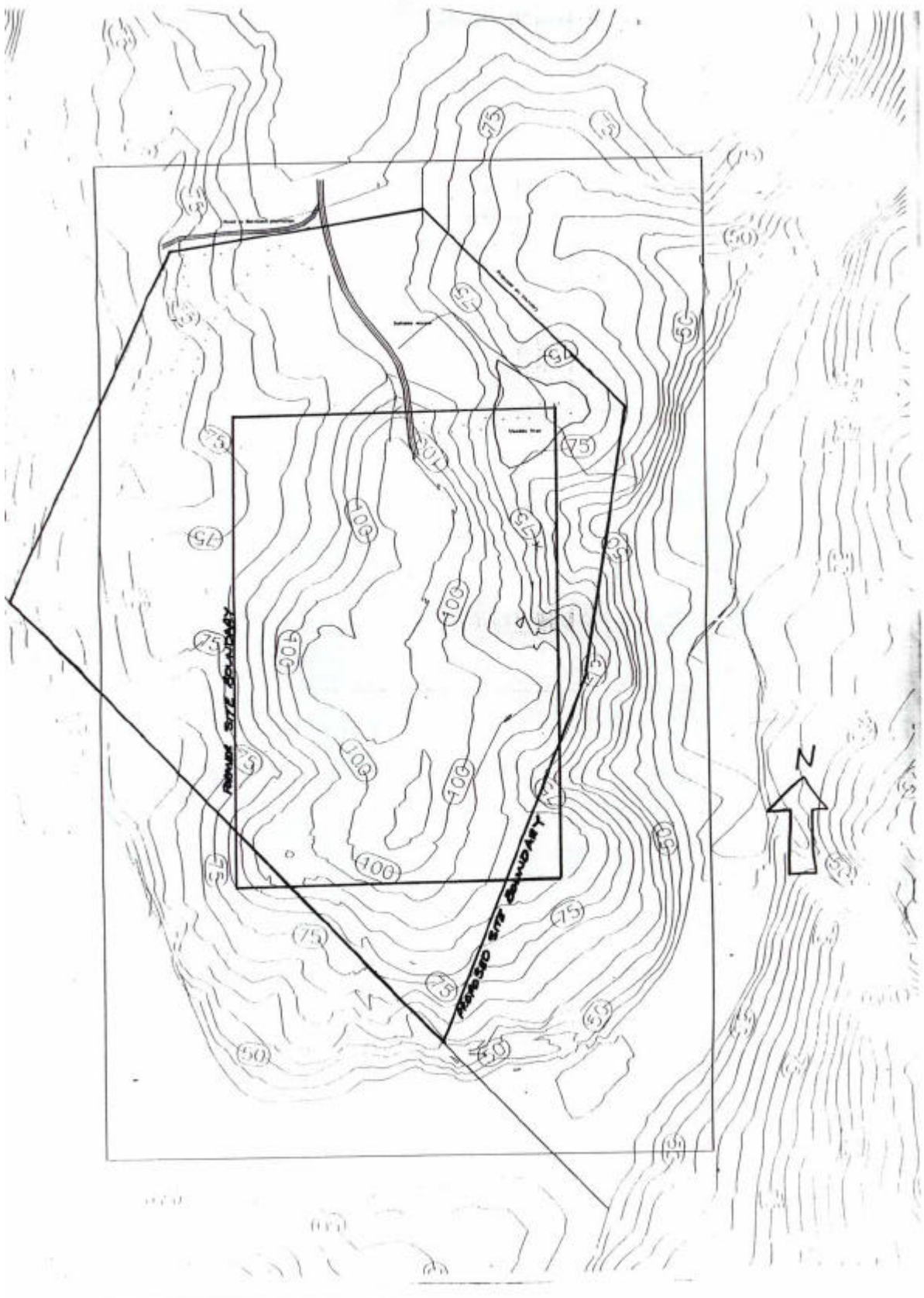
- * Merchandising yard
- * Sawmill
- * Rotary peeled veneer mill
- * Wood fibre processing facility
- * Wood- fired power station
- * State-wide communal wastewater management system

· site location plan is attached for your information.

1.4 Scope of works.

The scope of works for this Aboriginal Cultural Heritage Assessment is provided below.

- * Review of literature and past research for the proposed development site and immediate area;
- * Verification of known archaeological sites on, or adjacent to, the site as determined from an initial Tasmanian Aboriginal Sites Index search, and collection of additional site information from the TASI as determined to be necessary;
- * Survey of the proposed development site to be undertaken as soon as possible upon the receipt of TALC approval;
- * Interpretation of research and site survey findings and provision of a draft report as soon as possible, but not later than 15 January 2001 (The report is also to contain management recommendations based on findings and reference to relevant legislation);and
- * Consideration of comments on the draft (as provided by SEMF on behalf of the client), and provision of a final report.





Construction of bridge across Huon River.
Disused Quarry.



2. Survey Method

2.1 Recording Process

All sites located and recorded as a result of this survey will be recorded on the TASI register at the DPIWE and on the Tasmanian Aboriginal Land Council Inland site recording form. Copies will be provided to SEMF for information and the DPIWE for recording.

2.2 Previous Surveys/Research

Previous surveys:

A qualified Cultural Heritage Officer completed an archaeological survey of the site on 4 August 2000 for the Forestry Practices Unit of Forestry Tasmania. The survey was not successful in locating any sites, and the subsequent report indicated that the site was not considered to have high potential for the recovery of Aboriginal sites (report attached).

It was proposed that a follow-up survey of the site being carried out by a suitably qualified specialist (TALC approval be sought for the survey to proceed).

Tasmanian Aboriginal Site Index (TASI) Access:

- * Access to the Tasmanian Aboriginal Site Index (TASI) was requested by the client on 26 September 2000 and resent on 2 October 2000 at TALC's request. SEMF was informed of the request for access being denied on 12 October 2000.
- * After a briefing was provided by Forestry Tasmania and SEMF at the TALC Committee met on 9 December 2000 on the project, approval for access was granted, (SETAC declined the invitation to attend this briefing).

The TASI search located no records of Aboriginal sites on the site or in the immediate area. This is most likely due to no surveys having been undertaken in the area. The closest recorded site was an unoccupied cave on a hill top on the opposite side of the Huon River.

2.3 Survey Method

A field survey for Aboriginal sites was undertaken on the 6th-9th January 2001. The survey method adopted for this project was to survey all areas which provided reasonable visibility to any surface or subsurface material. In addition a systematic survey was undertaken which involved surveying transects approximately 20 metres apart. Visibility was restricted to less than 5% due to very thick undergrowth. A disused quarry site and all tracks were surveyed.



Thick vegetation, visibility <5%.





All tracks surveyed extensively.



3. Ethnohistory

Ethnohistoric information is that which describes traditional Aboriginal life styles at the time of European contact. For south east Tasmania this information is derived principally from documentary (ethnohistoric) sources.

These sources can be divided into three groups, the maritime observers, early colonial accounts, official records and field journals of George Augustus Robinson.

A collation of the ethnohistoric information for south east Tasmania has previously been researched and documented by Brown 1986 as part of the Aboriginal Archaeological Resources in South East Tasmania, Occasional Paper No. 12.

Literature has been compiled by Hiatt (1967:100-101), Lourandos (1970:97), Jones (1974:319-321) and Brown (1986, occasional paper no.12) all are essentially the same and cover topics such as tribal boundaries, Social organisation, settlement pattern, material culture, art, burial, food, mythology and ceremonies. Much of this literature has been reproduced many times in various studies and reports and is easily obtainable.

South East Tribe

The South East Tribes territory covered about 3 000 square kilometres, with 555 kilometres of coastline from New Norfolk to Storm Bay, all D'Entrecasteaux Channel and Bruny Island, as far south as South Cape and extended inland north to the Huon Valley and approximately New Norfolk.

The south east Tribe occupied the area and consisted of four bands the Mouheneener (Hobart), Nuenonne (Bruny Island), **Mellukerdee (Huon River)**, and the Lyluequonny (Recherche Bay), each band is estimated to have between forty and fifty people. However Jones indicated that more bands may have occupied the area.

It has been noted previously that there may have been seven bands in this territory in pre-European contact time, each band consisting of between seventy to eighty people. Jones 1974:338 concludes that: we have evidence of the former existence of at least 7 and possibly 9 or 10 bands for this tribe. Given the gaps which must exist in our information, I feel that 10 would be a reasonably conservative estimate for the original number of bands within this tribe before European contact. This gives the population estimate for the tribe of about 400 or 500 people (Jones 1974:337). Groups of this size were seen several times in the early days of the Hobart settlement: for example on 9th October 1807 when Knopwood recorded between 250 and 300 people between Hobart and Kingston (Nicholls 1977:145).

Limited ethnological history or records of observations of this area remain, this is a reflection of the fact that the main source in Tasmania for this type of information is Robinson: and his journals commence in 1829 by which time much of the south east had been settled by Europeans and the Aboriginal people were no longer living in their traditional territories.

However these are all European perspective's and the documented ethnohistory does not represent or include direct Aboriginal views or oral history. Oral knowledge from the community proves that white scientific investigations struggles to give a true interpretation of Aboriginal ancestral heritage.

The local community accommodate oral history associated with the area, some which vary to the ethnological records. Much of this information has not yet been researched and compiled to project a true Aboriginal perspective on many issues regarding lifestyles which have only previously been portrayed by non Aboriginal people.

4. Aboriginal Cultural Resources

Aboriginal cultural resources are those resources which Aboriginal people used every day and include the vegetation which is a traditional food and medicinal source, the fibre of many plants were also used for building shelters and weaving baskets etc. All other food sources including the wildlife and shell fish from the coast are recorded. The geology of an area is important as not all stone material is suitable for producing stone tools. These resources are integral to the Aboriginal people and represent culture and heritage.

Aboriginal Cultural Resources are in abundance in the project and surrounding areas. Native fauna includes; bandicoot, possums, wallaby, pademelons, snakes, lizards, echidna, native hens, and various other species including all the water birds like ducks and swans.

The geology of the south east includes mud stone and sand stone, which form many escarpments which are suitable for and may contain rock shelters. Dolerite dominates the landscape, it caps all the highest mountains forming extensive plateau like residuals and scarps. Limestone does occur within the south east with an isolated outcrop near Hasting. Cherty hornfels, quartzite and silcrete is both common and wide spread over much of the south east, this material was a major and important stone type utilised in the region for the production of Aboriginal stone tools.

Vegetation in the south east may be divided into three broad regional categories (Kirkpatrick and Dickinson 1984). The most extensive of these vegetation categories occurs in those areas of low altitude and low rain fall, comprising of land along the east of the Derwent River, coastal areas north of the Huon River and north Bruny Island. Here the vegetation is predominantly open Eucalyptus forest with a grassy or bracken understorey and some areas of grassy woodland and open scrub. It has been noted that most of the vegetation type in this category has been extensively cleared as a result of rural and urban development.

Category two is those areas of low altitude and high rainfall, vegetation is predominantly tall open Eucalypt forest greater than 40m height, with dense rainforest or shrub understorey. The dominant eucalypts are **Eucalyptus obliqua** (stringy bark), **Eucalyptus regans** (swamp gum) and **Eucalyptus delegatensis** (gum topped stringy bark). Buttongrass moor occurs in small patches in low altitude - high rainfall areas particularly in the far south.

The third category describes small areas of alpine and subalpine vegetation complex (heath and herbland communities) occur at high altitudes (above 1200m) such as Mt. Wellington. Vegetation structure surrounding this complex varies from open scrub through woodland to open forest dominated by **Eucalyptus coccifera** (Tasmanian Snow Gum).

Jones 1971:91-95 lists some 70 edible plant species, representing 43 edible genera at Rocky Cape and the adjacent coast in north west Tasmania. Many of these as well as other genera of plants occur in southern Tasmania and therefore represent a wide range of plants available as a food source.

Tasmania's forests are rich in fauna both in species and diversity and the coastal heath furnishes a very rich habitat for mammals and birds. However there is very little recorded information on the abundance of faunal species in south east Tasmania, especially at the time of European settlement. Possum, wallaby, forester kangaroo, wombat and echidnas were included in the diet.

Food resources, both plant and animal and other cultural resources including stone material would have been in abundance prior to European settlement. However as previously mentioned much of the cultural resources in the south east region have been depleted by farming and urban development. All cultural resources are of significance to the Aboriginal community.

The Aboriginal community have an interest in all cultural resources and all Aboriginal sites are of significance to the Aboriginal community. These sites are the cultural heritage of the Aboriginal community and represent and maintain the links with our cultural and heritage.

5. Community Consultation

5.1 Consultation Process

It is imperative that the Aboriginal community be informed and consulted on all issues that are related to our cultural heritage.

The client initiated consultation with the Tasmanian Aboriginal Land Council (TALC), the South East Tasmanian Aboriginal Corporation (SETAC), the Aboriginal Heritage Unit (DPIWE) and completed a TASI search prior to the commencement of this survey.

Ongoing consultation was undertaken by myself with the Tasmanian Aboriginal Land Council (TALC), the South East Tasmanian Aboriginal Corporation (SETAC), and the Aboriginal Heritage Unit (DPIWE) prior to, during and upon completion of this survey.

5.2 The Tasmanian Aboriginal Land Council

The Tasmanian Aboriginal Land Council stated in a letter to the client dated the 15/12/00 the following: that they do not support the project "due to the destruction of landscape values, destruction/impact upon Aboriginal sites on the surface and possibly subsurface, and the other environmental issues associated with a project like this. Given this the committee have passed a motion stating";

"That the S.E.M.F (Forestry Tasmania) proposal not be endorsed and that we do not endorse an Aboriginal Heritage Officer to conduct the survey".

The Tasmanian Aboriginal Land Council also released a statement identifying following reasons for not supporting the project:

- * The undoubtable severe ecological and aesthetic impacts.
- * The mills close proximity to old growth forest such as the Styx Valley.
- * The mills close proximity to Oyster Cove Aboriginal site.
- * The inedibility of impacts and destruction upon Aboriginal sites both surface and subsurface.
- * The further degradation of water and air quality, therefore further damaging the ozone layer.
- * The fact that another commercial venture of this nature is simply not warranted.
- * Five million tonne of Tasmanian woodchips are annually exported, mainly to Japan and Taiwan, of which only a small proportion Tasmania buys back in paper.

- * Statistics also show that an increase in logging is not relative to an increase in employment within the Forest Industry sector.
- * Any direct financial benefit, in any, to the state in royalties is kept behind the bureaucracy's closed doors.
- * The associated ecological and landscape values will be severely damaged for not only the Aboriginal community but to everybody if a project of this calibre is allowed to proceed.
- * For a supposed "veneer mill" 70% of wood will be chipped/pulped anyway.
- * TALC do not support deforestation of any kind no matter how sustainable.
- * It is the firm belief of the TALC that forestry industries disturbs if not destroys Aboriginal Heritage on a daily basis, and even those sites that have been protected have been damaged by inappropriate management practises.

It should be noted that:

- * The Tasmanian Aboriginal Land Council (TALC) **do not endorse** any proposed activity that may impact upon the Aboriginal sites.
- * The Tasmanian Aboriginal Land Council (TALC) **does not endorse** the destruction of any Aboriginal site.

Current status

TALC do not endorse this proposed development and have concerns which are yet to be resolved, it is recommended that future consultation be undertaken with the TALC to address their concerns.

5.3 The South East Tasmanian Aboriginal Corporation

The South East Tasmanian Aboriginal Corporation stated in correspondence to the client dated 23110100 the following:

"Historically, contact with organisations regarding proposed developments and the impact of these developments on Aboriginal Cultural values have only been tokenistic and there has already been too much destruction to the environment especially from the Forestry Department".

Current status;

- * SETAC have concerns which are yet to be resolved, it is recommended that future consultation be undertaken with the SETAC to address their concerns and agreement on proposed management measures.
- * The South East Tasmanian Aboriginal Corporation (SETAC) are prepared to undertake further ongoing consultation in relation to this project.
- * A site inspection has been organised for the South East Tasmanian Aboriginal Corporation for the 13th of February 2001. This is proposed as part of ongoing consultation.

6. Results/Summary/Discussion

6.1 Results

At this stage it **can not be determined** if there are any Aboriginal sites located within the study area. No Aboriginal sites were identified by this survey, but due to poor visibility investigations were not conclusive.

6.2 Summary

Given the abundance of cultural resources in the area as outlined in the Aboriginal Resources section, plus the ethnohistory for the area and the local oral knowledge indicates that the project area is extremely rich with Aboriginal cultural values and of significance. Taken all the factors into account it is possible that Aboriginal sites exist in the area, however are not visible due to thick vegetation.

Surface visibility was restricted to less than 5% due to very thick undergrowth in most of the project area. This made the observation of any Aboriginal cultural material which may be on the surface an impossibility. A disused quarry site and all tracks were surveyed and no material was located, however the disturbance involved with the construction of the road may have displaced any cultural material.

If the proposed development is going to proceed the area needs a ground survey after the vegetation removal prior to construction and excavations require monitoring during the construction period.

The TALC do not endorse this proposed development and SETAC have concerns which are yet to be resolved, it is recommended that future consultation be undertaken with the TALC and SETAC to address their concerns and agreement on proposed management measures.

6.3 Discussion General

When discussing and determining Aboriginal cultural/heritage significance of a site or area various factors must be taken into account.

Firstly it should be recognised that assessing cultural/heritage significance is very much personal feeling and can be interpreted differently by heritage officers and members of the Aboriginal community. However there are some underlying factors that assist in assessment of a site or area.

Site type: To say that the larger the site is, the more significant it is not so all the time, however it is a major factor. For example a single artefact in

various environments where suitable stone material is sparse would have been of extreme significance to the maker. And is of extreme significance to the Aboriginal community today. Unique sites such as burials, rock art or stone arrangements for example are of extreme cultural significance as are all sites to the Aboriginal community as these sites represent and maintain the links with our cultural and heritage.

Location/Landscape: Heritage officers interpret sites in the landscape. We look for routes to and from sites and the resources that probably made people go **the** area.

Spiritual. Is a feeling that is difficult to describe, it is a feeling that reflects and maintains links with our culture and heritage. This feeling can vary from site to site and can be interpreted differently. The Indigenous people of the world are and have been considered the custodians of mother earth and believe inevitably that what happens to mother earth will in turn happen to all mankind. The community today have a responsibility to preserve and protect as much of our cultural heritage as possible.

These are just some contributing factors taken into account when assessing the cultural significance of a site or an area. For more comprehensive information contact the author.

7. Recommendations

- * It should be noted that Under section 14 (1) a of the Aboriginal Relics Act 1975 Aboriginal sites can not be destroyed, damaged, defaced or otherwise interfere with unless a permit has been granted by the minister.
- * Since TALC do not endorse this proposed development and SETAC have concerns which are yet to be resolved, it is recommended that future consultation be undertaken with the TALC and SETAC to address their concerns and agreement on proposed management measures.
- * If the proposed development is to proceed then a ground survey should be undertaken after the removal of the vegetation. The area requires further investigations to determined if Aboriginal sites are present. The removal of the vegetation should be done in a sensitive manner.
- * If any sites are located during the ground survey, then works should cease and the appropriate departments notified which will allow for a consultation process which will be in accordance with the Aboriginal Relics Act.
- * If the proposed development is to proceed an Aboriginal Heritage Officer be present on-site to monitor excavations undertaken during the construction period. This will enable works to cease if an Aboriginal site is uncovered and it be assessed and managed appropriately in accordance with the Aboriginal Relics Act.

8. Resources:

Hiatt (1967:100-101), Lourandos (1970:97), Jones (1974:319-321) and Brown (1986, occasional paper no. 12)

Historical synopsis of European cultural activity in the area

Vegetable and fruit growing

Potatoes and wheat were the first cash crops in the area. Experimental plantings of fruit started as early as 1838 and it was soon found that apples were well suited to the conditions. By 1840 shipments of fresh and dried apples were being exported to England. The timber industry flourished along side the fruit industry by providing timber for tramways, buildings and boxes.

Fur farming

Fur farming was seen to be an industry with a future for the area and there was a flurry of interest around 1925. A section of land (17,000 acres) near the junction of the Weld and Huon Rivers just west of the Wood Centre site was to be leased to Tasmanian Fur Traders Ltd. A free-range style fur farm was to be established on 30,000 acres of Crown land with a processing plant at Ranelagh. A representative went to Europe to select modern machinery but the project was abandoned before any significant progress was made.

Timber

Timber was procured for dwellings for the first human visitors from the early 1800s. One of the first industries to use timber was whaling in the early 1800s. Whalers (1815 — 1830) needed timber to fuel the blubber pots, build huts and make boat repairs.

Early farmer/settlers arriving around 1830 at Castle Forbes Bay and Franklin cleared land for self-sufficiency and farming. Initially trees were seen by farmers as an impediment to the true value of the land - the soil. The bush was set alight, cut, grubbed and burnt again. The remaining large trees were ringbarked, left to die, then burned. For some settlers, timber was a valuable resource rather than an impediment and if a settler had timber on his selection, he could gradually clear his land, and the timber would support him until his produce was grown in profitable quantities .
(*Tasmanian Tribune*, 31 July 1877)

Timber was used for palings posts rails, boards and planking and by 1850 substantial percentages of felled timber were being exported eg to Victoria during the Gold Rush for mine construction. Once interstate market demands could not be met by the small-scale pit sawyer and bullockies, new permanent saw mills were established by the river, and powered by water c1848. In 1874 first steam driven mill super mill was established. The smaller timber operators provided the fruit industry with smaller sized timber for fruit boxes. These smaller timber operators were the mainstays when the large companies failed due to over investment and takeovers etc. The portable sawmills carried the industry through the Depression until the end of the Second World War. The demand for smaller diameter logs and portability allowed them to move freely through the regrowth stands created by the big mills.

An example of the spot mills that existed in the district before and soon after the War is located just north of the site. This was operated by the Watson family until the early 1950s. Little evidence of the operation is visible. There are some sleepers from the tramway that can still be identified and the location of the bark hut in which the staff lived can still be distinguished.

The Second World War saw the arrival of new diesel and petrol power internal combustion engines that revolutionised society. The timber industry gained new type of power, motorised vehicles which made tramways obsolete. Chain saws and tracked vehicles likewise altered harvesting practices in the forest. There was a period of stability followed dominated by medium-sized sawmills, powered by diesel petrol and electricity and timber supplied by trucks and bulldozers.

There was a reintroduction of corporate players in a boom motivated by the demand for timber pulp. The introduction of the cardboard box in 1960 was disastrous for the small timber mills, as they were dependent on the fruit industry. Traditionally the domain of European softwoods this major diversification was actually pioneered by an experimental pulp and paper making plant at Port Huon which was erected on the site of the defunct Kermantie super mill. This is the legacy we have today.

Transport

Transport was difficult in heavily timbered areas of the Upper Huon. This limited timber to splitters and small-scale sawyers who first carried their product on their backs with the help of convict labour. Logs were floated down stream due to the lack of navigable waterways in the Upper Huon.

Early roadways were constructed to link farms to the river so that supplies could be landed and produce dispatched to the river. Tramways were also constructed to get produce from paddock to river jetty. These were easy to construct from local timbers and were powered by horses and bullocks. Tramways were also used to transport timber from forest to river. This revolutionised timber getting in the 1850s. Water and steam powered sawmills were established along the river

As the Huon Valley prospered in the 1880s and 1890s it was thought that a railway was needed. After six separate enquiries and about as many proposed routes not a single foot of train track was ever laid in the Huon Valley by the Government of Tasmania.

Prospecting

Small deposits of gold, silver, nickel and osmiridium were found in the Weld area west of the Wood centre site and the potential of a mining development was often cited as a reason for building a railway. However, a viable mining development has never materialised in this area due to the lack of any worthwhile deposits of minerals.

Sawmill sites of significance in the area

There are remains of two sawmills and a connecting tramway, built in the 1930s, about 8 kilometres east of the wood centre site, that have been rated low to medium significance by Parry Kostaglou in his *Historic timber getting in the Southern Forests — Statements of site significance and management recommendations 1996*. These mills are the McMullens Leithbridge Sawmill, the McMullens Bermuda Road Mill and the McMullens Leithbridge Tramway. Kostaglou recommends that these remains should be protected, however, they are not listed on the National Heritage Register.

The other historic sawmills within a 5 km radius of the wood centre site do not fall within any study available for these guidelines and are probably small spot mills of a similar nature described above. Known mill locations are shown in Figure xx.

Excerpt from *Historic timber getting in the Southern Forests — Statements of site significance and management recommendations 1996* Parry Kostaglou 1996

McMullen s Leithbridge Sawmill

HISTORY

Messrs J. H. and M. McMullen established what was probably Franklin s largest sawmill alongside New Road in c.1932, when boiler records first site him as a mill owner here. In 1936, the Huon Times Centenary supplement made reference to this mill and its local significance when it said

There have never been any very big mills at Franklin. The forest was taken by splitters and sawyers, followed by settlers. The largest owned by Messrs J. & M. McMullen, is in operation at the present time.

Machinery records indicate that the mill was last inspected in 1953, suggesting that it had closed down by the following year. The operation was then moved three kilometres north west and a new mill built. This is described subsequently as McMullen s Bermuda road mill.

DESCRIPTION

The McMullen sawmill occupies a large clearing at the very end of New Road, which was extended to this point by the sawmiller. A timber tramline described subsequently leads westward into the forest from the mill skids. The following features were identified at this mill site:

SAW MILL SHED

Measuring 16 X 7 metres, the remains of the sawmill shed and saw benches occupy a large cutting in the south eastern corner of the site. The log built saw benches for a breaking down frame and breast/docking saws remain *in situ* as does the central saw pit beneath the breaking down frame.

TRAMWAY

The 3 kilometre long timber tramway built by Mr McMullen terminates immediately south of the roadway terminus, beside the mill skids described below. The tramway terminus is still evidenced by regularly spaced timber sleeper and one length of spar rail. The other side of the tramway retains earthen impressions of these of these features, since insect activity has rotted out the actual timbers.

MILL SKIDS

The 6 X 7 metre long skidway located between the tramline terminus and the mill shed was used to roll logs off the tram and onto the main saws in the mill shed. It is still evidence by two 6 metre long bed logs embedded in the ground here.

HUT 1

Living quarters for the mill staff were located in clearings to the north and west of the sawmill precinct. The first structure stands 30 metres west of the roadway terminus, and measures 8 X 3.5 X 3 metres in height. It retains its floor joists, southern wall and fireplace, although the rest of the fabric is falling away to form a large scatter of boards and palings.

HUT 2

A second hut site was located bedside the roadway some metres north of its terminus. This structure resides in a shallow cutting dug by its builders to keep the building level. Measuring 5 X 3.5 metres in width, the flooring and southern wall panel remains in evidence.

McMullens Leithbridge Tramway

HISTORY

A tramway was constructed by Mr McMullen from newly established mill at the end of New Road to the forests on the southern slopes of Leithbridge Hill. This was probably begun in c.1932 and gradual extensions were made into the early 1940s.

DESCRIPTION

Measuring just under three kilometres in length, the Leithbridge tramway until recently ran a westerly course from the McMullen sawmill to a point some 350 metres south east of the Bermuda Road. The tramway boasted the most extensive in addition to the best preserved set of historic timber haulage machinery seen in Tasmania. Unfortunately recent logging activities have destroyed the most significant sections of the line, and only the eastern-most 1.5 kilometres of the line remains *in situ*.

The remains of this line have been degraded by natural forces, but intact sections of timber tramline and incidental bridging survive none the less. Historically, a locomotive type engine was employed on this tramway, and no decking was therefore required. A number of related features survive alongside the tramline which are described below or subsequently as sites in their own right.

References

Historic timber getting in the Southern Forests — Statements of site significance and management recommendations. Parry Kostaglou Forestry Tasmania, Tasmanian Forest Research Council, Inc. 1996

Above the Falls. Some notes on the People, the History of the Upper Huon Richie N Wooley. Geilston Bay June 2000

The History of the Huon, Channel, Bruny Is. Region R. Ely Centre for Tasmanian Historical Studies, University of Tasmania

Mineral Supplies and the National Estate in Tasmania — Achieving a Balance Chris Sharples (Prepared for the Combined Environment Groups) March 1991

A History of Trains and Trams in Tasmania Thomas CT Cooley

MAP showing:

McMullens Leithbridge Sawmill — low/medium significance recommendation — to protect — private property

McMullens Bermuda Sawmill - low/medium significance: recommendation — to protect, State forest

McMullens Leithbridge Tramway

NOISE & NOISE MEASUREMENT

1. Sound (Noise) Level

Sound and unwanted sound, called noise, is the result of fluctuations or oscillations in atmospheric pressure. These excite the ear mechanism and evoke the sensation of hearing.

The human ear responds to changes in sound pressure over a very wide range - the loudest sound pressure to which the human ear responds is ten million times greater than the softest. This large ratio is reduced to a more manageable size by the use of logarithms. The logarithms scale provides a more convenient way of comparing the sound pressure of one sound with another. To avoid a scale which is too compressed, a factor of 10 is introduced, giving rise to the decibel unit.

The level of sound pressure p is said to be L_p decibels greater than a reference sound pressure P_{ref} according to the following definition:

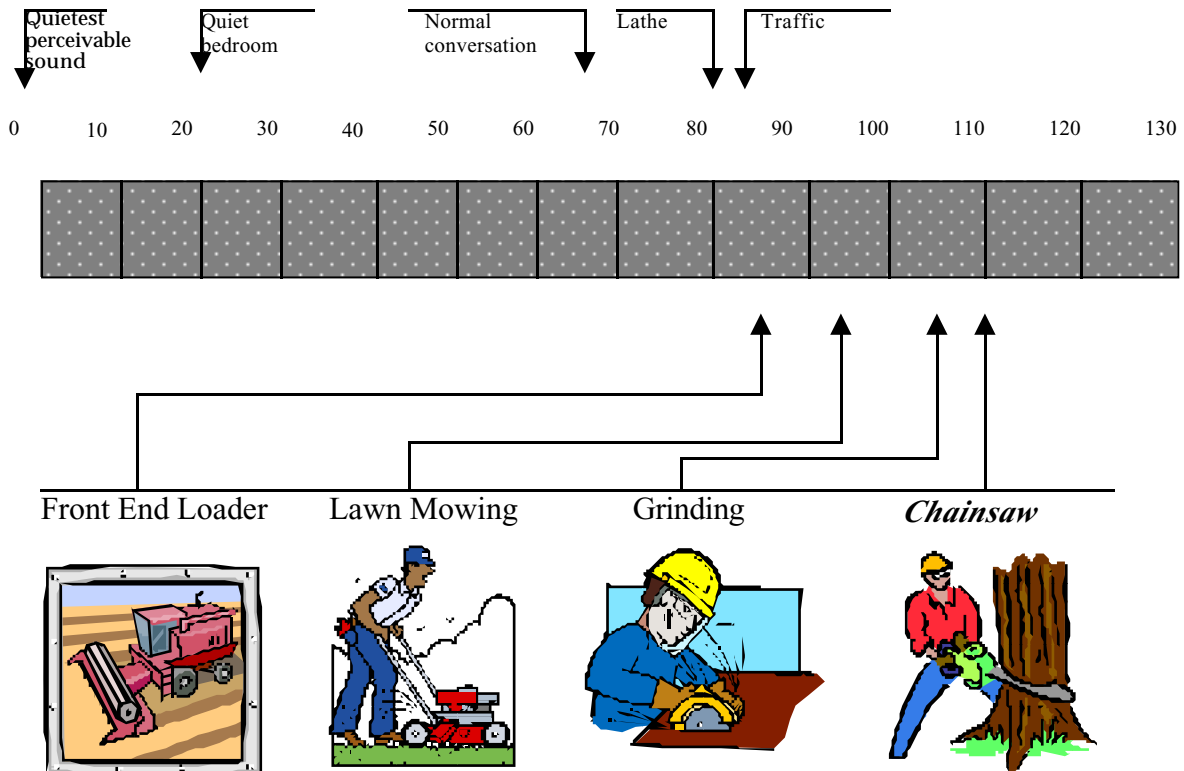
$$\begin{aligned} \text{Sound Pressure Level (Lp or SPL)} &= 10 \log_{10}(P^2/P_{ref}^2) \text{ dB} \\ &= 20 \log_{10}P - 20\log_{10}P_{ref} \text{ dB} \end{aligned}$$

where p is the sound pressure fluctuation (above or below atmospheric pressure) and P_{ref} is 20 micropascals (2×10^{-5} Pa), which is approximately the threshold of hearing.

The decibel scale is shown in **Figure 1**.

Figure 1: The Decibel Scale

The Decibel Scale - some typical sound levels



2 A-Weighted Decibels, dBA

The threshold of human hearing varies with frequency, being most sensitive to sound mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. The pressure amplitude of a sound therefore does not directly relate to its perceived loudness and both frequency and amplitude need to be taken into account. For low level sounds, a filter having a frequency response corresponding to that of human hearing (in level range about 40 dBA), is incorporated in sound level meters. Sound level measurements made using this filter (A-weighting) are described as A-weighted decibels, dBA.

The level of a sound expressed in dBA is a reasonable measure of the loudness of that sound. Different sounds having the same dBA level generally sound about equally as loud, although the character of the noise also plays a part in its perceived loudness.

A change of 1dBA or less in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5dBA change corresponds to small but noticeable change in loudness. A 10 dBA change is generally accepted to correspond to an approximate doubling or halving in loudness. **Table 1** following, gives examples of dBA levels are shown in Table 1.

Table 1: Example Noise Levels

Sound Pressure Level (dBA)	Typical Source	Subjective Evaluation
140	Long range gun, gunner s ear	Extremely noisy to intolerable
130	Threshold of pain	
120	Jet take-off at 100m	
110	Night club dance floor	
100	Loud car hom at 3 metres	Very noisy
90	Heavy truck at 10m	
80	Curbside of busy street	Loud
70	Car interior	
60	Normal conversation at 1m	Moderate to quiet
50	Office noise	
40	Living room in quiet area	Quiet to very quiet
30	Inside bedroom at night	
20	Unoccupied recording studio	Almost silent

3. Statistical Analysis of Sound (Noise)

Ambient sound varies in level over time and so is commonly described statistically in terms of exceedence levels. These levels summarise the percentage of time a noise level was exceeded during the measurement period at the measurement point.

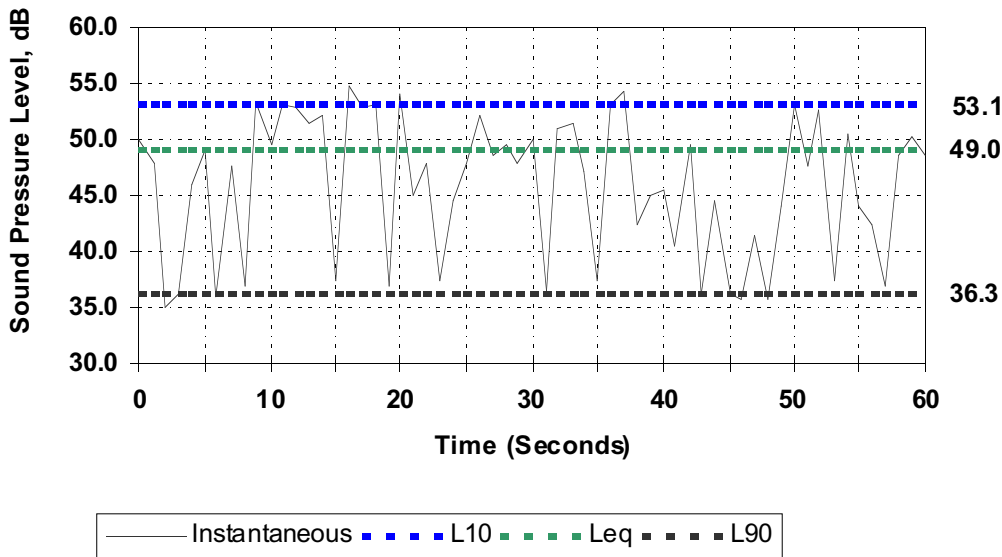
For example, if a noise level of 80 dBA was exceeded 10% of the time during a sampling period, this result would be described as an LA10 of 80 dBA. Statistical sound level meters usually generate a range of percentile results between 0 and 100.

An A-weighted noise level exceeded for N% of a given measurement period is denoted as an LAN of that level. LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on. LA90 is a commonly used measure of the average minimum or background A-weighted noise level.

Another index of sound level that is also in common usage is the A-weighted equivalent continuous noise level, denoted as LAeq. LAeq is essentially the constant sound pressure level, which is equivalent to (contains the same amount of acoustical energy as) the varying sounds level over the measurement period.

Figure 2 depicts a sixty second measurement sample of a varying sound and some of the descriptors discussed.

Figure 2: Sound Variation with Time and its Descriptors



Noise Assessment Report

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Southwood Resources
Huon

23 July 2001

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Wind Noise A1

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Spectral distribution of truck noise C4

Comparative spectra of two trucks C6

Spectral distribution of noise of truck using 'Jake' brake C7 - C8

1. Introduction

The likely noise impacts and issues are investigated in this report. The following matters have been considered:

- the existing noise climate in the proposed Southwood integrated timber processing site (I.T.P.S.)
- the predicted operating noise levels at the residences in other ownership, 6000 metres away from the I.T.P.S. complex
- possible DPWIE permit (Noise) conditions and limits
- 9 assessment of predicted noise levels against possible DPWIE noise limits
- noise mitigation measures
- truck noise levels
- traffic induced vibrations.

There are two major problems with accurately predicting noise levels from distant sources. One is the difficulty in obtaining reliable sound power levels of noise sources such as large machines because of the influence of ground effects and the impracticality of exploring sound fields over an imaginary hemisphere that encompasses the large sound source. Many measurements have to be taken in order to express the mean values with some confidence. For example, a sample with a standard deviation of 6 dB(A) may require 28 measurements to obtain the correct mean within +/- 2 dB(A), nine times out of ten. The other major problem that makes accurate prediction difficult is the variability of weather conditions. The input data requirements regarding meteorological factors (temperature gradients, wind velocity profiles) are comprehensive, resulting in considerable computational effort.

The method used to predict the noise levels likely to be encountered at 6000 m (the nearest neighbour) is as follows:

- Distant noise level data has been obtained for existing operating facilities located in Tasmania because manufacturers of 'one of' large machines or plants do not have noise data of their products, especially if the plant is in the design stage. These Tasmanian facilities include sewage plants, merchandising yards, sawmills, veneer mills and wood chip mills. However, the noise data for the wood fired power station and the portable chip plant came from Siemens in Germany, and Peterson Pacific Corporation in USA, respectively.
- Fricke (1987) quotes work by Kenna et al (1986) at the National Acoustic Laboratories regarding outdoor sound propagation which suggests that a good fit for their data is given by:

$$\text{Attenuation, dB(A)} = 6 \text{ dB(A)} / \text{dd} + 3 \text{ dB(A)} / \text{km},$$

where dd = doubling of distance.¹

¹ Fricke, F. & Treagus. R., "Sound Attenuation Rates Near the Ground' Proc. Aust. Acoustical Soc. Annual Conference 1987, p. 57.

The above formulae is suitable for determining the attenuation of sound over flat and undulating ground and large distances and is claimed to give results comparable in accuracy to that given by complex models. Noise levels obtained from actual plants located at 45 m, 370 m, 450 m, 1000 m and 4100 m are used to calculate the noise levels at 6000 m using the above formulae. The calculations do not include the attenuation provided by topographical features, and so the results are conservative.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether a noise is intrusive or not depends on the following factors:

1. the level of the background noise;
2. the level of the intruding noise;
3. whether the noise has tonal components;
4. whether the noise has impulsive components;
5. whether the noise is regretfully inflicted or mindlessly caused;
6. the time of day or night the noise occurs.

2. Existing Noise Climate

This is a first major development of this type within the State Forest in the Huon. Consequently true background noise levels can be obtained that are not inflated by the presence of other industrial noise in the area.

Noise measurements were conducted in the State Forest during the day and in the evening. During the day there was some distant noise associated with logging. The results of 15 minute statistical noise analysis is given below.

date	time	dB(A)			
		L ₁	L ₁₀	L ₉₀	L _{eq}
13/12/00	1435 h	51.3	47.3	36.8	44.0
26/8/00	1830 h	41	39.8	36.5	38.3

In the table L90 is the noise level exceeded for N% of the sampling time. L90 is a descriptor of the background noise levels encountered. L10 is a descriptor of the fluctuating higher noise levels. Leq is the equivalent 'A' weighted noise level. For example, a fluctuating noise having an Leq = 38.3 has the same acoustic energy as a steady noise of 38.3 dB(A).

The author has conducted noise surveys and analysis in Tasmania over the past eighteen years and the results have been used to determine the means and standard deviations of noise levels in rural and semirural areas. The results are given overpage.

		Day dB(A)			Night dB(A)		
		L ₁₀	L ₉₀	L _{eq}	L ₁₀	L ₉₀	L _{eq}
Rural	mean	44.9	36	44.8	39.1	32.3	38.4
	std. dev.	6.1	5.5	7.6	5.7	5.7	10.4
	n	24	24	24	21	21	20
Semirural	mean	41.7	33.5	40.8	39.2	31.8	38.9
	std. dev.	6.1	5.6	6.8	6.1	5.4	7
	n	30	30	29	13	13	13

Where n = number of sites. The measurements were generally conducted over 30 minutes to 60 minutes. The results indicated that the day time rural background (L90) noise levels are higher than the noise levels recorded in semirural areas. Rural areas are not always tranquil, there are watering systems, tractors, distant sawmills and quarries. Furthermore the ambient noise in rural areas having forests or trees depends on the wind speed. Wind generates noise in the trees and consequently the background noise levels can vary from 20 dB(A) on a still night without insect noise, to over 50 dB(A) during moderate winds. At night time the rural and semirural noise climates are similar, with a mean background L90 level of about 32 dB(A). For example, wind noise generated by a 16.6 m gum tree at a distance of 16.6 m from the microphone gave the following results:

mean wind speed m/ s	std. dev.	dB(A)		
		L ₁₀	L ₉₀	L _{eq}
1.1	.26	44.3	42.3	43
1.75	.43	49	45.8	47.1

The wind speed was measured at 1.5 m from the ground. The sound power level of such a tree during a mean wind speed of 1.75 m/s is 79.5 dB(A). If there were 25 such trees in 5 rows and 5 columns (10 m apart) then the 'A' weighted sound pressure level, measured 20m from these trees could be 54.4 dB(A).

Page A1 in the Appendix shows a time recording of noise made by the same tree when the mean wind speed was 3.1 m/s and the standard deviation was 1.2 m/s. These results show considerable noise of wind in the trees. See for example, wind data for the Grove Research Station and Geeveston Station in the Appendix, pages A2 - A5. In addition to the wind interacting with the flora, there are other natural sounds due to fauna, especially birds, frogs and insects. The net result of these noise contributions is a noise climate that only occasionally is tranquil.

3.0 Communal Wastewater Treatment/Reuse Facility, Potential Noise Iml2act

A large metropolitan sewage plant (44,000 equivalent persons, 9 megafitres/day) capable of tertiary treatment and occupying about 3 hectares generates an Leq = 33.5 dB(A) and L90 = 31 dB(A) measured at a line of sight distance of 370 m. At 6000 m the noise level due to geometric spreading is:

$$L_{eq} = 33.5 - 20 \log (6000/370) = 9.3 \text{ dB(A)}$$

$$L_{90} = 31 - 20 \log (6000/370) = 6.8 \text{ dB(A)}$$

The plant has a range of irrigators and purpose built pump houses designed for noise mitigation. Additional noise mitigation measures are unnecessary.

4. Merchandising Yard

4.1 Dropping Logs by Log Grabber/ Loader

The main source of noise at a distance is the noise made by dropping of logs during sorting by the log loader/grabber. These noise events have been measured in line of sight conditions as follows: at 450 m the mean $L_{max} = 58 \text{ dB(A)}$ with a standard deviation of 2.92 dB(A); at 1000 m the mean $L_{max} = 50.2 \text{ dB(A)}$ with a standard deviation of 2.54. Therefore at 6000 m the mean $L_{max} = 58 - 20 \log (6000/450) - 3 \text{ dB(A)/km} = 19 \text{ dB(A)}$, or the mean $L_{max} = 50.2 - 20 \log (6000/1000) - 5(3) = 19.6$.

With a standard deviation of 2.5 to 2.9 dB(A), 84% of the log dropping noise events are likely to be less than $19.6 + 2.9 = 22.5 \text{ dB(A)}$ and 97.7% of the log dropping noise events are likely to be less than $19.6 + 2(2.9) = 25.4 \text{ dB(A)}$.

These noise events may on occasion be heard during very still nights. However, a bedroom with a 20% open window offers about an 11 dB(A) noise reduction and so awakening reactions during sleep are unlikely.

4.2 Log Loader/ Grabber

A CAT 988 log grabber generates 91 dB(A) at 7 m. This machine is typical of the likely equipment to be used at the proposed site. At 6000 m the noise level is likely to be $91 - 20 \log (6000/7) - 6 \times 3 = 14.3 \text{ dB(A)}$. This noise is unlikely to be heard at 6000 m.

4.3 Chain Saws

A Stihl 064 chain saw, which is a typical saw used in merchandising yards and sawmills, generated the following noise levels at 15 m during operations:

dB(A)			
L_1	L_{10}	L_{90}	L_{eq}
81.8	78.8	36.3	73.7

At 500 m, a noise level of 47 dB(A) was measured during sawing. At 6000 m the noise level is likely to be $47 - 20 \log (6000/500) - 5.5(3) = 8.9 \text{ dB(A)}$. This noise is unlikely to be heard at 6000 m.

5. Sawmill

Noise levels were obtained 450 m, line of sight, from a large sawmill processing about 200,000 m³ of raw material annually, compared to the 88,000 m³ intended for processing at the proposed sawmill. The following mean values were obtained over 2 nights and result from eleven 15 minute samples.

	dB(A)		
	L ₁₀	L ₉₀	L _{eq}
mean	52.6	45.7	49.3
Std. dev.	1.07	2.08	1.88

The sawmill was equipped with chippers for processing waste from the green mill and the dry mill.

At 6000 m the noise level is likely to be $L_{eq} = 49.3 - 20 \log (6000/450) - 5.5(3) = 10.3$ dB(A), and $L_{10} = 13.6$ dB(A) and $L_{90} = 7$ dB(A). With standard deviation of 1.88 dB(A), 97% of the Leq noise levels from the sawmill could be below $10.3 + 2(1.88) = 14.1$ dB(A). The noise is unlikely to be heard at 6000 m.

6. Rotary Peeled Veneer Mill

Veneer Mills are generally quieter than sawmills, with the main noise being external noise generated by the log loader. A microphone traverse of an operating veneer mill gave the following results:

	dB(A)		
L _{max}	L ₁₀	L ₉₀	L _{eq}
98	81	71	79

The large industrial hall is likely to be clad with metal having a weighted sound reduction index (Rw) of about 18.

Measurements conducted 45 m from an operating veneer mill gave the following results.

dB(A)		
L ₁₀	L ₉₀	L _{eq}
61	58	61

At 6000 m the noise level is likely to be $L_{eq} = 61 - 20 \log (6000/45) - 6(3) = 0.5$ dB(A). The veneer mill is unlikely to be heard at 6000 m.

7. Wood Fibre Generation

The proposed chipper is a 2.84 m diameter disc with 12 knives driven by a 2000 hp motor.

A large wood chip facility (615,000 tpa of woodchips) having a much larger 3.66 m diameter

10 knife disc driven by 4000 hp motor has been subject to extensive monitoring and noise analysis. The mean noise levels obtained during 4 nights at a distance of 4100 m (beyond line of sight) is as follows.

	dB(A) (30 minutes)		
	L ₁₀	L ₉₀	L _{eq}
mean	36.4	33	35.1
Std. dev.	3.3	1.6	2.6
n	9	9	9

Climatic conditions were as follows:

date	time h	temp. °C	R.H. %	press. hPa	wind m/s	dir.	cloud octals
1.7.97	1930	1.5	92	992	0	-	0/8
2.7.97	2020	5.5	93	982	0	-	0/8
3.7.97	0604	3.5	79	982	2	W	0/8
4.9.97	0615	1.5	90	97	0	-	0/8

There were discrete events associated with chipping and log/metal (debarker) contact that could be heard on occasions. The mean noise events during the 4 nights is as follows:

date	dB(A)
1.7.97	41.3
2.7.97	41.8
3.7.97	40.3
4.7.97	46.8 - possible temperature inversion

At 6000 m the above noise levels obtained at 4100 m are likely to be decreased by $20 \log(6000/4100) = 3.3$ dB(A) due to geometric spreading and a further $2 \times 3 = 6$ dB(A) due to the 3 dB(A)/km factor. The above noise levels could be reduced by $3.3 + 6 = 9.3$ dB(A). Hence the Leq noise level at 6000 m could be 35.1 dB(A) - 9.3 dB(A) = 25.8 dB(A). Considering the standard deviation of 2.6 dB(A) we can expect that for 97.7% of the 30 minutes samples the Leq = $25.8 + 2(2.6) = 31$ dB(A), or less.

The discrete noise events of 41.3 dB(A) to 46.8 dB(A) are also likely to be reduced by 9.3 dB(A) to 32 dB(A) to 38 dB(A). The 38 dB(A) discrete noise events may be heard on occasions during still evenings and during conditions where temperature inversions occur. However, taking into account the smaller diameter disc and the 50% smaller hp motor, noise from the wood fibre generation facility is unlikely to be heard. The ambient L₁ noise levels at night is 41 dB(A) (see page 2) and hence exceeds the discrete noise events of 38 dB(A). Such noise events do not cause awakening reactions in sleepers.

8. Wood-fired Power Station

8.1 Steam Turbine Noise

Siemens have estimated the total sound power level of a 50 MW wood fired power station without noise control to be $SWL = 118 \text{ dB(A)}$, and with maximum noise control $SWL = 95 \text{ dB(A)}$.

The typical expected sound pressure level at a distance of 250 m from the outermost points of a power plant installation is approximately 60 dB(A) with no noise control and approximately 38 dB(A) with maximum noise control. At 6000 m, without noise control, the noise level is likely to be $60 - 20 \log (6000/250) - 5.75(3) = 15.1 \text{ dB(A)}$. However this noise may include tonal components due to forced draft and induced draft fans. The adjusted noise level due to tonal components could be $15.1 + 5 = 20.1 \text{ dB(A)}$. On occasions, during temperature inversions, the noise level could be higher.

The design should allow for quarter wave tuning tubs or packless silencers should this prove necessary. However, the estimated noise level of $15 - 20 \text{ dB(A)}$ is unlikely to be heard at 6000 m in the presence of ambient noise.

8.2 Boiler Blow Down Noise

Boiler blow down/stream purging noise has been recorded from an 8 MW boiler. This boiler had a 30 m stack, was 860 m from the microphone and in direct line of sight. The noise level varied between about 48 dB(A) to 62 dB(A) .

A 50 MW boiler may generate a noise level which is: $15 \log (50/8) = 11.9 \text{ dB(A)}$ higher than that made by the 8 MW boiler. At 6000 m, the noise level is likely to be: $(62 + 11.9) - 20 \log (6000/860) - 5(3) = 42 \text{ dB(A)}$. This noise might be heard at 6000 m both during the day and night. The boiler blow down operation should be conducted during the day time, avoiding especially sunrise and sunset periods. The steam blow down, relief and safety valves should be fitted with silencers such as the R2 series silencers made by Sound Attenuation Australia.

The boiler blow down operations are not daily events. They occur infrequently, have durations of perhaps 15 minutes and are not likely to generate complaints, especially if fitted with silencers.

8.3 Transformer

A 50 MVA transformer is likely to have a sound power level SWL of:
 $SWL = 74 + 14 \log MVA = 74 + 14 \log 50 = 100.8 \text{ dB(A)}$. See AS 2374.6-1994, Power Transformers, page 22.

At 6000 m the sound pressure level is likely to be:

$$SPL = SWL - 20 \log r - 8 - 6(3) = 100.8 - 20 \log 6000 - 8 - 6(3) = 17.2 \text{ dB(A)}$$

The ultimate design could consist of two transformers - perhaps 30 MVA each so that one could be taken out of service for maintenance. With two 30 MVA transformers operating together (same frequency and phase) the sound pressure level at 6000 m is likely to be 0.9 dB(A). In any case the transformer or transformers are unlikely to be heard at 6000 m.

8.4 Fuelwood Processor

The HC5400 Portable heavy duty wood recycler is typical of the equipment to be used and has been measured as generating 77 dB(A) at 61 m. Measured noise levels, taken in the field during operations, are shown on page A6. A photograph of the unit is shown on page A 7.

At 6000 m the noise level could be $77 - 20 \log (6000/61) - 6(3) = 19.1$ dB(A) where 6(3) is the 3 dB(A)/km factor. This level is below the likely day time background noise level L_{90} of 36.5 dB(A) or 20 dB(A) on a still evening. The noise is unlikely to be heard at 6000 m.

9. Construction Noise and Vibration

The contractors are expected to be acquainted with Australian Standard AS 2346-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

Percussive Piling operations using 5T drop hammer could generate noise levels that may be heard at 6000 m. However, there will be attenuation due to atmosphere, topography, and the noise levels are unlikely to exceed 47 dB(A) at 6000 m.

Blasting may be necessary. Ground vibrations are unlikely to exceed the recommended maximum peak particle velocity of 5 mm/s for the effective charge per delay likely to be used in construction as opposed to quarry blasting, and at a distance of 6000 m. For example, AS 2187.2-1993 'Use of Explosives' indicates that for heavily confined blasting in far field situations, an effective charge of 3150 kg per delay may generate a peak particle velocity of 5 mm/s at 1000 m. This is a large charge. Ground Vibration due to construction is unlikely to exceed 5 mm/s, 6000 m from the blast.

10. Summary and Combined Noise Level at the nearest neighbour, 6000 m from facility

	dB(A)		
	L _{max}	L ₉₀	L _{eq}
Waste water/ reuse facility	-	6.8	9.3
Merchandising yard			
mean, log drops	19.6		
log loader			14.3
chain saw			8.9
Sawmill			
general			10.3
mean, log drops	19.6		
log loader			14.3
chain saw			8.9
Veneer Factory			
general machine hall noise			0.5
mean,log drops	19.6		
log loader			14.3
chain saw			8.9
wood fibre generation			
general			25.8
discrete noise events	32 - 37.5		
wood fired power station			
power station			20.1
transformer			0
fuel wood processor			19.1
Logarithmic total	37.7		28.4

11. Possible DPWIE Permit (Noise) Condition and Limit

11.1 Noise emissions from the activity (or activities) to which the permit relates shall be such that when measurements have been adjusted for noise in accordance with the relevant standards, the noise levels from the activity (or activities) on the land shall not exceed an equivalent continuous A-weighted sound pressure level of 40 dB(A) at any time when measured at any domestic premises in other ownership. Noise level measurements shall be taken in the presence of ambient noise normally existent in the area.

11.2 The time interval over which the noise level is to be determined shall be 15 minutes.

11.3 Where the combined level of noise from the activity (or activities) on the land and the normal ambient noise exceeds the level stated in part 10.1 this condition shall not be considered to be breached unless the noise emissions from the activity (or activities) on the land are audible.

All methods of measurement shall be in accordance with the relevant Australian Standards and the Tasmanian "Code of Practice for Sound Pressure Level Measurement".

12. Assessment of predicted noise levels against possible DPIWE noise limits

12.1 The criteria of $Leq \leq 40$ dB(A) is likely to be met.

12.2 Discrete noise events such as those made by the chipper and the banging due to logs dropped into the debarker may reach levels of 38 dB(A) on occasions.

13. Noise Mitigation Measures at I.T.P.S.

13.1 The main noise source is the large chipper. There is merit in orienting the chipper building so that there are no openings in the direction of the nearest occupied residence at 6000 m near the junction of Denison and Weld Roads. The chipper mouth should have sufficient space for a possible set of three, quarter wave tuning stubs.

13.2 Allowance should be made for possible inclusion of silencers in the power station stacks.

13.3 The mobile heavy duty recycler should be located behind a building so that the building provides a noise barrier in the direction of the 6000 m neighbour.

14. Truck Noise

The sound exposure level (SEL) of a number of log trucks travelling about 60 km/h were measured in an open area 15 m from the kerb and found to average 83.6 dB(A). The SEL is a useful concept whereby a truck pass by noise event lasting many seconds is transformed into an equal energy event of duration 1 second. The SEL can then be used to estimate the equivalent 'A' weighted sound level Leq , due to a number of trucks.

The proposal is for a wood chip truck traffic flow of $2 \times 24 = 48$ movements per day. This means that there will be 48 truck movements in 24 hours, or an average of 2 truck movements per hour. However, truck arrivals and departures may not occur at regular intervals but are likely, on occasions, to be clustered. The arrival of such trucks could follow a Poisson distribution with a mean arrival rate of 2 trucks per hour.

There are also likely to be periods where truck traffic is prohibited, or restricted, to allow for school buses, and so there could be bunching of trucks.

The equivalent 'A' weighted 1 hour sound level due to the wood chip trucks can be determined as follows:

$$Leq(1 h) = 10 \log [n \times 10^{SEL/10} + 10 \log (1/T)]$$

where n = number of trucks per hour
 SEL = sound exposure level at 15 m = 83.6 dB(A)
 T = time = 60 x 60 = 3600 seconds

therefore $Leq(1 h) = 10 \log [2 \times 10^{8.361} + 10 \log (1/3600)]$
 $= 51.0 \text{ dB(A)}$

In addition, there will be 28 truck movements carrying product between 0700 h and 1600 h. That is, 28 truck movements in 9 hours or 3.111 truck/ hour. The total trucks/ hour between 0700 h and 1600 h will be $2 + 3.111 = 5.111$. The equivalent 'A' weighted 1 hour sound level due to both the chip and product trucks will be:

$$\begin{aligned} Leq(1 h) &= 10 \log [5.111 \times 10^{8.36}] + 10 \log (1/3600) \\ &= 90.68 - 35.56 \\ &= 55.1 \text{ dB(A)} \end{aligned}$$

Over a 24 hour period, the equivalent noise level due to the trucks consists of 9 hours where $Leq = 55.1 \text{ dB(A)}$ and 15 hours where $Leq = 51.0 \text{ dB(A)}$ making $Leq(24 h) = 53.0 \text{ dB(A)}$.

Day-time noise measurements have been conducted 10 m from North Huon Road at Ranelagh (Playground). The mean of 6 one hour measurements over 2 days was $Leq(1 h) = 55.4 \text{ dB(A)}$ with a sample standard deviation of 2.3 dB(A). See pages B1 and B2.

Night time noise measurements at the same location (two 15 minute samples and one 30 minute sample) gave a mean $Leq = 34.9 \text{ dB(A)}$, see pages B3 and B4.

Page B5 gives data obtained at Glen Road and North Glen Road.

Pages C1 to C8 give the results of truck noise measurements. The time recording on page C3 shows truck pass by noise events measured at 15 m from the kerb. The mean of the maximum noise levels is 78.3 dB(A) with a sample standard deviation of 2 dB(A) for speeds of 60 km/h.

Page C4 shows spectral content of log truck noise. The features at 63 Hz and 80 Hz are due to engine noise. Page C5 shows narrow band analysis of the truck noise. Page C6 shows comparative spectra of noise of a truck using 'Jacob's' brake.

Truck noise is mainly due to three components:

- 1) engine, gearbox sound;
- 2) engine exhaust noise; and
- 3) road/ tyre interaction noise.

To reduce overall noise by say 5 dB(A), the noise of each of the three above components must be reduced by a similar amount. Present technology does not offer significant reductions in truck noise other than tunnel enclosure of the engine and gearbox. The road surfaces should be well maintained so that they are free from pot holes and in good clean, smooth condition.

15. Peak Truck Noise Levels

Recent research (Kraus, J. 1993²) has found that for vehicles greater than 12 tonnes the regression equation that fitted the data was:

$$Y = 0.138 X + 76.24$$

where X = speed km/ h,
Y = peak noise level rms

For 60 km/h $Y = 0.138(60) + 76.24 = 84.25 \text{ dB(A)}$

At 15 m the peak noise level is likely to be $84.25 - 6 = 78.25 \text{ dB(A)}$. Measurements conducted by the author at Bell Bay of maximum truck noise at 15 m gave a mean value of 78.3 dB(A) and a sample standard deviation (n = 10) of 2 dB(A). The trucks were in a 60 km/h zone.

Trucks using Tehnar retarders are quieter than trucks using Jacob brakes. For example, a descending truck using Jacob brakes generated a noise level of 66 dB(A) at a given location. Another truck, using the same route and descending, generated 50 dB(A) at the same location.

16. Truck Noise Level Criteria

The current Criteria for the noise at the facade of residential dwellings are:

$$L_{10}(18 \text{ h}) @68 \text{ dB(A)} \text{ maximum acceptable level}$$

$$L_{10}(18 \text{ h}) @63 \text{ dB(A)} \text{ maximum desirable level}$$

The lower level is a design goal, which the Tasmanian Department of Infrastructure, Energy and Resources (DIER) aims to achieve when new works are constructed.

There are no formal criteria for night time noise (2200 h to 0600 h) but the following criteria can be considered as reasonable: $Leq(8 \text{ h}) = 55 \text{ dB(A)}$, and

² Kraus, J. (1993) An Investigation of Heavy Vehicle Noise, Criffith University, Queensland.

$L_1 = 77$ dB(A), for low density transportation. Empirical traffic noise studies have shown the following relationship (Road Traffic Authority of NSW):

$$L_{10}(18 \text{ h}) = L_{\text{eq}}(24 \text{ h}) + 3.5.$$

Therefore the expected $L_{10}(18\text{h})$ is: $L_{10}(18 \text{ h}) = 52.3 + 3.5 = 55.8$ dB(A).

The 63 dB(A) maximum desirable noise level is likely to be met. These two criteria are likely to be met by the proposed schedule of truck movements.

As night-time traffic is characterised by peak noise events rather than continuous noise, the criteria could include the peak noise made by trucks as they pass. Research on intermittent noise at night (Criefahn, 1992³) has suggested that one awakening will probably be evoked in not more than 10% of the exposed people if two noises with peak levels of 59.4 dB(A), or 10 noises of 54.1 dB(A), or 30 noises of 53.6 dB(A) occur during a night.

The mean outdoor/indoor attenuation of houses for maximum noise events is 17.3 dB(A) with the window slightly open (Carter, 1992, page 52⁴). Hence, for 30 noise events through the night the outdoors noise level is $53.6 + 17.3 = 70.9$ dB(A). This noise level is likely to be exceeded for houses within about 30 m from the kerb. However, Griefahn's work suggests one awakening reaction in fewer than 10% of the exposed people. There are currently no formal criteria for peak noise levels in relation to truck traffic. The trucks should conform with the Australian Design Rule 28/01 (Table 1, page 4) in relation to truck noise limits, that is, for heavy goods vehicles ($\text{NEP} \geq 270$ KW) 87 dB(A) at 7.5 m. This is about 81 dB(A) at 15 m and 75 dB(A) at 30 m.

17. Truck induced vibrations

Traffic induced ground vibrations depend on the following: vibrational behaviour of trucks; mass of trucks; speed of trucks; tyre characteristics; roughness of road surface; and, subsoil properties. Cracks in houses can be caused by many factors, including: structural overload; shrinkage and swelling of wood framing; uneven foundation settlement; slamming of doors; washing machines (agitator frequency 1.6 Hz); conducting aerobics; temperature variations; bricks in weather board walls; water leakage; trees outside absorbing moisture and causing footings to settle; and, movement of trees in wind causing ground movement by roots. Architects in the USA have identified 40 causes for cracks other than vibration.

The Australian Road Research Board (Mr. A. E. Tynan, 1973⁵) conducted ground vibration tests at Richmond, after the collapse of the Tasman Bridge, when traffic through the town increased by about 700%. The tests showed that the ground vibrations from the traffic were safe when using the

³ Griefahn, B., (1992) 'Noise Control During Night' *Acoustics Australia* Vol. 20, No. 2 pp 43 47, August 1992.

⁴ Carter, N. L., (1992) 'Overnight Traffic Noise Measurements in Bedrooms and Outdoors, Pennant Hills Road, Sydney, Comparison with Criteria for Sleep', in *Acoustics Australia*, Vol 20, No. 2, pp 49 - 55.

⁵ Tynan, A. E., 1973, "Daniaging Effects of Ground Vibrations" Australian *Road Research Board*

criteria of 2 mm/s adjacent to historical buildings. His tests also included trucks travelling over purpose built 100 mm high ramps to simulate pot holes.

The author conducted vibration measurements at Richmond (Bridge Street) with the transducer set on a stone window sill of a stone cottage. The wall was 5 m from the kerb and the following mean vertical peak particle velocities (ppv) were obtained:

36 t truck, near lane 30 - 40 km/ h	1.6 mm/ s
36 t truck, far lane 30 - 40 km/ h	1.4 mm/ s
15 t truck, near lane 30 - 60 km/ h	1.3 mm/ s
15 t truck, far lane 30 - 60 km/ h	1.0 mm/ s
6 t roller pulled by tractor, near lane	9.5 mm/ s
6 t roller pulled by tractor, far lane	4.8 mm/ s

A report by Mr. Chris Nieuwhof, MIE Aust, CP Eng, FIQ, on ground vibrations at the Royal Engineers Building concluded that "no discernible vibration influences due to traffic were identified during the monitoring period' when trucks moved to and from the Boral concrete plant and container, gravel and log trucks used the Tasman Highway.

Tests conducted by the author found that locomotives weighing 92 t to 96 t are left with their engines idling at about 445 rpm, generate low frequency sound and vibrations at 7.4 Hz, 22.25 Hz and 44.5 Hz. The railway track is 10 m from the heritage building. The diesel locomotives are left idling for periods of 30 minutes or more then accelerate and move to other locations to engage in shunting activities. As far as is known, there is no damage to the Royal Engineers Building from sustained air borne or ground borne vibrations from the heavy locomotive accelerations, 10 m from the building. There are sawmills near Judbury and log trucks use the existing roads. It is therefore unlikely that vibrations from heavy log or chip trucks at distances of 10 m will cause damage to domestic buildings.

PEARU TERTS

Noise Assessment Report

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Southwood Resources
Huon

23 July 2001

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Spectral distribution of noise of truck using 'Jake' brake C7 - C8

1. Introduction

The likely noise impacts and issues are investigated in this report. The following matters have been considered:

- the existing noise climate in the proposed Southwood integrated timber processing site (I.T.P.S.)
- the predicted operating noise levels at the residences in other ownership, 6000 metres away from the I.T.P.S. complex
- possible DPWIE permit (Noise) conditions and limits
- 9 assessment of predicted noise levels against possible DPWIE noise limits
- noise mitigation measures
- truck noise levels
- traffic induced vibrations.

There are two major problems with accurately predicting noise levels from distant sources. One is the difficulty in obtaining reliable sound power levels of noise sources such as large machines because of the influence of ground effects and the impracticality of exploring sound fields over an imaginary hemisphere that encompasses the large sound source. Many measurements have to be taken in order to express the mean values with some confidence. For example, a sample with a standard deviation of 6 dB(A) may require 28 measurements to obtain the correct mean within +/- 2 dB(A), nine times out of ten. The other major problem that makes accurate prediction difficult is the variability of weather conditions. The input data requirements regarding meteorological factors (temperature gradients, wind velocity profiles) are comprehensive, resulting in considerable computational effort.

The method used to predict the noise levels likely to be encountered at 6000 m (the nearest neighbour) is as follows:

- Distant noise level data has been obtained for existing operating facilities located in Tasmania because manufacturers of 'one of' large machines or plants do not have noise data of their products, especially if the plant is in the design stage. These Tasmanian facilities include sewage plants, merchandising yards, sawmills, veneer mills and wood chip mills. However, the noise data for the wood fired power station and the portable chip plant came from Siemens in Germany, and Peterson Pacific Corporation in USA, respectively.
- Fricke (1987) quotes work by Kenna et al (1986) at the National Acoustic Laboratories regarding outdoor sound propagation which suggests that a good fit for their data is given by:

$$\text{Attenuation, dB(A)} = 6 \text{ dB(A)} / dd + 3 \text{ dB(A)} / \text{km},$$

where dd = doubling of distance.¹

¹ Fricke, F. & Treagus. R., "Sound Attenuation Rates Near the Ground' Proc. Aust. Acoustical Soc. Annual Conference 1987, p. 57.

The above formulae is suitable for determining the attenuation of sound over flat and undulating ground and large distances and is claimed to give results comparable in accuracy to that given by complex models. Noise levels obtained from actual plants located at 45 m, 370 m, 450 m, 1000 m and 4100 m are used to calculate the noise levels at 6000 m using the above formulae. The calculations do not include the attenuation provided by topographical features, and so the results are conservative.

The calculated noise levels are then compared to the existing ambient noise levels in the area. Whether a noise is intrusive or not depends on the following factors:

1. the level of the background noise;
2. the level of the intruding noise;
3. whether the noise has tonal components;
4. whether the noise has impulsive components;
5. whether the noise is regretfully inflicted or mindlessly caused;
6. the time of day or night the noise occurs.

2. Existing Noise Climate

This is a first major development of this type within the State Forest in the Huon. Consequently true background noise levels can be obtained that are not inflated by the presence of other industrial noise in the area.

Noise measurements were conducted in the State Forest during the day and in the evening. During the day there was some distant noise associated with logging. The results of 15 minute statistical noise analysis is given below.

date	time	dB(A)			
		L ₁	L ₁₀	L ₉₀	L _{eq}
13/12/00	1435 h	51.3	47.3	36.8	44.0
26/8/00	1830 h	41	39.8	36.5	38.3

In the table L90 is the noise level exceeded for N% of the sampling time. L90 is a descriptor of the background noise levels encountered. L10 is a descriptor of the fluctuating higher noise levels. Leq is the equivalent 'A' weighted noise level. For example, a fluctuating noise having an Leq = 38.3 has the same acoustic energy as a steady noise of 38.3 dB(A).

The author has conducted noise surveys and analysis in Tasmania over the past eighteen years and the results have been used to determine the means and standard deviations of noise levels in rural and semirural areas. The results are given overpage.

		Day dB(A)			Night dB(A)		
		L ₁₀	L ₉₀	L _{eq}	L ₁₀	L ₉₀	L _{eq}
Rural	mean	44.9	36	44.8	39.1	32.3	38.4
	std. dev.	6.1	5.5	7.6	5.7	5.7	10.4
	n	24	24	24	21	21	20
Semirural	mean	41.7	33.5	40.8	39.2	31.8	38.9
	std. dev.	6.1	5.6	6.8	6.1	5.4	7
	n	30	30	29	13	13	13

Where n = number of sites. The measurements were generally conducted over 30 minutes to 60 minutes. The results indicated that the day time rural background (L90) noise levels are higher than the noise levels recorded in semirural areas. Rural areas are not always tranquil, there are watering systems, tractors, distant sawmills and quarries. Furthermore the ambient noise in rural areas having forests or trees depends on the wind speed. Wind generates noise in the trees and consequently the background noise levels can vary from 20 dB(A) on a still night without insect noise, to over 50 dB(A) during moderate winds. At night time the rural and semirural noise climates are similar, with a mean background L90 level of about 32 dB(A). For example, wind noise generated by a 16.6 m gum tree at a distance of 16.6 m from the microphone gave the following results:

mean wind speed m/ s	std. dev.	dB(A)		
		L ₁₀	L ₉₀	L _{eq}
1.1	.26	44.3	42.3	43
1.75	.43	49	45.8	47.1

The wind speed was measured at 1.5 m from the ground. The sound power level of such a tree during a mean wind speed of 1.75 m/s is 79.5 dB(A). If there were 25 such trees in 5 rows and 5 columns (10 m apart) then the 'A' weighted sound pressure level, measured 20m from these trees could be 54.4 dB(A).

Page A1 in the Appendix shows a time recording of noise made by the same tree when the mean wind speed was 3.1 m/s and the standard deviation was 1.2 m/s. These results show considerable noise of wind in the trees. See for example, wind data for the Grove Research Station and Geeveston Station in the Appendix, pages A2 - A5. In addition to the wind interacting with the flora, there are other natural sounds due to fauna, especially birds, frogs and insects. The net result of these noise contributions is a noise climate that only occasionally is tranquil.

3.0 Communal Wastewater Treatment/Reuse Facility, Potential Noise Iml2act

A large metropolitan sewage plant (44,000 equivalent persons, 9 megafitres/day) capable of tertiary treatment and occupying about 3 hectares generates an Leq = 33.5 dB(A) and L90 = 31 dB(A) measured at a line of sight distance of 370 m. At 6000 m the noise level due to geometric spreading is:

$$L_{eq} = 33.5 - 20 \log (6000/370) = 9.3 \text{ dB(A)}$$

$$L_{90} = 31 - 20 \log (6000/370) = 6.8 \text{ dB(A)}$$

The plant has a range of irrigators and purpose built pump houses designed for noise mitigation. Additional noise mitigation measures are unnecessary.

4. Merchandising Yard

4.1 Dropping Logs by Log Grabber/ Loader

The main source of noise at a distance is the noise made by dropping of logs during sorting by the log loader/grabber. These noise events have been measured in line of sight conditions as follows: at 450 m the mean $L_{max} = 58 \text{ dB(A)}$ with a standard deviation of 2.92 dB(A); at 1000 m the mean $L_{max} = 50.2 \text{ dB(A)}$ with a standard deviation of 2.54. Therefore at 6000 m the mean $L_{max} = 58 - 20 \log (6000/450) - 3 \text{ dB(A)/km} = 19 \text{ dB(A)}$, or the mean $L_{max} = 50.2 - 20 \log (6000/1000) - 5(3) = 19.6$.

With a standard deviation of 2.5 to 2.9 dB(A), 84% of the log dropping noise events are likely to be less than $19.6 + 2.9 = 22.5 \text{ dB(A)}$ and 97.7% of the log dropping noise events are likely to be less than $19.6 + 2(2.9) = 25.4 \text{ dB(A)}$.

These noise events may on occasion be heard during very still nights. However, a bedroom with a 20% open window offers about an 11 dB(A) noise reduction and so awakening reactions during sleep are unlikely.

4.2 Log Loader/ Grabber

A CAT 988 log grabber generates 91 dB(A) at 7 m. This machine is typical of the likely equipment to be used at the proposed site. At 6000 m the noise level is likely to be $91 - 20 \log (6000/7) - 6 \times 3 = 14.3 \text{ dB(A)}$. This noise is unlikely to be heard at 6000 m.

4.3 Chain Saws

A Stihl 064 chain saw, which is a typical saw used in merchandising yards and sawmills, generated the following noise levels at 15 m during operations:

dB(A)			
L_1	L_{10}	L_{90}	L_{eq}
81.8	78.8	36.3	73.7

At 500 m, a noise level of 47 dB(A) was measured during sawing. At 6000 m the noise level is likely to be $47 - 20 \log (6000/500) - 5.5(3) = 8.9 \text{ dB(A)}$. This noise is unlikely to be heard at 6000 m.

5. Sawmill

Noise levels were obtained 450 m, line of sight, from a large sawmill processing about 200,000 m³ of raw material annually, compared to the 88,000 m³ intended for processing at the proposed sawmill. The following mean values were obtained over 2 nights and result from eleven 15 minute samples.

	dB(A)		
	L ₁₀	L ₉₀	L _{eq}
mean	52.6	45.7	49.3
Std. dev.	1.07	2.08	1.88

The sawmill was equipped with chippers for processing waste from the green mill and the dry mill.

At 6000 m the noise level is likely to be $L_{eq} = 49.3 - 20 \log (6000/450) - 5.5(3) = 10.3$ dB(A), and $L_{10} = 13.6$ dB(A) and $L_{90} = 7$ dB(A). With standard deviation of 1.88 dB(A), 97% of the Leq noise levels from the sawmill could be below $10.3 + 2(1.88) = 14.1$ dB(A). The noise is unlikely to be heard at 6000 m.

6. Rotary Peeled Veneer Mill

Veneer Mills are generally quieter than sawmills, with the main noise being external noise generated by the log loader. A microphone traverse of an operating veneer mill gave the following results:

	dB(A)		
L _{max}	L ₁₀	L ₉₀	L _{eq}
98	81	71	79

The large industrial hall is likely to be clad with metal having a weighted sound reduction index (Rw) of about 18.

Measurements conducted 45 m from an operating veneer mill gave the following results.

	dB(A)		
L ₁₀	L ₉₀	L _{eq}	
61	58	61	

At 6000 m the noise level is likely to be $L_{eq} = 61 - 20 \log (6000/45) - 6(3) = 0.5$ dB(A). The veneer mill is unlikely to be heard at 6000 m.

7. Wood Fibre Generation

The proposed chipper is a 2.84 m diameter disc with 12 knives driven by a 2000 hp motor.

A large wood chip facility (615,000 tpa of woodchips) having a much larger 3.66 m diameter

10 knife disc driven by 4000 hp motor has been subject to extensive monitoring and noise analysis. The mean noise levels obtained during 4 nights at a distance of 4100 m (beyond line of sight) is as follows.

	dB(A) (30 minutes)		
	L ₁₀	L ₉₀	L _{eq}
mean	36.4	33	35.1
Std. dev.	3.3	1.6	2.6
n	9	9	9

Climatic conditions were as follows:

date	time h	temp. °C	R.H. %	press. hPa	wind m/s	dir.	cloud octals
1.7.97	1930	1.5	92	992	0	-	0/8
2.7.97	2020	5.5	93	982	0	-	0/8
3.7.97	0604	3.5	79	982	2	W	0/8
4.9.97	0615	1.5	90	97	0	-	0/8

There were discrete events associated with chipping and log/metal (debarker) contact that could be heard on occasions. The mean noise events during the 4 nights is as follows:

date	dB(A)
1.7.97	41.3
2.7.97	41.8
3.7.97	40.3
4.7.97	46.8 - possible temperature inversion

At 6000 m the above noise levels obtained at 4100 m are likely to be decreased by $20 \log(6000/4100) = 3.3$ dB(A) due to geometric spreading and a further $2 \times 3 = 6$ dB(A) due to the 3 dB(A)/km factor. The above noise levels could be reduced by $3.3 + 6 = 9.3$ dB(A). Hence the Leq noise level at 6000 m could be 35.1 dB(A) - 9.3 dB(A) = 25.8 dB(A). Considering the standard deviation of 2.6 dB(A) we can expect that for 97.7% of the 30 minutes samples the Leq = $25.8 + 2(2.6) = 31$ dB(A), or less.

The discrete noise events of 41.3 dB(A) to 46.8 dB(A) are also likely to be reduced by 9.3 dB(A) to 32 dB(A) to 38 dB(A). The 38 dB(A) discrete noise events may be heard on occasions during still evenings and during conditions where temperature inversions occur. However, taking into account the smaller diameter disc and the 50% smaller hp motor, noise from the wood fibre generation facility is unlikely to be heard. The ambient L₁ noise levels at night is 41 dB(A) (see page 2) and hence exceeds the discrete noise events of 38 dB(A). Such noise events do not cause awakening reactions in sleepers.

8. Wood-fired Power Station

8.1 Steam Turbine Noise

Siemens have estimated the total sound power level of a 50 MW wood fired power station without noise control to be $SWL = 118 \text{ dB(A)}$, and with maximum noise control $SWL = 95 \text{ dB(A)}$.

The typical expected sound pressure level at a distance of 250 m from the outermost points of a power plant installation is approximately 60 dB(A) with no noise control and approximately 38 dB(A) with maximum noise control. At 6000 m, without noise control, the noise level is likely to be $60 - 20 \log (6000/250) - 5.75(3) = 15.1 \text{ dB(A)}$. However this noise may include tonal components due to forced draft and induced draft fans. The adjusted noise level due to tonal components could be $15.1 + 5 = 20.1 \text{ dB(A)}$. On occasions, during temperature inversions, the noise level could be higher.

The design should allow for quarter wave tuning tubs or packless silencers should this prove necessary. However, the estimated noise level of $15 - 20 \text{ dB(A)}$ is unlikely to be heard at 6000 m in the presence of ambient noise.

8.2 Boiler Blow Down Noise

Boiler blow down/stream purging noise has been recorded from an 8 MW boiler. This boiler had a 30 m stack, was 860 m from the microphone and in direct line of sight. The noise level varied between about 48 dB(A) to 62 dB(A) .

A 50 MW boiler may generate a noise level which is: $15 \log (50/8) = 11.9 \text{ dB(A)}$ higher than that made by the 8 MW boiler. At 6000 m, the noise level is likely to be: $(62 + 11.9) - 20 \log (6000/860) - 5(3) = 42 \text{ dB(A)}$. This noise might be heard at 6000 m both during the day and night. The boiler blow down operation should be conducted during the day time, avoiding especially sunrise and sunset periods. The steam blow down, relief and safety valves should be fitted with silencers such as the R2 series silencers made by Sound Attenuation Australia.

The boiler blow down operations are not daily events. They occur infrequently, have durations of perhaps 15 minutes and are not likely to generate complaints, especially if fitted with silencers.

8.3 Transformer

A 50 MVA transformer is likely to have a sound power level SWL of:
 $SWL = 74 + 14 \log MVA = 74 + 14 \log 50 = 100.8 \text{ dB(A)}$. See AS 2374.6-1994, Power Transformers, page 22.

At 6000 m the sound pressure level is likely to be:

$$SPL = SWL - 20 \log r - 8 - 6(3) = 100.8 - 20 \log 6000 - 8 - 6(3) = 17.2 \text{ dB(A)}$$

The ultimate design could consist of two transformers - perhaps 30 MVA each so that one could be taken out of service for maintenance. With two 30 MVA transformers operating together (same frequency and phase) the sound pressure level at 6000 m is likely to be 0.9 dB(A). In any case the transformer or transformers are unlikely to be heard at 6000 m.

8.4 Fuelwood Processor

The HC5400 Portable heavy duty wood recycler is typical of the equipment to be used and has been measured as generating 77 dB(A) at 61 m. Measured noise levels, taken in the field during operations, are shown on page A6. A photograph of the unit is shown on page A 7.

At 6000 m the noise level could be $77 - 20 \log (6000/61) - 6(3) = 19.1$ dB(A) where 6(3) is the 3 dB(A)/km factor. This level is below the likely day time background noise level L_{90} of 36.5 dB(A) or 20 dB(A) on a still evening. The noise is unlikely to be heard at 6000 m.

9. Construction Noise and Vibration

The contractors are expected to be acquainted with Australian Standard AS 2346-1981 "Guide to Noise Control on Construction, Maintenance and Demolition Sites".

Percussive Piling operations using 5T drop hammer could generate noise levels that may be heard at 6000 m. However, there will be attenuation due to atmosphere, topography, and the noise levels are unlikely to exceed 47 dB(A) at 6000 m.

Blasting may be necessary. Ground vibrations are unlikely to exceed the recommended maximum peak particle velocity of 5 mm/s for the effective charge per delay likely to be used in construction as opposed to quarry blasting, and at a distance of 6000 m. For example, AS 2187.2-1993 'Use of Explosives' indicates that for heavily confined blasting in far field situations, an effective charge of 3150 kg per delay may generate a peak particle velocity of 5 mm/s at 1000 m. This is a large charge. Ground Vibration due to construction is unlikely to exceed 5 mm/s, 6000 m from the blast.

10. Summary and Combined Noise Level at the nearest neighbour, 6000 m from facility

	dB(A)		
	L _{max}	L ₉₀	L _{eq}
Waste water/ reuse facility	-	6.8	9.3
Merchandising yard			
mean, log drops	19.6		
log loader			14.3
chain saw			8.9
Sawmill			
general			10.3
mean, log drops	19.6		
log loader			14.3
chain saw			8.9
Veneer Factory			
general machine hall noise			0.5
mean,log drops	19.6		
log loader			14.3
chain saw			8.9
wood fibre generation			
general			25.8
discrete noise events	32 - 37.5		
wood fired power station			
power station			20.1
transformer			0
fuel wood processor			19.1
Logarithmic total	37.7		28.4

11. Possible DPWIE Permit (Noise) Condition and Limit

11.1 Noise emissions from the activity (or activities) to which the permit relates shall be such that when measurements have been adjusted for noise in accordance with the relevant standards, the noise levels from the activity (or activities) on the land shall not exceed an equivalent continuous A-weighted sound pressure level of 40 dB(A) at any time when measured at any domestic premises in other ownership. Noise level measurements shall be taken in the presence of ambient noise normally existent in the area.

11.2 The time interval over which the noise level is to be determined shall be 15 minutes.

11.3 Where the combined level of noise from the activity (or activities) on the land and the normal ambient noise exceeds the level stated in part 10.1 this condition shall not be considered to be breached unless the noise emissions from the activity (or activities) on the land are audible.

All methods of measurement shall be in accordance with the relevant Australian Standards and the Tasmanian "Code of Practice for Sound Pressure Level Measurement".

12. Assessment of predicted noise levels against possible DPIWE noise limits

12.1 The criteria of $Leq \leq 40$ dB(A) is likely to be met.

12.2 Discrete noise events such as those made by the chipper and the banging due to logs dropped into the debarker may reach levels of 38 dB(A) on occasions.

13. Noise Mitigation Measures at I.T.P.S.

13.1 The main noise source is the large chipper. There is merit in orienting the chipper building so that there are no openings in the direction of the nearest occupied residence at 6000 m near the junction of Denison and Weld Roads. The chipper mouth should have sufficient space for a possible set of three, quarter wave tuning stubs.

13.2 Allowance should be made for possible inclusion of silencers in the power station stacks.

13.3 The mobile heavy duty recycler should be located behind a building so that the building provides a noise barrier in the direction of the 6000 m neighbour.

14. Truck Noise

The sound exposure level (SEL) of a number of log trucks travelling about 60 km/h were measured in an open area 15 m from the kerb and found to average 83.6 dB(A). The SEL is a useful concept whereby a truck pass by noise event lasting many seconds is transformed into an equal energy event of duration 1 second. The SEL can then be used to estimate the equivalent 'A' weighted sound level Leq , due to a number of trucks.

The proposal is for a wood chip truck traffic flow of $2 \times 24 = 48$ movements per day. This means that there will be 48 truck movements in 24 hours, or an average of 2 truck movements per hour. However, truck arrivals and departures may not occur at regular intervals but are likely, on occasions, to be clustered. The arrival of such trucks could follow a Poisson distribution with a mean arrival rate of 2 trucks per hour.

There are also likely to be periods where truck traffic is prohibited, or restricted, to allow for school buses, and so there could be bunching of trucks.

The equivalent 'A' weighted 1 hour sound level due to the wood chip trucks can be determined as follows:

$$Leq(1 h) = 10 \log [n \times 10^{SEL/10} + 10 \log (1/T)]$$

where n = number of trucks per hour
 SEL = sound exposure level at 15 m = 83.6 dB(A)
 T = time = 60 x 60 = 3600 seconds

therefore $Leq(1 h) = 10 \log [2 \times 10^{8.361} + 10 \log (1/3600)]$
 $= 51.0 \text{ dB(A)}$

In addition, there will be 28 truck movements carrying product between 0700 h and 1600 h. That is, 28 truck movements in 9 hours or 3.111 truck/ hour. The total trucks/ hour between 0700 h and 1600 h will be $2 + 3.111 = 5.111$. The equivalent 'A' weighted 1 hour sound level due to both the chip and product trucks will be:

$$\begin{aligned} Leq(1 h) &= 10 \log [5.111 \times 10^{8.36}] + 10 \log (1/3600) \\ &= 90.68 - 35.56 \\ &= 55.1 \text{ dB(A)} \end{aligned}$$

Over a 24 hour period, the equivalent noise level due to the trucks consists of 9 hours where $Leq = 55.1 \text{ dB(A)}$ and 15 hours where $Leq = 51.0 \text{ dB(A)}$ making $Leq(24 h) = 53.0 \text{ dB(A)}$.

Day-time noise measurements have been conducted 10 m from North Huon Road at Ranelagh (Playground). The mean of 6 one hour measurements over 2 days was $Leq(1 h) = 55.4 \text{ dB(A)}$ with a sample standard deviation of 2.3 dB(A). See pages B1 and B2.

Night time noise measurements at the same location (two 15 minute samples and one 30 minute sample) gave a mean $Leq = 34.9 \text{ dB(A)}$, see pages B3 and B4.

Page B5 gives data obtained at Glen Road and North Glen Road.

Pages C1 to C8 give the results of truck noise measurements. The time recording on page C3 shows truck pass by noise events measured at 15 m from the kerb. The mean of the maximum noise levels is 78.3 dB(A) with a sample standard deviation of 2 dB(A) for speeds of 60 km/h.

Page C4 shows spectral content of log truck noise. The features at 63 Hz and 80 Hz are due to engine noise. Page C5 shows narrow band analysis of the truck noise. Page C6 shows comparative spectra of noise of a truck using 'Jacob's' brake.

Truck noise is mainly due to three components:

- 1) engine, gearbox sound;
- 2) engine exhaust noise; and
- 3) road/ tyre interaction noise.

To reduce overall noise by say 5 dB(A), the noise of each of the three above components must be reduced by a similar amount. Present technology does not offer significant reductions in truck noise other than tunnel enclosure of the engine and gearbox. The road surfaces should be well maintained so that they are free from pot holes and in good clean, smooth condition.

15. Peak Truck Noise Levels

Recent research (Kraus, J. 1993²) has found that for vehicles greater than 12 tonnes the regression equation that fitted the data was:

$$Y = 0.138 X + 76.24$$

where X = speed km/ h,
Y = peak noise level rms

For 60 km/h $Y = 0.138(60) + 76.24 = 84.25 \text{ dB(A)}$

At 15 m the peak noise level is likely to be $84.25 - 6 = 78.25 \text{ dB(A)}$. Measurements conducted by the author at Bell Bay of maximum truck noise at 15 m gave a mean value of 78.3 dB(A) and a sample standard deviation (n = 10) of 2 dB(A). The trucks were in a 60 km/h zone.

Trucks using Tehnar retarders are quieter than trucks using Jacob brakes. For example, a descending truck using Jacob brakes generated a noise level of 66 dB(A) at a given location. Another truck, using the same route and descending, generated 50 dB(A) at the same location.

16. Truck Noise Level Criteria

The current Criteria for the noise at the facade of residential dwellings are:

$$L_{10}(18 \text{ h}) @68 \text{ dB(A)} \text{ maximum acceptable level}$$

$$L_{10}(18 \text{ h}) @63 \text{ dB(A)} \text{ maximum desirable level}$$

The lower level is a design goal, which the Tasmanian Department of Infrastructure, Energy and Resources (DIER) aims to achieve when new works are constructed.

There are no formal criteria for night time noise (2200 h to 0600 h) but the following criteria can be considered as reasonable: $Leq(8 \text{ h}) = 55 \text{ dB(A)}$, and

² Kraus, J. (1993) An Investigation of Heavy Vehicle Noise, Criffith University, Queensland.

$L_1 = 77$ dB(A), for low density transportation. Empirical traffic noise studies have shown the following relationship (Road Traffic Authority of NSW):

$$L_{10}(18 \text{ h}) = L_{\text{eq}}(24 \text{ h}) + 3.5.$$

Therefore the expected $L_{10}(18\text{h})$ is: $L_{10}(18 \text{ h}) = 52.3 + 3.5 = 55.8$ dB(A).

The 63 dB(A) maximum desirable noise level is likely to be met. These two criteria are likely to be met by the proposed schedule of truck movements.

As night-time traffic is characterised by peak noise events rather than continuous noise, the criteria could include the peak noise made by trucks as they pass. Research on intermittent noise at night (Criefahn, 1992³) has suggested that one awakening will probably be evoked in not more than 10% of the exposed people if two noises with peak levels of 59.4 dB(A), or 10 noises of 54.1 dB(A), or 30 noises of 53.6 dB(A) occur during a night.

The mean outdoor/indoor attenuation of houses for maximum noise events is 17.3 dB(A) with the window slightly open (Carter, 1992, page 52⁴). Hence, for 30 noise events through the night the outdoors noise level is $53.6 + 17.3 = 70.9$ dB(A). This noise level is likely to be exceeded for houses within about 30 m from the kerb. However, Griefahn's work suggests one awakening reaction in fewer than 10% of the exposed people. There are currently no formal criteria for peak noise levels in relation to truck traffic. The trucks should conform with the Australian Design Rule 28/01 (Table 1, page 4) in relation to truck noise limits, that is, for heavy goods vehicles ($\text{NEP} \geq 270$ KW) 87 dB(A) at 7.5 m. This is about 81 dB(A) at 15 m and 75 dB(A) at 30 m.

17. Truck induced vibrations

Traffic induced ground vibrations depend on the following: vibrational behaviour of trucks; mass of trucks; speed of trucks; tyre characteristics; roughness of road surface; and, subsoil properties. Cracks in houses can be caused by many factors, including: structural overload; shrinkage and swelling of wood framing; uneven foundation settlement; slamming of doors; washing machines (agitator frequency 1.6 Hz); conducting aerobics; temperature variations; bricks in weather board walls; water leakage; trees outside absorbing moisture and causing footings to settle; and, movement of trees in wind causing ground movement by roots. Architects in the USA have identified 40 causes for cracks other than vibration.

The Australian Road Research Board (Mr. A. E. Tynan, 1973⁵) conducted ground vibration tests at Richmond, after the collapse of the Tasman Bridge, when traffic through the town increased by about 700%. The tests showed that the ground vibrations from the traffic were safe when using the

³ Griefahn, B., (1992) 'Noise Control During Night' Acoustics Australia Vol. 20, No. 2 pp 43 47, August 1992.

⁴ Carter, N. L., (1992) 'Overnight Traffic Noise Measurements in Bedrooms and Outdoors, Pennant Hills Road, Sydney, Comparison with Criteria for Sleep', in Acoustics Australia, Vol 20, No. 2, pp 49 - 55.

⁵ Tynan, A. E., 1973, "Daniaging Effects of Ground Vibrations" Australian Road Research Board

criteria of 2 mm/s adjacent to historical buildings. His tests also included trucks travelling over purpose built 100 mm high ramps to simulate pot holes.

The author conducted vibration measurements at Richmond (Bridge Street) with the transducer set on a stone window sill of a stone cottage. The wall was 5 m from the kerb and the following mean vertical peak particle velocities (ppv) were obtained:

36 t truck, near lane 30 - 40 km/ h	1.6 mm/ s
36 t truck, far lane 30 - 40 km/ h	1.4 mm/ s
15 t truck, near lane 30 - 60 km/ h	1.3 mm/ s
15 t truck, far lane 30 - 60 km/ h	1.0 mm/ s
6 t roller pulled by tractor, near lane	9.5 mm/ s
6 t roller pulled by tractor, far lane	4.8 mm/ s

A report by Mr. Chris Nieuwhof, MIE Aust, CP Eng, FIQ, on ground vibrations at the Royal Engineers Building concluded that "no discernible vibration influences due to traffic were identified during the monitoring period' when trucks moved to and from the Boral concrete plant and container, gravel and log trucks used the Tasman Highway.

Tests conducted by the author found that locomotives weighing 92 t to 96 t are left with their engines idling at about 445 rpm, generate low frequency sound and vibrations at 7.4 Hz, 22.25 Hz and 44.5 Hz. The railway track is 10 m from the heritage building. The diesel locomotives are left idling for periods of 30 minutes or more then accelerate and move to other locations to engage in shunting activities. As far as is known, there is no damage to the Royal Engineers Building from sustained air borne or ground borne vibrations from the heavy locomotive accelerations, 10 m from the building. There are sawmills near Judbury and log trucks use the existing roads. It is therefore unlikely that vibrations from heavy log or chip trucks at distances of 10 m will cause damage to domestic buildings.

PEARU TERTS

Noise Survey C. Glen and North Glen Roads

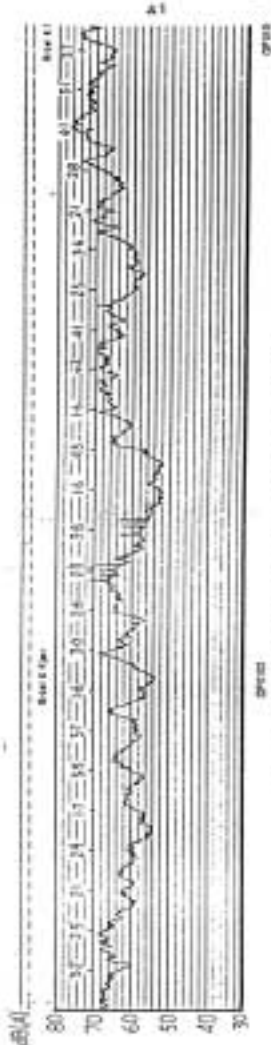
CIB(A)
1~ 1.1 1.10 T,90

Glen Road, 275 m from Huon @ghway

22.7.97	222@22.50 h	71	-53	46	29	46
23-7.97	06"9720 h	70	57	51	42	49
	1223-1253 h	74	62	49	40	50
	2225-2255 h	7@13	54	48	30	46
24.7.97	0,520~0550 h	@';6	52	42	28	39

near 61 North Glen Road

2.3.7-97	1328-1358 li	74	60	50	41	49
	2,331~0001 h	58	50	44	31	40



Time recording of wind noise in trees and shrubs, 4/4/1977.
 Microphone 1 m from wall of house (35 Falcon Rd.) with trees
 and shrubs on the lee hand reserve. Numbers on chart are spaced
 at 5 seconds and show wind speed in m/s,
 mean speed = 3.09 m/s, std. dev. = 1.2 m/s, n = 24
 Chart shows a duration of 6 minutes.

PEARU TERETS
 Consulting Engineer
 33 Falcon Rd.
 Claremont
 Tas. 7011

Climatological Summary for Grove Research Station using data from 1952 to 2000

Site Number 02000 - Locality Name - Oxnard - County for 02000 - Elev. above sea level - 107 meters - Longitude - 117.917777 - Province - CA

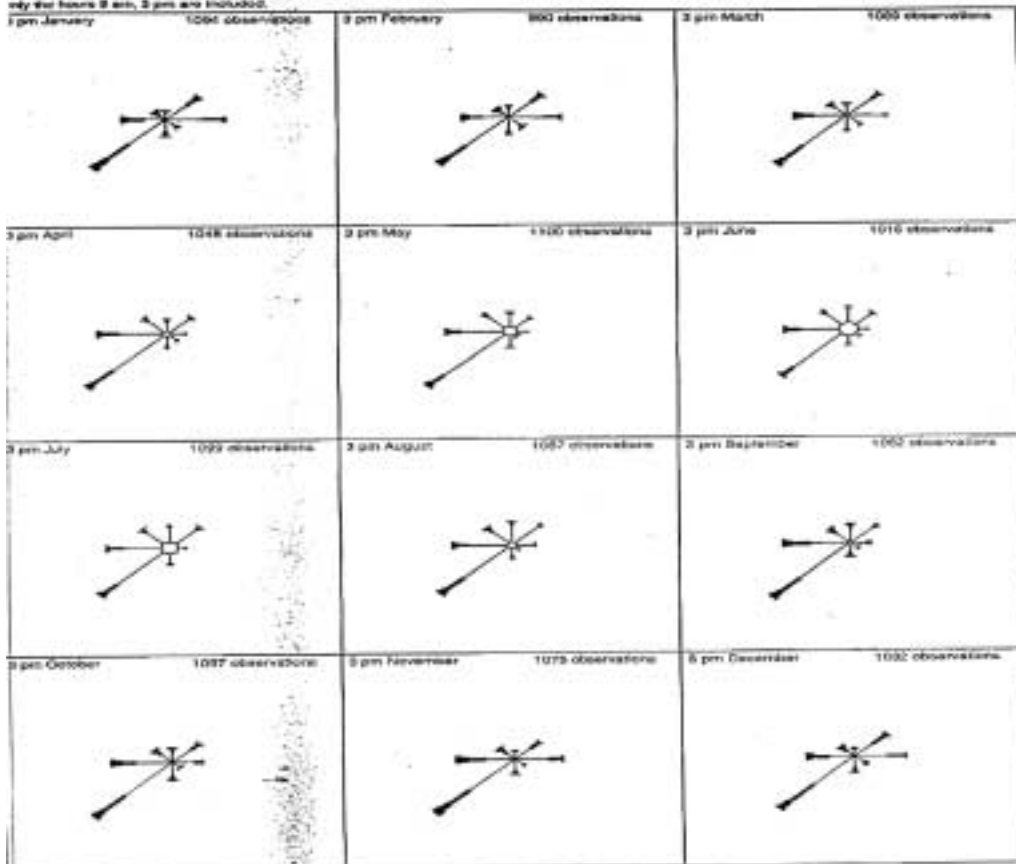
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Total of Percent
Mean Dry Season Temp (°C)	20.2	20.2	20.4	20.7	21.5	21.8	21.7	21.9	21.7	21.8	21.7	21.6	21.6	21.6
Lowest Season Temperature (°C)	0.9	3.1	5.3	7.3	9.3	11.7	13.7	15.8	17.8	19.8	21.8	23.8	23.8	17.8
Mean Number of days over 20°C	11.8	22	32	42	52	62	72	82	92	102	112	122	122	122
Mean Number of days over 25°C	0.2	0.4	0.7	1.1	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.0	5.0
Mean Dry Season Temp (°C)	9.2	8.4	7.9	8.1	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
Lowest Temperature (°C)	0.2	-0.8	-1.4	-1.9	-2.5	-3.0	-3.5	-4.0	-4.5	-5.0	-5.5	-6.0	-6.0	-6.0
Wettest Season Temperature (°C)	20.2	20.7	21.2	21.7	22.2	22.7	23.2	23.7	24.2	24.7	25.2	25.7	25.7	25.7
Mean Number of Days over 25°C	0.2	0.4	0.7	1.1	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.0	5.0
Mean Daily Wettest Minimum (°C)	4.8	4.8	5.4	5.8	6.4	6.8	7.4	7.8	8.4	8.8	9.4	9.8	9.8	9.8
Lowest Daily Wettest Minimum (°C)	-4.2	-4.8	-5.4	-6.0	-6.6	-7.2	-7.8	-8.4	-9.0	-9.6	-10.2	-10.8	-10.8	-10.8
Number of Days Wettest Below 0°C	2.1	1.7	1.3	0.9	0.5	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean Wet Season Temperature (°C)	15.2	15.2	15.3	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4	15.4
Mean Wet Season Temperature (°C)	20.4	20.7	21.0	21.3	21.6	21.9	22.2	22.5	22.8	23.1	23.4	23.7	23.7	23.7
Mean Wet Season Maximum (°C)	30	31	32	33	34	35	36	37	38	39	40	41	41	41
Mean Wet Season Minimum (°C)	10	11	12	13	14	15	16	17	18	19	20	21	21	21
Mean Wet Season Precipitation (mm)	4.8	4.7	5.2	5.4	5.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Mean Wet Season Cloud Cover (%)	4.9	4.9	4.8	5.2	5.3	5.3	5.2	5.2	5.3	5.3	5.3	5.3	5.3	5.3
Mean Wet Season Wind Speed (km/h)	195	195	195	195	195	195	195	195	195	195	195	195	195	195
Mean Wet Season Wind Direction	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Mean Wet Season Wind Speed (km/h)	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1
Mean Daily Wet Season Precipitation (mm)	5.8	4.8	3.1	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Mean Daily Wet Season Humidity (%)	77	72	5.9	4.7	3.7	3.1	2.1	1.4	1.4	2.2	3.3	4.8	5.4	5.4
Mean Number of Days with High Cloud Number of Days with Low Cloud Number of Days with Frost	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean Number of Days with Fog	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean Number of Days with Thunder	0.3	0.3	0.5	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Mean Number of Clear Days	52	48	45	47	47	47	47	47	47	47	47	47	47	47
Mean Number of Cloudy Days	9.8	8.8	9.5	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3	11.3
Mean Number of Partly Cloudy Days	17.8	17.1	16.5	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.3
Lowest Monthly Maximum (°C)	14.5	16.1	18.5	20.9	23.1	25.3	27.5	29.7	31.9	34.1	36.3	38.5	38.5	38.5
Lowest Monthly Minimum (°C)	0.2	1.8	3.2	4.6	6.0	7.4	8.8	10.2	11.6	13.0	14.4	15.8	15.8	15.8
Mean number of Days over 10°C	10.4	18.2	26.0	33.8	41.6	49.4	57.2	65.0	72.8	80.6	88.4	96.2	96.2	96.2
Mean number of Days over 15°C	1.8	7.7	14.6	21.5	28.4	35.3	42.2	49.1	56.0	62.9	69.8	76.7	76.7	76.7
Lowest number of Days over 10°C	1	5	8	11	14	17	20	23	26	29	32	35	35	35
Lowest number of Days over 15°C	1	1	1	1	1	1	1	1	1	1	1	1	1	1

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 Prepared by Climate and Convective Systems in the Australian Regional Office of the Bureau of Meteorology
 Contact us by phone on 023 4221 5842, by fax on 023 4221 2445, or by email at climate@bom.gov.au
 All data values are for 1952-2000 (not necessarily per season) over 2000; any values for the following



**Wind Roses using available data between 1957 and 2000 for
Irove Research Station**

Station Number 084060 - Locality: Grove - Collected April 1959 - Still Open
Altitude 40°39'00"S - Longitude 147°04'00"E - Elevation 80m
Only the hours 08 a.m. - 2 pm are included.



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Prepared by Climate and Forecasting Section in the Tasmanian Regional Office of the Bureau of Meteorology
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We have taken all due care but cannot provide any warranty nor accept any liability for this information.

Climatological Summary for Geveleson/Forestry Cemetery (Pd) using data from 1971 to 2000

Site Number 094121 - Location - Geveleson - Opened Jan 1971 - 588 Open - Latitude - 41°19'07" - Longitude - 87°50'37" - Elevation 25.3m

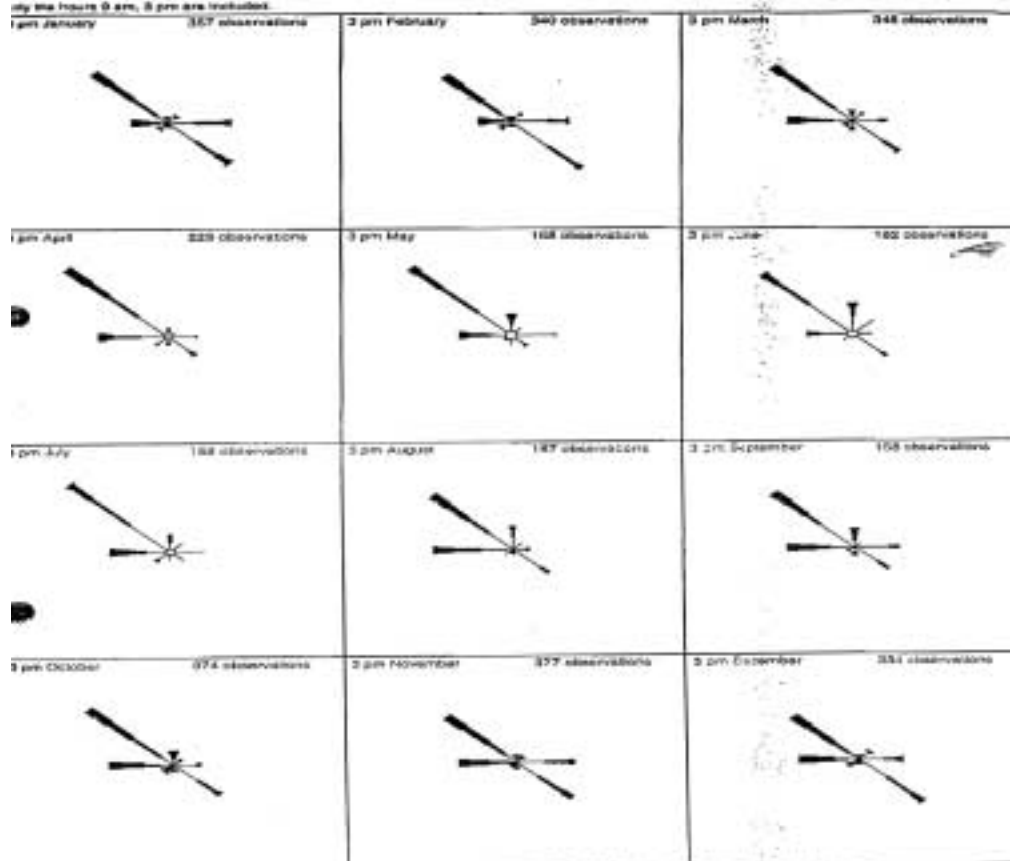
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Years of Record
Mean Daily Maximum Temp (°C)	20.5	22.7	28.1	32.2	34.9	37.2	37.0	32.9	25.9	14.7	8.2	18.8	28.8	12
Highest Temperature (°C)	28.5	32.5	38.4	43.1	45.1	47.1	47.1	42.9	37.7	21.0	14.0	28.8	38.8	14
Lowest Maximum Temperature (°C)	15.4	15.0	20.2	25.0	28.3	31.7	34.4	34.0	30.0	18.5	11.3	17.3	27.1	14
Mean Number of Days over 20°C	5.8	7.1	12.7	18.4	23.1	27.4	27.4	23.1	15.0	7.0	3.0	8.4	14.7	14
Mean Number of Days over 25°C	5.3	6.1	11.1	16.4	20.4	24.1	24.1	20.4	13.0	6.0	2.0	6.4	13.1	14
Mean Daily Maximum Temp (°C)	5.4	6.7	11.1	15.4	18.1	20.4	20.4	18.1	14.0	9.0	5.0	8.2	13.1	14
Lowest Minimum Temperature (°C)	2.4	3.1	-0.8	-5.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	-7.1	14
Highest Minimum Temperature (°C)	18.8	19.3	24.4	29.1	31.7	34.4	34.4	31.7	24.4	14.0	8.4	12.0	24.4	14
Mean Number of Days below 2°C	8.2	6.2	3.8	2.4	1.8	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	14
Mean Number of Days below 5°C	10.1	8.1	5.1	3.1	2.1	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	14
Mean Daily Temperature (°C)	10.1	11.1	16.1	20.4	23.1	25.4	25.4	23.1	18.1	11.0	6.4	12.0	18.1	14
Lowest Daily Temperature (°C)	0.1	1.1	5.1	10.1	13.1	15.4	15.4	13.1	10.1	6.0	3.1	7.4	13.1	14
Number of Days Temperature below 0°C	15.3	13.1	8.1	4.1	3.1	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	14
Mean Max Temperature (°C)	15.3	15.3	22.7	27.4	30.4	32.7	32.7	30.4	25.0	15.0	9.0	18.8	28.8	14
Mean Min Temperature (°C)	5.4	6.7	11.1	15.4	18.1	20.4	20.4	18.1	14.0	9.0	5.0	8.2	13.1	14
Mean Jan Relative Humidity (%)	79	78	69	62	59	57	57	57	57	57	57	57	57	14
Mean Jan Relative Humidity (%)	57	57	57	57	57	57	57	57	57	57	57	57	57	14
Mean Jan Cloud Cover (mm)	5.3	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	14
Mean Jan Cloud Cover (mm)	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	14
Maximum Wind Gust (mph)														14
Mean Daily Wind Run (km)	1.5	1.2	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	14
Mean Number of Days of Strong Wind	8.2	6.1	8.2	8.2	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	8.1	14
Mean Number of Days of Gales	4.5	3.3	3.5	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	14
Mean Daily Wet Evaporation (mm)														14
Mean Daily Sunshine (hours)														14
Mean Number of Days with Mist	48	48	48	48	48	48	48	48	48	48	48	48	48	14
Mean Number of Days with Frost	48	48	48	48	48	48	48	48	48	48	48	48	48	14
Mean Number of Days with Snow	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	14
Mean Number of Days with Fog	0.4	0.6	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	14
Mean Number of Days with Thunder	5.3	4.5	4.5	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	14
Mean Number of Clear Days	15.1	16.1	11.3	9.2	11.7	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	14
Mean Number of Cloudy Days	18.9	17.9	22.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	24.9	14
Mean Monthly Rainfall (mm)	101.0	113.3	124.4	152.9	156.4	156.4	156.4	156.4	156.4	156.4	156.4	156.4	156.4	14
Highest Monthly Rainfall (mm)	4.8	6.2	7.9	13.2	20.0	27.9	42.8	29.8	20.0	10.0	6.0	10.0	20.0	14
Lowest Monthly Rainfall (mm)	12.2	9.5	11.3	14.2	15.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14.2	14
Mean number of Rain Days	18	18	20	28	25	20	20	20	20	20	20	20	20	14
Highest number of Rain Days	8	4	8	8	8	8	8	8	8	8	8	8	8	14
Lowest number of Rain Days	8	4	8	8	8	8	8	8	8	8	8	8	8	14

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A5

**Wind Roses using available data between 1971 and 2013 for
Leveston(Forestry Cemetery Rd)**
 id Number 094137 • Locality: Gairvoan • Opened Jan 1971 • Still Open
 Altitude 4371000" • Longitude 149°52'00" • Elevation 55.7m
 Only the hours 9 am, 3 pm are included.





Noise Levels on HC 5400 Recycler



Figure 1. Warning: Wear Personal Protective Equipment

Caution: Always wear hearing protection when working with or near this machine. Always wear hearing protection within 100 feet (30 m) of the HC 5400 when it is running.

Avoid hearing loss! Wear hearing protection! Noise levels near a working HC 5400 can be too high for workers without hearing protection. Near the engine, standing on the ground at the Main Control Panel, or at the top of the ladder on the walkway, noise levels, measured in decibels on the A scale (dBA), can be greater than 100 dBA. This is loud enough to risk damage to hearing. Routine exposure to noise levels of 90 dBA or higher can cause permanent hearing loss. Short term exposures of two hours or more at 100 dBA can cause permanent hearing loss.

Decibel levels vary widely depending on the listener's position relative to the noise source. Some directions away from the machine are quieter than others. Obstacles, such as piled materials and building walls, can absorb or reflect sounds, dissipating or magnifying existing sound wave patterns.

Noise levels drop with greater distance from the noise source, eventually reaching safe levels. See Table 1 on page 1. The Decibel data is derived from actual field operation/measurements, but can only approximate noise conditions at your operating site. To be on the safe side, always encourage use of hearing protection when working near the HC 5400.

Table 1. Noise Level Chart

Noise Level decibels (dBA)	Distance	
	feet	meters
100 to 110	3	1
92	25	7-8
89	50	15
86	75	23
83	100	30
78	150	45
77	200	61



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HC 5400 Portable Heavy Duty Recycler

Peterson Pacific Horizontal Recyclers feature our patented grinding system, and are the safest and most productive design on the market today. Our design is often imitated, but the original is still the best.

Engine: 575 or 800 horsepower

Weight: approx. 69,000 lbs or 74,750 lbs

Length: 41 ft 8 in

Width: 10 ft

Height: 13 ft 1.5 in

Production Volume: 575 hp - up to 325 cubic yards per hour
800 hp - up to 500 cubic yards per hour

download complete HC 5400 Specification Sheet in Acrobat .PDF format 

Other Horizontal Recyclers: HC 2410 HC 2400-A HC 2450 HC 7400

<http://www.petersonpacific.com/5400.htm>

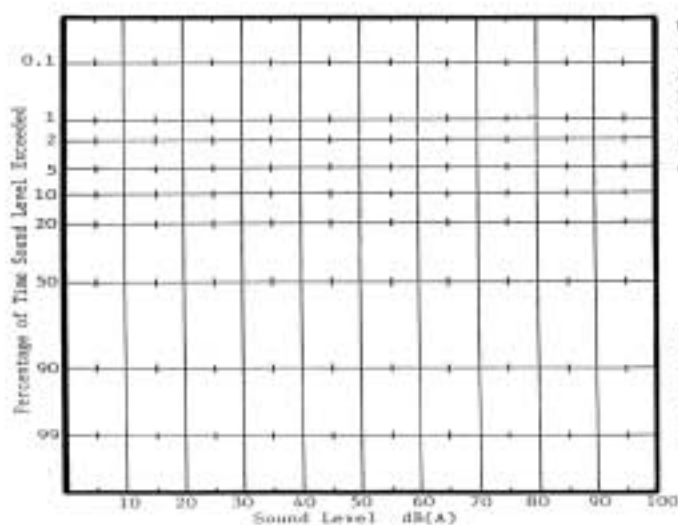
23/01/2011

STATISTICAL SURVEY ANALYSIS SHEET

Location: Play ground, 10 m from Agnes St., near junction of North
Huon Rd.

Survey Date: 21/12/2000 Officer: p.t.

Time Period	L_{max}	$L_{0.1}$	L_1	L_2	L_5	L_{10}	L_{20}	L_{50}	L_{90}	L_{99}	L_{min}	L_{eq}
1000-1100			65.5	63.0	59.5	56.3	52.5	49.8	40.8	37.3		53.1
1100-1200			63.5	61.8	58.8	56.0	52.5	47.0	41.3	37.3		52.1
1200-1300			64.5	62.8	60.0	57.8	54.8	49.5	44.0	41.8		54.1

**WEATHER**

temp. °C 17⁰
 press hPa 1008
 R.H. % 99 %
 wind speed m/s 0
 wind dir. -
 cloud 5/8

TRAFFIC 1000-1100

close lane 1 truck, 24 c
 far lane 3 tr., 21 car
 speed
 speed limit
 gradient
 surface texture

PEARU TEXTS
 Consulting Engineer

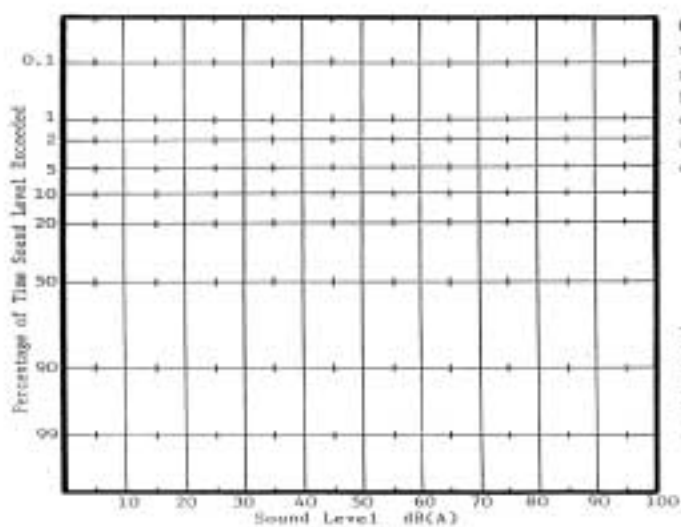
STATISTICAL SURVEY ANALYSIS SHEET

Location: As on page B 1

Survey Date: 31/1/2001

Officer: P.U.

Time Period	L _{max}	L _{0.1}	L ₁	L ₂	L ₃	L ₁₀	L ₂₀	L ₃₀	L ₉₀	L ₉₉	L _{min}	L _{eq}
1300-1400			67.0	64.8	61.5	58.0	53.5	44.3	36.5			55.1
1400-1500			69.8	67.0	62.8	58.8	54.3	46.3	39.0			58.1
1500-1600			65.8	64.0	61.3	58.3	54.8	48.3	41.0			57.1



WEATHER

temp. °C 24°
 press hPa 1015
 R.H. % 39 %
 wind speed m/s 1.6
 wind dir. 250°
 cloud 1/8

TRAFFIC

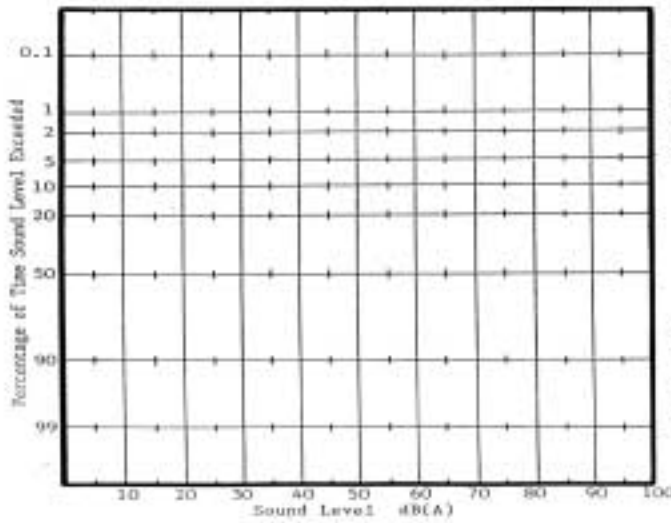
close lane
 far lane
 speed
 speed limit
 gradient
 surface texture

PEARU TESTS
 Consulting Engineers

STATISTICAL SURVEY ANALYSIS SHEET

Location: Play ground, 10 m from Agnes St., near junction of North
 Huon Rd .
 Survey Date: 4/7/2001
 Officer: P.T.

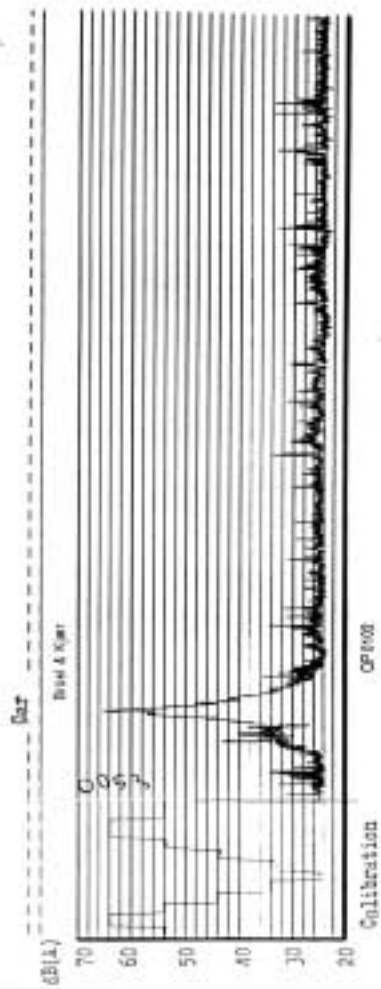
Time Period	L _{max}	L _{0.1}	L ₁	L ₂	L ₃	L ₁₀	L ₂₀	L ₅₀	L ₉₀	L ₉₉	L _{min}	L _{eq}
0053-0108 (1 car)			52.8	46.0	36.8	31.3	28.8	27.3	26.5	26.5		40.1
0115-0130 (no cars)			32.3	31.0	29.8	29.0	28.3	27.3	26.3	26.3		27.5
0140-0210 (log truck Marguerita St. 1 car Agnes St)			49.3	46.8	41.0	35.0	30.0	28.0	27.0	26.8		36.1



WEATHER
 temp. °C 4^o
 press hPa 1021
 R.H. % 100 %
 wind speed m/s 0
 wind dir.
 cloud -

TRAFFIC
 close lane
 far lane
 speed
 speed limit
 gradient
 surface texture

PEARU TESTS
 Consulting Engineer



Time recording of noise, 4/7/2001, starting at 0051 h. Microphone 10 m from
 Agnes St., in play ground, near junction of North Lane Rd., Knapelagh
 Paper speed = 0.3 mm/s.

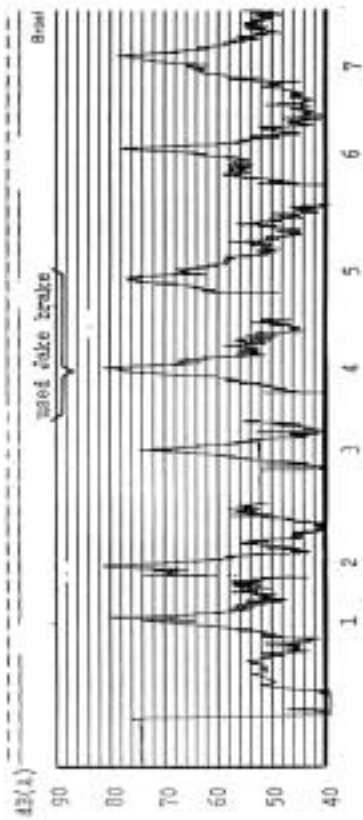


Log truck, 60 kmh zone, 15 m kerb to microphones,
road gradient = 7 %.



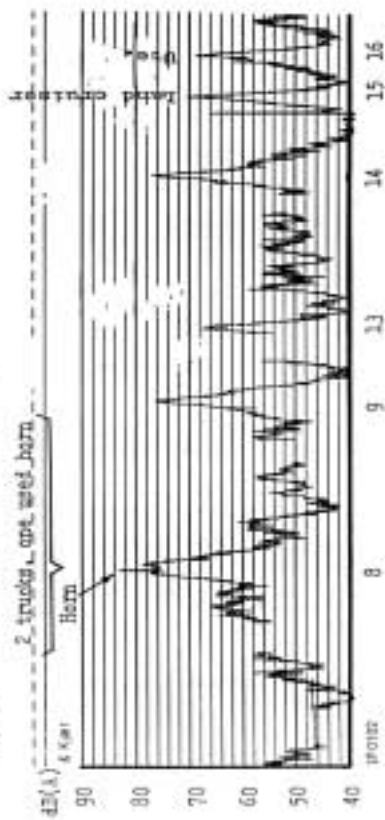
G2



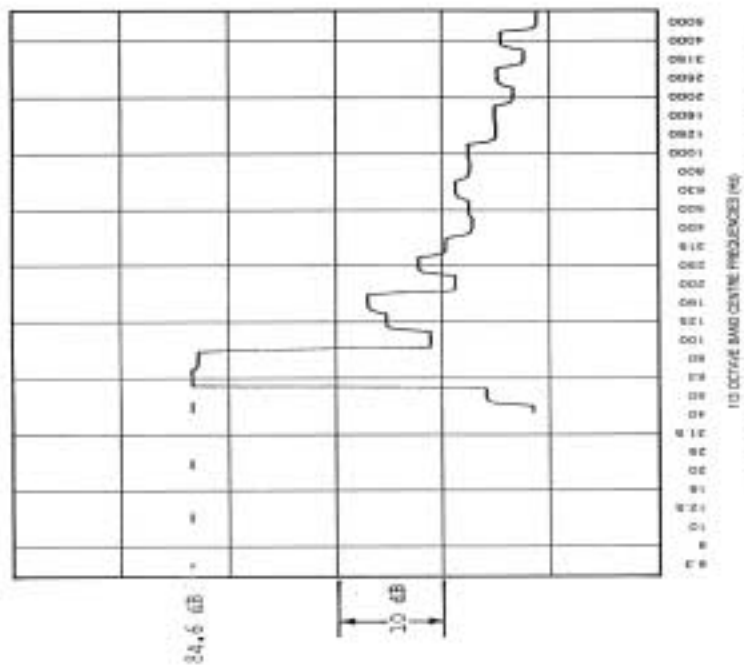


Callib. Time recording of log trucks, 15 m from kerb. Paper speed = 0.3 mm/s

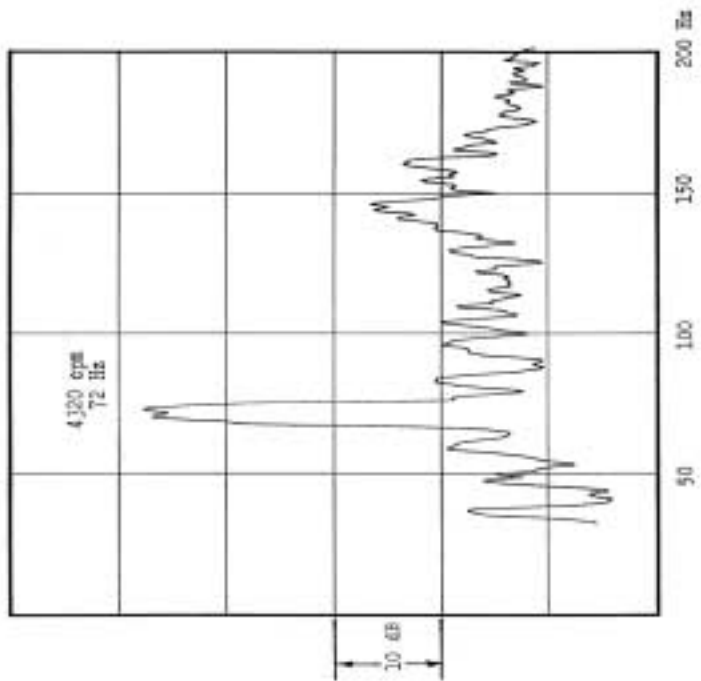
Signal

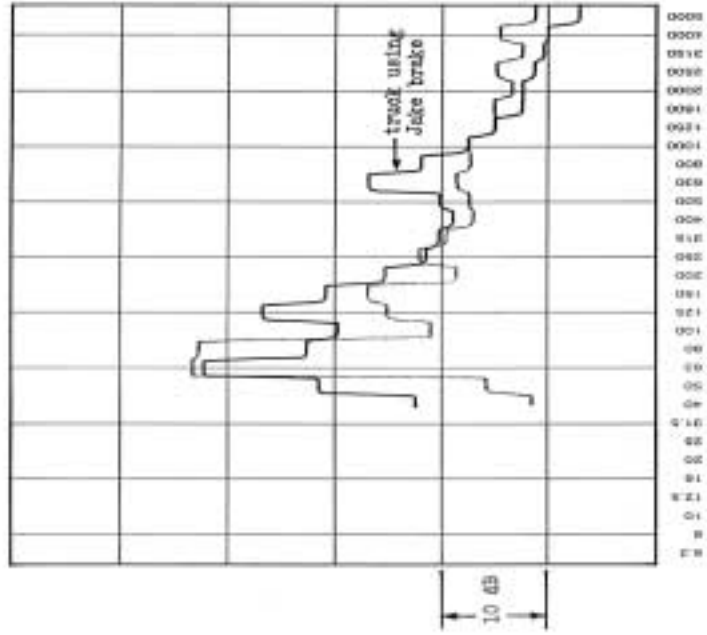


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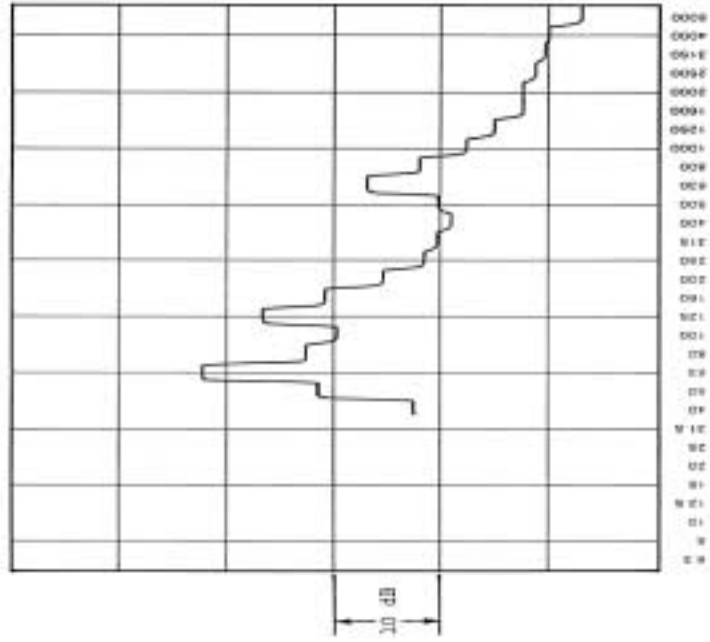


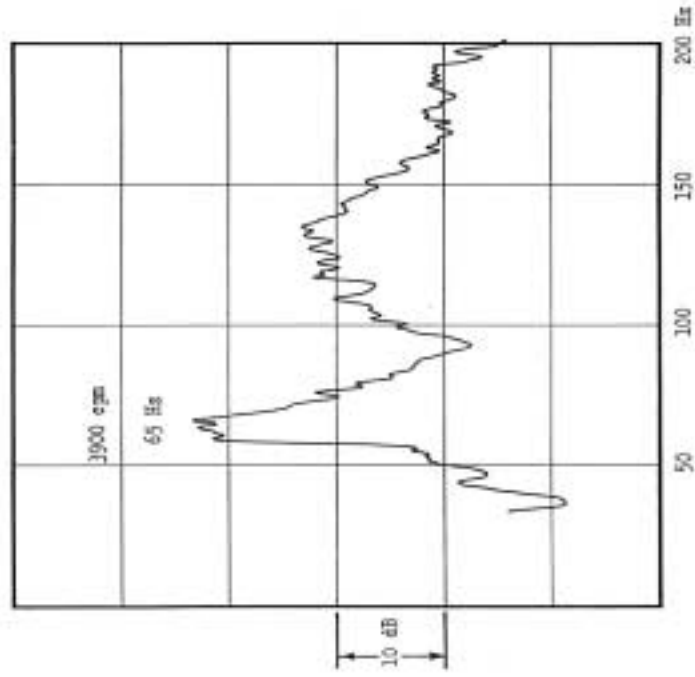
Spectral distribution of red log track at 15 m





Comparative spectra of two trucks, one using
Jake brake





Spectral distribution of noise made by yellow log truck using Jake brake.

Huon Forest District Forest Management Plan

March 2000

Forestry Tasmania

Prepared by: Huon District Forest Planning Team, and
Simon Orr, Planning Branch.

Maps prepared by: Peter McLoughlin, *Resources Branch.*

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Foreword

This Forest Management Plan applies to State forests and other land managed by Forestry Tasmania south of Hobart.

The Huon Forest District Forest Management Plan was originally approved in January 1996. Following the *Tasmanian Regional Forest Agreement 1997*, it became necessary to amend the 1996 Plan. Following two public comment periods, this amended Plan was approved by the Deputy Premier in February 2000.

For further information about this plan, please contact Forestry Tasmania, Main Road Geeveston 7116, phone (03) 6297 0012 or email: management.plans@forestrytas.com.au.

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Figure 1 Land tenure map (see web site)

Figure 2 Land use map (see web site)

1 Introduction

This Forest Management Plan deals with State forests managed by Forestry Tasmania within the Huon Forest District. The main objectives of preparing this plan are to:

- communicate the objectives of management for this area to the public;
- provide opportunities for public comment and participation in the planning process; and
- document the management prescriptions that will be applied to achieve the objectives of management, while conforming to all relevant Acts and Regulations and the *Tasmanian Regional Forest Agreement*.

The Plan is intended as a concise, readable policy document. It avoids re-stating background information available in a range of other documents published by, or available from Forestry Tasmania. It prescribes how the State forests in the Huon District will be managed at a strategic level, rather than giving a comprehensive record of operational planning. Forestry Tasmania undertakes further planning at tactical and operational levels for more specific and immediate issues. Examples of these plans are:

- annually updated wood production plans that schedule roading and timber harvesting operations over a three year period - these are often termed “tactical” plans;
- Forest Practices Plans which detail harvesting prescriptions for individual coupes - “operational” plans;
- periodically revised strategic and tactical Fire Management Plans and an annually updated Fire Action Plan; and
- plans for individual burning operations.

Members of the public are welcome to contact the Forestry Tasmania office in Geeveston to discuss operational issues in more detail and to examine current maps and copies of references and operational plans described in this Plan. A glossary of terms is included (page 35).

The Plan Area

The Huon Forest District south of Hobart is an area of some 762,800 hectares of which 128,900 hectares is State forest (see Figure 1). The components of the District to which this plan applies (herein referred to as the Plan Area) includes State forests between the Wellington Park in the north to Recherche Bay State Recreation Area to the south. East of the State forest boundary is predominantly private land while the western boundary adjoins the Southwest National Park. The Plan Area also includes State forests at Grey Mountain (proposed to become Snug Tiers Nature Recreation Area), Garden Island Creek and on Bruny Island.

The forests in the region are characteristically tall eucalypt with dense understoreys. The dominant eucalypt species are *Eucalyptus obliqua*, *Eucalyptus regnans* and *Eucalyptus globulus* with *Eucalyptus delegatensis* and *Eucalyptus nitida* occurring on higher elevations. The main forest types are mixed forest and wet sclerophyll forest. Mixed forest is dominated by eucalypts over a rainforest understorey. Common understorey species in mixed forest include myrtle, celery-top pine, sassafras, blackwood and leatherwood. Wet sclerophyll forest comprises eucalypts over an understorey shrub layer. Fire frequency has a major influence over forest composition and age, a lower fire frequency favouring the development of mixed forest.

Land allocation

The State Parliament has determined land use in the Plan Area with Forestry Tasmania being responsible for managing the State forests. The State forests will be managed for their conservation and commercial values in a sustainable manner using a multiple use philosophy.

During 1996 and 1997, Tasmania and the Commonwealth conducted a Comprehensive Regional Assessment of Tasmania's forests. Major studies of the economic, environmental, heritage and social values of the forests were carried out. Results from these studies were used in the preparation of the *Tasmanian Regional Forest Agreement (RFA)*, signed by the State and Commonwealth governments in November 1997 (Commonwealth of Australia and State of Tasmania 1997). Outcomes of the *RFA* have been incorporated into this Plan.

The implementation of the *RFA* has, under the *Regional Forest Agreement (Land Classification) Act 1998 (Tas)*, involved changes to the public land allocation in Huon District. A number of reserves have been created or enlarged as part of this process. Table 1 and Figure 1 indicate the approved land allocation, following the proclamation of the *Regional Forest Agreement (Land Classification) Act 1998* and finalisation of *RFA* related land tenure changes.

Table 1 Land allocation in the Huon Forest District

Tenure	Area (hectares)	Percentage of Huon Forest District
Private land	125,500	17
Reserves under the <i>National Parks and Wildlife Act 1970</i>	503,600	66
State forest	123,000	16
Non-allocated Crown land	10,700	1
Total	762,800	100

As at February 2000

1.1 Planning process

In January 1996, the then Minister for Forests formally approved a Forest Management Plan for Huon Forest District (Forestry Tasmania 1996). The release of that approved Plan followed an extensive consultation process and the release of a draft and an amended Plan. Once approved, the Plan was to apply for a period of up to ten years.

Following the implementation of land use and other changes resulting from the Tasmanian Regional Forest Agreement 1997, it became necessary to amend this 1997 Plan, together with the equivalent Bass and Circular Head District Forest Management Plans. The process for amending Forest Management Plans is set out in Part IIIA of the *Forestry Act 1920*.

In accordance with the Act, draft amendments for each Plan were released for comment in September 1999. Those amendments, together with changes arising from the comment period, were submitted to the Deputy Premier as the Minister responsible for the *Forestry Act 1920* in November 1999. The Minister released the Plans for a second, 50 day public comment period, during which time no submissions were received by the Minister's office.

Now approved by the Deputy Premier, this Plan will apply for a period of up to ten years from the original release date of January 2006.

Forestry Tasmania's Huon District Forest Manager will review the amended Plan each year to assess how it has performed in meeting its objectives and consider the need for any future amendments. A report of the review findings will be made publicly available.

1.2 Plan Area and State forest category

The Plan Area covered by this Forest Management Plan is shown on Figure 1. Table 2 summarises these State forest areas according to three categories.

- i) State forest included on the **Register of Multiple Use Forest Land** managed by Forestry Tasmania for a range of uses including wood production;
- ii) **Forest Reserves** managed for the values for which they were reserved (usually conservation and/or recreation); and
- iii) Other minor areas of State forest not currently included in the above categories. This include freehold land purchased by Forestry Tasmania and land not yet added to the Register of Multiple Use Forest Land.

Among the outcomes of the *RFA* is the reservation of additional forest areas to protect specific conservation values and the abolition of the Register of Deferred Forest Land. Deferred Forest Land in the Plan Area has been formally reserved or has become Multiple Use Forest Land.

Table 2 Plan Area according to State forest tenure and category

State forest category	Area (hectares)	Percentage of Plan Area
Multiple use forest land	115,800	94
Forest Reserves	5,300	4
Other	2,000	2
Total	123,100	100

As at February 2000

1.3 Administration and legislation

Forestry Tasmania has the legislative authority to manage State forest in accordance with the *Forestry Act 1920* and the *Forestry Regulations*. Management of the Plan Area is the responsibility of Forestry Tasmania's Huon District Forest Manager. The *Regional Forest Agreement (Land Classification) Act 1998* brings about the legislative implementation of land tenure changes under the *RFA*.

The *Forest Practices Act 1985*, the *Forest Practices Regulations* and the *Forest Practices Code* (Forestry Commission 1993a) regulate the conduct of timber harvesting operations.

Environment Australia, the department administering the Commonwealth *Endangered Species Protection Act 1992* (to be replaced by the *Environment Protection and Biodiversity Conservation Act 1999*), has primary responsibility for developing and implementing recovery plans under that Act. The Department of Primary Industries, Water and Environment (DPIWE) administers the *National Parks and Wildlife Act 1970*, the *National Parks and Reserves Regulations*, the *Wildlife Regulations*, the *Threatened Species Protection Act 1995*, the *Aboriginal Relics Act 1975* and the *Historic Cultural Heritage Act 1995*. These Acts and regulations are relevant for the protection of flora, fauna, features of scenic or scientific interest and Aboriginal and historical cultural sites.

DPIWE is also responsible for the administration of Crown land leases previously on non-allocated Crown land transferred to State forest under the *Public Land (Administration and*

Forests) Act 1991 and for forest leases, occupation permits and easements on land revoked from State forest as part of the *Regional Forest Agreement (Land Classification) Act 1998*.

The Resource Management and Planning System (RMPS) is a suite of legislation and policy documents that seeks to provide an integrated policy, statutory and administrative framework for sustainable resource management and planning in Tasmania. While recognising the primacy of the Forest Practices system, Forestry Tasmania also supports the principles of the RMPS. Forestry Tasmania conforms to other relevant State government policies including the State Policy on Water Quality Management (1997). A State policy on integrated management of water catchments is also under development.

The *Mineral Resources Development Act 1995*, administered by the Department of Infrastructure, Energy and Resources (DIER), controls mineral exploration and development activities within the Plan Area.

Except for the Esperance, Hopetoun and Tahune Forest Reserves, the Plan Area is subject to the provisions of the *Mineral Resources Development Act 1995* (Tas.). The majority of the Plan Area is also subject to the *Mining (Strategic Prospectivity Zones) Act 1993*. Mines and gravel pits which produce material for sale or use outside State forest require planning permits in accordance with the *Land Use Planning and Approvals Act 1993* and the *Environmental Management and Pollution Control Act 1994*. Activities on State forest not associated with forest practices may be subject to the *Land Use Planning and Approvals Act 1993* and may be subject to the provisions of Huon Valley or Kingborough municipal planning schemes.

The *Fire Service Act 1979*, administered by the Tasmania Fire Service, provides Forestry Tasmania with certain powers and responsibilities in regard to the control of fires within three kilometres of any area of State forest.

The *Water Act 1957* also applies to the Plan Area. All water in the State's streams, other than "ordinary riparian requirements" of riparian holdings, is vested in the Rivers and Water Supply Commission for re-allocation to other uses such as irrigation or domestic supplies to non-riparian holdings. The Hydro-Electric Corporation also has certain powers under the *Water Act 1957*. The *Water Management Bill 1999* will, if proclaimed, replace the *Water Act 1957*.

The *Roads and Jetties Act 1935* applies to public roads passing through State forest.

The *Agriculture and Veterinary Chemicals (Control of Use) Act 1995*, administered by DPIWE, controls the use and application of pesticides.

Tasmania or Australia is also signatory to various agreements or treaties that can potentially impact on forest management. Of particular note are the Intergovernmental Agreement on the Environment, the National Strategy for Ecologically Sustainable Development, The National Greenhouse Response Strategy and the National Strategy for the Conservation of Australia's Biological Diversity.

Any reference in this Plan to an agency, Act, Regulation, State policy or other statutory document includes reference to any subsequent renaming, revision or replacement of that agency, Act, Regulation, policy or document.

1.4 Sustainable forest management

Forestry Tasmania is committed to a process of continuous improvement in relation to sustainable forest management (forest management sustainable in environmental, social and economic contexts). Three key aspects to this work, which follow on from our published environmental policy and the *RFA* are to:

- Assist in developing a set of sustainability indicators for forest management for Tasmania consistent with agreed international standards (as developed from what is known as the 'Montreal criteria');
- Undertake a series of agreed improvements to Tasmania's forest management systems as listed in Attachment 10 of the *RFA*; and
- Develop and implement an Environmental Management System compatible with ISO 14001 standards.

This process of continuous improvement will have implications for the management of the Plan Area and for the implementation of this Management Plan.

2 Management objectives

The *Forestry Act 1920* states that as a manager of forest land with a commitment to multiple use, the objectives of Forestry Tasmania are to optimise the economic returns from its wood production activities and the benefits to the public and the State of the non-wood values of forests.

The specific management objectives for the Plan Area are to:

- supply, as part of a sustainable yield unit of production forest, a range of wood products to forest industry and the community;
- implement the outcomes of the *RFA* as they apply to the Plan Area, including those relating to the maintenance of a permanent native forest estate, maintenance of biodiversity and protection of regional conservation values;
- provide a contribution from the commercial management of the Plan Area;
- continue to develop a financially viable plantation estate, both hardwood and softwood in conjunction with the forest industry and other interested parties;
- encourage additional value adding utilisation of forest products and facilitate the establishment of new industries to achieve this;
- maintain or increase the sustainable supply of special species timbers;
- provide opportunities for other products to be harvested including nectar, essential oils, treeferns, other plant materials and firewood;
- conform to Forestry Tasmania's environmental policy, including the fulfilment of all statutory environmental standards and achievement of sustainable forest management targets;
- protect rare or threatened plant species, and plant communities or associations that are of botanical significance and maintain the extent and diversity of flora habitat sufficient to allow the maintenance of viable populations of plant species;
- protect rare or threatened fauna species and maintain an area and diversity of fauna habitat sufficient to allow the maintenance of the long term viability and range of fauna species;
- protect high value assets from fire through application of the Huon District fire management plan and through appropriate wildfire suppression;
- maintain biodiversity values;
- conserve landscape values;
- conserve places, sites and features of Aboriginal and other cultural significance;
- encourage cooperative management programs with Aboriginal people in areas of significance to them in a manner consistent with other management practices;
- conserve soil values;
- maintain geodiversity and conserve features and systems of geomorphological significance;
- maintain water values and allow for the continued supply of water for domestic and rural purposes;
- provide infrastructure for and foster tourism, recreation and visitor education consistent with multiple use values;
- facilitate the exploration and development of mineral resources found within multiple use forest land consistent with the good management of wood, cultural, natural and recreational values; and
- institute effective weed, pest and disease control.

3 Management zones

Management zones are used to indicate priorities in the achievement of management objectives.

The management zoning used by Forestry Tasmania is described as the Management Decision Classification (MDC) system (Orr and Gerrand 1998, Orr 1999). This identifies two levels of zoning. In the first level, all land is allocated to a Primary Zone that defines whether the land will primarily be managed as **Production** or Protection, or as **Conditional** land. At the second level, Special Management Zones are defined within a Primary Zone to indicate where particular emphasis will be placed on management for special values (Appendix 1 shows a listing of the Special Management Zones).

Management Decision Classification zones are applied to all land that Forestry Tasmania manages. Management Decision Classification zone mapping underlies this Management Plan. Forest operations within the Plan Area will conform to this zoning.

The *Forest Practices Code* is of key importance in setting operational standards to protect environmental values during all forest operations. Prescriptions for the protection of values relevant to an area being harvested are also detailed in Forest Practices Plans. The Management Decision Classification zones reflect additional broader objectives and may place more constraints on timber harvesting operations than does the *Forest Practices Code*.

Table 3 and Figure 2 show the area of management zones. The Protection Zone includes 5,800 hectares for which the eventual reserve land tenure is subject to the outcomes of the RPDC inquiry. The Protection Zone comprises 28,000 hectares (23 percent) of the Plan Area. There are presently no areas remaining within the Conditional Zone in Huon District.

Management Decision Classification maps for the Plan Area are held in Forestry Tasmania's Huon Forest District office in Geeveston and are available for public inspection and comment.

Table 3 Areas of management zones in the Plan Area

Management Zone	Area (hectares)	Percentage of Plan Area
Production	64,300	52
Production with additional special management	27,400	22
Production with plantations	3,400	3
Production – Total	95,100	77
Protection	28,000	23
Total	123,100	100

As at February 2000

Zoning of forest areas as Production, Conditional or Protection does not preclude their use for tourism or recreation, including the establishment of associated infrastructure.

3.1 Production Zone

The *Forest Practices Code* provisions apply for roading, timber harvesting and regeneration activities in all of the Production Zone. Areas (coupes) planned for timber harvesting have been provisionally identified and mapped.

Production Zone with Plantations Special Management Zoning

Existing plantation sites within the Production Zone are zoned as Plantation Special Management Zones. Forestry Tasmania is planning a substantial expansion of its plantation estate over the period of this Plan. This will include both freehold land purchase or lease and conversion of suitable areas of native forest. Plantations are discussed in more detail in Section 4.2.2.

Production Zone with additional special management

Within the Production Zone there are many Special Management Zones for the conservation of intrinsic values. Additional prescriptions may be applied in these Special Management Zones to ensure the special values identified are conserved. New Special Management Zones may be identified in the Production Zone as new information becomes available.

3.2 Protection Zone

The Protection Zone applies to areas where special values are conserved and wood production is excluded. Timber harvesting within this Zone is restricted to specific and infrequent circumstances involving approved research, salvage, fire fighting and safety. Salvage may include the removal of trees following the construction of roads or visitor facilities but does not include salvage of timber after wildfires. Areas within the Protection Zone include:

- Forest Reserves managed by Forestry Tasmania for their intrinsic values;
- areas managed for the protection of specific flora and fauna species, such as areas set aside surrounding wedge tailed eagles' nests;
- most recognised walking tracks in the Plan Area that will have timber harvesting excluded from their immediate surrounds for most of their length;
- known areas of high landslip potential;
- areas known to contain significant cultural heritage where timber harvesting is not compatible with site protection;
- areas of steep slopes that are very rocky or are difficult to access;
- areas that have particularly sensitive landscape values;
- wildlife habitat strips set aside to link up other areas excluded from timber harvesting to maintain an unlogged network of habitat across the Plan Area; and
- geomorphologically significant sites that have important conservation values or are hazardous to road or harvest.

The Protection Zone is part of the "Comprehensive, Adequate and Representative" reserve system identified by the *RFA* and includes both Formal and Informal Reserves. As set out in the *RFA*, forestry operations may occur up to the boundaries of Formal Reserves without the need for additional buffers. The *RFA* provides for a Code of Practice for reserve management that is currently being developed by DPIWE in conjunction with Forestry Tasmania.

The *RFA* also allows for changes to be made to Informal Reserves. Any such changes must maintain protection levels, on a regional basis, of identified values for which the Informal Reserve was established. One change that may occasionally occur is the realignment of a wildlife habitat strip to improve conservation outcomes or operational boundaries.

Changes to the zones which would ease restrictions on timber harvesting activities require the approval of Forestry Tasmania's General Manager (Forest Management) or Manager Planning. Under the *RFA*, the removal of any area from an Informal Reserve (ie any area of Protection Zone outside of Formal Reserves) must be documented for independent review as part of the five yearly review of the *RFA*.

Forestry Tasmania's Huon District Forest Manager can approve changes to Management Decision Classification mapping that further constrain timber harvesting activities. Such could be the case where additional special values are identified.

3.3 Additions to State forest

Land acquired by Forestry Tasmania in the Huon Forest District during the period of this plan will be added to the Register of Multiple Use Forest Land, zoned on Management Decision Classification maps and managed in accordance with this Plan.

4 Management prescriptions

Management prescriptions applying to management issues that occur in the three management zones are given in the following sections.

4.14.1 Adjacent land use

Figure 1 shows the broad tenure of land adjacent to the Plan Area.

The Department of Primary Industries, Water and Environment manages the Southwest National Park, Hartz Mountains and South Bruny National Parks and a range of other smaller reserves abutting the Plan Area. Most of this land is within the World Heritage Area (Parks and Wildlife Service 1999).

The boundaries of the World Heritage Area have been selected to ensure adequate protection of the integrity of the area. In accordance with the *Regional Forest Agreement*, forestry operations are permitted in areas adjacent to the boundary.

The Wellington Park adjoins the Plan Area to the northeast and is administered by the Wellington Park Management Trust. Snug Tiers, while currently State forest, is proposed to become a Nature Recreation Area.

The rest of land adjacent to the Plan Area is predominantly private freehold with a number of owners and a range of uses, mainly agriculture and forestry.

Management prescriptions

- Forestry Tasmania will consult with land managers or owners who share common boundaries with, or are in the immediate vicinity of, forestry operations during the planning and implementation of those operations in the Plan Area.
- In the interest of mutual fire safety, Forestry Tasmania will liaise with nearby property owners when planning and conducting fuel reduction burning programs.
- Forestry Tasmania requires adjacent landowners to prevent stock entering State forest. This is usually achieved through a fenced boundary. The clearance of State forest vegetation along fencelines to protect fencing will continue to be negotiated with individual landowners through the Huon District Forest Manager.
- Forestry Tasmania will continue to liaise with local government on an annual basis as part of the three year wood production planning process. This shall include consultation regarding log truck routes and volumes on Council roads.

4.2 Wood production

The State forests of the Huon Forest District have been a traditional source of a range of timber products for more than 150 years. These products include veneer logs and sawlogs, pulpwood, poles, craftwood, fence posts and firewood.

The timing and extent of timber harvesting is planned so as to result in the sustainable production of eucalypt veneer log and sawlog and the scheduled supply of special timbers. The Plan Area's sustainable yield forms about one fifth of the current statewide annual legislative commitment of 300,000 cubic metres of eucalypt veneer log and sawlog from multiple use forest land. Wood produced within Huon District makes a significant contribution to the State's economy.

An increased emphasis on regrowth forest harvesting away from mature forest harvesting has been set in place through the *Forests and Forest Industry Strategy* (Forests and Forest Industry Council 1991) and, more recently, by the *Regional Forest Agreement*.

This plan identifies and broadly defines the circumstances under which wood production may be conducted. Scheduling of operations is through an annually reviewed three year wood production plan. Operational planning is conducted through the use of Forest Practices Plans.

Timber sales are authorised by Forestry Tasmania by the issue of contracts of sale and wood supply agreements or licences. Timber harvesting operations are authorised and controlled by the issue of Forest Practices Plans and cutting approval advices. Authorisations include conditions that limit activities where necessary, so that the management objectives applying to an area are achieved.

A quality standards system is in place to ensure a high standard of operations are maintained on all State forest. This involves the *Forest Practices Code* and harvest supervision, together with regular formal reviews and monitoring of performance against a set of prescribed standards. These standards incorporate results from research and operational experience and are set out within various Silvicultural Technical Bulletins, Technical Reports, Codes of Practice, Guidelines and Manuals; those in the reference list are marked (with ❖, page 35).

The *RFA* sets ongoing targets in relation to the further improvement of forest management systems. Progress of the State and Commonwealth in relation to meeting these targets will be examined in each five yearly review of the *RFA*.

Sustainable wood production

Sustainable management for wood production requires a detailed knowledge of both timber volumes currently available and the rate at which the forest grows. This information has been derived from mapping the forest vegetation types and field assessment of the timber volumes found in each forest type.

Sustainable yield is calculated after allowance has been made for the plan's management prescriptions, non-commercial forest types, areas uneconomic to road or too steep to harvest and *Forest Practices Code* requirements such as streamside reserves. Limiting the average annual harvest to a sustainable yield ensures that continuing supplies of veneer and sawlogs are available to meet industry requirements.

Sustainable yield estimates are reviewed at five yearly intervals to take account of factors such as improving forest resource information, changing constraints on forest harvesting, plantation establishment and the incidence of major bushfires (Whiteley 1998).

Reserves established as part of the *RFA* have reduced the area of State forest available for wood production. The *RFA* supports the increased use of thinning and hardwood plantations to at least maintain current eucalypt sawlog yields despite the reduced area available for harvest. It also provides for greater certainty regarding the availability of these remaining forests for wood production. There was a review of eucalypt sawlog supply levels during 1998 (Forestry Tasmania 1998b) and further reviews are planned at five yearly intervals.

Intensification

In November 1998, the Government and Forestry Tasmania presented a vision for a world scale forestry industry in Tasmania in the coming decades. Features of this vision include the doubling of the State-owned plantation estate, development of more sophisticated log sorting and processing facilities and the fostering of a range of new value adding forest industries utilising wood fibre currently only marketable as woodchips.

4.2.1 Native forests - eucalypts

Timber harvesting

Over the 10 year period of this plan approximately 1,300 hectares of forest is likely to be harvested and regenerated each year.

Clearfelling, high intensity burning and aerial re-seeding will be the predominant timber harvesting method used in the Plan Area. In wet sclerophyll forests with a dense understorey, clearfelling and burning is required to achieve successful regeneration and reduce fuel loads after harvesting. Eucalypts require full sunlight to become established. Partial logging systems in wet sclerophyll forests create conditions under which regeneration cannot compete with retained vegetation. Long term fire hazards associated with logging slash are difficult and expensive to manage if partial logging is employed in wet forests.

Clearfelling will be carried out through either ground based or cable operations. Cable harvesting, particularly on steep terrain, minimises the environmental impacts on soils. Guidelines for cable harvesting in relation to soil type are outlined in the *Forest Practices Code*.

Cable harvesting technology will be required to access about one half of the mature forest and about one third of the regrowth forest resource.

Approximately 7 % of the forests in the Plan Area is suitable for thinning. Thinning removes a proportion of the trees in an immature stand to improve the growth of the remaining trees. Due to the nature of the terrain and ground conditions in the Plan Area, cable thinning rather than ground based thinning is desirable. Commercial thinning results in a pulpwood harvest at about 25 years of age and can yield sawlogs from the retained trees at approximately 65 years of age compared with 80 years or longer in unthinned stands.

Management prescriptions

- Further downstream processing of forest products will be encouraged by supporting viable industries, while also encouraging competition and new entrants.
- Timber harvesting operations will be planned and scheduled from the Plan Area as a contribution to the sustainable cut of eucalypt veneer logs and sawlogs in the State. In scheduling coupes for harvest, consideration will be given to the market requirements for various wood products that those coupes contain.
- All timber harvesting, regeneration and roading operations will meet, as a minimum, the requirements of the *Forest Practices Code*.
- Harvesting and regeneration will be carried out within the appropriate silvicultural guidelines (Forestry Commission 1990b, 1990c, 1991b, 1991c, 1991d, 1992b, 1993e and 1994b and Forestry Tasmania 1998b and 1998c) and with subsequent research findings.
- Eucalypt thinning will be considered where a sawlog growth increase is achievable and where thinning is operationally and economically feasible (Forestry Tasmania 1998a).
- Other forest products will be made available under licence or contract as dictated by demand and availability.

- Forests in the Protection Zone will not be available for harvesting during the term of this plan, with the exception of salvage of timber cleared through approved construction activities including exploration or development of mineral resources, road construction, transmission line easements and water impoundments; and harvesting as part of a research project.
- Special Management Zones within the Production Zone will be managed to conserve the special values or uses that have been identified within them.
- Research priorities for wood production in the Plan Area include:
 - i) refining prescriptions for silvicultural options in wet forests;
 - ii) determining expected growth rates for regeneration up to 10 years in age on a range of sites; and
 - iii) liaison with the Browsing Damage Management Group to evaluate alternative methods for reducing animal damage in areas of silvicultural regeneration;

4.2.2 Native forests - special species timbers

Continuing supplies of special species timbers are provided for in accordance with the Forests and Forest Industry Strategy. Three Special Timbers Management Units, totalling 7,900 hectares, have been specifically identified to support this strategy in the Huon District. Together with Special Timbers Management Units in other Forest Districts, these will ensure a sustainable supply of special species timbers that will continue to provide resources for this sector of Tasmania's forest industry.

Areas of regenerated forest within the Huon District will also be assessed over time, to determine if they are suitable to be managed for special species timbers, in addition to the three Special Species Timbers Management Units that have already been identified. These assessments will be based on the distribution of special species timbers that have regenerated in these areas, together with other management objectives for the forests.

Detailed maps of the three Special Species Timbers Management Units are available for inspection at the Huon District Forestry Office in Geeveston.

Special timbers will also be harvested in conjunction with the supply of eucalypt veneer logs and sawlogs from areas of Multiple Use Forest other than Special Timbers Management Units. This source will augment the sustainable supply from Special Timbers Management Units.

Special timbers craftwood is made available to the community through Forestry Tasmania's special timber retail business "Island Specialty Timbers" in Geeveston and, for those who wish to collect their own craftwood from the forest, through the issue of licences for craftwood collection from the Huon District office.

Management prescription (additional to those for native eucalypt forests)

- Special timbers production will be maximised from forest harvesting operations, subject to demand.

4.2.3 Plantations

The Plan Area has some areas of excellent climate and soils to grow plantations for wood production. By November 1999, the hardwood plantation estate in the Plan Area was 2,600ha with *Eucalyptus globulus* and *Eucalyptus nitens* the main species planted.

Forestry Tasmania intends to substantially expand its plantation estate across the State during the life of this Plan. The primary objective of this plantation establishment will continue to be the

production of sawlogs and veneer logs for high value solid timber products. As part of this expansion, Forestry Tasmania expects that over the next ten years its hardwood plantation estate in the Plan Area will increase, on State forest and purchased or leased land, to approximately 13,000 ha. Additional blackwood plantations may also be established in the Plan Area.

Joint ventures with industry and other interested parties are being established as one means of expanding the plantation estate. In 1999, Forestry Tasmania entered into a joint venture arrangement with GMO Renewable Resources to manage and develop softwood plantations in northern Tasmania to world scale.

Forestry Tasmania is strategically planning the extent and distribution of plantations to ensure biodiversity requirements are maintained (see section 4.3.1 Biodiversity). Bio-regional policy on maintaining a permanent native forest estate is outlined in Attachment 9 of the *RFA*. These policies will be applied in the Plan Area. Where plantations are developed on State forest, Forestry Tasmania will retain a network of native forest areas to provide continuity of natural habitat, consistent with this policy. Further information regarding the specific areas of proposed plantation development is available from the Huon District office in Geeveston, and from Forestry Tasmania's annually updated Three Year Wood Production Plan.

Forestry Tasmania currently prefers plantation sites to have slopes of less than 15 degrees (27 percent), receive greater than 800 millimetres of annual rainfall, be at an altitude no greater than 800 metres and to be on highly productive soils. The *Plantation Handbook* (Neilsen 1990) has been Forestry Tasmania's standard plantation establishment reference but is now significantly outdated. Subsequent research findings and Forestry Tasmania policy also govern current procedures. Hodgson (1999b) sets out procedures for aerial fertilising of plantations.

Management prescriptions (additional to those for native forests)

- Potential plantation sites will be identified from the Production Zone of the Plan Area. Sites will be assessed for land capability, suitability for plantation and availability. The *Plantation Handbook* (Neilsen 1990) and strategic biodiversity planning will be used to guide site selection for plantation development. New plantation areas will be identified in the three year wood production plan.
- Silvicultural regimes will be further developed to increase the quantity and quality of products from the plantations, to optimise the returns to the grower and to purchasers.
- Areas zoned for Special Management for conservation values will not normally be considered for plantations.
- Joint ventures with industry and other interested parties will continue to be negotiated as a means of expanding the plantation estate.

4.3 Natural values

4.3.1 Biodiversity

The range of geology, soils, climate and vegetation within the Huon District creates a diversity of habitat which supports a large variety of plants and animals both terrestrial and aquatic.

Tasmania is divided into 11 Nature Conservation Regions on the basis of biogeography (Forestry Commission 1993c) and eight Interim Biogeographic Regionalisation Areas (IBRA) (Thackway and Cresswell 1995). The Plan Area falls within Nature Conservation Region 10b and IBRA region 8 (D'Entrecasteaux).

Forestry Tasmania is active in strategic planning for biodiversity conservation. At a species level, specific research and planning for management of threatened species is carried out. This planning examines management of a species across its range and aims to integrate management with prescriptions and planning for other species, reserves and biodiversity issues in the locality. Management agreements for threatened species are being developed in

collaboration with the Forest Practices Board and the Department of Primary Industries, Water and Environment.

Regional biodiversity is maintained through the Comprehensive, Adequate and Representative (CAR) reserve system on public land. In Huon District, this includes an extensive system of statutory reserves which includes National Parks, State Reserves and Forest Reserves. This system is complemented by Informal Reserves on State forest and other areas set aside from wood production for operational reasons or to protect natural and cultural values.

Biodiversity values are maintained within the Production Zone through procedures including the dispersal of logging coupes and the establishment of streamside reserves and wildlife habitat strips. Special Management Zones for flora and fauna also recognise special values requiring additional protection.

Eucalypt biodiversity within native forests is maintained through natural regeneration of the species present and systematic procedures for collection and sowing of seed, usually from the same area as is being harvested (Forestry Commission 1991b). Other species present prior to logging generally either recolonise freely from adjacent areas or have seed that are retained on site following burning and germinate of their own accord (Hickey 1994).

Principles for ensuring the integrity of the native forest estate are applied in areas being considered for plantations. Corridors of native forest, including protection and production forest, are identified to ensure a representative range of forest types are retained in areas of plantation development. This assists in minimising the fragmentation of native forest. Work is also underway examining the potential for the spread of plantation species as a weed into adjacent native forest.

Previous siting of plantations is also being reviewed. Often older plantations incorporate areas that would now be excluded from planting and protected as streamside reserves. Where cost effective these areas are now regenerated with native species following the harvesting of plantations.

Harvesting mixed forests on an 80 to 100 year rotation could potentially cause a shift towards wet eucalypt forest with reduction of rainforest understorey species. Hickey (1994) examines the recolonisation of mixed forest coupes with species present before harvesting. He concludes that after a single harvest, clearfelled mixed forest will successfully regenerate to mixed forest, and ultimately to rainforest. He suggests the critical factor in the perpetuation of mixed forests may be rotation length rather than regeneration treatment. This is a long term issue that will require further research.

The Warra Long Term Ecological Research site has been established in the Huon District as one of a number of sites around Australia that will be used to develop and test sustainability indicators for Australian commercial forests (Packham 1995). Taylor (1999) overviews other long term ecological monitoring sites within Tasmanian forests. A long term program of floristic monitoring within the wood production forests of north west Tasmania has been initiated by Walsh (1994). This should provide an important performance indicator of the ecological sustainability of native forest management for wood production.

For more information on biodiversity see Sections 4.3.4 Flora and 4.3.5 Fauna and also the *Regional Forest Agreement*.

Management prescriptions

- Existing planning and management practices for the maintenance of biodiversity will continue to be used to complement the CAR reserve system.
- Forestry Tasmania will implement the measures for maintaining biodiversity identified in the *RFA*.

4.3.2 Old growth forest

Within the *RFA*, old growth forest is defined as “ecologically mature forest where the effects of disturbance are now negligible”. The *RFA* incorporates old growth forest within the CAR reserve system to an agreed level and allows harvesting of areas outside the reserve system. This includes protection of some communities outside reserves where prudent and feasible.

In total, 21% of the forests in the Plan Area are assessed as being oldgrowth and some 38% of this is within the Protection Zone. Statewide, some 68% of all existing oldgrowth forest has been reserved.

Oldgrowth communities within Forest Reserves in the Plan Area are listed in Appendix 2. There are no old growth communities requiring additional protection under the *RFA* outside of reserves, as is the case in the other Forest Districts.

Management prescription

- Old growth forests within reserves will be managed to maintain old growth values in accordance with the *RFA*.

4.3.3 Wilderness

An inventory of wilderness in Tasmania has been produced as part of the Comprehensive Regional Assessment (PLUC 1997). This identified high quality wilderness areas. Almost all high quality wilderness in the Huon Forest District is in the World Heritage Area and adjacent National Park. High quality wilderness exists within some Informal Reserves on the boundary of the World Heritage Area.

Ninety-four percent of high quality wilderness areas in Tasmania Statewide are reserved from timber harvesting. This level of reservation is in excess of the Commonwealth's reserve criterion.

Management prescription

- Reserves with high-quality wilderness areas as defined by the Regional Forest Agreement will be managed to maintain their wilderness values in accordance with the Regional Forest Agreement.

4.3.4 Flora

Information on the flora and vegetation types occurring in the Plan Area is contained in a variety of publications. They include Williams (1987), Duncan and Johnson (1995) and Smith and Banks (1993). Some facets of the vegetation have been studied in detail, for example successional processes on the Hogs Back Plain (Podger *et al.* 1988) and the distribution and ecology of several species (Potts 1989 and Barker 1992).

Attachment 6 of the *RFA* identifies forest communities to be protected by prescription, where prudent and feasible, outside Formal and Informal Reserves. None of these communities are found in the Plan Area.

Reserves within the Huon Forest District assist in protecting flora values. Areas of State forest, designated as Special Management Zones are managed to maintain specific flora conservation values.

Schedule 1 of the Commonwealth *Endangered Species Protection Act 1992* lists Australian plants considered to be vulnerable, endangered or presumed extinct. No plant species listed on the Schedule are known to occur in the Plan Area. Rare and threatened higher plants in

Tasmania identified in the *Threatened Species Protection Act 1995* includes 20 species found in the Plan Area. This list is larger than the Commonwealth's because it includes species that are rare, in addition to those that are vulnerable or endangered. A number of species on this list occur in the Plan Area and will be protected as part of planned forest management. An example is the slender tree fern (*Cyathea cunninghamii*) which is protected using Special Management Zone where it occurs. The *Forest Practices Code* requires that specialists from the department administering the *National Parks and Wildlife Act 1970* be consulted if a rare or threatened species is known to occur in a proposed operational area, in order that appropriate conservation prescriptions can be adopted.

A *Forest Botany Manual for Nature Conservation Region 10b* (Duncan and Johnson 1995) has been prepared. The manual assists forest managers to identify and manage areas containing species or communities of conservation significance. The *Forest Botany Manual* also provides advice on management of native vegetation and control of introduced species and diseases. Information on the management of introduced species and diseases is also contained in the *Pests and Diseases Management Plan for State Forests in Tasmania* (Wardlaw 1990). Some exotic species and fungal diseases in the Plan Area have the potential to affect production and conservation values (see Section 4.12 Pests and diseases).

Management prescriptions

- Forestry Tasmania will participate in the development and implementation of any Recovery Plans for threatened species listed in Attachment 2 (Part A) of the *RFA*. Management prescriptions or actions applicable to the Plan Area identified in agreed Recovery Plans or Threat Abatement Plans will be implemented as a matter of priority in accordance with the *RFA*.
- The Forest Botany Manual for Nature Conservation Region 10b together with the results of relevant subsequent research will form a further basis of management for flora conservation within the Plan Area. Management Decision Classification zoning, operational boundaries or management will be modified where needed to protect identified plant species and communities of particular conservation significance.
- Research into the ecological processes and flora occurring in the Plan Area and studies designed to give information for management for conservation purposes will be encouraged.

4.3.5 Fauna

Regional fauna conservation objectives in the Plan Area will be achieved through a combination of Formal Reserves, habitat reservation and management in unreserved areas. Regional fauna conservation objectives are also met in part through the adjacent Southwest National Park and other reserves under the *National Parks and Wildlife Act* such as National Parks, State Reserves and Nature Recreation Areas.

Wildlife habitat strips link Formal and other Informal Reserves managed by the District and other areas outside the Plan Area to create a network of reserved fauna habitat. The *Forest Practices Code* requires the conservation status of threatened species to be considered in the preparation of Forest Practices Plans. The *Threatened Fauna Manual for Production Forests in Tasmania* (Forest Practices Board 1998) identifies areas known, or likely, to contain threatened species or their preferred habitat and recommends management actions for the species. The Code also sets out routine measures to address the maintenance of habitat diversity. Some of these measures are dispersal of coupes harvested each year, streamside reserves, wildlife habitat strips, wildlife habitat clumps within coupes and partial logging techniques. The Tasmanian *Threatened Species Protection Act 1995* sets out requirements for public authority management agreements, Recovery Plans and Threat Abatement Plans for protection of threatened species.

Within the Production Zone areas have been identified by Forestry Tasmania, in consultation with the Forest Practices Board and the Parks and Wildlife Service, as habitat of high importance for particular threatened species (Taylor 1991) and these have been designated as Fauna Special Management Zones. In these areas conservation of fauna is given a higher priority than wood production and logging is constrained or excluded to meet the conservation requirements of the particular species.

Attachment 2 (Part A) of the *RFA* identifies priority fauna species for protection, based on species listed in the Schedules of the Commonwealth *Endangered Species Protection Act 1992* and Tasmanian *Threatened Species Protection Act 1995*.

There are four vertebrate species occurring in the Plan Area listed on Schedule 1 of the *Commonwealth Endangered Species Protection Act 1992*. They are the forty-spotted pardalote (*Pardalotus quadragintus*), swift parrot (*Lathamus discolor*), eastern quoll (*Dasyurus viverrinus*) and eastern barred bandicoot (*Perameles gunnii*).

All known habitat of the endangered forty-spotted pardalote known to exist in the Plan Area is contained within the Protection Zone (Brereton *et al.* 1997).

The vulnerable swift parrot in the Huon Forest District is largely found in coastal areas. The birds feed on nectar from flowering blue gums (*Eucalyptus globulus*). A small number of pairs breed in the Plan Area on South Bruny Island. Management prescriptions are provided by Brereton (1997).

The two mammal species, eastern quoll and eastern barred bandicoot, both listed as vulnerable on Schedule 1 of the Commonwealth Act, are regarded to be abundant and widespread at a State level (Vertebrate Advisory Committee 1994, Jones and Rose, 1996).

The Tasmanian *Threatened Species Protection Act 1995* lists the following species found within the Plan Area.

Nesting habitat for the rare grey goshawk (*Accipiter novaehollandiae*) is found in the Plan Area and the known nesting sites are mapped (Brereton 1993). Streamside vegetation is an important nesting habitat for the grey goshawk. The *RFA* flags this species as requiring further research. In the interim, management prescriptions are provided by Forest Practices Board (1998).

The Tasmanian subspecies of the wedge-tailed eagle (*Aquila audax fleayi*) occurs in the Plan Area and the known nesting sites are mapped. It is listed as vulnerable under the Tasmanian legislation, but nationally it is listed as endangered (Garnett 1992). This species is highly sensitive to disturbance whilst nesting. Areas that are likely to provide potentially suitable nesting sites are identified before roading or harvesting occurs. Ground surveys of these areas are carried out, where ground visibility permits, in advance of planned forestry operations. Aerial surveys are sometimes used to supplement ground surveys. Mooney and Holdsworth (1991) provides an important reference and source of management guidelines for this species.

The vulnerable Australian grayling (*Prototroctes maraena*) has been recorded from the Huon River. This species may occur in other river localities in the Plan Area. Management involves maintaining water quality and streamside reserves and ensuring unimpeded access between freshwater and marine habitats.

The vulnerable log dwelling Mount Mangana Stag Beetle (*Lissotes menalcas*) is found in the Plan Area in wet forests both on mainland Tasmania and on Bruny Island (Meggs and Taylor *In press*).

A rare land snail *Roblinella agnewi* may occur in the eastern region of the Plan Area.

The rare caddisfly *Tasimia drepana* occurs in parts of the Huon River in the Plan Area.

The rare cave harvestman *Hickmanoxyomma cavaticum* is found in caves around the Hastings and north Lune areas.

Management prescriptions additional to those provided in the *Forest Practices Code* may be required for the Australian Grayling, *Roblinella agnewi* and *Tasimia drepana* and some other invertebrate species.

The *Wildlife Regulations 1971* govern the collection and trading of fauna and fauna products. Feral cats (*Felis catus*) and a number of other introduced species occur widely in the Plan Area as pest species.

Management prescriptions

- Forestry Tasmania will continue to develop strategic management plans for selected threatened fauna species including, where appropriate, public authority management agreements with the Department of Primary Industries, Water and Environment.
- Forestry Tasmania will participate in the development and implementation of any Recovery Plans for threatened fauna species listed in Attachment 2 (Part A) of the *RFA*. Management prescriptions or actions applicable to the Plan Area identified in agreed Recovery Plans or Threat Abatement Plans will be implemented as a matter of priority in accordance with the *RFA*.
- The Forest Practices Board's Threatened Fauna Adviser expert system, the booklet *Fauna Conservation in Production Forests in Tasmania* (Forest Practices Board 1998), the *Forest Practices Code* and other relevant research results will form the basis of management for fauna conservation within the Plan Area. Management Decision Classification zoning, operational boundaries or management will be modified where needed to protect identified animal species of particular conservation significance. Regional fauna populations will be maintained by a combination of reservation and off-reserve management, including a range of wood production techniques.
- Surveys will be undertaken in light of the Forest Practices Board advice in areas known or suspected to contain fauna species of conservation significance.
- Planned coupes and roadlines with habitat conducive to the presence of wedge tailed eagles nests will be searched for such nests prior to harvesting. A minimum area of 10 hectares will be set aside around any viable wedge-tailed eagle nest found in State forest in the Plan Area. Any forest operations within 500 m of a nest will also be timed to minimise disturbance during the breeding season (August-January) while any disturbance within one kilometre uphill from a nest will, as a minimum, be kept out of sight of the nest during this period.
- If introduced fauna are identified as a management problem, Forestry Tasmania will develop programs for their control, in cooperation with other land managers and responsible agencies.

4.3.6 Geoconservation

There is a range of landforms, geomorphic systems and geological features in the Plan Area. Understanding of the geomorphology of the area is encompassed within two main reports.

The Tasmanian Geoconservation Database compiled as one of the studies leading up to the *RFA* (Dixon and Duhig 1996) identified 28 features located at least partially within the Plan Area. Of these, the Exit Cave - D'Entrecasteaux Valley Karst Area has been assessed as being of outstanding world significance. The Hastings - Upper Creekton Rivulet Karst and Lune River Area Jurassic basalts and Gemfield association are assessed as being outstanding at the National level. The significance of eight sites is not identified. Of the 28 features, 21 are potentially sensitive to forestry activities such as road construction and clearing and two are sensitive to souveniring.

A geomorphic inventory of the area provided by Sharples (1996) identifies additional sites on State forest and also makes a systematic assessment of their sensitivity to forestry operations. Eleven are included in the Protection Zone, 23 in Geomorphological Feature Special Management Zones and eight are robust and require no additional special management. Additional outstanding features in the Plan Area, as identified in this report, include unusually rich fossil coral beds, plant fossils including the largest fossil tree known in Tasmania and possible evidence of glaciation to sea level and interfingering marine deposits.

The sensitivity of important geomorphological sites vary, as do their management implications, and a variety of strategies is employed that range from minimal if any intervention for robust large scale features, to full reservation and protection of vulnerable and small scale sites. Harvesting operations are planned with reference to known sites of significance to ensure they are appropriately managed. In addition to forestry operations, recreational and research use of land with significant geomorphology create environmental impacts that need to be managed.

Guidelines for the management of geomorphological values on State forest are set out in Kiernan (1990).

Management prescriptions

- Planning for forest operations and other works within State forest will include consideration of known and potential geomorphological features potentially affected by such works.
- Management prescriptions will be drawn up to conserve identified geomorphologically and geologically significant features.

4.3.7 Soils

Soils are the basis of forest growth. A guide to Tasmanian forest soils (Grant *et al.* 1995) describes characteristic soils of the Plan Area. Guidelines for the conservation and management of soils on State forest are found in Brown and Laffan (1993).

The *Forest Practices Code* provides interim landslide threshold slope angles for soils developed from rock types which are known to be susceptible to landslides. An assessment by a soils expert of areas with slopes greater than the threshold slope angle with respect to landslide hazard is required before timber harvesting can proceed.

Management prescriptions

- During the preparation of Forest Practices Plans soil erosion hazard will be assessed and appropriate soil conservation techniques will be applied as prescribed in the *Forest Practices Code* and Brown and Laffan (1993).
- Where the majority slope of a planned timber harvesting area is greater than 15 degrees (27 percent), Forestry Tasmania will carry out surveys to determine areas of high landslip potential.
- Planned roadlines will be assessed with regard to their landslip potential prior to commencement of any road works. Road alignments will be located away from known areas of high landslip potential.

4.3.8 Landscape

Forestry Tasmania's Visual Management System has been designed to safeguard forest landscape values. The system is based on detailed mapping that shows the sensitivity of the forest landscape to alteration. There are three landscape priority zones which give the level of importance of each area of the landscape.

Maps showing the application of the Visual Management System within the Plan Area are available for public viewing in Forestry Tasmania's Huon Forest District office in Geeveston. Special management zones identify areas where the major priority for management is the protection of existing landscape values.

Forestry Tasmania's landscape policy and visual management guidelines are documented in *A Manual for Forest Landscape Management* (Forestry Commission 1990b).

Management prescriptions

- The impact of a timber harvesting operation on the landscape will be considered during the preparation of Forest Practices Plans. This will involve the analysis of such aspects as slope of the land, soil colour, forest type and screening potential.
- Forestry Tasmania will undertake landscape planning when preparing Forest Practices Plans in that part of the Production Zone containing Special Management Zones identified for their landscape values. Particular consideration will be taken of visual location, coupe shape and size, harvesting method and timing of harvesting of coupes.

4.3.9 Water quality and supply

The Plan Area forms part of the water supply catchment for a number of rural communities and towns in the Huon Forest District. It also provides water to adjacent rural properties. There is a need to maintain water quality in all catchments and watercourses and Forestry Tasmania conforms to the State Policy on Water Quality Management (1997). Aquaculture in the Huon is a valuable export industry and is dependent on the maintenance of clean water.

The taking of water from streams is regulated by the *Water Act 1957*. The occupation of State forest (including occupation for water intake and supply facilities) requires an appropriate permit, lease or easement granted by Forestry Tasmania. Forestry Tasmania keeps a register of water intake points for reference when undertaking detailed operational planning.

Owners of private property with water intake and supply facilities on streams which originate from catchments within the Plan Area are encouraged to register their location with Forestry Tasmania so that they can be considered during operational planning.

Forestry Tasmania routinely monitors the water quality in major streams in the Plan Area.

The *Forest Practices Code* sets out a number of prescriptions and guidelines to protect water values during forest operations. These include watercourse protection through streamside reserves and guidelines for timber harvesting in town water supply catchments.

Timber harvesting affects the amount of water flowing in streams, with an increase immediately after harvesting, and a decrease while the new forest is young and fast growing. The impact from timber harvesting on water quantity is minimised by dispersing coupes over different catchments and by the network of areas excluded from timber harvesting.

Strict procedures apply to the use of herbicides and other pesticides to ensure that water quality is maintained (Forestry Commission 1994a). Hodgson (1999a) sets out the technical procedures used by Forestry Tasmania for water sampling. Forestry Tasmania is committed to research into alternative methods of weed and pest control.

Management prescriptions

- Forestry Tasmania will minimise the effects of management activities on water quality within the Plan Area by ensuring that Forest operations conform with the *Forest Practices Code*.
- Pesticides will be used in accordance with the Pesticide Application Manual (Forestry Tasmania 1994a) and Hodgson (1999b).

- Forestry Tasmania will continue to issue permits, leases or easements for water intakes and supply facilities on State forest where appropriate.
- Forestry Tasmania will consider all registered water intake points and supply facilities within the Plan Area in any operational planning undertaken.
- Forestry Tasmania will continue to monitor the major streams which flow through the Plan Area to further increase its baseline water quality information. A water quality monitoring program at the Warra Long Term Ecological Monitoring Site will also be maintained to further increase research information on water qualities and flows.
- Forestry Tasmania will monitor streams draining areas of plantation establishment prior to and after any planned pesticide or herbicide application to check operational procedures. .

4.4 Cultural values

Cultural heritage has in the past referred to the physical remains, including sites, objects and records of past human use and occupation of the land. Increasingly, this definition is being widened to include aspects of culture such as folklore, traditions and places, and to include ongoing as well as historical use of the land.

In the forests of Huon Forest District there are many known sites and features left behind by past generations of Europeans and the original Aboriginal inhabitants. Some of these features are important sources of information about past human activity and ways of life. Cultural heritage sites and features can also have contemporary social and spiritual value. They can represent a link between the community, the land and ancestors.

Significant sites of cultural heritage located in the Plan Area are managed, depending on their significance, by protecting them in Informal Reserves or by controlling forest operations occurring around them.

The management of cultural heritage sites at the operational level relies on the *Forest Practices Code* and the *Forest Archaeology Manual* (McConnell 1990) which provides fundamental strategies for the conservation of cultural heritage values in State forest. Where appropriate, existing guidelines are supplemented by direct consultation with the Forest Practices Board and with Aboriginal and other traditional land user groups.

Forestry Tasmania also supports the Burra Charter (the Australia ICOMOS Charter for the Conservation of Places of Cultural Significance) (Pearson and Sullivan 1995) that sets out standards for the protection of cultural sites.

4.1.14.4.1 Aboriginal cultural heritage

Aborigines have lived in the area for at least 35 000 years. Sites of Aboriginal cultural heritage within the district include scatters of stone tools, engravings, rock shelters and stone tool sources. These sites and objects are important to the present day Aboriginal community as the last material signs of their past culture to survive the last 200 years. Plants, animals and places can also be of cultural value to the Aboriginal community. Much of Tasmanian Aboriginal history has been lost or is maintained by oral tradition, with the result that most documented history is archaeological in emphasis.

There are over thirty known Aboriginal cultural sites (artefact scatters and isolated artefacts) within the Plan Area and it is likely that further sites will be found.

Assessment of the probability of Aboriginal sites within any given area of State forest is based upon 'Archaeological Potential Zoning' maps (McConnell 1995) which are used to optimise the allocation of survey resources. Where ground visibility permits, field surveys continue to be implemented to address the protection of Aboriginal sites prior to forest operations. Problems can arise where Aboriginal artefacts are buried in the soil profile and are only exposed after ground disturbance such as forest operations (eg. burning and cultivation).

The reporting of Aboriginal sites is mandatory under the *Aboriginal Relics Act 1975*. Sites are to be reported to Director of National Parks and Wildlife and must not be knowingly disturbed without an official permit. Sites located by Forestry Tasmania are reported initially to the Forest Practices Board (FPB) and then forwarded by FPB to DPWIE. Once known, management of Aboriginal sites often involves the establishment of a Special Management Zone.

Forestry Tasmania is supportive of the establishment of cooperative management arrangements with Aboriginal people in areas of particular significance to them in a manner consistent with other management objectives. This is explicitly recognised as an objective within the *Forestry Act 1920* with respect to Forest Reserves.

4.1.24.4.2 European and other cultural heritage

Evidence of European occupation of the Plan Area is principally confined to that associated with timber harvesting although sites related to mining, farming and early exploration and settlement also occur. In addition, there are a number of tracks of historical value in the Plan Area.

Parham (1992) has produced an initial inventory of historic sites in the forests of the south-east of the state which includes the Plan Area.

Much of the Plan Area has historically been subject to intensive timber harvesting. Timber-getting commenced in colonial times using convict labour and has continued to the present day. Kostoglou (1993) has prepared a detailed survey of the archaeology of timber-getting in the Huon Valley. From Franklin in the north to Recherche Bay in the south and Bruny Island some 650 historical sites have been identified. Thirty-five sites are regarded as culturally significant and include tramways, machinery remains, bush huts and sites of settlements, sawmills and wharves.

Cultural sites located in the Plan Area are managed according to their significance and in accordance with the *Forest Practices Code*. They are placed in a Cultural Heritage Special Management Zone and, if appropriate, in the Protection Zone. Historic sites of State significance can receive additional legal protection if listed under the *Historic Cultural Heritage Act 1995*. Guidelines for the conservation and management of cultural values on State forest are found in McConnell (1991).

Forestry Tasmania is supportive of the development of cooperative management arrangements for areas of particular importance to traditional land user groups (see also section 4.5.1). Such arrangements could include for example, joint maintenance of tracks used for recreational purposes.

Management prescriptions (applying to both 4.4.1 and 4.4.2).

- Forestry Tasmania will continue to encourage involvement from the Aboriginal and the wider community in the identification and management of cultural heritage sites.
- Pre-operational surveys will be guided by research findings and Archaeology Potential Zoning.
- Further surveys of cultural sites will be encouraged by Forestry Tasmania.
- Aboriginal and historic sites will be brought to the attention of the Forest Practices Board as they are identified.
- Where sites and features are of sufficient cultural significance to warrant protection, they will be managed to conserve their values.
- Forestry Tasmania will explore opportunities for developing cooperative management arrangements for specific areas of cultural importance through dialogue with peak organisations representing Aboriginal and other community groups.

4.5 Community services

The provision of quality tourism, recreation and educational experiences is accorded a high priority as part of Forestry Tasmania's role as a multiple use forest land manager. The Huon Forest District's proximity to Hobart provides an ideal setting to present the issues and approaches associated with multiple use forestry.

4.1-14.5.1 Tourism and recreation

The most popular activity is car touring which incorporates short walks and learning via interpreted experiences. Other activities include rafting, picnicking, horse riding, four wheel driving, fishing, bushwalking and hunting.

Commercial recreational and tourism activities include camping, birdwatching, rafting and ecotourism. Forestry Tasmania and the Department of Primary Industries, Water and Environment have set up a statewide licensing system for commercial tourism operators that use State forest, Crown Land or Crown Reserves. The DPIWE administers the scheme and is responsible for processing applications, providing information, and charging fees.

The Arve Road Forest Drive is recognised as Forestry Tasmania's major tourism and recreational opportunities within the Huon Forest District. Documents have been produced to direct resources and improve the quality of all visitor experiences associated with these forest drives (McArthur 1994a and 1994b). The National Trail passes also through the Plan Area and is used by horseriders, mountain bikers and bushwalkers.

A major tourism, research and education centre is planned for development in Tahune Forest Reserve in conjunction with the Warra Long Term Ecological Research Site. This is proposed to include accommodation, interpretation facilities and a tree-top tourist walk.

Hunting, horse riding and off-road vehicle activities are being reviewed by a State Government interdepartmental working group on recreational and tourism use of State owned land. Guidelines and procedures have been developed for the use of recreational vehicles on State owned land (Interdepartmental Working Group for the Recreational/Tourism Use of State Owned Land 1994).

Three Tall Tree Management Zones exist in the Plan Area. These are accessible areas of attractive, well-stocked stands of tall eucalypts. Such areas of tall trees are primarily for recreation and inspiration. They are found in the following locations:

- Huon Tall Tree Management Zone - 208 hectares with access from Arve Road and encompassing the Zig Zag Forest Walk;
- Hastings Tall Tree Management Zone - 446 hectares with access from Hastings Caves and Tuganah Road; and
- Coolangatta Tall Tree Management Zone - 144 hectares with access from Coolangatta Road.

There are a number of walking tracks in the Plan Area that provide access to the World Heritage Area. These include Adamsons Peak, Huon, Hartz, Lake Skinner, Mount Picton, Nevada Peak, Weld River and Snowy North tracks. Forestry Tasmania uses the *Tasmanian Walking Tracks Strategy and Marketing Plan*. (Inter-agency Working Party (Statewide Walking Tracks Strategy) 1997) as a basis for walking track management. Proposals for walking tracks are considered in terms of the Strategy and the requirement that management of tracks is practical and consistent with good practice. Proposed developments in the Plan Area conform to Forestry Tasmania's tourism policy (Forestry Tasmania 1995c).

Forestry Tasmania is committed to fostering communication and good relationships with key groups representing those who use State forests for recreational and traditional purposes. The use of formal agreements is seen as one way of setting out a sound basis for these relationships. The first such Community Forest Agreement was signed between Forestry Tasmania and the Tasmanian Traditional Recreational Land Users Federation in November 1998.

Management prescriptions

- Forestry Tasmania will liaise with recognised stakeholders, including local government and the regional tourism sector, to assist further development of nature based tourism and recreation in the Plan Area. The establishment of commercial facilities and other commercial tourism opportunities in the Plan Area will be encouraged consistent with multiple use values.
- When planning forest operations Forestry Tasmania will consult with registered tourist operators where necessary.
- Forestry Tasmania will monitor social and environmental impacts of tourism use of the Plan Area.
- Forestry Tasmania will pursue options, including Community Forest Agreements, for fostering communication with key groups representing those who use State forests for recreational and traditional purposes.
- Tall Tree Management Zones are to be managed on a notional rotation of 300 years or until the area is burnt by wildfire or the values otherwise lost. When no longer suitable they may be harvested and replaced by areas of younger or undamaged forest designated as new Tall Tree Management Zones.
- The *Tasmanian Walking Tracks Strategy and Marketing Plan* will form the basis of existing walking track management and the consideration of proposals for new tracks.
- Forestry Tasmania will liaise with the Department of Primary Industries, Water and Environment on the use and management of walking tracks that access the World Heritage Area and other areas of Formal Reserve adjacent to State forest.

4.5.2 Forest education

Forestry Tasmania's Forest Education Program aims to:

- develop teacher knowledge and understanding of forests and forest management;
- support schools in the development of teaching resources in line with school curriculum; and
- support teachers in the implementation of forest education in the classroom.

The forests of the Plan Area are one of Forestry Tasmania's key areas for visitors to learn about forests and forest management. A range of techniques has been developed to stimulate visitor interest, awareness and understanding.

Management prescription

- Forestry Tasmania will continue to promote the value of forests as an educational resource in the Plan Area.

4.6 Vehicular access

There are approximately 900 kilometres of formed roads in the Plan Area built and maintained by Forestry Tasmania. About 15 to 20 kilometres of new road is constructed annually.

Details of new road construction proposals are included in the publicly available annually updated three year wood production plan.

The level of vehicular access affects fire management (see Section 4.7 Fire management).

Existing roads, tracks and firetrails in the Plan Area provide access for a range of recreational and forest management activities.

Increased public access to State forest may open up further opportunities for tourism, recreation and other activities, and for the harvesting of minor forest products (for example firewood). Improved access may also increase the likelihood of management problems such as increased risk of fire, damage to tracks from off-road vehicles, unauthorised removal of forest products and an increase in road maintenance costs.

Conditions may be placed on access to or through State forest where required for private purposes. Such access may be managed through an easement or lease.

Management prescriptions

- Any new roads, tracks or firetrails constructed in the Plan Area will meet, as a minimum, the *Forest Practices Code* requirements.
- New roads, tracks or firetrails will not be constructed in the Protection Zone unless they are required:
 - i) to provide access to approved construction works;
 - ii) to provide access to the Production Zone if no prudent or feasible alternative route is available; or
 - iii) as part of a wildfire control operation.
- Some roads in the Plan Area may be closed for management reasons. Access will be at the discretion of Forestry Tasmania's Huon District Forest Manager.
- The Policy for the Use of Recreational Vehicles on State Owned Land in Tasmania (Interdepartmental Working Group for the Recreation/Tourism Use of State Owned Land 1995) will be applied.
- Forestry Tasmania will assess all applications for rights of access through State forest on their merits and in accordance with achieving the objectives of this plan.

4.7 Fire management

Forestry Tasmania's fire management policy on State forest is to:

- manage fire so that fire damage to forest environmental and economic values is minimised;
- manage fires to avoid them spreading onto other lands;
- maintain timber productivity;
- conserve flora and fauna;
- protect soil and water values; and to
- protect recreational, aesthetic and other social values.

The protection of life and property takes precedence over other policy objectives. Forestry Tasmania is responsible for fire control in the Plan Area in accordance with the *Fire Service Act 1979* and the *Forestry Act 1920*. Under the *Fire Service Act 1979*, Forestry Tasmania has the authority to control or extinguish fires within three kilometres of the boundary of any area of State forest.

The risk of wildfire in the Plan Area stems mainly from fire lit by people, both from within and from outside the Plan Area. The proximity of State forest to private assets such as farms, houses and tourism facilities gives rise to Forestry Tasmania's and the community's concern over wildfire damage and risk. Increased road access may increase the risk of fire commencing within the Plan Area, but it also increases the ability to control a wildfire. Forestry and industry staff are trained in fire weather observation to ensure high risk activities are curtailed in high risk conditions.

Prescribed burning is used following timber harvesting operations to create optimum conditions for eucalypt regeneration or plantation development and to reduce long term fire hazard. These burns are generally carried out in autumn and when conditions are safe for burning. A burning plan is completed and audited for each planned burn.

Most of the Plan Area is mixed forest or wet sclerophyll forest and is unsuited to fuel reduction burns. However in moorland communities and dry eucalypt forest types fuel reduction burning is conducted at regular intervals.

Fire protection measures in the Plan Area include a fire detection program based on three fire towers, aerial fire detection flights and maintenance of the road system for access.

Forestry Tasmania has prepared fire management plans for the Plan Area. These specify fire protection and fire suppression measures. The fire management plans cover identified high risk areas and identify moorland communities which have been a source of wildfire in past years.

The objectives of the fire management plans are to ensure that fuel loads in dry eucalypt forest and moorland communities remain at or below 10 tonnes per hectare. If fuel loads exceed this level wildfires can become difficult to control.

Suppression of wildfires in the Plan Area will be conducted using a range of techniques including machinery.

A protocol for inter-agency fire management has been drawn up (Forestry Tasmania, Department of Primary Industries, Water and Environment and Tasmania Fire Service 1998). This protocol allows:

- free exchange of fire management information between the agencies;
- production of a joint World Heritage Area boundary fire management plan covering a zone approximately five kilometres on each side of the World Heritage Area where it adjoins State forest (currently under preparation);
- cooperative suppression operations; and
- a consistent training policy to ensure an equivalent professional approach to joint fire operations and fire management.

Forestry Tasmania's Huon Forest District Fire Action Plan is revised each year. The plan details the detection, preparedness and suppression procedures for land managed by Forestry Tasmania during the fire risk season and is available for inspection at Forestry Tasmania's Huon Forest District office in Geeveston.

Management prescriptions

- Fire management planning will continue to address the special values identified in the Plan Area, in particular rainforest and plant communities containing species of high conservation value or of botanical interest vulnerable to fire.
- Adjacent land managers will be consulted during the revision of fire management plans.
- Fire management plans prepared for the Plan Area will be reviewed at least every three years.

- Adjacent land managers will be encouraged to participate in fuel reduction burning programs where appropriate.
- Burning will continue to be conducted to regenerate forests after harvesting or where necessary to reduce fuel loads.
- Regard will be paid to special values in wildfire suppression operations. Temporary tracks and firebreaks constructed when suppressing wildfire will be closed and rehabilitated where necessary.

4.8 Air quality and greenhouse gases

Forestry Tasmania recognises that smoke generated from the use of fire in forest management can impact on air quality. However unduly restricting prescribed burning can ultimately lead to subsequent indirect impacts on air quality by means of larger and more intense and more damaging wildfires. In most cases, the impacts of prescribed burning are concentrated into a few days each year when climatic conditions are suitable for safe burning.

A national air quality standard applies to Tasmania (National Environment Protection Council 1998). This sets an upper level to the concentration of smoke particles in the air over a day as recorded at designated monitoring stations to be located near population centres. The standard allows for this level to be exceeded at any particular monitoring station on up to five occasions per year. It was recognised in preparing the standard that unduly restricting burning can ultimately be counter productive.

Some forestry operations such as burning lead in the short term to the accelerated release of carbon dioxide into the atmosphere. By capturing carbon dioxide within trees and wood products, sustainable forestry also potentially results in a longer term net reduction in greenhouse gases in the atmosphere. This is in contrast to alternative building materials such as steel and plastic, that require much more energy to produce.

Management prescriptions

- Forestry Tasmania will advertise planned burning programs potentially impacting on air quality in populated areas.
- Where possible, Forestry Tasmania will seek to minimise the effects of burning on air quality by consideration of prevailing winds and variations in fuel dryness.

4.9 National estate

The Commonwealth Government, including the Australian Heritage Commission, and the Tasmanian Government have agreed that the *RFA* provides sufficient protection for National Estate values. It is recognised that the sensitivity of National Estate values to disturbance varies according to the nature of the value and the nature of the disturbance. The *RFA* identifies values adequately protected by an expanded reserve system, those values also reliant on existing management systems outside of reserves and a third category requiring protection by means of additional mechanisms agreed to within the *RFA*. Those additional mechanisms that apply to the Plan Area are summarised within the prescriptions below.

The *RFA* sets out guidelines for the identification, listing and management of National Estate values throughout public lands, including areas of State forest within the Production Zone. It also sets out guidelines agreed to by the Commonwealth and Tasmanian Governments for the identification of other National Estate places.

Twenty-seven percent of the Plan Area is on the Register or the Interim List of the National Estate. Most of this area is a small part, about three percent, of a large National Estate listing (Western Tasmania) which extends outside the Plan Area and outside the Huon Forest District.

Management prescriptions

- National Estate values within the Plan Area will be managed in accordance with the principles set out in Attachment 1 of the *RFA*.
- Areas identified as having National Estate value due to being “type localities for flora or fauna species” or “research, teaching or benchmark sites” will be identified as Special Management Zones and managed as appropriate to maintain the specific identified values.

4.10 Exploration and development of mineral resources

Exploration and development of mineral resources on multiple use forest land is facilitated consistent with Forestry Tasmania's functions to manage for wood, natural, cultural and recreational values.

The *Mineral Resources Development Act 1995* applies to all of the Plan Area with the exception of Esperance, Hopetoun and Tahune Forest Reserves.

Mining, quarrying and mineral exploration are subject to rigorous approval processes and control by the Department of Infrastructure, Energy and Resources (DIER) who administer the *Mineral Resources Development Act 1995*. A mining lease and municipal council permit are required before any mining is carried out. Dependent on the scale of the proposal, the department administering the *Environmental Management and Pollution Control Act 1994* (DPIWE) will make an assessment of the proposal and set conditions to be incorporated in the permit.

The *Mineral Exploration Code of Practice* (Bacon 1999) and the *Quarry Code of Practice* (Department of Primary Industries, Water and Environment 1999) provide guidelines for exploration and quarrying and are designed to regulate these activities. They are similar to the *Forest Practices Code* and cover issues such as the control of weeds and diseases, conservation of topsoil, rehabilitation of disturbed areas, access and drainage.

Proposed mineral exploration, mining and quarrying activities in conservation and other sensitive areas are referred to the Mineral Exploration Working Group. The Working Group includes representatives of the DIER, DPIWE and Forestry Tasmania. Its function is to investigate the impact that any works may have on natural and cultural values and advise of any conditions to be placed on activities so that these values are not permanently or adversely affected.

In areas not considered by the Mineral Exploration Working Group, Forestry Tasmania works with DIER and requires that exploration and development of mineral resources seek to:

- avoid any impact on important natural and cultural values;
- minimise clearing of vegetation;
- recover any affected timber; and
- minimise the impact on other forest values.

There are 51 registered operational gravel pits within the Plan Area. Gravel pits on State forest are subject to Forest Practices Plans as administered under the *Forest Practices Act 1985*. The *Quarry Code of Practice* and *Forest Practices Code* guides the operation and rehabilitation of these gravel pits. Forestry Tasmania must notify the department administering the *Environmental Management and Pollution Control Act 1994* (DPIWE) in the case of a gravel pit producing 5000 cubic metres or more per year or a crushing premises processing more than 1000 cubic metres per year. Should a pit produce material for sale or use outside State forest, a mining lease and planning permit are required.

Management prescriptions

- Forestry Tasmania will continue to liaise with the Department of Infrastructure, Energy and Resources to facilitate the exploration and development of mineral resources in the Plan Area consistent with the conservation of important natural or cultural values.
- Forestry Tasmania will work to ensure exploration and development of mineral resources complies with the *Forest Practices Code* and with permit conditions. Forestry Tasmania will also support the administration of the *Mineral Exploration Code of Practice*, in conjunction with the Department of Infrastructure, Energy and Resources.
- Any new gravel pit in the Plan Area will be operated according to the provisions of the *Environmental Management and Pollution Control Act 1994*, the *Quarry Code of Practice*, the *Forest Practices Code* and Forestry Tasmania's Visual Management System. Rehabilitation shall be carried out concurrently with pit operation. Gravel pits will not be established in the Protection Zone.
- For the purpose of exploration and development of mineral resources, the following parts of the Plan Area are classed as sensitive areas and will be referred to the Mineral Exploration Working Group:
 - i) places with features identified as significant for geoconservation;
 - ii) Special Management Zones for natural, cultural or recreational values within the Protection Zone; and
 - iii) Forest Reserves (to which the *Mineral Resources Development Act 1995* applies).

4.11 Honey production

There are approximately 60 apiary sites within the Plan Area. These are principally used for harvesting of nectar from leatherwood rich forests for the production of honey and wax products. The apiary industry plays an important role in pollination of apple, cherry and seed crops. Leatherwood honey production is important to the ongoing viability of the commercial apiary and agricultural industries in the Huon Forest District.

The *Guidelines to Facilitate Apiculture on State Forest* (Forestry Tasmania 1994a) give practical techniques to manage the nectar resource. These guidelines were developed in association with the Tasmanian Beekeepers Association.

Management prescriptions

- The *Guidelines to Facilitate Apiculture on State Forest* will guide forestry activities in leatherwood rich forests.
- Forestry Tasmania will continue to ensure that leatherwood rich sites will be conserved in the Plan Area. Where appropriate, areas of leatherwood rich forest will be excluded from timber harvesting through prescription and where practicable added to wildlife habitat strips and streamside reserves.
- Forestry Tasmania will continue to identify and make new apiary sites within the Plan Area as new road developments take place. Any new sites will require the approval of the Huon District Forest Manager.
- Forestry Tasmania will liaise with the Southern Tasmanian and the Tasmanian Beekeepers Associations when planning timber harvesting in leatherwood rich forests.

4.12 Pests and diseases

There are two pathogenic fungal diseases which are of some concern in the Plan Area, namely *Phytophthora cinnamomi* and *Chalara australis*.

Phytophthora cinnamomi is a soil-borne disease that affects a number of species particularly in the more open vegetation types such as dry eucalypt forest, heaths or swamps. This disease spreads downhill and is readily spread in soil carried on machinery. Some understorey species are highly susceptible and can be lost from an infected area (Podger et al 1990). Forestry Tasmania has guidelines for the management of *Phytophthora cinnamomi* and has strategies for identifying and protecting areas containing rare and susceptible plant species from the impacts of this disease (Barker 1994). The Parks and Wildlife Service (1993) provides a set of hygiene guidelines relevant to the protection of uninfected areas.

Chalara australis affects myrtle (*Nothofagus cunninghamii*) found in both mixed forests and rainforest within the Plan Area. While a serious and ubiquitous disease, in undisturbed forest it appears to be a component of the natural regenerative processes. Disturbances which cause damage to mature myrtles, including roading and harvesting, have the potential to trigger local epidemics of this disease. This can result in the death of a high proportion of mature myrtles and spread of the disease into adjacent undisturbed areas. There is much variability in this response but 'higher risk' areas can be identified (Packham 1991).

Chrysophtharta bimaculata is a widely distributed native leaf-eating beetle which is sometimes found in large and potentially damaging numbers in eucalypt plantations and young eucalypt forests. An integrated pest management program has been developed to protect young eucalypt plantations. It makes use of the beetles natural enemies as a first line of defence and minimises the use of insecticides. Forestry Tasmania is also trialing the use of the naturally occurring bacterium *Bacillus thuringiensis* (Bt) as an alternative to synthetic insecticides.

General procedures for the management of common insect pest and diseases are given in Wardlaw (1990).

Management prescriptions

- Forestry Tasmania will continue regular monitoring programmes to identify the development of pests and diseases and aims to respond to problems before they cause serious damage.
- Forestry Tasmania will continue to implement guidelines for the management of *Phytophthora cinnamomi* (Wardlaw 1990, Barker 1994).
- Forestry Tasmania will continue to implement operational guidelines for the management of *Chalara australis* as set out in Packham (1991) and the *Forest Practices Code*.
- Forestry Tasmania will continue to implement guidelines for the management of *Phytophthora cinnamomi*.
- Forestry Tasmania will consider the effect any new roads or tracks proposed in the Plan Area may have on the spread of *Phytophthora cinnamomi* to sensitive vegetation types prior to finalising their location.

4.13 Browsing

Browsing by native animals, in particular Bennett's wallabies and red-bellied pademelons can cause severe damage to young plantations and native forest regeneration.

All native forest coupes are monitored for browsing damage in the first one or two years after sowing in accordance with Forestry Tasmania (1999). Low levels of browsing are considered

acceptable. Browsing which has the potential to reduce regeneration success needs to be acted upon.

Either shooting or chemicals are used when browsing control is necessary. Shooting is effective when animal populations are not large or are accessible. Poisoning with sodium mono-fluoro-acetate (1080) has been the most effective browsing control option. This poison is non-residual and if used properly, is specific to the target species (Statham 1983). Permits are required from the Parks and Wildlife Service prior to the use of either control method. Strict controls apply to the use of 1080 (Nielsen 1990, Coleman *et al.* 1997 and Dredge 1998). and its application is carried out under direct supervision by officers of the Department of Primary Industries, Water and Environment.

In plantations, browsing problems cannot be addressed after they have occurred. Planted seedlings are highly visible and tasty and much damage can occur overnight. Eucalypt plantation areas are poisoned prior to or soon after planting under specific conditions (Nielsen 1990). Browsing of the seedlings is subsequently monitored and repeat poisoning undertaken if significant damage is occurring.

Forestry Tasmania closely reviews its use of chemicals and cost effective alternatives to existing browsing and weed controls are being actively pursued in conjunction with the Browsing Damage Management Group.

Management prescriptions

- Browsing control will be used to ensure successful regeneration of harvested native forests and establishment of plantations. Forestry Tasmania will control browsing in accord with Dredge (1998) and after obtaining appropriate permits and adhering to guidelines set down by the Parks and Wildlife Service and the Department of Primary Industries, Water and Environment.

4.14 Weeds

Weed control is both an issue during plantation establishment and in relation to opportunistic weeds throughout the Plan Area.

Herbicides are used as required preceding, or following plantation establishment. They can have a very important role in ensuring plantation success. Choice of herbicides as well as application methods and regimes are subject to regular review. Their application is in accordance with the Pesticide Application Manual (Forestry Tasmania 1994a). The policy of Forestry Tasmania is to minimise the use of chemicals. Alternative methods of weed control which do not use chemicals are being actively pursued. The issue of water quality in relation to herbicide use is addressed in section 4.3.9.

Forestry Tasmania has an active program of weed control in and adjoining State forest. Pampas grass has been the focus of control efforts in recent years. Other weeds significant in State forests include canary broom, gorse and erica. Forestry Tasmania maintains a weed management strategy for environmental weeds in the Plan Area and uses Dredge (1997) to guide integrated weed control in plantations.

Forestry Tasmania recognises that to be effective, weed control needs to be regional, rather than simply based on land tenure. It also acknowledges the potential for weed invasion associated with road construction and maintenance and recognises the benefits associated with prevention and early control of weed infestations.

Management prescriptions

- Forestry Tasmania will support an integrated regional approach to weed control that involves agricultural and local government interests, together with forestry interests.

- Activities will be concentrated on significant weeds for which control is cost effective. The eradication of pampas grass will have the highest priority. Social and environmental costs of weeds, and the potential for weeds to spread if left unchecked will also be taken into account when setting weed control priorities.
- Management activities such as coupe scheduling will address the need to limit opportunities for weed invasion.

4.15 Other forest products and occupation of State forest

The collection of a range of other forest products occurs in the Plan Area. Posts, poles, piles, chopping blocks, shingles, firewood, stakes, tree ferns and other minor forest products are sold by issue of licences or contracts.

Forestry Tasmania issues leases, licences, permits and easements for the occupation of State forest for grazing and a number of other purposes.

Management prescriptions

- Forestry Tasmania will actively promote the commercial development of the firewood resource.
- Minor forest products will continue to be made available under licence or contract as dictated by demand and availability and in accordance with the management objectives and prescriptions of this plan.
- Forestry Tasmania will continue to institute measures (such as the erection of gates and the conduct of patrols) to assist with the control of unauthorised removal of minor forest products.
- Forestry Tasmania will continue to issue leases, licences, permits and easements as appropriate for the occupation of State forest for grazing and other purposes in accordance with the management objectives and prescriptions of this plan.

4.16 Managing Forests on Bruny Island

During the period 1992-95, the then Forestry Commission maintained a Bruny Island Forestry Consultative Committee to discuss forest management issues with island residents. This culminated in a Forest Management Plan for Bruny Island that was included as an appendix to the 1996 Huon District Forest Management Plan (Forestry Tasmania 1996). That appendix set out some of the special characteristics of Bruny Island and included management prescriptions specific to the island.

Most of those prescriptions relating to Bruny Island are encompassed within prescriptions applying to the whole of Huon District in this amended Plan. The remaining issues from the Bruny Plan are addressed by the prescriptions below. This amended Plan thus has no separate appendix dealing with Bruny Island.

Of the 35,300 ha of land on Bruny Island, 27% is State forest, 20% is reserves managed by the Department of Primary Industries, Water and Environment and 53 % is privately owned. Of the State forest, 52% is within Informal or Formal reserves and 48% (4,600 ha) is within the Production Zone.

Management prescriptions

- Forestry Tasmania will consult regularly with the Bruny Island Community Group on the management of forests on the island.
- Forestry Tasmania acknowledges the value the community places in milling locally on the island and encourages the development of island-based processing.

- Forestry Tasmania will schedule operations on the island such that the rate of harvesting will not increase beyond an average rate of 3 trucks per day.
- Forestry Tasmania will monitor the impact of logging traffic on other road users on the Island. If appropriate, speed limits and times during which cartage may occur on State forest roads will be restricted in order to minimise those impacts.

5 References

These references are relevant to the management of the Plan Area and are kept at the Huon District office at Geeveston. Most are in a small library collection freely available to the public for reading at the Geeveston office. Any not in the collection are available and inquiries should be made at the office. Forestry Tasmania is obliged to treat information in some references as confidential.

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6 Definitions

Biodiversity	Includes 'genetic diversity' which reflects the diversity within each species; 'species diversity' which is the variety of species; and 'ecosystem diversity' which is the diversity of different communities formed by living organisms and the relationship between them.
Clearfelling	The harvesting of all commercial trees on a specified cutting area.
Comprehensive, Adequate and Representative (CAR) Reserve System	A Formal and Informal Reserve system incorporating both public land and private land that is based on the principles of comprehensiveness, adequacy and representativeness as described by JANIS (1997). This report provides guidelines for the reservation of biodiversity, old growth forest and wilderness , taking account of reserve design and management and social and economic considerations.
Coupe	A discrete area of forest harvested and regenerated in a single operation (usually over 1 or 2 years).
Crown land	Land owned by the State.
Deferred forest land	The now defunct category of Crown forest included on the Register of Deferred Forest Land. The RFA has since decided on the future management of these areas as Reserves or Multiple Use Forest.
Dry eucalypt forest	Open eucalypt forest, mostly of low and medium height and with an understorey of grasses and drought tolerant shrub species; usually associated with less fertile soils with limited water infiltration or storage capacity. Often limited to areas with annual rainfall below 1,000 millimetres.
Endangered	Species in serious risk of disappearing from the wild state within one or two decades if present land use and other causal factors continue to operate.
Environmental Management System	A framework for the systematic management of an organisation's environmental obligations and targets.
Forest operations	Forest operations involves work connected with - (a) planting trees; or (b) managing trees before they are harvested; or (c) harvesting forest products - and includes any related land clearing, land preparation, burning-off, access construction or transport operations.
Formal Reserve	A term from the RFA (Attachment 6) for reserves equivalent to IUCN Protected Area Management Categories I, II, III or IV. Their status is secure, requiring action by the Tasmanian Parliament to be dedicated or revoked. Examples are National Parks and Forest Reserves .
Informal Reserve	A term from the RFA (Attachment 6) for areas of State forest zoned for Protection in the Management Decision Classification system (except for the Forest Reserves) and other administrative reserves on public land managed to protect CAR values.

Karst	Landforms associated with the formation of cavities within relatively soluble rocks. Caves and sinkholes are examples of karst landforms.
Landslide threshold slope angle	A measure of ground slope above which, for a given soil type and geology, mass movement of soil and rock may take place.
Mature forest	Forest, containing a majority of trees greater than 110 years old, which is either not or only slowly increasing in biomass.
Mixed forest	Wet eucalypt forest with a predominance of rainforest tree species [for example myrtle (<i>Nothofagus cunninghamii</i>), sassafras (<i>Atherospermum moschatum</i>), leatherwood (<i>Eucryphia lucida</i>), celery-top pine (<i>Phyllocladus aspleniifolius</i> and blackwood (<i>Acacia melanoxylon</i>)] growing in the understorey.
Multiple use	Forest management which combines a number of uses, usually in a single stand or on the same general site, but not necessarily at the same time.
Multiple use forest land	State forest included on the Register of Multiple Use Forest Land.
National Estate	A property registered under the <i>Australian Heritage Commission Act 1975</i> which is one of ‘..those places being components of the natural environment of Australia, or the cultural environment of Australia, that have aesthetic, historic, scientific or social significance or other special value for future generations, as well as the present community’.
Old growth forest	Forest that is ecologically mature for which the effects of any disturbance (eg logging, roading and clearing) is now negligible.
Plantations	Forests which are established by planting seedlings rather than sowing seed. Plantation areas usually have intensive site preparation prior to planting seedlings at a specified spacing.
Pulpwood	Those logs which are below sawlog quality, but are suitable for the manufacture of pulp, paper and panel products. Pulpwood is usually turned into woodchips before pulping.
Rainforest	Closed forests in areas of high rainfall dominated by tree species such as myrtle (<i>Nothofagus cunninghamii</i>), sassafras (<i>Atherospermum moschatum</i>), celery-top pine (<i>Phyllocladus aspleniifolium</i>), leatherwood (<i>Eucryphia lucida</i>) and blackwood (<i>Acacia melanoxylon</i>) and able to regenerate without a major disturbance. Eucalypts may be present at a density of less than 5 percent of the crown cover.
Rare	Species which are rare in Australia but which overall are not currently considered endangered or vulnerable . Such species may be represented by a relatively large population in a very restricted area or by smaller populations spread over a wider range, or some intermediate combination of distribution pattern.
<i>Regional Forest Agreement (RFA)</i>	An agreement of 20 year duration between the State and Commonwealth government that seeks to achieve an agreed set of conservation outcomes while providing for greater certainty and security for forest industries. (The legal document is titled “ <i>Tasmanian Regional Forest Agreement</i> ”)

Regrowth forest	Native eucalypt forest regenerated after wildfire or other disturbances where there was no deliberate site preparation or sowing of seed. May contain scattered individuals or stands of older trees. See also silvicultural regeneration .
Reserves	Areas set aside for the conservation of natural ecosystems, enjoyment and study of the natural environment and for the provision of community recreation. Includes National Parks, State Reserves and Forest Reserves.
Rotation	The period taken to grow a tree crop to a point where the crop is felled and a new crop is grown.
RPDC	Resource Planning and Development Commission, formerly the Tasmanian Public Land Use Commission (PLUC).
Sawlogs	Logs capable of being processed for sawn timber, veneer, poles and sleepers.
Silvicultural regeneration	Eucalypt forest which has been regenerated after timber harvesting using deliberate site preparation and seeding techniques. The year of sowing is documented and the age of the trees may be determined.
Special species timbers	Timber of non-eucalypt native tree species. Special timbers include Blackwood, myrtle, celery-top pine, sassafras, Huon pine, King Billy pine, leatherwood, musk, tea tree, silver wattle, and other species.
State forest	Land which is managed by Forestry Tasmania under the <i>Forestry Act 1920</i> .
Sustainable yield	For wood products, the sustainable yield of a forest is the maximum level of commercial timber (or product mix) that can be maintained under a given management regime.
Threat Abatement Plan	A plan made under the Threatened Species Protection Act (1995) which sets out a process to reduce threat(s) to the survival of a threatened species.
Threatened	Species deemed to be vulnerable or endangered .
Veneer	A thin slice or peeling of wood which is used to make up panel products.
Vulnerable	Species not presently endangered but at risk of disappearing from the wild over a longer period (20 to 50 years) through continued depletion, or which largely occur on sites likely to experience changes in land use that would threaten the survival of the species in the wild.
Wet eucalypt forest	Tall to medium height eucalypt forest occurring in higher rainfall areas on fertile sites and with an understorey of species well adapted to moist conditions.
Wilderness	Land that together with its plant and animal communities, is in a state that has not been substantially modified by, and is remote from, the influences of European settlement or is capable of being restored to such a state; is of sufficient size to make its maintenance in such a state feasible; and is capable of providing opportunities for solitude and self-reliant recreation.
World Heritage Area	References in this Plan to the World Heritage Area relate to the "Tasmanian Wilderness World Heritage Area"

Appendix I Classification system for forest management decisions

The Management Decision Classification system provides uniform statewide zoning for all land managed by Forestry Tasmania . It provides a simple, map-based summary of land management decisions based on the best available information. Its major uses are for strategic planning and to allow the general management intent of land managed by Forestry Tasmania to be communicated to the public, other land management agencies and interested parties.

Management Decision Classification Zones are given in Table 4. The first section shows an initial classification of land according to its availability for wood production. This is the Primary Zone. The second section further differentiates the Primary Zone to indicate any special emphasis to be placed on particular values or management. The special values shown are used to derive Special Management Zones.

The Production Primary Zone is sub-divided into two zones. In the Production zone not containing Special Management Zones forestry operations can occur subject to the *Forest Practices Code*. In those parts of the Production Zone containing Special Management Zones additional prescriptions may be applied to ensure that the special values identified are conserved.

Table 4 Management decision classification zones

Primary Zones

Production
Undeveloped
Conditional
Protection

Special values from which Special Management Zones are derived

Agricultural activity
Apiculture
Cultural heritage
Forest Health
Fauna
Flora
Fuel management
Geomorphic ***hazard***
Geomorphological feature
Harvest deferred
Intensive silviculture
Landscape
Long rotation wood production
Plantation
Recreation/education
Research
Special timbers
Utility
Water supply

Appendix II CAR values within Forest Reserves in the Plan Area

Table 5 CAR values within Forest Reserves in the Plan Area

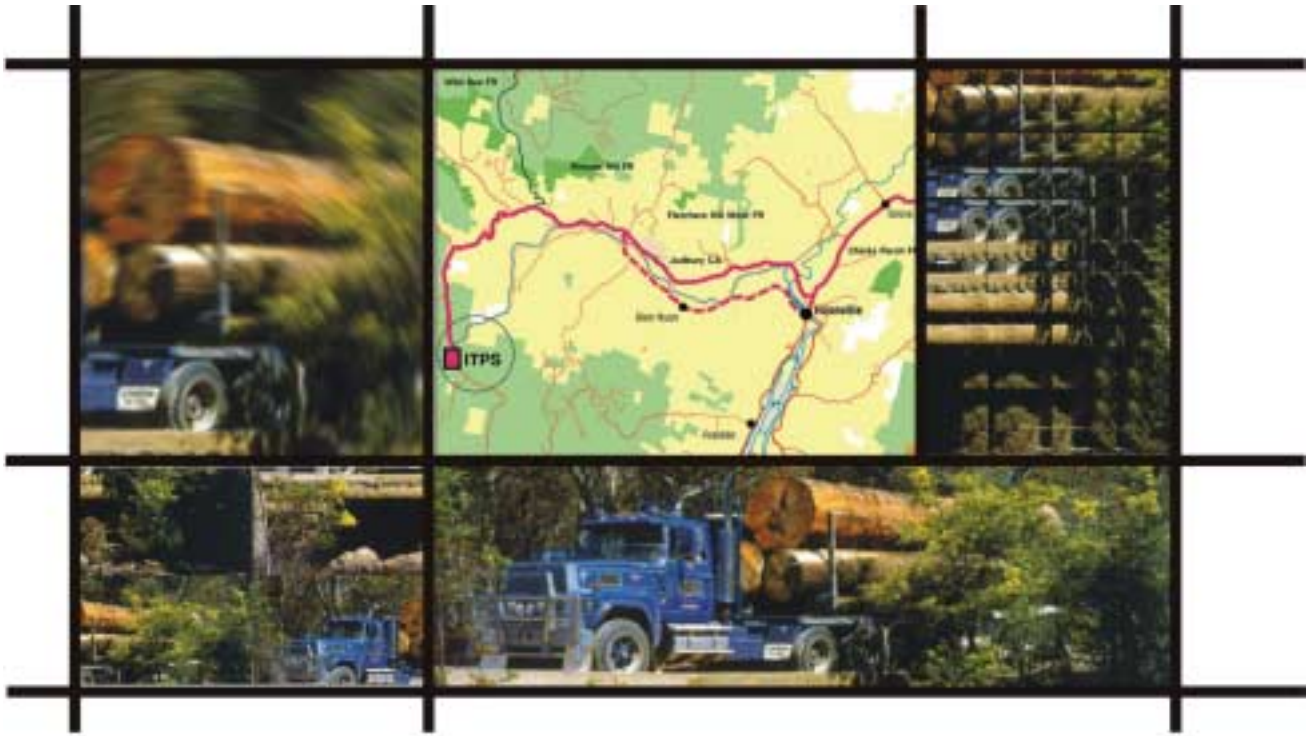
Forest Reserve	Area (ha)	Forest communities	
		Non-old growth	Old growth
Arve Loop FR	941	O,OT,R,SI	M-,O,OT,R,SU
Denison Ridge FR	153	O,OT	O
Esperance FR	149	OT	
Fletchers Hill West FR	56	O,OT	
Fords Pinnacle FR	96	OT,P	
Hopetoun FR	21	OT	
Lutregala Creek FR	109	O	
Mt Bruny FR	1,336	O,OT	O,OT
Mt Mangana FR	852	D,O,OT,R,SI,SU	D
Mt Midway FR	462	D,DT,O,OT,R	O,OT
Rimons Hill FR	399	DT,OT,P	DT,M+,OT
South Weld FR	46	M-,OT	OT
Tahune FR	115	OT,H	OT
Wild Bee FR	536	D,O,OT,SI	D,M+,OT
Informal reserves	22,700	C,D,DT,M-,M+,N,NT, O,OT,P,R,SI,SU,	C,D,D,H,M-,M+,NT, O,OT,P,R,SU,TD

NOTE: Old growth and non-old growth communities are those shown in the *RFA* Vegetation maps as occurring in each Reserve. Note that the scale of these maps has resulted in some forest vegetation being inaccurately mapped. Minor occurrences of several forest communities in Reserves have generally not been mapped. Non forest vegetation types were not detailed in the *RFA*. More accurate information on vascular plant species and communities occurring in many of the reserves is given in North et al. (1998). The vegetation of other reserves, including new reserves created as an outcome of the *RFA*, is currently being surveyed by Forestry Tasmania.

CAR forest communities present in Plan Area

AD	<i>E. amygdalina</i> forest on dolerite
C	<i>E. coccifera</i> dry forest
D	Dry <i>E. delegatensis</i> forest
DT	Tall <i>E. delegatensis</i> forest
H	Huon Pine
L	<i>Leptospermum</i> sp./ <i>Melaleuca squarrosa</i> swamp forest
M-	Thamnic rainforest on less fertile sites
M+	Callidendrous and thamnic rainforest on fertile sites
N	Dry <i>E. nitida</i> forest
NT	Tall <i>E. nitida</i> forest
O	Dry <i>E. obliqua</i> forest
OT	Tall <i>E. obliqua</i> forest
P	<i>E. pulchella</i> - <i>E. globulus</i> - <i>E. viminalis</i> grassy shrubby dry sclerophyll forest
R	<i>E. regnans</i> forest
SI	Silver wattle (<i>Acacia dealbata</i>) forest
SU	<i>E. subcrenulata</i> forest
TD	<i>E. tenuiramis</i> on dolerite

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Template: C:\PROGRAM FILES\MICROSOFT
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SOUTHWOOD PROJECT Transport Route Options

Forestry Tasmania


***Wood Centre to the
Huon Highway***



Value Management Study March 2001

Report

Implications of Transport Movements to and from the Huon Integrated Timber Processing Site



Prepared for:
General Manager (Marketing)
Forestry Tasmania

S403r2v4

April 2001

Commercial - in - Confidence

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APPENDICES

- A. Tasmanian Department of Infrastructure, Energy and Resources (DIER) *Route Selection Criteria — Checklist — Attachment C to Guidelines for HPVs in Tasmania***
- B. Tasmanian Department of Infrastructure, Energy and Resources (DIER) *Road Assessment Report***

1. EXECUTIVE SUMMARY

This report considers the implications of vehicle movements in the Huon Valley Council area of vehicles associated with the establishment of the proposed new Southwood Resources Integrated Timber Processing Site (ITPS) at Huon. In particular, the report examines the impact of forestry product vehicle movements both from the southern forests to the proposed new ITPS and between the ITPS and the Huon Highway/Sandfly Rd intersection, for trucks en route to, or returning from, the proposed new wharf facility at Electrona.

It is estimated that about 900,000 tonnes per annum of logs from the forests will be transported into the ITPS.

It is also estimated that about 450,000 tonnes per annum of timber products, comprising 340,000 tonnes of wood-chip and 110,000 tonnes of saw-logs, sawn timber, veneer and plywood, will be transported out of the ITPS. These quantities include 300,000 tonnes per annum of wood-chip to Electrona, about 40,000 tonnes per annum of wood-chip on the new Forestry Tasmania road between the ITPS and New Norfolk to the Boyer paper mills and 110,000 tonnes per annum of saw-logs, sawn timber, plywood and veneer to mills and other outlets in and around Hobart.

It is estimated that operation of the ITPS will generate a total of 332 vehicle movements per day (vpd) to and from the site. This comprises 246 log-truck movements (123 loaded, 123 empty) for trucks carting logs from the forest to the ITPS and 86 movements for trucks carting processed timber products (woodchip, saw-logs, sawn timber, veneer and plywood) from the ITPS, employee commuter vehicles and visitors.

Log trucks hauling logs from the forests to the ITPS will mostly operate on forestry roads that are not accessible to the general public. Trucks carting the processed timber products from the ITPS and employee and visitor vehicles will significantly increase the volume of traffic on some of the country roads (eg by 32% on Glen Road and 18% on North Huon Road), but will only have a minor impact on Huon Highway (an increase of 1%).

Both AUSTRROADS and Tasmanian Government Standards have been used to assess the extent of road upgrading required to accommodate the use of High Performance Vehicles (HPVs) to transport the timber product. In addition, Forestry Tasmania require a minimum standard road construction that includes 6.0m road width (ie 2 x 3.0m traffic lanes) plus, if possible, 1.0m wide shoulders. This standard sometimes exceeds the government standards, depending on the volume of traffic on the road.

All modifications necessary to ensure that the roads are suitable for operation of HPV s and other heavy trucks associated with the Huon ITPS have been identified.

Measures to ensure that the additional noise caused by the road traffic associated with the Huon ITPS is acceptable have been identified.

Measures to ensure the safe operation of HPV s associated with the Huon ITPS have been identified.

The total cost for road upgrade work and noise mitigation associated with the transport of wood-chip from the ITPS to Sandfly is \$2.55m, comprising \$2.45m for road upgrade work and \$0.1m for noise mitigation.

As a result of the need for local councils to provide better roads for an industry that will enhance the overall economy of Tasmania, there is a reasonable argument that the State should contribute to the cost of the council road upgrading required.

This report has been prepared as a background paper for the Development Proposal and Environmental Management Plan (DP and EMP) documents that are to be prepared for the ITPS.

Assistance with the preparation of the noise assessment section of this report has been provided by Pearu Terts, Consulting Engineer for Architectural Acoustics and Noise Control.

A second report by Indec Consulting entitled, *Impact of Vehicle Movements Associated with Re-development of Wharf Facilities at Electrona*, December 2000, deals with the impact of vehicle movements along Sandfly Rd and along the section of Channel Highway from the Sandfly Rd intersection, through Margate, to Electrona.

2. INTRODUCTION

Forestry Tasmania is proposing to establish a new Integrated Timber Processing facility at a site approximately 20 km west of Huonville in the Southern Forests of Tasmania. Logs from the Southern Forests will be transported by Forestry Tasmania's contractors to the Integrated Timber Processing Site (ITPS). Processors at the ITPS will convert the logs to timber products, mainly wood-chip, saw-logs, pulp-wood and veneer.

Concurrently, the Hobart Ports Corporation is proposing to establish a new multi-use wharf facility at Electrona, which is approximately 25 km south of Hobart. This new wharf facility will be constructed within the limits of the Port of Hobart's existing boundaries at Electrona.

As part of the Regional Forest Agreement (RFA), wood flow from the southern forests will increase from the current 300,000 tonnes per annum to 420,000 tonnes per annum over the next five years.

At present, timber is transported by road trucks from the Southern Forest sites through Hobart to the existing port at Triabunna, on the east coast of Tasmania. This is a relatively long and slow trip necessitating passage through a number of urban areas, not the least of which is the passage through Hobart itself.

To reduce the cost of transport of the timber products and to improve the efficiency of their overall operation, Forestry Tasmania is therefore proposing to transport the timber products to the proposed new wharf facility at Electrona south of Hobart, substantially closer to the Southern Forest area. Forestry Tasmania will also continue to supply forestry product to the Boyer Paper Mills and to several saw-mills in the southern part of Tasmania.

The establishment of the new Integrated Timber Processing (ITP) facility in conjunction with the proposed new wharf at Electrona will enable Forestry Tasmania to:

- a) introduce new value-added timber products;
- b) reduce the cost of transport of the timber products
- c) reduce the distances that timber product that will need to be transported on public roads;
and
- d) improve the efficiency of their overall operation.

The objective of this report is to examine the implications of the vehicle movements (both forestry product trucks and other vehicles) in the Huon Valley Council area associated with the new ITPS. This includes the movement of trucks both from the southern forests to the ITPS and between the new Huon ITPS and the Huon Highway/Sandfly Rd intersection at Sandfly, en route to or from the wharf facility at Electrona. The report also discusses, where necessary, ways to ameliorate the impact of these truck movements.

The implications of the vehicle movements include:

- Implications of suitability or otherwise existing roads and bridges; and
- Implications on public social issues (safety and noise issues).

This report has been prepared as a background paper for the Development Proposal and Environmental Management Plan (DP and EMP) documents that are to be prepared for the ITPS.

A second report by Indec Consulting entitled, *Impact of Vehicle Movements Associated with Re-development of Wharf Facilities at Electrona*, December 2000, deals with the impact of vehicle movements along Sandfly Rd and along the section of Channel Highway from the Sandfly Rd intersection, through Margate, to Electrona.

3. BACKGROUND

Forestry Tasmania is a government business enterprise owned by the State of Tasmania. It manages 1.6 million hectares of land including about 830,000 hectares of forests available for wood production and managed for multiple purposes. Forestry Tasmania currently supplies wood from a balance of plantation and native forest harvesting. There are 66,000 hectares of plantations on State forest and private land, made up of 49,000 ha of softwood and 17,000 ha of hardwood. Plantings have increased from 2,500 ha pa in recent years to 5,800 in 1998-9 and will accelerate further through private investments in Forestry Tasmania Unit Trusts.

In 1998-9, 875,000 cubic metres of sawlogs and veneer logs and almost 3.5 million cubic metres of pulp-logs were harvested in Tasmania, with Forestry Tasmania producing about 86% of the former and 45% of the latter. Forestry Tasmania is joint venturing with private enterprise in many ways to increase its production of timber consistently with the long-term sustainability of the resources.

Forestry Tasmania is committed to protecting the quality of the environment, developing and applying the best forest management practices and achieving commercial success. Its primary objectives in managing its resources are to optimise both the economic returns from wood production and other benefits to the community, such as recreation, conservation, flora, fauna, heritage protection and water quality.

Forestry is very important to Tasmania which is the top state in Australia in terms of forestry endowment index, direct labour costs, access to ports, port charges, low industrial disputes and low labour turnover. Adding value to its forestry production, and reducing the costs of getting that production to the mill door or the holds of ships is important to improving Tasmania's competitive position in the world markets for timber and timber products.

To help increase the value of its product and the profitability of its operations, Forestry Tasmania is now planning to establish the ITPS in state forest near the Huon River, about 20km west of Huonville in Southern Tasmania.

An estimated 900,000 tonnes of timber per year will flow through the ITPS. Expected inflows are 88,000 cubic metres of sawlogs, 377,000 tonnes of pulplogs, 120,000 tonnes of rotary peeler logs and 300,000 tonnes of fuel wood. Expected outflows are 64,000 cubic metres of sawn timber and sawlogs, 340,000 tonnes of wood-chip, 51,000 tonnes of dried rotary peeled veneer or ply wood, and 155 MWh of electricity.

Rather than continue to transport this production by highway through Hobart, Forestry Tasmania, in association with the Department of Infrastructure, Energy and Resources (DIER) and the Hobart Ports Corporation (HPC), has explored the possibility of establishing a new wharf facility south of Hobart. Possible sites for the new wharf facility include Electrona in North West Bay and Whale Point and Surges Point on the Huon River.

In 1997, the Hobart Ports Corporation purchased property at Electrona with the view to developing a new multi-purpose wharf facility there. They produced a strategic Concept Plan for this development in September 1997 and held public consultations.

This report assumes that the export port for the wood-chip will be Electrona.

The Forestry project will generate permanent extra employment of about 200 persons at the ITPS, working over 3 shifts, as well as about 7 persons at Electrona.

As well, extra employment of around 60 persons will be generated during the 6 month construction period of the ITPS and the wharf facility re-development.

This extra employment will benefit communities in both the Kingborough and Huon Valley Council areas.

4. SELECTION OF LOCATION FOR ITPS

Forestry Tasmania identified four potential sites for the proposed new ITPS, as follows:

- Boyer (adjacent to the Fletcher Challenge paper mills);
- Puzzle (on the new Forestry Tasmania link road from the ITPS to New Norfolk, about 15 kms north of Lonnvale Rd);
- Russell (on Denison Rd about 1.0km from the intersection with Russell Rd); and
- Huon (on Denison Rd about 13.0km from the intersection of the Judbury to Lonnvale road and Denison Rd).

A further site at Arve was considered but discounted because of lack of water.

Selection of the best site was based on factors such as the cost to transport raw logs from the various forest coupes to the ITPS, the proximity of an appropriate wharf facility for export of the processed timber product and the availability of water.

Forestry Tasmania's assessment concluded that the Huon site was the best option for the ITPS for the Southern Forests, regardless of the location of the new southern port location.

5. FORESTRY PRODUCT QUANTITIES

5.1. Recent Quantities of Wood Flow from the Huon District

Actual wood flows from the Huon district over the past three years were as follows:

Year	Sawlogs	Pulpwood
	m ³	tonnes
1997/98	56,000	234,000
1998/99	67,000	176,000
1999/00	76,000	265,000

Most of the sawlogs are supplied to mills in Geeveston, Dover and Margate.

About 30,000 tonnes pa of pulpwood is supplied to Boyer. The rest of the pulpwood is supplied to wood-chippers at Triabunna.

5.2. Future Quantities of Wood Flow to and from the Proposed ITPS

The proposed ITPS will allow timber harvested from the Southern Forests to be processed on site in the forest area prior to transport to the wharf facility at Electrona (for wood-chip) and Hobart (for saw-logs and veneer).

There are therefore two main aspects to the transport tasks involved in the process:

- a) transport of logs from the forest coupes to the ITPS;
- b) transport of processed timber products from the ITPS to Electrona, Boyer and Hobart.

Volumes of wood-flow from the district are forecast to increase over time.

By 2003, with the Huon Integrated Timber Processing Site (ITPS) in operation, the total output from the ITPS is expected to be as follows:

Output from ITPS (2003)	Tonnes pa
Wood-chip to Boyer	40,000
Sawlog market in and around Hobart	60,000
Veneer to be distributed around or exported from Hobart	50,000
Wood-chip for export through Electrona	300,000
Total	450,000

Future volumes of wood-flow from the district will be significantly increased over the present values.

In terms of breakdown by type of product, these outflows will be as follows:

Output from ITPS (2003)	
Sawn timber and sawlogs	64,000 cubic metres (approx 61,000 tonnes) pa
Wood fibre	340,000 tonnes pa
Dried rotary peeled veneer or ply wood	50,000 tonnes pa
Electricity	155 MWh

To enable this output from the ITPS, an estimated 900,000 tonnes of timber per year will flow into the ITPS, made up as follows:

Input to ITPS (2003)	Tonnes pa
Saw-logs	88,000
Lower quality logs	392,000
rotary peeler logs	120,000

Fuel wood	300,000
	900,000

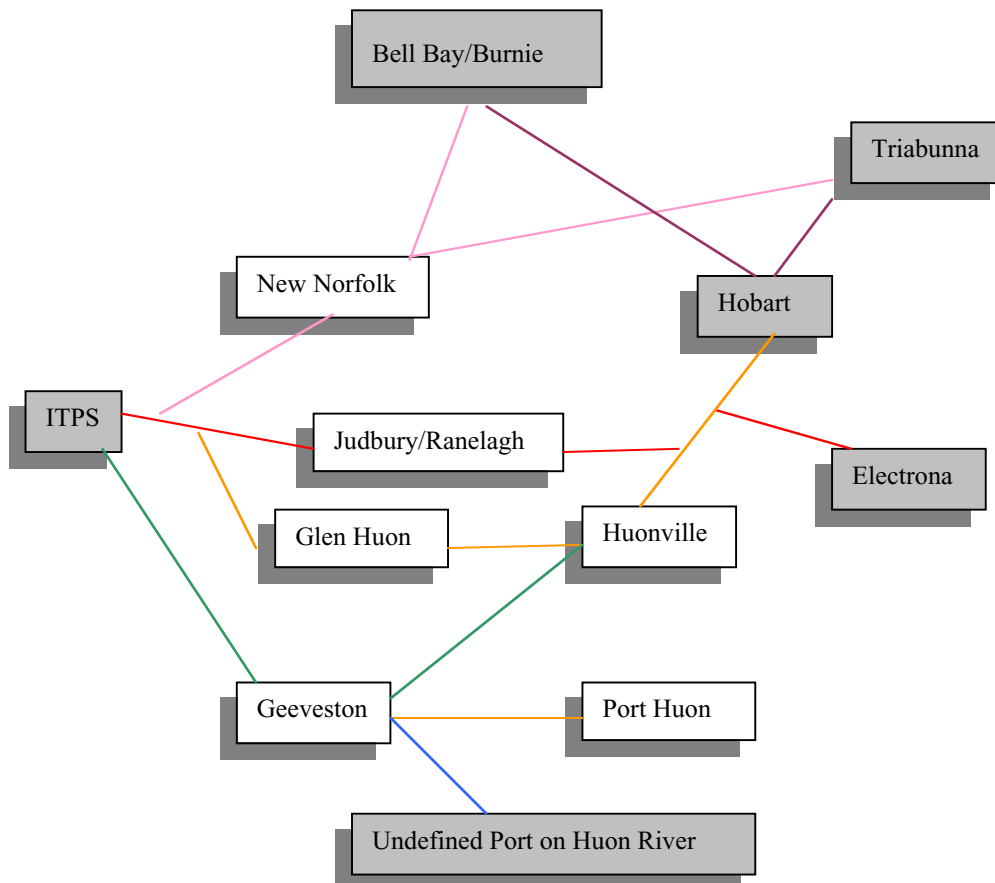
6. SELECTION OF TRANSPORT ROUTE

6.1. Alternative Ports for Export of Wood Fibre

There are a number of alternative ports that have been considered for export of wood fibre from Tasmania. These are:

1. Triabunna (as at present);
2. Bell Bay / Burnie;
3. Electrona; and
4. Various ports on Huon River.

The various routes from the ITPS to these ports are shown diagrammatically as follows:



6.2. Benefits of Electrona compared to Triabunna

The transport benefits of using the port of Electrona rather than Triabunna, as at present, accrue as a result of the considerably shorter road distance, about 61 kms compared to about 160 kms, a saving of about 100 kms each way, or about 200 kms for each round trip. There is also considerable benefit in the reduction in travel through urban areas, principally Hobart, where the timber product trucks to Triabunna would be required to traverse some 10 kms each way of urban roadway.

Indec Consulting prepared a broad independent report entitled *Overview: Diversion of Woodchip Transport to a New Port South of Hobart* in June 2000. This report assessed the issues involved in diverting the flow of timber products from the existing port at Triabunna to a new port to be built south of Hobart. In summary, the findings from this report were:

The proposal to transport woodchips to a new port to be built south of Hobart instead of carrying chiplogs to Triabunna seems to offer large benefits to the economy of Tasmania, as well as social and environmental benefits.

On our quick but conservative appraisal, the economic benefits approach \$5 million pa, made up as:

§ \$120,000 pa savings in road accident costs,

§ \$3.5 million pa in reduced vehicle operating costs,

§ \$800,000 pa in reduced road construction and maintenance costs,

§ \$500,000 pa in reduced environmental impact costs.

In addition there seem to be significant net social, environmental, logistical, and political benefits in such a move.

However, there will be people and interest groups that do not benefit but suffer. They should be identified and consulted so that their losses may be avoided or minimised or offset. Similarly net environmental gains do not mean there will not be environmental challenges and disadvantages in some respects.

Our analysis has necessarily been brief and broad. We have not seen any estimates for creating a new port or for improving the roads as will be required. Broad costs for these should be compared with the estimated benefits, and then more detailed analysis begun.

6.3. Benefits of Electrona compared to Ports on Huon River south of Geeveston

Although the road distance from the ITPS to some of these possible ports would be less than the road distance to Electrona, none of these possible ports are considered to be suitable for the type of ships that would be needed for the transport of wood-chip. There is also considerable concern relating to the potential damage that any wood-chip ships, even if they were able to navigate the Huon River, would do to the existing aquaculture industry in the Huon River.

These ports are therefore not considered to be viable options and have not been considered further.

6.4. Benefits of Electrona compared to Bell Bay and Burnie

Due to the cost of transport the wood-chip to Bell Bay or Burnie, these options have not been considered further.

6.5. Alternative Routes between the ITPS and Electrona

There are a number of possible alternative routes between the Huon ITPS and Electrona that could be used.

These alternatives, and the reasons for not preferring them, are as follows:

a) Judbury to Huon Highway via Glen Huon Road rather than North Huon Road.

Glen Huon Road, although sealed for its entire length, is generally narrower, has considerably more development along it (housing, farms, cottage industries, schools), has more bends and poorer alignment, than North Huon Road.

Of particular concern is the difficulty that would be faced by HPV s in turning out of Glen Huon Rd into Huon Highway at Huonville as a result of the road alignment at the roundabout there.

North Huon Road is favoured by DIER (see Appendix B).

b) Construction of bypass road around Ranelagh

Generally the terrain to the north of Ranelagh very hilly and heavily forested, with questionable stability of ground for road construction

c) Ranelagh to Huon Highway via Lollara Rd (3.5km) rather than Agnes St and Glen Rd

The major problem with this route, apart from the general road widening that would be required for much of the road, is the need to replace the 45m long single lane timber deck bridge which is about 0.6km from Huon Highway, for which the cost has been estimated to be about \$2.5m.

d) Use of North Glen Road to bypass the first 0.5km of Glen Road from Huon Highway

North Glen Road is a narrow, winding, gravel road, with many tight bends, poor sight distances and very little verges. It also has poor egress to Huon Highway due to the incline on North Glen Rd at the highway intersection.

e) Lower Longley to Huon Highway via Longley and Leslie Vale

This route is not preferred as it would require the wood-chip trucks to use the poorer standard and longer, more winding road through Longley and Leslie Vale, compared to the more direct route on the Huon Highway. It would also either require trucks to cross over the Huon Highway at a point south of Leslie Vale and proceed on a yet to be constructed road to link to the Channel Highway at a point north of the Sandfly Rd/Channel Highway intersection, or alternatively continue on to Margate via Kingston, a much longer trip.

f) Construction of new road northeast of and parallel to Sandfly Road for access from Huon Highway to Channel Highway

Forestry Tasmania has located the route for this possible road. Apart from the cost of construction of an entirely new road, requiring further intersections on the major State roads, this route would require trucks to negotiate considerably higher hills and extend the haul distance, and is therefore not preferred.

6.6. Alternative Routes from the ITPS to Ports Other than Electrona

6.6.1. ITPS to Triabunna

Most of the wood-chip from Tasmania's Southern Forests is currently exported from Triabunna.

Options for the route from the ITPS to Triabunna include:

- a) (via Judbury and Ranelagh) Weld Rd, Denison Rd, Lonnvale Rd, North Huon Rd, Agnes St, Glen Rd, Huon Highway and Southern Outlet to Hobart, then via the Tasman Highway (Route A3) from Hobart to Triabunna; and
- b) (via Huonville) Weld Rd, Denison Rd, Lonnvale Rd, Glen Huon Rd, Huon Highway and Southern Outlet to Hobart, then via the Tasman Highway (Route A3) from Hobart to Triabunna.

6.6.2. ITPS to Bell Bay / Burnie

Options for routes from the ITPS to Bell Bay / Burnie include:

- a) (via Hobart) Weld Rd, Denison Rd, Lonnvale Rd, North Huon Rd, Agnes St, Glen Rd, Huon Highway and Southern Outlet to the intermodal yard at Hobart, then by rail to Bell Bay or Burnie;
- b) (via Huonville) Weld Rd, Denison Rd, Lonnvale Rd, Glen Huon Rd, Huon Highway and Southern Outlet to the intermodal yard at Hobart, then by rail to Bell Bay or Burnie; and
- c) (via New Norfolk) Weld Rd, Denison Rd, Lonnvale Rd. From Lonnvale Road the route climbs Russell Spur to the upper reaches of the Plenty River. The road joins a Norske Skog Road network in the Plenty Valley before joining Lower Plenty Road (owned by Derwent Valley Council). (The Norske Skog and Lower Plenty Road are both narrow and windy). From Fielton a sealed road leads to Glenora Road joining Glenora Road near the Byrne Eske Pumping Station. The route follows Glenora Road to New Norfolk, crossing the Derwent River by the New Norfolk Bridge and then follows Boyer Road to the rail loading point at Boyer for transport by rail to Bell Bay or Burnie.

It may be possible to construct a rail loading facility near Byrne Eske, but this would be subject to acquiring a suitable site and planning approval.

6.6.3. ITPS to Possible Ports on Huon River, south of Geeveston

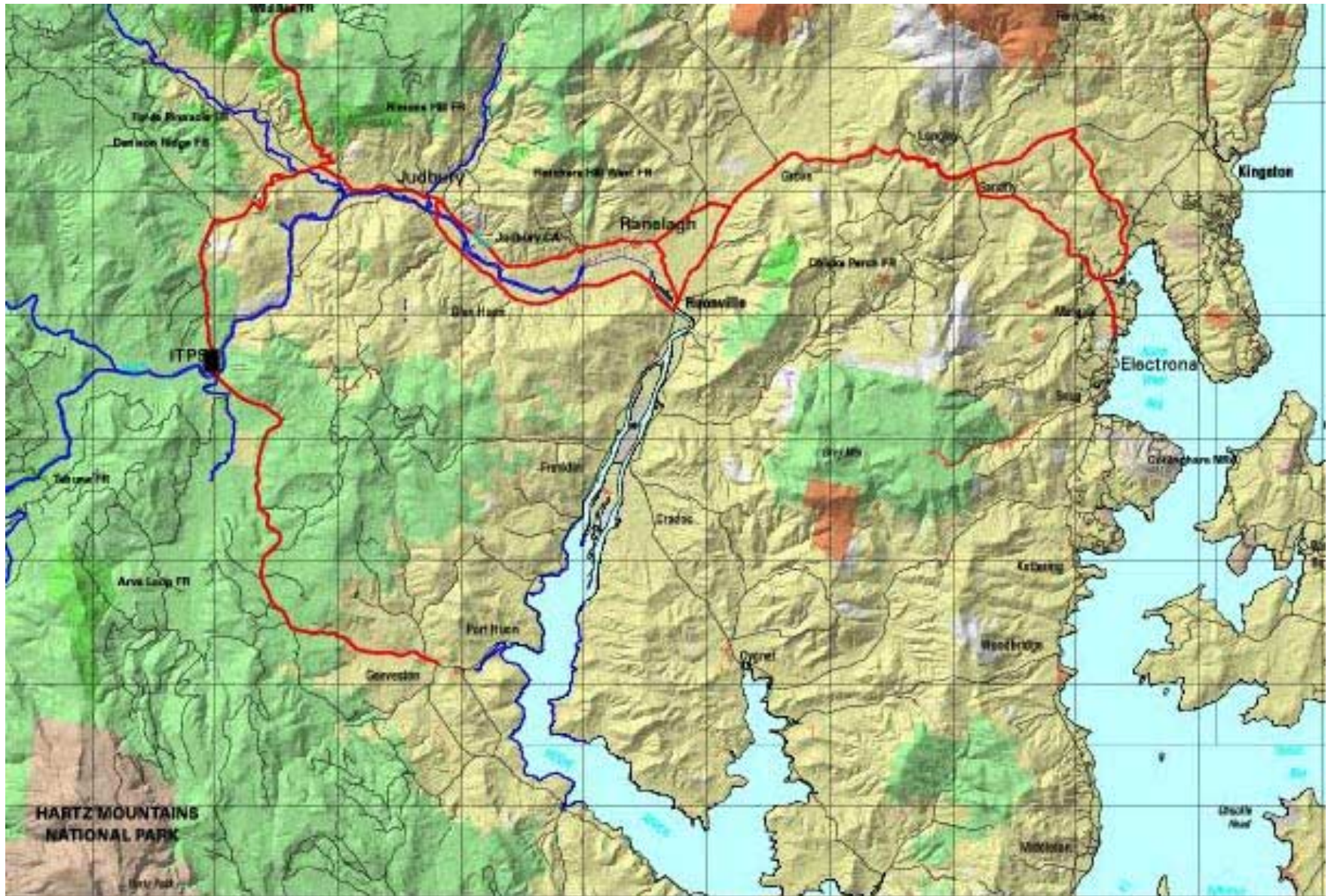
The route from the ITPS to possible Ports on the Huon River, south of Geeveston would include travel from the ITPS south via Lidgerwood Road to the Arve Road junction. From there a sealed road joins the Huon Highway at Geeveston. Proceeding south on the Huon Highway provides access to various potential sites. Turning onto a Council Road at the Police Point junction gives access to all the other potential sites.

None of the identified sites have been investigated in detail to confirm whether land can be acquired or whether it is feasible to construct the required wharf facilities.

6.7. Preferred Route Between ITPS and Electrona Wharf facility

Having discounted the possible alternative routes as discussed above, the preferred route for the movement of the processed timber products from the ITPS is Weld Rd, Denison Rd, Lonnavale Rd, North Huon Rd, Agnes St, Glen Rd, Huon Highway, Sandfly Road, Channel Highway and Pothana Pl to the wharf facility at Electrona.

This route is shown on the following map:



7. TRANSPORT TASK

An analysis of the transport task is as follows:

7.1. Current Road Traffic Volumes

Current Annual Average Weekday (Workday) Traffic (AAWT) seasonally adjusted road traffic volumes, as estimated by DIER Tasmania's Division of Transport, are as follows:

	Denni- son Rd	Lonna vale Rd	North Huon Rd (2000)	Agnes St	Glen Rd (1998)	Huon Hwy (1999) ¹
Whole day						
- all traffic	na	na	450 ²	na	240	6,183
- trucks only	na	na	66	na	16	650
Morning Peak ³ (2 way)						
- all traffic	na	na	43	na	19	516
- trucks only ⁴	na	na	na	na	na	na
Evening Peak (2 way)						
- all traffic	na	na	52	na	23	583
- trucks only	na	na	na	na	na	na

DIER has assessed that North Huon Rd, with the exception of the Salters Creek Bridge, is suitable for HPV use (see Appendix B). DIER have also reported that, Average daily traffic on this route is 430/day with 12% heavy vehicles. Reported accidents for the past five years are 7, none of which involved a heavy vehicle, this may be due to the load limit on Salters Creek Bridge. (See Appendix B)

It is estimated that Huon Highway, which is a State road, would have a capacity of 10-15,000 vehicles per day (vpd), considerably greater than the volume that it currently carries. Huon Highway has already been assessed by DIER as being suitable for HPV use (see Appendix B).

¹ Truck and Peak traffic volumes factored up from 1993 counts.

² Another traffic volume count in July 2000 indicated 430 vehicles in total and 52 trucks. See Appendix B

³ Morning Peak is 0800 to 0900

⁴ Trucks defined as any vehicle with more than 3.2 metres between the 1st and 2nd axles or with twin steer axles (ie AUSTRROADS 1994 Classification)

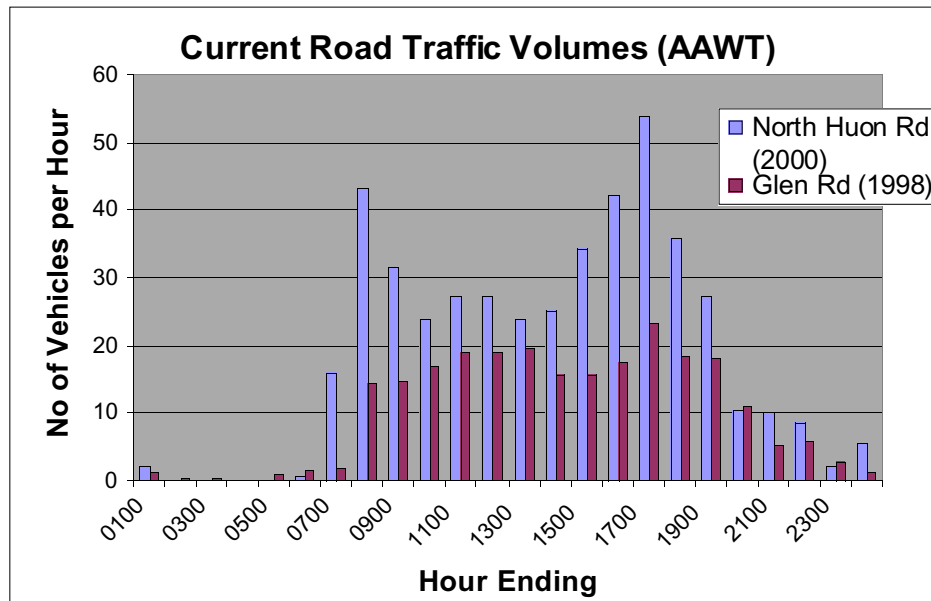
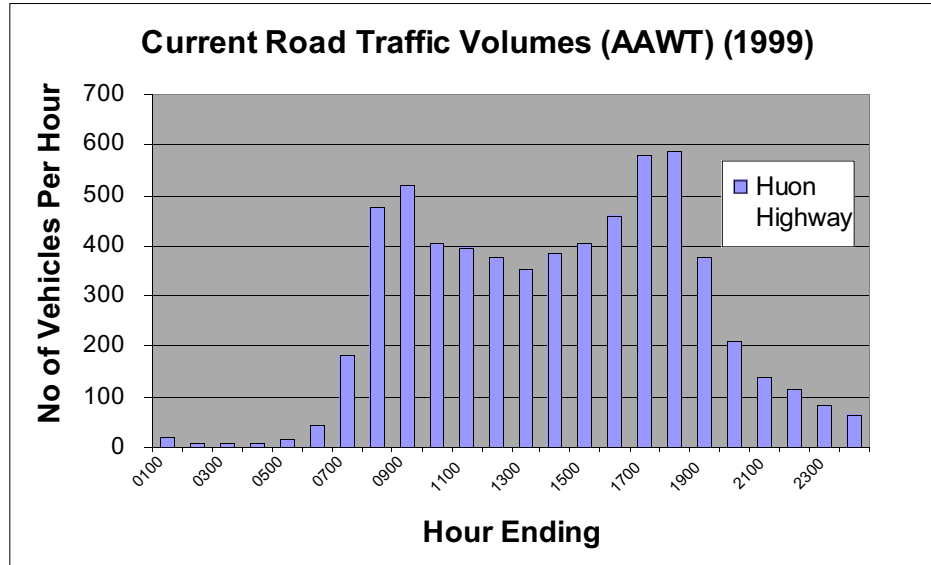
Hourly traffic volumes counted on North Huon Rd and Huon Highway in 2000 were as follows:

Hour Ending:	North Huon Rd		Glen Rd		Huon Highway	
	All Traffic	Trucks Only	All Traffic	Trucks Only	All Traffic (1999) ⁵	Trucks Only
0100	2	na	1	na	21	na
0200	0	na	0	na	8	na
0300	0	na	0	na	7	na
0400	0	na	0	na	8	na
0500	0	na	1	na	14	na
0600	1	na	2	na	42	na
0700	16	na	2	na	183	na
0800	43	na	14	na	473	na
0900	32	na	15	na	516	na
1000	24	na	17	na	404	na
1100	27	na	19	na	396	na
1200	27	na	19	na	376	na
1300	24	na	19	na	350	na
1400	25	na	16	na	383	na
1500	34	na	16	na	403	na
1600	42	na	18	na	460	na
1700	54	na	23	na	578	na
1800	36	na	18	na	584	na
1900	27	na	18	na	375	na
2000	10	na	11	na	208	na
2100	10	na	5	na	137	na
2200	9	na	6	na	115	na
2300	2	na	3	na	81	na
2400	5	na	1	na	62	na
Total	451	66	244	16	6,183	158 ⁶

⁵ This data is factored up from the 1993 counts for which the total AAWT was 5,328 vpd.

⁶ Factored up from the 1993 truck volume counts for which the AAWT was 136 vpd.

Graphically, these volumes are as follows:



These traffic distributions are relatively typical for rural roads as they show reasonably steady usage throughout the 0800 to 1800 period, compared with urban roads that would show more pronounced am and pm peaks. The graphs also show that there is almost no truck movement before 0700 or after 1800.

7.2. Current Vehicle Movements to and from Southern Forests

The estimated current number of vehicle movements to and from the Southern Forests is as follows:

	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	No of Return Trips per Day	Vehicle Movements per Day
- log trucks from forests to Triabunna, Boyer and Hobart	280,000	28	10,000	33 ⁷	66
- log trucks from forests to Port Huon and Strathblane	20,000	28	714	2	4
- employee vehicles				20 ⁸	40
Total	300,000			55	110

7.3. Future Vehicle Movements to/from the ITPS

The estimated number of future vehicle movements to and from the ITPS is as follows:

	Tonnes pa	Truck Capacity (Tonnes)	No of Return Trips pa	No of Return Trips per Day	Vehicle Movements per Day
Movements associated with wood-flow into ITPS:					
- log trucks from forests	900,000	28	32,143	103 ⁹	206
- employee midi-buses				10 ¹⁰	20
- visitors and staff cars				10	20
Total in	900,000		32,143	123	246
Movements associated with wood-flow out of ITPS:					
- wood-chip trucks to Electrona	300,000	42	7,143	24	48
- Wood-chip trucks to	40,000	28	1,429	5	10

⁷ Assumes 6 days per week operation

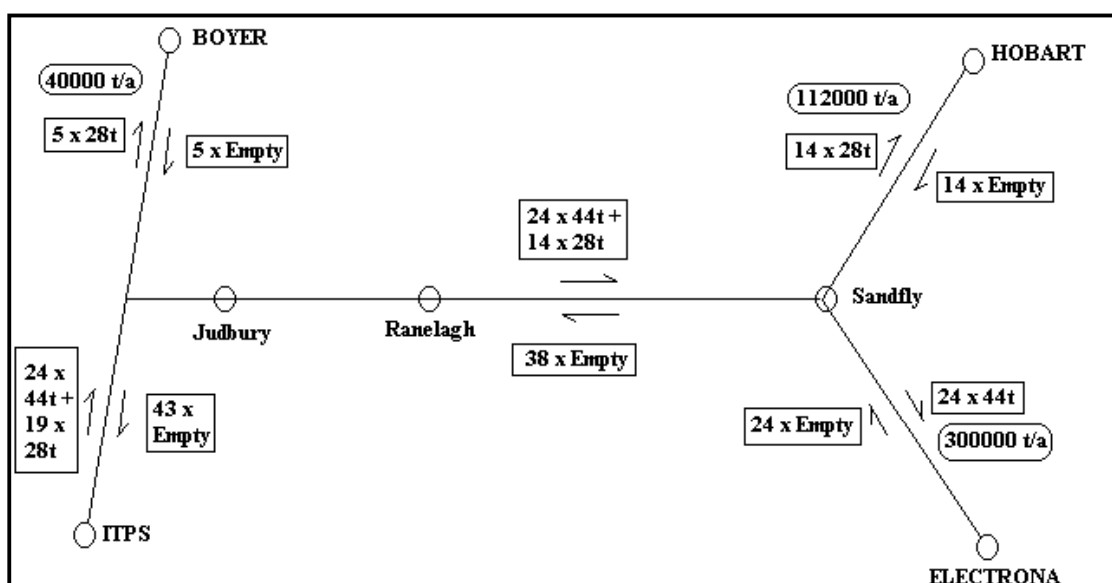
⁸ Assumes 20 employees

⁹ Assumes 6 days per week operation

¹⁰ Assumes 200 employees using 22 seat midi-buses

Boyer					
- Saw-log, veneer, etc trucks to Hobart	112,000	28	4,000	14	28
Total out	452,000		12,572	43	86
Total	1,352,000		44,715	166	332

These truck and timber product volumes on each section of the route are shown in the following diagram (the rectangular boxes show truck movements per day and the round-ended boxes show the total wood product quantities per annum):



7.4. Number of Woodchip Vehicle Movements to/from the ITPS

The number of trips per day from the ITPS required to transport the wood product obviously depends on the size of the trucks used.

There are a number of advantages in using the biggest trucks possible, namely HPV trucks, for this task. These advantages include:

- Allowing the total number of truck movements per day to be minimised (and consequently minimising the risk of road accidents and the number of occurrences of noise and vibration intrusion);

- Minimising the size of the truck fleet required, thus reducing the number of vehicles that may need special treatment to reduce noise emission;
- Allowing the smallest number of dedicated drivers to operate on the route;
- Minimising the cost through economy of scale.

It is not considered that the extent of road-works needed to upgrade the roads to accommodate HPVs would be significantly different to the extent of road-works needed to upgrade the roads to accommodate smaller semi-trailer type trucks.

Forestry Tasmania believe that a processor will prefer the use of HPV trucks for the transport of the wood-chip.

It is proposed to operate the trucks six (6) days per week, twelve (12) hours per day (7 am to 7 pm).

It is estimated that the number of HPV truck movements per day required between the ITPS and Electrona will be 24 return trips (ie 48 truck movements per day). This is estimated as follows:

No of Return Trips per day

$$= (\text{No of tonnes of wood-chip per year}) / \{(\text{No of Working days per year}) \times (\text{No of tonnes of wood-chip per Truck})\}$$

$$= 300,000 / (300 \times 42)$$

$$= 23.8 \text{ Return Trips per day}$$

This equates to 48 truck movements per day (24 from the ITPS to Electrona and 24 from Electrona to the ITPS), or, on average, four (4) movements per hour (two from the ITPS to Electrona and two from Electrona to the ITPS) over the twelve (12) hour working day.

Operational requirements may result in the number of truck movements during any one hour, or on any one day, being slightly different to the averages quoted above.

7.5. Changes in Road Traffic Volumes Due To ITPS Development

The additional vehicle movements associated with the wood-chip operation on sections of the route between the ITPS and the Huon Highway/Sandfly Rd intersection will be as follows:

	Current Avg Daily Traffic Volume (AAWT)	Additional No of Vehicle Movements per Day	% Increase (compared to Current)
North Huon Rd:			
- Trucks	66	76	115.2%
- Cars, Light Trucks and Vans	384	5 ¹¹	1.3%
- Total	450	81	18.0%
Glen Rd:			
- Trucks	16	76	475%
- Cars, Light Trucks and Vans	224		Nil
- Total	240	76	31.7%
Huon Highway:			
- HPV s and Trucks	650	76	11.7%
- Cars, Light Trucks and Vans	5,533		Nil
- Total	6,183	76	1.2%

Broken down by hour of day, the current and estimated future numbers of trucks on North Huon Rd, Glen Rd and Huon Highway are as follows:

Hour Ending:	North Huon Road			Glen Rd			Huon Highway		
	All Vehicles (July 2000)	Additional Vehicles to and from ITPS	Total Vehicles (2003)	All Vehicles (July 2000)	Additional Vehicles to and from ITPS	Total Vehicles (2003)	All Vehicles (July 2000)	Additional Vehicles to and from ITPS	Total Vehicles (2003)
0100	2		2	1		1	21		21
0200	0		0	0		0	8		8

¹¹ Assume 50% of employee and visitor vehicles use North Huon Rd

0300	0		0	0		0	7		7
0400	0		0	0		0	8		8
0500	0		0	1		1	14		14
0600	1	3	4	2		2	42		42
0700	16	6	22	2	6	8	183	6	189
0800	43	7	50	14	7	21	473	7	480
0900	32	6	38	15	6	21	516	6	522
1000	24	7	31	17	7	23	404	7	411
1100	27	6	33	19	6	25	396	6	402
1200	27	6	33	19	6	25	376	6	382
1300	24	7	31	19	7	26	350	7	357
1400	25	6	31	16	6	22	383	6	389
1500	34	7	41	16	7	23	403	7	410
1600	42	6	48	18	6	24	460	6	466
1700	54	6	60	23	6	29	578	6	584
1800	36	6	42	18	6	24	584	6	590
1900	27	2	29	18		18	375		375
2000	10		10	11		11	208		208
2100	10		10	5		5	137		137
2200	9		9	6		6	115		115
2300	2		2	3		3	81		81
2400	5		5	1		1	62		62
Total	451	81	532	244	76	320	6,183	76	6,259

As there will be a relatively even flow of wood-chip and other vehicles from the ITPS throughout the day (from 7 am to 7 pm), as can be seen from the above tables, the increases in each one-hour period are a relatively constant 6 — 7 vehicles per hour. These increases, whilst not insignificant, are possibly not much greater than would occur in a few years time through natural growth anyway.

7.6. Size of Fleet Required for Wood-chip Export Operation

The return trip from the ITPS to Electrona, including loading and unloading time, will take two (2) hours.

The total number of HPVs needed for operations (excluding spares) is therefore:

= (Total No of Return trips per day required) / (No of return trips per day that each truck can make)

= 24 / 6

= 4 HPVs

7.7. Use of Alternative Sized Vehicles to High Performance Vehicles (HPV s)

Should smaller trucks be used, the total number of trucks required would increase.

For example, if conventional 28 tonne trucks were to be used for wood-chip cartage in lieu of the 42 tonne capacity HPV s, the total number of trucks required would be $(4 \times 42/28 = 6)$, and the number of truck movements per day would also increase, to $(46 \times 42/28 =) 72$ per day.

Obviously, the greater the number of truck movements that occur, the greater the risk of road accidents and the greater the number of occurrences of noise intrusion to residences along the route.

Compared with the total number of vehicle movements in the area however, the greater number of wood-chip truck movements required if smaller trucks are used is still relatively insignificant.

However, to keep the total number of vehicle movements to the minimum possible, it is recommended that the largest vehicles possible be used.

8. ROAD SECTIONS AND ASSESSMENT CRITERIA

8.1. Road Sections

A summary of the sections of roads proposed to be traversed between the ITPS and Electrona is as follows:

Road Section	Distance (km)	Owned by
along Denison Rd from ITPS end of Forestry Tas section of Denison Rd	7.3	FT
along Denison Rd from end of Forestry Tas section of Denison Rd to Russell Rd (= road to Lonnvale)	5.7	HVC
along Lonnvale Rd from Russell Rd to intersection with road from Judbury	0.7	HVC
along Lonnvale Rd from intersection with road from Judbury to Judbury	5.9	HVC
along North Huon Rd from Judbury to Ranelagh	10.2	HVC
along Agnes St from Ranelagh to Glen Rd	0.7	HVC
along Glen Rd from Agnes St to Huon Highway	4.1	HVC
along Huon Highway from Glen Rd to Sandfly Rd	14.1	DIER
along Sandfly Rd from Huon Highway to Channel Highway	8	KC
along Channel Highway from Sandfly Rd through Margate to entrance road to wharf facility of Electrona (Pothana Pl)	3.9	DIER
along Pothana Pl from Channel Hwy to entrance to wharf facility of Electrona	0.3	KC
Total	60.9	

This report only considers the roads between the ITPS and the Huon Highway/Sandfly Road intersection.

The second report by Indec Consulting entitled, *Impact of Vehicle Movements Associated with Re-development of Wharf Facilities at Electrona*, December 2000, deals with the impact of vehicle movements along Sandfly Rd and along the section of Channel Highway from the Sandfly Rd intersection, through Margate, to Electrona.

8.2. Assessment Criteria

To accommodate the use of HPV wood-chip trucks, the roads from the ITPS to Electrona have been assessed on the basis of the following criteria:

- Width and condition of road pavement and shoulders;
- Width and condition of bridges;
- Need for left or right turn slip lanes at intersections;
- Sight distances at intersections;
- Sight distances on the roadway.

The Standards used to assess the current suitability or otherwise of the roadways are:

- The Tasmanian Department of Infrastructure, Energy and Resources (DIER) *Route Selection Criteria — Checklist — Attachment C to Guidelines for HPVs in Tasmania* (see Appendix A);
- AUSTRROADS *Rural Road Design — Guide to the Design of Rural Roads*;
- AUSTRROADS Road Design Manual, Part 5 *Intersections at Grade — Guide to Traffic Engineering Practice*;

For HPV usage, the accepted minimum lane widths, on roads with an ADT less than 1000, are 2.75m, with a useable shoulder of 0.6m. Generally however, Forestry Tasmania would prefer lane widths of 3.0m, with shoulders of 1.0m width, for their HPV vehicle operation.

9. DETAILED ASSESSMENT OF ROADS

9.1. From ITP Site along Denison Rd to end of Forestry Tasmania s Section of Denison Rd

9.1.1. Description of Existing Road

This section of road is 7.3km long and is owned by Forestry Tasmania.

The road is a gravel road and is currently being upgraded by Forestry Tasmania to suit HPV truck operation.

The 2.3km section between 6.7km and 9.0km from the Denison Rd/Russell Rd intersection has already been upgraded.

Other parts, totalling 5.0km in length still require upgrading, as they have narrow sections (barely 5 m wide), little or no shoulders, sharp corners, poor sight distances, steep inclines and are generally in poor condition.

9.1.2. Upgrading Required to Suit HPV Operation

Other than the 2.3km section between 6.7km and 9.0 km from the Denison Rd/Russell Rd intersection which has already been upgraded, there is still a 5.0km section of the road to be completely rebuilt, bypassing the existing section.

9.1.3. Estimated Cost

The estimated cost of this re-building is (5kms @ \$200k/km =) \$ 1.0m.

9.2. From the end of FT s section of Denison Rd along Denison Rd to Russell Rd (= road to Lonnvale) intersection

9.2.1. Description of Existing Road

This section of road is 5.7km long and is owned by the Huon Valley Council and is in need of upgrading.

The road is a gravel road and has narrow sections (barely 5 m wide), little or no shoulders, sharp corners, poor sight distances, steep inclines and are generally in poor condition.

9.2.2. Upgrading Required to Suit HPV Operation

The whole section of this road still needs re-construction.

9.2.3. Estimated Cost

The estimated cost of this upgrading is (5.7km @ \$120k/km =) \$ 684k.

9.3. From Denison Rd/Russell Rd intersection along Denison Rd to intersection with road from Judbury

9.3.1. Description of Existing Road

This section of road is 0.7km long and is owned by the Huon Valley Council.

The road is a gravel road and, apart from the section between 0.3 km and 0.4 km from the intersection with road from Judbury which is badly pot-holed, is generally in reasonable condition with a 6.0 m wide formed section and mostly 0.8 m wide shoulders.

There is a single lane, timber deck, timber pile bridge, 4.8m wide x 27m long, about 0.5 km from the intersection with the road from Judbury. This bridge is in good condition and has no load restriction other than the normal roadway limits.

9.3.2. Upgrading Required to Suit HPV Operation

Generally the only upgrading required on this section of road is:

- a) the routine maintenance required to remove the pot-holes in the section between 0.3 km and 0.4 km from the intersection with road from Judbury; and

- b) the routine maintenance required to maintain the formation of the shoulders.

9.3.3. Estimated Cost

The estimated cost of this upgrading is \$7,000 (based on an average road maintenance cost of \$10k per km).

9.4. From Denison Rd/road from Judbury to Lonnvale intersection, to Judbury

9.4.1. Description of Existing Road

This section of road is a gravel road 6.3km long, owned by the Huon Valley Council and is generally in good condition.

There is a bridge over Russell River about 6.2km from Judbury. This bridge is a single lane timber deck bridge, 24m long and 4.3m wide, and has no load limit below normal roadway limits.

About 5.6km from Judbury there is a narrow bend (6.5m between white posts) over a culvert.

The section between 2.8 km and 3.4 km from Judbury is badly pot-holed.

The gravel section between 1.5km and 1.7km from Judbury is generally only 5.5m wide.

The 0.1 km sealed section of the road on the western side of Judds Creek bridge (0.5 to 0.6km from Judbury) needs a considerable amount of patching up to fix pot-holes and frayed edges.

Judds Creek bridge is 0.5 km from Judbury and is a single lane, timber deck bridge, 24m long and 4.3m wide, and has no load limit below normal roadway limits. This bridge is not in a critical position with regard to sight distances and although the Huon Valley Council would like it to be replaced, this is not necessary at present.

The first 0.5km section and the final 0.9km section of the sealed road from Judbury is in good condition with generally 6.0m wide pavement and generally 0.8 m wide shoulders. There is no line marking on the road.

The first 1.5km of the road west from Judbury is sealed and the remainder is gravel.

9.4.2. Upgrading Required to Suit HPV Operation

Upgrading required includes:

- a) Widening the narrow bend over at the culvert about 5.6km from Judbury;
- b) Repairing pot-holes on the section between 2.8 km and 3.4 km from Judbury;
- c) Widening the gravel section between 1.5km and 1.7km from Judbury from 5.5m to 6.0m and constructing 0.8m wide shoulders; and
- d) Patching of pot-holes and frayed edges on the sealed section between 0.5km and 0.6km from Judbury;

9.4.3. Estimated Cost

The estimated cost of this upgrading is as follows:

Item	Cost (\$ 000)
Widen road to 6.0m for distance of 0.25km (@\$50k per km)	13
Repair pot-holes for 0.6km (@ \$10k per km)	6
Total	19

9.5. From Judbury along North Huon Rd to Ranelagh

9.5.1. Description of Existing Road

The length of this section of road is 10.2 km.

The road is owned and maintained by the Huon Valley Council and has both sealed and gravel sections. The sealed sections are from Judbury to 0.9km east of Judbury and from Ranelagh to 4.6km west of Ranelagh. The sealed sections have widths varying from 5.0m to 6.0m with gravel verges from 1m wide to nil. There is no line marking on the sealed road section. The gravel section is generally 6m wide and has 1m wide gravel verges. There are sight distance problems at a number of bends in the road. These occur at the following distance from Judbury: 1.3km, 2.2 - 2.3km, 3.1km, and 4.3km.

There are Give Way signs on the roads into Judbury for traffic from the north (George St) and from the south (Glen Huon Rd), giving priority to traffic travelling east to west from Lonnvale, straight through Judbury onto North Huon Road (and reverse). There is a 60kph speed limit on the east-west traffic through Judbury.

Apart from the first 100m, the sealed 0.9km section eastwards from Judbury is 6.0m wide and is in good condition.

There is a saw-mill 5.6km west of Ranelagh.

The western end of the sealed section between 4.0km and 4.6km from Ranelagh is 6.0m wide and is in good condition.

There is a one lane bridge (Salters Creek) with timber deck, 8.0m long and 4.8m wide, and a 15 tonne load limit, approximately 2.7 km west of Ranelagh.

The eastern end of North Huon Road forms a T-junction with Agnes St at Ranelagh. On the section of North Huon Road for about 0.5km from this T-junction there are a number of houses very close to the road, with the house right at the junction (on the southern side of the road) being built almost right onto the boundary. Road width at this point is only 5.5m, with only 0.5 — 1.0m shoulders on either side of the road. Vehicles

travelling eastwards along North Huon Road need to decelerate at the T-junction both in order to negotiate the junction and as a result of the poor sight distances caused by the houses on the corner. There is a Give Way sign at this intersection for southbound vehicles on the extension of Agnes St, giving priority to vehicles turning right out of North Huon Rd into Agnes St. The closeness of the houses to the road at this intersection will also cause problems with respect to noise intrusion into the houses from wood-chip trucks.

The Tasmanian Dept of Infrastructure, Energy and Resources (DIER) have assessed that this road, apart from the Salters Creek bridge, is adequate for High Performance Vehicle (HPV) operation (ie HPV vehicles). (See Appendix B)

However, it is considered advisable that some minor improvements be made to parts of the road, as follows:

- a) the first 0.1km of sealed road leading out of Judbury is only 5.5m wide and is in need of patching up.
- b) on the gravel section at points about 1.1km and 2.2km from Judbury there is a culvert with virtually no shoulders on the road and a drop of about 2m to the creek below;
- c) on the gravel section at points 2.8km and 3.0km from Judbury there is a steep drop beside the southern edge of the road;
- d) on the sealed section between 6.4km and 6.7km from Judbury there is a post and wire fence on the southern side of the road only 0.5km from the edge of the bitumen, and on the northern side of the road there is only 0.5m of shoulder before a steeply rising embankment;
- e) the shoulders on the section 7.9km from Judbury fall away steeply from the edge of the sealed pavement and need building up;
- f) the shoulders on the section 8.4km from Judbury fall away steeply from the edge of the sealed pavement and need building up for a distance of about 20m around a bend;

- g) about 8.7km from Judbury there is a power pole on the southern side of the road that is only 0.5 m from the traffic lane;
- h) the paving on the section between 8.8km and 9.0km from Judbury is breaking up and needs repair;
- i) the shoulders on the section about 9.3km from Judbury rise steeply from the edge of the sealed pavement and need cutting away; and
- j) the shoulders on the section between 9.7km and 9.8km from Judbury fall away steeply from the edge of the sealed pavement and need building up;

9.5.2. Upgrading Required to Suit HPV Operation

Upgrading required includes:

- a) attention to items a) to j) above;
- b) rebuilding of the 15 tonne limit bridge (Salters Creek) 7.5km from Judbury.
- c) sight distance improvement and noise mitigation at the T-junction of North Huon Road in Ranelagh, which may at worst require compulsory acquisition of properties on the corner (particularly on the southern side); and

9.5.3. Estimated Cost

The estimated cost of this upgrading is as follows:

Item	Cost (\$ 000)
Increase width and seal first 0.1km of sealed road leading out of Judbury (@ \$60k per km)	6
Increase width of shoulders to 1.0m in section	12

6.4km to 6.7km from Judbury (@ \$40k per km)	
Relocate power pole at point 8.7km from Judbury	10
Repair paving on section 8.8km to 9.0 km from Judbury (@ \$20k per km)	4
General building up of shoulders	10
Rebuild Salters Creek Bridge	200
Compulsory acquisition of property on SW corner of North Huon Rd/ Agnes St intersection in Ranelagh	150
Total	392

9.6. From Ranelagh along Agnes St to Agnes St/Glen Rd Intersection

9.6.1. Description of Existing Road

Agnes St is a Huon Valley Council road, and the section from Ranelagh to the Glen Rd intersection is 0.7km.

The road is a sealed 6.0m wide two lane road, with at least 1m wide shoulders and well-painted white lines.

Approximately 100m south of the North Huon Road/Agnes St intersection there is a further T-junction where Lollara Rd intersects with Agnes St. Traffic turning left from Lollara Rd into Agnes St has priority over traffic continuing southwards on Agnes St., which has a Give Way sign at this intersection. As this intersection is still within the town of Ranelagh, there may be some noise mitigation required to reduce the noise from HPV vehicles that are travelling south accelerating (slightly uphill) from possibly a stationary position at this intersection.

There are seven houses on the eastern side of Agnes St between the Lollara Rd intersection and the Glen Road intersection, set back between about 6m and 10m from the road. There are two houses on the western side.

Glen Road also intersects at Agnes St at a T-junction, at a point where Agnes St has a large sweeping bend. There is a sharp left turn (about 7m radius) into Glen Road for traffic travelling south along Agnes St. There is land available for the radius of this turn to be increased.

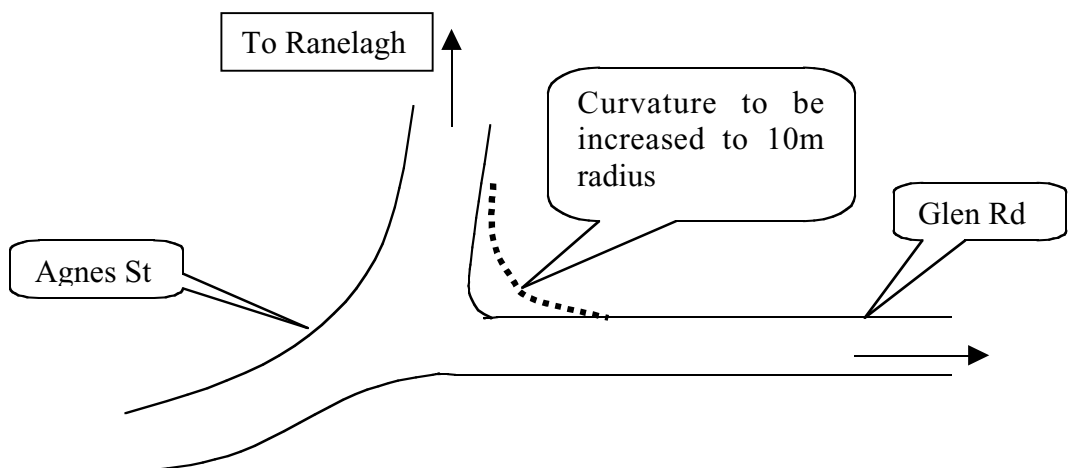
The noise level at the Agnes St/Glen Road intersection was measured at 48 dBA.

9.6.2. Upgrading Required to Suit HPV Operation

Upgrading required includes:

- a) Increasing the curvature of the left turn from Agnes St into Glen Rd

The curvature of the left turn from Agnes St into Glen Rd needs to be increased to a radius of at least 10m as shown in the following diagram:



- b) Some noise mitigation for houses along Agnes St may also be required.

9.6.3. Estimated Cost

The estimated cost of the road upgrading is \$50k.

9.7. From Agnes St/Glen Rd Intersection along Glen Rd to Huon Highway Intersection

9.7.1. Description of Existing Road

Glen Road is a 4.1km long Council road linking Agnes St to Huon Highway. It has a sign at the Huon Highway end that says No passage for Vehicles over 15 tonnes .

Although sealed, the road is only 5.5m wide, and the ability of the road construction to accommodate HPV vehicles is questionable. There are a lot of patches in the 1km section of this road at the Agnes St end. The shoulders are mostly not more than 0.5m and need re-formation for the whole length of Glen Road. There are no shoulders on the 0.6km section at the Huon Highway end. There are no white lines.

There is a large tree on the southern side of the road, approximately 0.3km from the Agnes St end of Glen Road, which may be encroach on road space for large vehicles travelling westwards.

There is a relatively new one lane concrete bridge, 34.3m long and 4.3m wide, over Mountain River, 2.6 km from the Agnes St end of Glen Road.

There is an active quarry about 0.5km south of the Mountain River bridge, which causes some noise in the area (measured to be about 43 dBA).

There is also a sawmill on the north side of North Glen Road, about 0.2km east of the Glen Road/North Glen Road intersection which also causes some noise in the area.

There is a sharp 90-degree bend in Glen Road where the North Glen Road intersects. This needs to be signed to prevent accidental straight through movements into North Glen Road for vehicles travelling eastwards along Glen Road.

9.7.2. Upgrading Required to Suit HPV Operation

Upgrading required includes:

- a) Widening of the road to 6.0m (ie 2 x 3.0m traffic lanes) and strengthening of the road construction to accommodate HPV vehicles;
- b) Construction or re-formation of the shoulders to 1.0m wide for the whole length of Glen Road;
- c) Painting of white roadway centre lines;
- d) Removal of large tree on the southern side of the road, approximately 0.3km from the Agnes St end of Glen Road;
- e) Signage at the sharp 90-degree bend in Glen Road where the North Glen Road intersects to prevent accidental straight through movements into North Glen Road for vehicles travelling eastwards along Glen Road.

9.7.3. Estimated Cost

The estimated cost of this upgrading is as follows:

Item	Cost (\$ 000)
Widening of the road to 6.0m (ie 2 x 3.0m traffic lanes), strengthening of the road construction and construction or re-formation of the shoulders to 1.0m width (4.1km @ \$60k per km)	246
Painting of white roadway centre lines	0.5
Removal of large tree on the southern side of the road, approximately 0.3km from the Agnes St end of Glen Road	2
Signage at 90-degree bend in Glen Road at North Glen Road intersection	0.5
Total	249

9.8. From North Glen Rd/Huon Highway Intersection along Huon Highway to Huon Highway/Sandfly Rd Intersection

9.8.1. Description of Existing Road

Huon Highway is a State road. The section from North Glen Rd/Huon Highway Intersection along Huon Highway to Huon Highway/Sandfly Rd intersection is 14.0km long and has been previously assessed by DIER to be suitable for HPV usage. (see Appendix B).

There are however concerns over the Sandfly Interchange. From the Huonville side of the intersection, Huon Highway has a long (4km) steep (5°) downhill decline to the Sandfly Rd turnoff. This requires heavy vehicles to travel in the left-hand lane in low gear and then make their way through the right-hand lane to the decelerating lane in the centre island, with the potential of conflict with other faster moving traffic. The road is signed with a High Accident Intersection — Approach With Care sign at this point. The decelerating lane is 120m long, including a 30m lead-in taper.

DIER have reported that there have been 23 reported accidents over the past five years on this section of the Huon Hwy.

9.8.2. Upgrading Required to Suit HPV Operation

The only improvements needed on this section of road is the extension of length of decelerating lane for eastbound traffic making right turns out of Huon Highway into Sandfly Rd.

The AUSTRROADS Road Design Manual, Part 5 *Intersections at Grade — Guide to Traffic Engineering Practice*, Table 5.6, recommends that for level roads where the speed of approach to the intersection is 100kph, and the exit speed is 20kph, the length of the decelerating lane should be 162m.

For 5-6% downhill grades, this should be increased by a factor of 1.35, making the overall length of the decelerating lane, including the tapered approach, ($162 \times 1.35 =$) 219m. (ie an increase of 99m over the current 120m lane)

9.8.3. Estimated Cost

The estimated cost to increase the length of the decelerating lane by 99m (@\$460 per m) is \$45,600.

10. ASSESSMENT OF TRAFFIC RELATED NOISE IMPACTS

This section considers the likely impact of the noise generated by truck movements along the route from the ITPS to the Huon Highway/Sandfly Rd intersection.

Noise generated on the remaining sections of the roads to the wharf facility at Electrona site are dealt with in a separate report by Indec.

Data in this section has been provided by Pearu Terts, Consulting Engineer for Architectural Acoustics and Noise Control.

10.1. Acceptable Noise levels

The acceptability or otherwise of changes in noise levels tends to be subjective, and depends on factors such as:

- The level and nature of the current noise sources;
- The extent of the increase in the noise level over the current ambient level;
- Whether new noise sources are of an intermittent or a continuous nature;
- The pitch of the noise source; and
- The environment in which the new noise source is introduced (eg residential, industrial, etc).

The general acceptable noise levels for persons in houses along the route can be identified by the noise level nominated in Australian Standard AS1055 for persons in a residential R4 zoned area (ie a suburban area with some commerce and industry). This is 55 dB(A) for the maximum continuous day-time noise level. The corresponding maximum night-time noise level is 45 dB(A).

For particular situations along the route, some recommended interior satisfactory and maximum design noise levels stated in AS 2107 — 1987 *Acoustics — Recommended Design Sound Levels and Reverberation Times for Building Interiors*, Table 1, are relevant, and when applied in conjunction with Australian Standard AS3671 — 1989 *Acoustics — Road Traffic Noise Intrusion* —

Building Siting and Construction, Section 3.2.1, allows the following table to be constructed:

Situation	Satisfactory Indoor dB(A)	Maximum Indoor dB(A)	Maximum Outdoor (= Indoor + 10dB(A))¹²
School Classrooms	40	45	55
Cafeterias	45	55	65
Residences (work areas)	35	40	50
Hotels (bars and lounges)	45	55	65
Small Retail Stores	45	50	60
Supermarkets	50	55	65

An alternative indication of what might be considered as acceptable average outdoor background noise levels along the route can be derived from AS1055.2 — 1997 *Acoustics — Description and Measurement of Environmental Noise — Application to Specific Situations*, Appendix A, which quotes estimated average background A-weighted sound pressure levels for different areas containing residences in Australia. This Appendix suggests the following values:

Location	Acceptable Day-time dB(A) (L₉₀)	Acceptable Night -time dB(A) (L₉₀)	Ref:

¹² Australian Standard AS3671 — 1989 *Acoustics — Road Traffic Noise Intrusion — Building Siting and Construction*, Section 3.2.1 states that for buildings of Standard construction; openings, including open windows and doors may comprise up to 10% of the exposed facades Total Noise Reduction (TNR) of approximately 10 dB(A) is expected.

ITPS to Glen Rd/Huon Hwy intersection	50	40	1
Huon Highway - from Glen Rd to Sandfly Rd	55	45	2

References:

1. Australian Standard AS1055.2 - 1997 for a Noise Area Category R3, which is defined as Areas with medium density transportation or some commerce or industry .
2. Australian Standard AS1055.2 - 1997 for a Noise Area Category R4, which is defined as Areas with dense transportation or some commerce or industry .

Examination of the above two tables suggests that the maximum acceptable noise levels of 55 — 65dB(A) would be acceptable on Huon Highway, because this is a major state road, whilst on all other sections of road, which are mainly either rural or residential, the maximum noise should be of the order of 50 dB(A).

10.2. Vibration from Truck Movements

Previous ground vibration measurements from heavy truck movements on roadways indicates that there is not likely to be any significant vibration problem from forestry truck movements. This is principally due to the damping out of the vibrations by the rubber tyres on the trucks.

10.3. Current Average Daytime Noise Levels

Current average day-time noise levels were measured at a number of locations along the route from the ITPS to the wharf facility at Electrona. The results for the section from the ITPS to Sandfly Rd were as follows:

Location	Date	Time	15 minutes dB(A)
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			L₁₀	L₉₀	L_{eq}
Denison Rd, 9.4km from Judbury	26/8/00	1830	39.8	36.5	38.3
Russell Rd/Denison Rd intersection	26/8/00	1900	58.3	54.0	56.3
North Huon Rd/Williscroft Rd	26/8/00	1745	42.0	32.3	47.4
Judbury Shop (15m from intersection)	26/8/00	1655	49.8	39.5	47.7
----- as above -----	26/8/00	1710	53.3	39.0	50.9
North Huon Rd/Rockwood Rd (44m)	26/8/00	1545	47.8	40.0	47.5
Agnes St/Glen Rd (15m from intersection)	26/8/00	1504	59.3	48.0	55.3

Further daytime 3 hour noise measurements were made at Ranelagh on Thursday 21/12/00 and Wednesday 31/1/01. The results of these measurements and the equivalent 18 hour noise level estimated from these measurements are as follows:

Location	Date	Time	Mean dB(A)			
			L₁₀ (3 hr)	L₉₀ (3 hr)	L_{eq}	L₁₀ (18 hr)¹³
Ranelagh (cnr North Huon Rd /Agnes St)	21/12/00	1000 - 1300	56.7	42.0	53.6	55.7
Ranelagh (cnr North Huon Rd /Agnes St)	31/1/01	1300 - 1600	58.4	38.8	57.2	57.4

Notes:

1. L₁₀ is the noise level that is exceeded for 10% of the time (eg if L₁₀ = 41 db(A) when measured over 10 minutes, then for 1.0 minute noise level would have been 41 db(A) or more).
2. Similarly, L₉₀ is the noise level that is exceeded for 90% of the time (eg if L₉₀ = 41 db(A) when measured over 10 minutes, then for 9 minutes noise level would have been 41 db(A) or more). L₉₀ is therefore a good descriptor of the background noise level.

¹³ Calculated by Pearu Terts, Noise Consultant

3. L_{eq} is the equivalent A weighted noise level. For example, if $L_{eq} = 38.8$ db(A), then that noise level has the same acoustic energy as a steady noise of 38.8 db(A).

10.4. Anticipated Noise Levels

Since the level of noise from passing road traffic builds up to a peak and then falls away again, it is useful to translate this transient Sound Exposure Level (SEL) noise energy into an equivalent energy of 1 second duration. This 1 second noise level can then be further translated to an L_{eq} noise level value.

Using this procedure, the Sound Exposure Level (SEL) of a number of log trucks operating at about 60 kph (which is the maximum speed likely to be achieved past residential areas along the route) was measured in open area 15 m from the trucks and found to average 83.6 dB(A). From this, the A weighted L_{eq} (1 hr) noise level was calculated to be 55.9 dB(A), when the flow rate was 6 trucks/hr, with each truck having an SEL= 83.6 dB(A).

When the noise level from the trucks is added to the daytime background noise levels along the route, the combined overall noise level at residential area points along the route from the ITPS to Sandfly Rd would be as shown in the following table:

Location	Daytime Noise Level				
	Current Ambient L_{90}	Current Ambient L_{eq}	+ Truck Noise L_{eq}	Expected New Noise Level L_{eq}	Increase above Current Noise
	dB(A)	dB(A)	dB(A)	dB(A)	dB(A)
Judbury Store (15m from intersection)	39.5	47.7	55.9	56.5	8.8
----- as above -----	39.0	50.9	55.9	57.1	6.2
North Huon Rd/ Williscroft Rd	32.3	47.4	55.9	56.5	9.1
North Huon Rd/	40.0	47.5	55.9	56.5	9.0

Rockwood Rd (44m)					
Ranelagh (cnr North Huon Rd /Agnes St) ¹⁴	42.0	53.6	55.9	57.9	4.3
----- as above -----	38.8	57.2	55.9	59.6	2.4
Agnes St/Glen Rd (15m from intersection)	48.0	55.3	55.9	58.6	3.3

Any increase in noise level of more than about 5.0 db(A) above the current ambient level would be quite noticeable.

The above assessment suggests that the noise from the forestry trucks will be noticeable, as would be expected in the relatively quiet rural environments that predominate on the route. However, the noise levels are expected to be only marginally outside the recommended values, and are therefore expected to be generally acceptable to the community.

The level of noise will be significantly affected by factors such as:

- The distance from the truck to the point of measurement of the noise level;
- The speed of the truck;
- The condition of the exhaust system on the truck;
- The type and condition of the road surface; and

Also, at distances greater than about 200m, the level of noise will be affected by the direction and speed of the wind.

10.5. Proposed Noise Mitigation Measures

The objective of any noise mitigation measures is to limit, as much as is possible, the noise levels inside the houses on the route to levels that are within the guidelines nominated by Australian Standard AS1055.

¹⁴ 3 hour noise measurement

The principal avenue for noise mitigation is to limit the level of noise produced by the trucks. This could be further improved by measures such as the provision of screening or shrubs between the roadway and the houses.

Mitigation of noise produced by trucks is difficult because:

- Trucks usually have high (3-4 m above ground level) exhaust stacks;
- Trucks often have a large number of wheels (up to 24), each of which is producing noise through contact with the roadway surface;
- Truck engines, engine-brakes, fan-belts and gear-boxes are all sources of noise, and it is difficult to attenuate the level of noise from these sources;

However, some measures for mitigation of the noise from trucks are possible, and include:

a) treatment of wood-chip trucks and bins

- this may include such measures as additional ribbing on bins to reduce panel size (and hence the drumming effect when empty), coating the bins with special sound reducing materials, installation of electromagnetic brake systems, etc.

b) Other measures such as:

- Restrict number of hours of day during which vehicles can operate;
- Reduction in speed of vehicles;
- Slower braking and acceleration of vehicles;
- Keeping size of fleet to minimum;
- Use of regular drivers who know the locations of the most noise sensitive areas; and
- Use of modern, well-maintained vehicles.

Since it is considered that noise levels can generally be maintained within acceptable levels by appropriate treatment of the wood-chip trucks and bins, it is proposed to limit noise mitigation to this area only.

10.6. Estimated Cost of Noise Mitigation

The estimated cost of the noise mitigation treatment of wood-chip trucks and bins to reduce noise production is as follows:

- treatment of 5 x HPV wood-chip trucks and bins @ \$20k /truck = \$100k

10.7. Conclusions

The conclusions are as follows:

- a) With the implementation of the noise mitigation measures proposed, the level of noise caused by the additional traffic is expected to be acceptable; and
- b) General noise mitigation measures for the whole length of the route will be achieved by treatment of wood-chip trucks and bins to reduce noise production, and is estimated to cost \$100k.

11. SAFETY OF OPERATION OF HPV S

DIER has reported that there has been twenty-three reported accidents on the section of Huon Highway from Huonville to the Sandfly Rd turn-off and one reported accident on Glen Rd in the five years to July 2000.

To ensure that HPV s associated with the movement of wood products from the Southern Forests are operated in the safest manner possible, the following measures will be taken:

1. All roads will be upgraded where necessary to comply with DIER s standards for the operation of HPV s in Tasmania. This includes:
 - ensuring that the construction and capacity of the roads and bridges are suitable;
 - ensuring that roads have suitable turn-out lanes;
 - ensuring that line of sight is adequate; and
 - ensuring that roads have adequate shoulders.

These measures will ensure that the standard of construction for the roads on which the HPV s will operate will be comparable to the standards set for operation of HPV s anywhere in Australia.

2. All vehicles will:
 - Carry an appropriate Notice stating that the vehicle has been approved under the relevant State Road Traffic Act Regulation and the National Heavy Vehicle Accreditation Scheme (HVAS) for operation on the route;
 - Be maintained in good mechanical condition. This includes:
 - Regular inspection and testing of brakes;
 - Regular inspection and testing of exhaust emission; and
 - Regular testing of noise emission.
 - Be fitted with Road Friendly Suspension systems, and carry the Certificate that acknowledges this;

- Be fitted with noise reduction treatment on the bins;

In addition, it is anticipated that the vehicles will have Alternative Compliance under the road-truck industries own self-regulation scheme. Alternative Compliance is a voluntary alternative to the conventional enforcement methods of road transport legislation and will ultimately operate under the National Heavy Vehicle Accreditation Scheme.

These measures will ensure that the vehicles comply with the current best practice conditions operating throughout Australia.

3. All drivers will:

- Be given specific training with respect to operation on the route;
- Be dedicated to the operation;
- Operate only during day-time hours on Mondays to Saturdays;
- Take special precaution on sections of road where the line of sight is limited; and
- Be particularly careful when operating in the vicinity of schools (scheduling of operation should be such that operation past schools during school start and finish times is avoided).

The above measures are intended to ensure that the safety of operation of the HPV s associated with the Huon ITPS will be equal to the best practices for similar situations anywhere in Australia.

12. SUMMARY OF COSTS

The overall cost of the road improvements and noise mitigation measures required to accommodate the transport of timber products from the Southern Forests is as follows:

A. Road Improvements

Item	Responsibility	Cost (\$ 000)
Denison Rd - from ITPS to end of FT section of Denison Rd	Forestry Tasmania	1,000 ¹⁵
Denison Rd - from end of FT section of Denison Rd to Russell Rd	Huon Valley Council	684
Denison Rd - from Russell Rd to Judbury Rd	Huon Valley Council	7
Judbury Road - from Denison Rd to Judbury	Huon Valley Council	19
North Huon Rd — from Judbury to Ranelagh	Huon Valley Council	392 (800 ¹⁶)
Agnes St — from Ranelagh to Glen Rd	Huon Valley Council	50
Glen Rd — from Agnes St to Huon Highway	Huon Valley Council	249
Huon Highway — at Sandfly intersection	DIER	45
Total		2,446

B. Noise Mitigation Measures

Item	Responsibility	Cost (\$ 000)
treatment of wood-chip trucks and bins to reduce noise production	Forestry Tas / State Govt	100
Total		100

The overall total cost is therefore (\$2,446k + \$100k =) \$2,546k.

¹⁵ Currently being carried out by Forestry Tasmania

¹⁶ Independently estimated by Forestry Tasmania

13. CONCLUSIONS

The overall conclusions from this report are as follows:

- It is estimated that the development of the new Huon ITPS will result in the transport of about 900,000 tonnes per annum of logs from the forests into the ITPS and about 450,000 tonnes per annum of timber products (comprising 340,000 tonnes of wood-chip and 110,000 tonnes of saw-logs, sawn timber, veneer and plywood) out of the ITPS.
- The total number of vehicle movements to and from the ITPS is estimated to be 332 vehicles per day (vpd). This includes 206 log-trucks carting logs from the forest to the ITPS, 48 HPV trucks carting processed timber products (woodchip, saw-logs, sawn timber, veneer and ply-wood) from the ITPS, 38 other trucks carting wood product out of the ITPS, 20 employee commuter vehicles and 20 visitor cars.
- Log trucks hauling logs from the forests to the ITPS will mostly operate on forestry roads that are not accessible to the general public. Trucks carting the processed timber products from the ITPS and employee and visitor vehicles will significantly increase the volume of traffic on some of the country roads (eg by 32% on Glen Road and 18% on North Huon Road), but will only have a minor impact on Huon Highway (an increase of 1%).
- The transport of woodchip from the ITPS to Electrona will require 48 High Performance Vehicle (HPV) movements per day (24 in and 24 out), carrying approximately 300,000 tonnes of wood-chip per annum into the wharf facility. It is estimated that there will be 20 car movements per day at Electrona for site employees and visitors associated with this initial wood-chip operation.
- All modifications necessary to ensure that the roads are suitable for operation of HPV s and other heavy trucks associated with the development of the Huon ITPS have been identified;
- Measures to ensure that the additional noise caused by the road traffic associated with the Huon ITPS is acceptable have been identified;
- Measures to ensure the safe operation of HPV s associated with the Huon ITPS have been identified;

-
- The total cost for road upgrade work and noise mitigation on the sections of road from the ITPS to Sandfly, associated with the transport of wood-chip from the ITPS to Electrona is \$2.55m, comprising \$2.45m for road upgrade work and \$0.10m for noise mitigation.
 - As a result of the need for local councils to provide better roads for an industry that will enhance the overall economy of Tasmania, there is a reasonable argument that the State should contribute to the cost of the council road upgrading required.

APPENDICES

APPENDIX A

The Tasmanian Department of Infrastructure, Energy and Resources (DIER) *Route Selection Criteria — Checklist — Attachment C to Guidelines for HPVs in Tasmania*

(Tasmanian Department of Infrastructure, Energy and Resources)

ATTACHMENT
C
to Guidelines for
HPV Trials in
Tasmania

ROUTE SELECTION CRITERIA**CHECKLIST**

Note: It is important that this checklist be used to assist with exercising engineering judgement not as a substitute for it.

CRITERIA**DESIRABLE****ADOPTED**1.0 Rural Roads1.1 Pavement Width

State Roads (undivided, 2 lanes)

·	AADT: less than 1000 vpd	
	Lane width ± 2.75m	100%
	Shoulder width ± 0.6 m	100%
·	AADT: 1000 vpd to 3000 vpd	
	Lane width ± 3.0m	100%
	Shoulder width ± 1.0m	100%
·	AADT: more than 3000 vpd	
	Lane width ± 3.5m	100%
	Shoulder width ± 1.0m	100%

National Highway (undivided, 2 lane)

·	AADT: all values	
	Lane width ± 3.5m	100%
	Shoulder width ± 2.0m	100%

Divided/Undivided 4 lane roads

	Lane width ± 3.5m	100%
	Shoulder width (LHS) ± 2.0m	100%
	Shoulder width (RHS) ± 1.0m	100%

1.2 Overtaking Opportunity

*	Road - an existing Heavy Vehicle route	100%
.	AAADT: less than 2500 vpd	
	Safe travel speed \pm 80 km/h	
	*~ % Overtaking opportunity (Sight distance \pm 450 m)	100%
	(include auxiliary lanes) 60%	
	AAADT: 2500 vpd to 4000 ~d	
	Safe travel speed \pm 100 km/h	100%
	** % Overtaking opportunity (Sight distance \pm 450 m)	60%
	(include auxiliary lanes)	
	Auxiliary lanes (1 in 15 km)	100%
*	AAADT: more than 4000 vpd	
	,Safe travel speed \pm 100km/h	100%
	** % Overtaking opportunity (Sight distance \pm 450 m)	60%
	(include auxiliary lanes)	
	Auxiliary lanes (1 on 10 km)	100%
** Note:	Reference should be made to Section 5.7 Overtaking Requirements of the Interim Guide to the Geometric Design of Rural Roads when evaluating the adequacy of overtaking opportunity.	

1.3 Rural Intersections

*	Left/right turn lanes provided (adequate turn paths)	100%
*	Turn lane width \pm 3.5 m	100%
*	Intersection Sight Distance available	100%
*	Access/junction blackspots	0%

1.4 Pavement

*	Sealed Pavement	100%
*	Pavement in Good Condition	100%
*	Shoulder in Good Condition	100%

2.0 Urban Areas

*	Arterial Roads	
	Two lanes in direction of travel	100%
	Lane width \pm 3.5 m	100%
	Left/right turn lanes provided (adequate turn paths)	100%
	Turn Lane width (front arterial) \pm 3.5 m	100%
	Existing Heavy Vehicle route	100%
*	Other Roads	
	Existing Heavy Vehicle route	100%
	Right turns to arterial road at signals, roundabout	
	or interchange	100%
	Adequate turn paths at intersections	100%
	Adequate turn paths (to/front depots)	100%
	Residential Streets on route	0%

*	Depots	
	Travel in/out forward direction	100%
	Coupling/manoeuvring off public roads	100%
*	Pavement	
	Sealed	100%
	Good Condition	100%

3.0 Other

- * Overtaking requirements are to be re-assessed if tourist/recreational use \geq 15% of AADT
- * Routes must have the support of relevant road authorities - e.g. Department of Roads and Transport and Local Councils
- * Road structures (bridges, major culverts etc) must be certified as structurally suitable for the use of fully laden HPVs

APPENDIX B

Tasmanian Department of Infrastructure, Energy and Resources (DIER) *Road Assessment Report*

TRAFFIC MANAGEMENT BRANCH

INTERNAL MEMORANDUM

FILE No.:

CORRESPONDENCE NO.:

DATE : 26 July 2000

TO: Manager, Traffic Management

FROM: Scott Ingles

SUBJECT: HPV Assessment Request for North Huon Rd., Glen Rd., Lollara Rd., Huon Hwy. (Glen Rd. to Sandfly Rd.), Sandfly Rd. and Channel Hwy. (Sandfly Rd. to Electrona)

COPIES TO: G. Doyle

An inspection of the above roads was conducted in July 2000 to assess the suitability of the routes for high productivity vehicular use in relation to the geometry and alignment.

North Huon Rd. (Council road, 11km): This road is a rural road with both sealed and gravel sections. The sealed sections are from Huonville to approximately 1km west of Ranelagh and from Judbury 1km east. The sealed sections have widths varying from 6.4m to 5.6m with gravel verges from 1m wide to nil. The gravel section maintains a width of 6m and has 1 m wide gravel verges. There are School Bus services on this road.

The road has some curves and in places is somewhat undulating with steep declines from road edge to the Huon River. There are few overtaking opportunities along the route. Some delineation is provided by guideposts, but there is a need to increase the number of these to better define both road edges. Large sections of the gravelled road are in shade for extended periods (estimate of 2-3months) during winter increasing the risk of road surface damage for this period. There are a number of concrete culvert ends on the northern side of the road, which should be better delineated.

The intersection with Lollara Rd./Agnes St. occurs at Ranelagh, where Lollara Rd./Agnes St. has priority. Sight distances are adequate for the 60km/h limit, although priority may be reconsidered and some channelisation should be considered. Sight distances at this junction are east 54m and north 183m.

Entry to the Huon Hwy. is via the roundabout in central Huonville and this facility should provide no problems regard to sight distances and swept paths.

A one-lane bridge with a 15 tonne load limit crosses Salters Creek, which is obviously inadequate. There are two further bridges on the route, one at Judds Creek, Judbury and the other over Mountain River near the Huonville High School.

Apart from the bridge at Salters Creek, the route is preferable to Glen Huon Rd. due to greater road widths, less development and a better general alignment.

Average daily traffic on this route is 430/day with 12% heavy vehicles. Reported accidents for the past five years are 7, none of which involved a heavy vehicle, this may be due to the load limit on Salters Creek Bridge.

This section of the route, apart from the Salters Creek Bridge, is adequate for HPV use.

Glen Rd./ North Glen Rd. (Council road, 2.1km): This road is a narrow, sealed road 2.1km long with some residential roadside development. The road is some 5m in width, with no shoulders, for its entirety with a one lane concrete bridge over Mountain River. A lack of delineation will need to be addressed, as at present there are only scattered guideposts. There is a 90-degree bend, with an access road heading north at the apex, which needs to be signed to prevent accidental straight through movements. Road width is inadequate for HPV usage as the accepted minimum lane widths, on roads with an ADT less than 1000, are 2.75m with a useable shoulder of 0.6m. The bridge Over Mountain River is a relatively new concrete structure with a deck 4.0m wide, forward sight distance for north bound vehicles approaching this bridge is 80m. At present there is no priority assigned for approaching traffic, this is being addressed at present. The junction with Agnes St. (North Huon Rd.) will need adjustment to accommodate larger vehicle swept paths (see plan HV/7/24 for detail). Sight distances for this junction are 450m west and 213m south. There has been one reported accident on this road in the past five years.

Without road widening for the length of Glen Rd./ North Glen Rd. this section of the route is inadequate for HPV use. There may also be a question over the road construction being of sufficient strength to carry the proposed amount of cargo.

Huon Highway, Glen Road to Sandfly Road (State road, 14.1km): This section of the route has been previously assessed as suitable for HPV usage. There are however some concerns over the Sandfly Interchange. These concerns are due to the surrounding road geometry. Specifically the steep downhill approach to the interchange, which requires heavy vehicles to travel in the left-hand lane in low gear. A HPV vehicle, operated by Tamarack, was followed north from the top of Vince s Saddle and maintained an average speed of some 30km/h, the same vehicle went past the Sandfly interchange at 50km/h. Turning vehicles would, presumably, not increase to 50km/h prior to the interchange, and to turn into Sandfly Rd. would need to change lanes, at low speeds in a very high-speed area following an horizontal curve on a steep descent. There is a possibility of trucks forcing lighter vehicles into the median island, or across it into oncoming traffic. The extension of the median barrier is recommended to ameliorate the risk to southbound traffic. There is a crossfall of 7.5% at this interchange for right turning northbound traffic; this may cause problems for laden HPVs at reasonable clearance speeds. There have been 23 reported accidents over the past five years on this section of the Huon Hwy. Sight distances at this intersection are 330m south and 430m north.

This road has been previously assessed as suitable for HPV use. There remains a query over safety at the Sandfly Rd. interchange.

Sandfly Road (Council road, 8km): This road is a high standard bitumen road with centrelines throughout and delineation provided by guideposts, with the frequency of guideposts dropping toward the eastern end. There are School Bus services along this road. The route was surveyed from west to east. The beginning of the route is in a 70km/h zone for Sandfly. The road is 6.0m wide with im sealed shoulders; there is an edgeline for the initial 1.2km. The road enters a general rural speed limit at 750m and the edgelines along with the sealed shoulders cease at 1.2km. Road width at this point is 6.1m with gravel shoulders of 1.0m. These road widths are adequate for an ADT of between 1,000 and 3,000. Roadside development is residential hobby farms for the initial 5.3km with development increasing markedly at the eastern end. At 5.35km the speed limit drops to 80km/h and at 5.55km the limit drops to 60km/h. The final 2.6km at the eastern end is posted with winding road signs and distance advisory plates. This section of road may cause some concern due to the frequent curves and a large number of HPV s would perhaps accentuate this geometric deficiency, in regard to other road users. The road has been previously assessed and approved but that assessment was for a vehicle operated by a resident who wished to overnight. There have been 13 accidents reported over the past five years on this road. The route has sufficient road widths along its entire length, but road geometry at the eastern end may cause some problems for other road users. There may be a need for a trial run to ascertain the ability of HPV s to ensure tracking remains to left of centre. Pending the results of a trial run this section of the proposed route is adequate for use by HPV type vehicles.

Channel Highway, Sandfly Road to Electron a (State road, 3.94km): The section of route starts at Sandfly Rd. at the newly reconstructed junction. The junction has sufficient widths to allow egress by HPV type vehicles; sight distances at this junction are south 210m and north 170m. Through the township of Margate the road has been narrowed by the installation of pedestrian facilities, but not to the extent that HPV type vehicles could not negotiate. There is also a school speed zone within Margate. The road after Margate changes with edge lines apparent and sealed shoulders. Pavement and line markings are in good condition for the 3km until the entrance to the old Carbide works. Road widths at the entry to the Carbide works are such that the provision of a deceleration lane is seen as necessary to provide a safer environment for all road users. There have been 43 reported accidents on this section of the Channel Hwy. in the past five years.

This section of the proposed route is suitable for HPV use.

Scott Ingles

Engineering Assistant



ROAD FREIGHT OPTIONS BETWEEN JUDBURY AND THE HUON HIGHWAY

A Feasibility Assessment for the Senior Manager of Southwood Resources

Carried out by Lupatec (Tas. Pty Ltd)

March 2001

INTRODUCTION

One possibility for product from the Timber Processing Site proposed in the Huon Valley, is to freight it to markets or downstream plants, via road to the Huon Highway in the vicinity of Huonville.

This process is similar to the process chosen for freight from the Hampshire Pulp Mill (Tasmania, in the early 90s).

Similar community issues now raised in connection with road freight were also raised in connection with the Hampshire freight arrangements.

The Hampshire issues were mainly centred on the township of Ridgely, just as Ranelagh, Judbury and Huonville residents issues are central to Southwood decision-making. In Ridgely's case, use of Value Management processes and close co-operation between North Ltd, the proponents and the Department of Transport (on behalf of the Government), resolved the issues of concern.

DESCRIPTION OF THE OPTIONS

The Huon River, east of Judbury, is bounded by roads to the north and south.

1. **The southern road, Glen Huon Road**, is a State Government responsibility 13.3 km in length. It is sealed throughout with a nominal 6m wide seal and at the time of inspection provided an approximate 65 km/h speed environment.

The road services lot sizes which are significantly smaller than those on the north of the river, as a general rule.

The number of driveways and side road accesses were counted as:

160 driveways — on average one every 83 metres
13 side roads (mostly gravel)

Many of these accesses and side roads have significant sight distance restrictions for vehicles wanting to cross or merge onto Glen Huon Road.



Limited Sight Distance Glen Huon Rd.

The standard of pavement (ie seal condition), was recorded as mediocre or failure incipient.



Limited Sight Distance Glen Huon Rd.

The general (average) sight distance available was estimated to be between 100 and 150 metres. This correlated with the estimated speed environment of 65 km/h. As a guide, a speed environment of 80 km/h would require sight distance of about 180 metres to be generally available.

2. **The northern road, North Huon Road**, is a Council road 10.5 km long between Judbury and Ranelagh.

From Judbury, it is sealed for 1 km then is unsealed for the next 4.7 km. The final 4.8 km into Ranelagh is sealed. The sealed pavement width is a nominal 6m, the unsealed width generally slightly wider.

The speed environment assessment breaks into two parts. From Judbury eastwards for 7 km it is assessed at 70 km/h; for the next 3.5 km into Ranelagh, it is assessed at 60 km/h.

For each of these lengths there is an assessed general sight distance available. East of Judbury for 7 km the sight distance is assessed at 150 — 200 metres. For the next 3.5 km into Ranelagh, the sight distance is assessed at 60 — 100 metres.

The standard of sealed pavement was recorded as failure incipient.

The number of driveways and side road accesses were counted as
70 driveways
9 side roads



Gravel formation North Huon Rd.

A number of these accesses were deficient in providing sight distance for vehicles wishing to cross or merge onto North Huon Road.



Truck over one lane Bridge North Huon Rd.

3. **Between Ranelagh and the Huon Highway**, three options are available —

- (a) Agnes Street, Louisa Street and Wilmot Road;
- (b) Agnes Street, Louisa Street and Glen Road;
- (c) Marguerite Street and Lollara Road.

(a) **Agnes Street, Louisa Street and Wilmot Road** is 2.7 km long and provides access for 55 driveways and 6 side roads. The road borders the High School 0.9 km west of the Huon Highway.

Sight distance is not an issue and the pavement appears stable. Mountain River is crossed by a 2-lane bridge with no load-limit.

(b) **Agnes Street, Louisa Street and Glen Road** is 2.8 km and has a narrow 5.5m seal. This route provides access for 53 driveways and 6 side roads.

Mountain River is crossed by a one-lane bridge with no load limit.



Mountain River Bridge one lane

The carriageway alignment is meandering (presumably never designed) and there are two 90° bends, one at the junction with North Glen Road, and the other at the turn-off to Muskett's Timber yard.

Adequate sight distance is generally available, but the sight distance diminishes rapidly in the vicinity of the Mountain River Bridge.

- (c) **Marguerite Street and Lollara Road** is 3.6 km and gives access to 45 driveways and 8 side roads.

The pavement seal is nominally 6m and failing.

Mountain River is crossed by a single-lane bridge load-limited to 20 tonnes.



Mountain River Bridge Lollara Rd.

ASSESSMENT OF THE OPTIONS

Choice of route through the closely settled Huon Valley is not self-evident. Noise and safety are judged the two most important issues. In community terms, safety is probably the most important.

We are considering quite small traffic volumes in absolute terms; however, the freight vehicles serving the proposal are very significant in that they increase the number of heavy vehicles on the chosen route by a factor of about 2 for the North Huon Road and a higher factor for the Glen Huon Road.

Lupatec s view is that Glen Huon Road should not be considered for development of the freight route.

The reasons are:

1. The continuous development along Glen Huon Road has created something that might be called rural suburbia . Both in noise and safety terms, issues for improvement occur on practically any 100m segment of the road.

At no point is it possible to create arterial road conditions. On the other hand, North Huon Road can, with suitable improvements, provide arterial road conditions — at least for the first seven kilometres east of Judbury.

2. Heavy vehicles at present use North Huon Road rather than Glen Huon Road. This is a powerful precedent which should not be altered except for overwhelming reasons.

This analysis having favoured North Huon Road, there is a related choice between the three connections between Ranelagh and the Huon Highway.

Lupatec s view is that the two options which rate highest in the up-coming value management study, should be designed and costed in some detail to provide accurate comparative assessments.

In particular, the benefits and problems of heavy vehicles using the Main Street in Huonville need full understanding and assessment.

STANDARDS TO BE APPLIED

(a) For safety reasons:

- It would be appropriate to provide three speed environments on North Huon Road-
 - 80 km/h for the first seven kilometres east of Judbury
 - 70 km/h to the outskirts of Ranelagh
 - 60 km/h in Ranelagh township

Difficulties implementing 60 km/h could provide good reasons for reducing the Ranelagh speed environment to 50 km/h, with appropriate signage.

- Pavement width should be 8m minimum seal width with line marked to provide 2 x 1m sealed shoulders in the 8m.
- All present single-lane bridges on the finally agreed route should be converted to two-lanes.
- Proper delineated provision for pedestrians and cyclists should be made in all townships and villages.
- Line marking should be carried out to define priority at junctions and any other ambiguous points.

(b) For noise reasons:

- Use of gap-graded asphalt in urban areas should be considered.
- Commitment to state-of —the-art freight vehicles should be considered. I understand North Forest Products employed Kellys Transport for the Hampshire-Burnie run on this basis.

IAN GIBBS

20 March 2001

Report

Overview:

Diversion of Woodchip
Transport to a New Port
South of Hobart

Prepared for:

General Manager (Marketing)



Forestry Tasmania

S401

June 2000

Commercial - in - Confidence

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1. INTRODUCTION

In early June 2000, Indec Consulting were asked to provide a quick and broad independent overview of the issues involved in diverting the flow of timber products from an existing port at Triabunna to a new port to be built south of Hobart. We have produced this report on the following bases:

- We have a good understanding of the issues and costs pertaining to transport;
- We have developed methodologies for carrying out studies of this kind and for developing solutions in consultation with all stakeholders (those who will benefit and those who might see dis-benefits);
- We have worked in Tasmania with the Department of Primary Industries, Water and Environment (DPIWE), Tasrail, the Department of Infrastructure Energy and Resources (DIER) and the Hobart Ports Corporation (HPC). We have a general understanding of their businesses and operations;
- Indec Consulting have recently opened an office in Hobart, recruited our first Tasmanian, and are currently seeking to recruit Tasmanian consultants;
- We are developing our knowledge of the Tasmanian geography and economy and our expertise in the cost structure of its transport and forestry operations;
- This report is based on one visit to some of the areas involved and limited discussions with Forestry Tasmania executives.

2. SUMMARY

The proposal to transport woodchips to a new port to be built south of Hobart instead of carrying chiplogs to Triabunna seems to offer large benefits to the economy of Tasmania, as well as social and environmental benefits.

On our quick but conservative appraisal, the economic benefits approach \$5 million pa, made up as:

- § \$120,000 pa savings in road accident costs,
- § \$3.5 million pa in reduced vehicle operating costs,
- § \$800,000 pa in reduced road construction and maintenance costs,
- § \$500,000 pa in reduced environmental impact costs.

In addition there seem to be significant net social, environmental, logistical, and political benefits in such a move.

However, there will be people and interest groups that do not benefit but suffer. They should be identified and consulted so that their losses may be avoided or minimised or offset. Similarly net environmental gains do not mean there will not be environmental challenges and disadvantages in some respects.

Our analysis has necessarily been brief and broad. We have not seen any estimates for creating a new port or for improving the roads as will be required. Broad costs for these should be compared with the estimated benefits, and then more detailed analysis begun.

3. BACKGROUND

Forestry Tasmania is a government business enterprise owned by the State of Tasmania. It manages 1.6 million hectares of land including about 830,000 hectares of forests available for wood production and managed for multiple purposes. Forestry Tasmania currently supplies wood from a balance of plantation and native forest harvesting. There are 66,000 hectares of plantations on State forest and private land, made up of 49,000 ha of softwood and 17,000 ha of hardwood. Plantings have increased from 2,500 ha pa in recent years to 5,800 in 1998-9 and will accelerate further through private investments in Forestry Tasmania Unit Trusts.

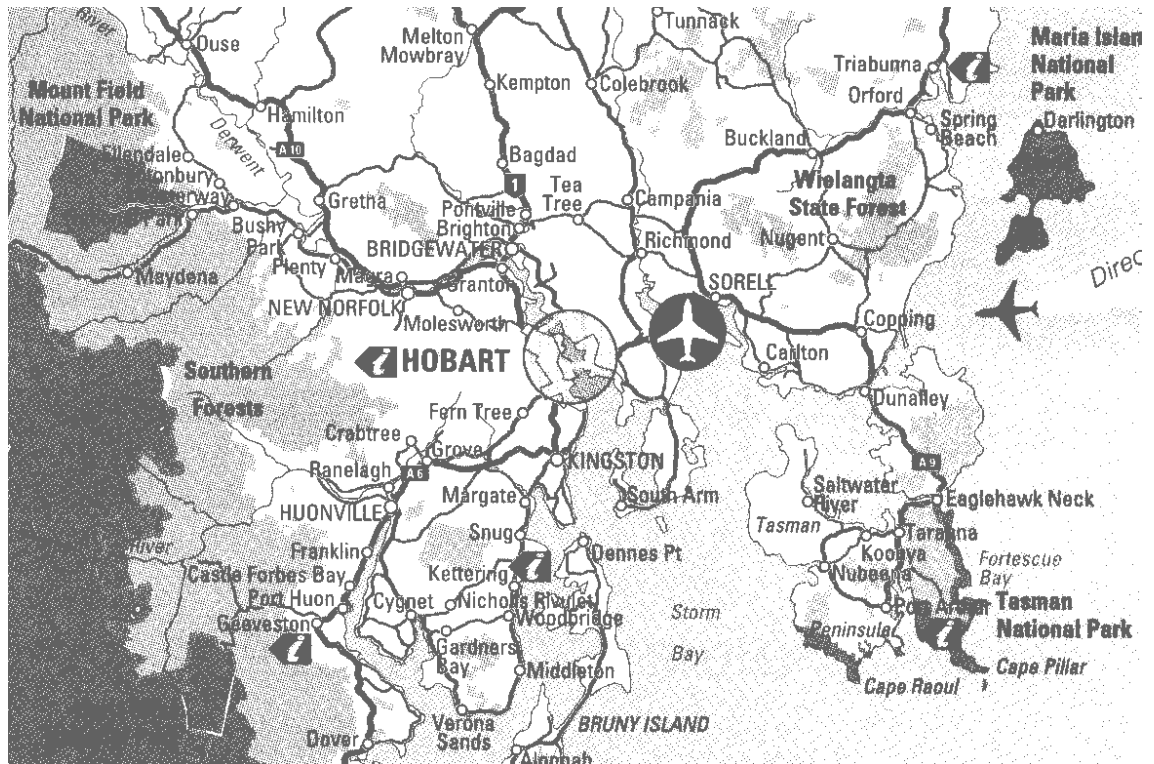
In 1998-9, 875,000 cubic metres of sawlogs and veneer logs and almost 3.5 million cubic metres of pulplogs were harvested in Tasmania, with Forestry Tasmania producing about 86% of the former and 45% of the latter. Forestry Tasmania is joint venturing with private enterprise in many ways to increase its production of timber consistently with the long-term sustainability of the resources.

Forestry Tasmania is committed to protecting the quality of the environment, developing and applying the best forest management practices and achieving commercial success. Its primary objectives in managing its resources are to optimise both the economic returns from wood production and other benefits to the community, such as recreation, conservation, flora, fauna, heritage protection and water quality.

Forestry is very important to Tasmania which is the top state in Australia in terms of forestry endowment index, direct labour costs, access to ports, port charges, low industrial disputes and low labour turnover. Adding value to its forestry production, and reducing the costs of getting that production to the mill door or the holds of ships is important to improving Tasmania's competitive position in the world markets for timber and timber products.

At present, the bulk of the wood produced by Forestry Tasmania from south of Hobart flows to seven clients, of whom five are sawmillers and two are pulpwood purchasers.

About 20,000 tonnes of sawlogs are processed in the district, mainly at Port Huon and Strathblane, while some 60,000 tonnes go to the three sawmillers at Austins Ferry, Bridgewater, Glenorchy (all north of the district).



Volumes of pulpwood from the district are forecast to increase over time. The annual volumes over the next five years will be about 40,000 tonnes of pulplogs to the paper mill at Boyer, with a further 320,000 tonnes to the port at Triabunna. In total, about 420,000 tonnes of sawlogs and pulplogs are trucked from the district on the Huon Highway from Franklin to Hobart.

To help increase the value of its product and the profitability of its operations, Forestry Tasmania is building an Integrated Timber Processing Site (ITPS) in state forest near the Huon River, about 20km west of Huonville in Southern Tasmania.

An estimated 900,000 tonnes of timber per year will flow through the ITPS. Expected inflows are 88,000 cubic metres of sawlogs, 377,000 tonnes of pulplogs, 120,000 tonnes of rotary peeler logs and 300,000 tonnes of fuel wood. Expected outflows are 64,000 cubic metres of sawn timber and sawlogs, 380,000 tonnes of wood fibre, 51,000 tonnes of dried rotary peeled veneer or ply wood, and 155 MWh of electricity.

Rather than continue to transport this production by highway through Hobart, Forestry Tasmania, in association with DIER and HPC, has explored the possibility of establishing a new port south of Hobart, perhaps at Electrona, or perhaps in the Huon River near Waterloo or Surges Point, or perhaps elsewhere. Substantial economic benefits are available provided a new port can be established at reasonable cost and any social or other issues against the proposal are not too great.

4. ROUTES

Several routes are under consideration for moving produce from the ITPS to a new port.

If the port were at Electrona, traffic would move north from the ITPS and then east to Judbury. From Judbury, it can take either Glen Huon Road (shown dotted) as at present, or North Huon Road (shown solid) to Ranelagh and then through North Glen Road to join the Huon Highway at the Glen Road intersection near Huonville. Then it would follow the Highway to the Sandfly Road turnoff to Margate and Electrona (the dotted line on the map). Various options exist for bypassing Sandfly Road, such as building a new road shown by the solid line, between the Huon and Channel Highways. These need to be evaluated. However, where other things are equal, there will be a clear advantage for shorter routes. This advantage grows if there is also less interference with residents, schools, and other sources of social difficulties with heavy transport. For these reasons there seems to be a strong case for using North Huon Road instead of Glen Huon Road.



If the port were located in the Huon River, traffic would flow south from the ITPS and then southeast to Geeveston, entering by Arve Road. The task of finding, building and upgrading roads to bypass Geeveston is much harder in that case, but the resultant travel distances to a potential port site are much shorter and with less travel in built-up areas.

For this short report, we assume the port will be at Electrona and that the preferred route, shown by the solid line on the map above, will be used.

5. ISSUES

When considering diverting product flow from one corridor to another, many factors must be evaluated and compared for the two routes.

5.1. Economic

5.1.1. Port

- Can a new port be built at reasonable cost?
- Where can it be located in terms of sufficient draft and turning clearance for the required ships?
- What other products will use the port?
- Capital costs to establish the port.
- Operating costs per shipload of product and pa.
- Consequences and the costs for pilotage and towage per ship.
- Effects on operating costs at the existing port?
- Impact on aquaculture?

5.1.2. Roads

- Can the roads to the new port be made adequate (pavement strength, width, horizontal and vertical contours, line of sight, passing lanes, etc) and at what cost?
- Consider the numbers of trucks to be diverted, and the consequent load alterations on both routes.
- The net increased or reduced amounts needed for road maintenance.
- The likely impacts on other traffic using the roads, especially with respect to congestion and speed.
- Net likely effects on road accidents and costs.

5.1.3. Transportation

- Fuel, maintenance and other truck running costs.

- Costs of extra time saved or expended by trucks, drivers, other vehicles in congested or de-congested traffic.
- Scheduling requirements (constraints) for trucks.
- Most appropriate truck configurations.

5.1.4. Multiplier Effects

The National Accounts Input-Output Tables allow multiplier effects to be calculated for most kinds of construction projects and economic operations. These show the extra employment created in other industries by new or extra activity. They also show the extra consumption, or spending, caused by that extra employment. Through this spin-off effect, the economic value of a project may be up to two or even three times greater than its intrinsic worth.

5.1.5. Beneficiaries

- Who will receive the economic benefits and who will pay the costs: to what degree can they be made to offset each other?
- If forestry investors receive the benefits, how will that translate into increases in investors and increases in timber product production?

5.2. Social

Many different interest groups take a legitimate interest in each new development or in the re-direction of any significant activity. Such groups include residents, local councils, government departments, businesses, developers, conservationists, landowners, ratepayers, tourists, travellers, commuters, shoppers, and retailers.

Within some groups there may also be sub-groups with different interests or perspectives. Government departments, for example, are responsible for regional development, main roads, public transport, lands, national parks, tourism, education, health, fire protection, decentralisation, forestry, water, electricity, communications and environment. There will be a full spectrum of opinion within these sub-groups: the benefits they will seek are different from each other, as are the costs they will perceive.

5.3. Environmental

There are many environmental impacts that must be considered. They include:

- Vegetation & Fauna
- Marine organisms / introduced species
- Noise
- Air Pollution
- Soil contamination from wood chip stockpiles
- Visual Impact
- Water runoff
- Waste water
- Road bank stabilisation
- Weed control

5.4. Logistics

The questions of supply and distribution of the products and the resources necessary to produce them must be considered. There may be a case for stockpiles of materials in various locations, and there may be different routes to take for different products, depending on the actual source and destination of various products. These stores or warehouses can have their own social and environmental impacts, as well as economic ones.

5.5. Political and Legislative

The suitability of the project and its parts to the political and economic objectives of the government must be considered, and its contribution to various aspects of the government's growth and asset plans. A Development Proposal and Environmental Management Plan (DPEMP) may be required. The project must fit into the approved uses in its locality from state and local government.

5.6. Allocations

Who will receive the various benefits and who will receive the various costs (focusing on the non-economic issues)? To what degree can they be made to offset each other? What programs of consultation and benefit transfers should be employed?

6. DISCUSSION

6.1. Economic

6.1.1. Port

Several port sites have been considered in broad terms, including Electrona, Port Huon (APM Wharf), Whale Point, Cairns Bay (opposite Brabazon Point), Surges Point, White Bluff, Desolation Bay, Granny Gibbons Bay and Surveyor s Point. Of these, Surges Point and Cairns Bay have been recommended for further consideration as alternatives to Electrona. Detailed site investigations have yet to be performed.

A new southern port is expected to make the export of crushed rock from the Hobart Blue Metal Industries feasible. Therefore such a port should be multi-product to at least that degree. In respect to crushed rock exports, Electrona is the only economically feasible site.

The woodchips would be shipped in ships of up to 65,000 tonne capacity. For annual shipments of 380,000 tonnes, as anticipated from the ITPS, six such ships pa would suffice.

It is anticipated that pilot vessels and tugs, if required, would travel from Hobart to the southern port. This is a distance of about 50km for Electrona, but about 140 km for the sites in the Huon River. We have not yet estimated costs for these: at six times pa they should have only a modest impact on the overall assessment.

6.1.2. Roads

- The map on the next page shows the present classifications of roads in the Tasmania by DIER.
- Category 1 roads are trunk roads. They have a standard and geometry for 110 kph, sealed surface, at least 3.5 m width per lane with 1 — 2 m sealed + 1 m unsealed shoulders. They cater for 2,500 — 5,000 vehicles per day including over 700 trucks, with over \$350 million worth of goods carried pa.



- Category 2 roads are Regional Freight Roads. These have a standard and geometry for 100 kph, sealed surface, and at least 3.5 m width per lane with at least 1 m sealed shoulder of 1.6 m total shoulder width, They are for capacities of 300 — 700 trucks per day, 1,000 — 5,000 vehicles per day and \$70 — 350 million value of goods pa.
- Category 3 roads are Regional Access Roads. These have a standard and geometry for 80 kph, sealed surface, and at least 3.0 m width per lane with up to 1 m sealed shoulder. They are for capacities of up to 300 trucks per day, with most sections averaging 1,500 — 5,000 vehicles per day and \$30 — 70 million value of goods pa.
- Category 4 roads are Feeder Roads, not preferred for freight. These have a standard and geometry for 60 kph, sealed surface, and at least 2.75 m width per lane with 0.6 m sealed shoulder. They are for capacities of up to 1,000 vehicles per day.

- We believe that for the volume and value of the woodchip and timber freight, Category 4 roads provide acceptable geometry but Category 3 is desirable. (It is not necessary for the roads to be sealed, though that would reduce their maintenance costs.)
- Apart from the Southern Outlet, which is Category 1, most of the other roads within our assessment are currently Category 5 (Other Roads, less than 1,000 vehicles per day, suitable for comparatively low frequency heavy freight such as log trucks).
- Dover to Geeveston to Huonville to Kingston is presently Category 3, as is Kingston to Electrona. Kingston to Hobart and halfway to Sorell is Category 1, while the remainder through to Triabunna is Category 2.
- Sandfly Road (less than Category 5) is not a classified high-productivity truck (b-double) route. Huon Highway is, through to Dover.
- The Channel Highway to Margate (Category 3) presently has about 6,800 vehicles per day, of which about 4.2% (286 per day) are semitrailers or larger vehicles.
- Sandfly Road to Margate presently has about 2,850 vehicles per day, of which about 9% (257 per day) are semitrailers or larger vehicles.
- Forestry Tasmania is building the Geeveston to Derwent Valley link. This is planned to be Category 3.
- The diversion of trucks from Triabunna to a southern port will involve only about 39 trucks per day at present or about 43 after the ITPS is operating. Doubling these (for truck movements / one-way trips) to 78 and 86 still does not affect the overall number of vehicles on either route noticeably. Using high-productivity vehicles from the ITPS to a southern port will further reduce movements by 40% or more, to only 52 one-way trips per day.
- We use figures of 2 cents and 31 cents per average (laden and unladen) truck km travelled for the average contribution required for damage to roads and for total road building and maintenance costs respectively. Diverting the log traffic from Triabunna to a southern port will save about 8,000 truck km per day (say 40 round trips of 200 km each per day). This means about \$48,000 pa less damage will be done to roads, and about \$744,000 pa less will be required for building and maintaining roads.

- Road accident costs are estimated at about 5 cents per average vehicle km (all vehicles, full and empty), spread among human costs (medical, ambulance, rehabilitation, long-term care, labour, quality, legal, correctional services, work disruption, funeral, coroner) vehicle costs (repairs, towing, unavailability), general costs (travel delays, insurance administration, police, fire, property). Diverting the log traffic from Triabunna, as above, will save about \$120,000 road accident costs pa.

6.1.3. Transportation

The reduction in distance per single truck trip from diverting timber from Triabunna is about 100 km if the southern port is at Electrona. If the port is at a site on the Huon River (say Surges Point), the distance saved is about the same 100 km if trucks move north from the ITPS to Huonville but increases to about 135 km if (as is more likely) the trucks travel south from the ITPS to Geeveston.

We estimate the after-GST costs of operating heavy vehicles to be around \$1.40 — 1.50 per truck km travelled. We use \$1.40 per truck km and we take the 100 km saving in distance, to be conservative. Therefore the savings per round trip are about \$280 per truck. If there are about 40 trucks per day, 6 days per week, 52 weeks per year, the total savings are about \$3.5 million pa. This includes time costs of vehicle and driver.

Obviously the relative conditions of the roads will affect the real savings, as will a host of other factors to do with larger or smaller trucks, carrying of chips instead of logs, actual fuel prices, etc

6.1.4. Multiplier Effects

We have not made any calculations for the multiplier effects at this stage. On the face of it, reductions in travel distances and transport costs might produce a multiplier that reduces spending and employment further than the base savings suggest. However, the project would transfer economic activity from one region to another. We do not know whether there would be a net benefit to employment and spending or not, since we do not know the flexibility of the people in those regions. We assume no effect for the present. (That is an average of the possibilities, none of which is likely to be great.)

6.1.5. Beneficiaries

- As mentioned above, one region will gain extra economic activity at the expense of another.
- New roads will be built or existing roads will be improved. That will benefit those who use the roads and will be paid for partly by people who will never use them.
- Certainly Tasmania as a whole will gain from improved productivity of the harvesting and marketing process. The gains may be realised as extra profit margins to Forestry Tasmania, or as extra sales at similar margins. Or the gains might attract extra investors to value adding to the Tasmanian timber industry, enabling further development of forests or further improvements in the state s infrastructure elsewhere.
- Decreases in trucking costs may mean reduced expenditures on vehicles and their parts and consumables, and less employment for drivers, mechanics, etc. But, alternatively, they may mean extra resources made available to carry extra forest products or other products. We do not know at this stage.
- It is useful to assess the likely winners and losers in advance so the latter can be shown the fuller picture and some of the winnings can be re-applied if possible.

6.2. Social

The areas through which the traffic now flows are more heavily populated than those suggested for the future. As well, the distance of travel is much less, being 60 km instead of 165 km. (In fact the comparison of *distances in built up areas* is more like 25km instead of 130km a reduction of over 80%!) Therefore, *prima facie*, the negative social impacts of the diversion must be much less overall. (This does not, of course, prove that they are less significant either overall or to everybody.)

There are also positive social impacts of the diversion, bringing activity and interest to a different locality. On some counts the Triabunna community can be expected to be pleased to lose the traffic. But on other counts some people may be upset.

It is always possible to impute financial numbers to social gains and losses but these are often meaningless to the people affected. A program of consultation and discussion is the only way to full evaluation and satisfaction.

6.3. Environmental

Many of the environmental factors can be given financial or economic costs in transport analyses. For such projects we have added amounts to average truck running costs (full and empty), as follows:

- 1.5 cents per km for environmental noise
- 8.7 cents per km for greenhouse emissions
- 10.8 cents per km for local air pollution
- 0.9 cents per km for water pollution

These total 21.9 cents per km, suggesting that the environmental benefits of travelling 8,000 truck km less per day are worth \$520,000 pa.

Evidently environmental impacts are not so simple. The actual interfaces need to be examined carefully and their mitigation planned and examined. This applies across all areas of vegetation, fauna, marine organisms and introduced species, noise, air pollution, soil contamination, visual impact, water runoff and waste, and weed control.

7. CONCLUSIONS

From our quick, conservative appraisal, the economic benefits of diverting the transportation of woodchips from the port at Triabunna to new port south of Hobart approach \$5 million pa, made up as:

- § \$120,000 pa savings in road accident costs,
- § \$3.5 million pa in reduced vehicle operating costs,
- § \$800,000 pa in reduced road construction and maintenance costs,
- § \$500,000 pa in reduced environmental impact costs.

In addition there seem to be significant net social, environmental, logistical, and political benefits. However, we have said nothing about the costs of developing a port, building or upgrading roads, or altering other infrastructure.

Now that the proposal seems to offer attractive benefits, some of the options and questions raised in this report should be explored and rationalised, such as:

- defining the likely best site for a southern port on the Huon River (Surges Point, or where), from a nautical point of view;
- estimating costs for building basic but adequate ports at Electrona and the Huon River site;
- estimating the costs of operating the alternative ports for the envisaged shipping, including pilotage and towage;
- assessing the feasibility and costs of building the southern road from the ITPS to Geeveston, considering options to bypass Geeveston;
- progressing discussions with councils and DIER concerning switching trucks from Glen Huon Road to North Huon Road, together with ownership and maintenance responsibility for the roads;
- performing more detailed analyses of the actual differences in truck transportation and road maintenance costs produced by the different possible routes to the different possible ports;
- screening out as many route alternatives as early as possible, from non-economic or broad analyses, so that less analytical work will be required;

- commissioning, or continuing, engineering assessments of the alterations that would be required to the geometry of the alternative roads (considering vertical grades, horizontal curves, line of sight, passing lanes, parking bays);
- involving stakeholders in the various options, taking care not to become too deeply immersed while so many options exist: this shows all stakeholders that other real options do exist and that all interests and concerns are genuinely being canvassed for consideration.

Most of these tasks can be carried out simultaneously, depending on the urgency of the proposal, as long as work-groups are well coordinated. The indicative benefits argue for a high priority and continuous effort to be applied. Indec Consulting are very pleased to have been able to contribute in this small way to the project and hope to be invited to contribute further in the future.

**Preliminary Hazard Analysis
and
Risk Assessment
for the
Wood Centre Development,
Southwood Resources - Huon**

**THE WOOD CENTRE DEVELOPMENT, SOUTHWOOD RESOURCES — HUON
DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN**

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PRELIMINARY HAZARD ANALYSIS AND RISK ASSESSMENT

Introduction

A preliminary hazard identification and risk assessment was conducted on the power station by SEMF to satisfy the requirements of Section 3.7.6 of the DPMP guidelines. This condition requires a Preliminary Hazard Analysis to be undertaken on the power station. This study was done in accordance with AS/NZS 4360, 1999 Risk Management Standards.

The potential hazards were systematically identified using a preliminary HAZOP study (Appendix A — HAZOPS Template), (Perry R.H, 1998) in conjunction with the schematic process flow diagram for the power station (Appendix B — Power Station Schematic). These identified hazards are detailed under each specific operational area, together with relevant actions and recommendations on solutions for prevention.

To determine whether a quantitative risk assessment is required, the Rapid Environmental Checklist (RERAC), (Jones M.K. 1995) has been selected and adapted in conjunction with Hazard Frequency Tables (Klietz T.A. 1992) as a suitable procedure for providing a preliminary quantitative assessment of the likelihood and severity of a hazardous incident occurring. With this preliminary assessment, accurate judgements can be made on the necessity of a quantitative risk assessment.

Methodology

The HAZOP study allows systematic identification of potential hazards associated with risks to people, process plants, and the environment. In this study, it has been used to identify hazardous effects caused by deviations in normal process operations.

The RERAC Process is primarily used to quantitatively assess hazard scenarios and its associated risks to the environment. In this study, its principal function was to assess the major hazards identified in the previous HAZOP study. A more detailed explanation of the RERAC method can be found in the following Risk Assessment section.

Hazard Identification

The following section makes use of Appendix A to identify hazards associated with the relevant area/process unit. Recommendations on mitigation measures are also detailed.

Fuel Stockpile

Hazard ID: Fire Hazard

Large amounts of fuel wood are stored for fuel supply to the boiler. The fuel stockpile presents an ideal situation for the propagation of a fire.

Action/Recommendation:

The appropriate fire hydrants are to be available, to enable containment and reduce the risks of further propagation.

Boiler

The boiler's primary function is to generate heat by complete combustion of fuel wood with air. This heat is utilised to generate steam from water. The following hazards were identified as having the most significant impact. Other possible deviations, which do not constitute any foreseeable hazards are not mentioned below.

Hazard ID: No Water Flow

Failure of the feed water pump to the boiler will result in no water flow into the boiler, therefore no heat sink for the combustion process. This will lead to a release of abnormally hot flue gases. This may cause thermal damage to equipment down stream, and ultimately result in release of very hot gases at the stack.

Action/Recommendation:

Proper control alarms in place will warn of any deviation in temperature, or water flow, and alert operators on cause of malfunction and allow them to shut down the process before the deviation causes damage.

Hazard ID: Feed Flow Rate Deviation

A deviation in the levels of fuel wood and combustion air will have an effect on the combustion products generated. A defined fuel:air ratio must be complied with, to optimise the combustion process. The effects of deviations such as more fuel wood and/or less air are: incomplete combustion, and a release of larger amounts of particulate matter, undesirable gaseous compounds, including VOCs, noxious gases, and other combustion by-products. These gases are potentially harmful in significant concentrations, and contribute to the greenhouse gas problem.

Action/Recommendation:

Control systems are to be put in place to monitor and regulate the flow rates of the fuel wood and air, as well as the temperature within the boiler furnace. Any deviation will warn the operators, and immediate corrective action is required. All effluent gas streams are to comply with set DPIWE guidelines for air emissions.

Hazard ID: Presence of Contaminants in Feed

Contaminants present with the fuel wood, such as off specification fuel wood material, or the boiler water. The latter may occur due to abnormal water treatment or domestic water supply composition. The former will result in abnormal compositions in flue gases, and perhaps will have some effect on the generated heats of combustion. The latter will produce a blowdown stream with an abnormal chemical composition bound for the sewage treatment plant. Provided that the sewage treatment plant is

robust enough to handle such deviations, then this incident will pose no further problems.

Action/Recommendation:

The level of hazard and course of action relating to the abnormal flue gas composition will depend on the types and concentrations of chemicals present. Control systems and continuous monitoring of the quality of the fuel wood going into the boilers will prevent this.

Steam Lines

Carries live high-pressure steam from the boiler to the turbine.

Hazard ID: High Pressure Steam Build-up

The event of high-pressure steam build-up, due to blocked lines or throttled valves, may lead to line rupture and pressure loss at the weaker joints. Consequently, this pressure loss will result in decreased turbine efficiency, and venting material may cause electrical and structural damage and pose a hazard to nearby workers.

Action/Recommendation:

Regularly scheduled maintenance on all piping infrastructures, repair any leaks as soon as possible, and regular structural testing.

Turbine

Converts the heat energy harnessed from the high pressure steam, to work, and generates electricity.

Hazard ID: Inadequate Turbine Maintenance

Inadequate maintenance such as failure to properly service the machine, or incorrect installation, will result in physical contact between moving metallic parts within the turbine. This will lead to increased wear, and eventually cause severe internal mechanical damage. There is no foreseeable effect of turbine malfunction on the environment or human life.

Actions/Recommendation:

A proper and rigorous maintenance procedure should be implemented and complied with, to prevent this event from occurring.

Cooling tower

Cools and recycles the cooling water used to condense the low-pressure steam from the turbine.

Hazard ID: Cooling Tower Non-functional

Reduced cooling water flow due to cooling water pump malfunction will result in a less effective condenser, therefore a less efficient turbine, due to the back pressure exerted by uncondensed steam. The reduced amount of steam being condensed will eventually result in a build-up of steam upstream of the condenser, leading to line ruptures. Line ruptures are potentially hazardous to nearby workers, mechanical, and electrical equipment. This hazard has no foreseeable effects on the environment.

Actions/Recommendation:

Instrumentation measures such as: flow meters installed in the cooling water lines will detect reduced flow; a pressure transmitter in the line upstream of the condenser will indicate any deviation from the set point pressure, and alert operators of the deviation. In the event that the line pressure does increase significantly, pressure relief valves will be present to vent out the extra pressure, and reduce the likelihood of human injury.

Particulate filter system

Filter out particles produced during combustion in two stages: a coarse filtration, followed by a fine filtration stage.

Hazard ID: Blocked Filters

Backlog of hot flue gases, due to the blocked lines, will cause an increased resistance at the induced draft fan, resulting in limited out flow of gas. The rate of combustion in the boiler will be affected, and incomplete combustion will occur, due to the lack of oxygen feed. This will result in more coarse size particulates being generated, as well as CO, NO_x, and other combustion by-products. The effluent gases produced will be released into the atmosphere, and are potentially hazardous to human life and the surrounding environment.

Actions/Recommendations:

Control systems in place will impose a decrease in the conveyor speed, therefore less fuel wood in, to accommodate the reduced oxygen entering. Temperature, oxygen, and CO alarms will alert the operators of the deviation, and will require their immediate attention, because if left unattended, will lead to complete shutdown. Compliance to a regular maintenance schedule will prevent this from occurring.

Hazard ID: Non-functional Electrostatic Precipitator (ESP)

Fine dust particles will not be removed from the flue gas stream, therefore the fines will go out through the stack.

Actions/Recommendation:

An air emission monitor, which measures the level of particulates present in the flue gas, is located in the stack. Above a certain particulate level, an alarm will alert

operators of the deviation, in which the operators will be required to alter the feed and boiler conditions to reduce the amount of particles generated in the combustion process, or to carry out corrective action to remedy this problem.

Air Circulation System

The air circulation system comprises of two fans, the induced draft fan, and the combustion air fan. The induced draft fan draws combustion air generated in the boiler, and discharges it out through the stack. The combustion air fan pushes air into the boiler, and provides the air required for combustion. These two fans function to generate a more efficient air flow both into and out of the boiler.

Hazard ID: Non-functional Air Circulation System

Failure of one or both of the fans will lead to reduced air flow through the system. The rate of combustion in the boiler will be affected, and incomplete combustion will occur, due to the lack of oxygen feed. This will result in more coarse size particulates being generated, as well as CO, NO_x, and other combustion by-products. The effluent gases produced will be released into the atmosphere, and are potentially hazardous to human life and the surrounding environment.

Actions/Recommendations:

Control systems in place will impose a decrease in the conveyor speed, therefore less fuel wood in, to accommodate the reduced air flow. Temperature, oxygen, and CO alarms will alert the operators of the deviation, and will require their immediate attention, because if left unattended, will lead to complete shutdown. Compliance to a regular maintenance schedule will prevent this from occurring.

Chemical Storage Area

The chemical storage area stores chemicals used for water treatment.

Hazard ID: Fork Lift Accidents

Fork lift operator while transferring storage containers, pierces one of the containment units, pumps, or lines, resulting in loss of containment of the chemicals. The hazard depends on the nature of the chemicals spilled.

Action/Recommendation:

Protective bunding should be present on all sensitive equipment in the storage area, and the appropriate chemical spill kits should be readily available if the incident does occur.

Hazard ID: Chemical Accidents

The hazardous nature of the chemicals impose a risk in themselves, in case of spillage, misuse, or a fire.

Action/Recommendation:

Entry into the storage area should be limited to trained personnel, wearing the appropriate personal protective equipment (PPE). Appropriate chemical spill kits should be readily available in case of accidents. Safety shower, eye-wash, and first aid facilities should be available in case of emergency. Material and Safety Data Sheets (MSDS) should be available for emergency personnel in an accident situation.

Risk Assessment

The preceding Hazard Identification section is used for this Risk Assessment section to focus on the most critical hazards present within the power plant site.

The Rapid Environmental Risk Assessment Checklist (RERAC) methodology has been used to quantify the likelihood and severity of an incident or hazard. These result in a ranking of each hazard in terms of total assessed risk (TAS). Events that are ranked the greatest TAS should be given the highest priority in terms of preventative action (Appendix C — RERAC Ranking Scales).

$$\text{Total Assessed Risk (TAS)} = \text{Likelihood} \times \text{Severity}$$

The acceptability of the hazards can then be decided for the particular activity depending on which of the three following categories they fall in.

Table 1 Hazard Categories

CATEGORY	DESCRIPTION	TAS
Category One	Immediate action required to reduce TAS to 9 or below.	>14
Category Two	Medium term action required to reduce TAS to 9 or below.	9-14
Category Three	Action depends on company policy and resources. Long term target should be for all TAS scores to be <5.	<9

Principal Site Hazards

As mentioned above, the HAZOPS report has assisted in identifying the following areas as having the potential to kill, injure, or cause significant engineering and environmental damage, resulting from abnormal operating conditions or accident based activities:

- Fuel stockpile
- Boiler
- Steam Lines
- Turbine
- Cooling Tower
- Particulate Filter System
- Air Circulation System

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- Chemical Storage

Each of these identified areas have been assessed under the RERAC method.

The following table details the Hazard Category Summary for the areas identified above. Hazard activities previously identified in the Hazard Identification section, which has a TAS ranking of <4 have not been included in this table because these hazards are deemed to be of significant consequence.

Table 2 Hazard Category Summary for selected critical areas within the Southwood Power Plant

Category One Hazards (TAS>14)

Activity	L	S	TAS	Consequence	Preventative Action
NIL	0	0	0	NIL	NIL

Category Two Hazards (9<TAS<14)

Activity	L	S	TAS	Consequence	Preventative Action
NIL	0	0	0	NIL	NIL

Category Three Hazards (4<TAS<8)

Activity	L	S	TAS	Consequence	Preventative Action
High pressure steam build-up	4	2	8	Line rupture, venting material may cause electrical and structural damage, and injure nearby workers.	Regularly scheduled maintenance on all piping infrastructure, and structural testing.
Fuel feed flow rate deviation	3	2	6	Incomplete combustion resulting in the generation of undesirable gaseous compounds such as CO, and increased levels of particulate matter.	Continuous monitoring of feed flow rates, as well as CO levels leaving through the stack.
Non-functional air circulation system	3	2	6	Incomplete combustion will occur, resulting in coarse size particulates generated, as well as CO, NO _x , and other combustion by-products.	Temperature, oxygen, and CO alarms will alert the operators of the deviation. Compliance to a regular maintenance schedule will prevent this from occurring.
Non-functional	3	2	6	Build-up of low	Recommendations

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cooling tower				pressure steam due to little or no condensation activity leading to line ruptures.	detailed in the HAZOP section should be implemented.
Boiler water feed pump failure	2	2	4	No water flow into the boiler, resulting in release of abnormally hot flue gases. This may cause thermal damage to equipment down stream, and result in release of very hot gases at the stack.	There will be a back-up pump. Switchover is automatic. Proper control alarms in place will warn of any deviation in temperature, or water flow, alert operators, and allow them to shut down the process before the deviation causes damage.
Inoperative ESP	2	2	4	Fine dust particles will be released with the effluent gas, through the stack.	An air emission monitor will alert the operators, should the particulate level rise beyond the set point level required by EPA guidelines.
Inadequate Turbine Maintenance	1	4	4	Accelerated wear of turbine components, eventually leading to lower power generation and ultimately, to severe internal mechanical damage.	A proper and rigorous maintenance procedure will be implemented and complied to.
Fork lift accidents at the chemical storage area	2	2	4	Loss of containment of boiler water treatment chemicals due to rupture of tanks or pipes.	Appropriate bunding and protection on all sensitive equipment in the storage area. Chemical spill kits readily available in immediate vicinity.

RERAC Summary

Hazard actions and recommendations have been defined in the Hazard Identification and RERAC sections of this report to reduce the frequency, and in most instances, the severity of a hazard event. As detailed in Table 2, there were no Category One or Category Two hazards identified. The vast majority of all RERAC assessments fell under a TAS ranking of 5, the recommended level for industry operations.

Category Three hazards are deemed minor, and company policy should dictate that a long term goal be set to reduce the TAS scores to below 5. The most significant of

these Category Three hazard is the hazard associated with the rupture of lines containing high pressure steam. Line ruptures pose a direct hazard to operators and electrical equipment. Implementation of the recommended control measures will significantly reduce the likelihood and severity of this event. There are no direct environmental effects associated with this hazard.

This preliminary RERAC study has not identified any catastrophic environmental hazard event scenarios.

Conclusion

Based upon the HAZOP and RERAC studies, it is concluded that if the actions and recommendations outlined in this report are acted upon, then there is little risk associated with hazards that have significant environmental consequences.

Appendix A — HAZOPS Template Guide Diagram

Guideword	Meaning	Example of Deviation	ID Hazard	Comment	Action
No (Not or None)	The activity is not carried out or ceases.	No flow in pipe, no reactant charged to process, batch not cooled, check omitted.			
More Of	A quantitative increase in an activity.	More (higher, longer) quantity flow, temp, pressure, batch, concentration, time.			
Less Of	A quantitative decrease in an activity.	Less (lower, shorter) of above.			
More Than or As Well As	A further activity occurs in addition to the original activity.	Impurities present, extra phase (solid or gas in liquid phase), extra (unplanned) process operation.			
Part Of	The incomplete performance of an activity.	Reduced strength, missing component, operation only part-completed.			
Reverse	Inversion of an activity.	Back flow or back pressure, heat rather than cool.			
Sooner/Later Than	An activity occurring at the wrong time relative to other activities.	The activity occurs at the wrong time.			
Other (Than)	Complete substitution of an activity, no part of the intention is achieved.	Wrong material charged, non-routine conditions, start up, shut down, maintenance, cleaning, etc. failure of services.			

Appendix B — Power Station Process Flow Schematic

(Insert diagram here)

Appendix C — RERAC Ranking Scales

In the RERAC method, the following ranking scales are used:

Likelihood Score (Frequency of Possible Cause)

Event Probability	Score
Frequent Event (25 times per year)	5
Probable Event (5 times per year)	4
Occasional Event (1 time per year)	3
Remote Possibility (1 time per 5 years)	2
Improbable Event (1 time per 25 years)	1

Severity Score Real Hazard Index

Severity	Description	Score
Critical	Major long-term engineering & environmental impacts and/or damage usually resulting in fatalities, multiple injury victims and/or highly visible to the public.	5
Major	Major short-term engineering & environmental impacts and/or significant human injury or injuries potentially fatal.	4
Significant	Minor short-term engineering & environmental impact and/or short-term human injuries and/or low public visibility.	3
Marginal	Marginal short-term engineering & environmental damage and/or minor human injuries.	2
Negligible	No measurable effect on the engineering or environmental condition on site, no effect on workforce, not visible to the public.	1

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Southwood Power Station and Heat Plants Air Quality Modelling

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Southwood Power Station and Heat Plants Air Quality Modelling

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1. MODELLING APPROACH

The meteorological stations located in the Huon Valley do not provide data sufficient to prepare a meteorological file to support the Ausplume model. Instead the Hobart met file has been used. A wind rose of the Hobart Meteorological file used in the modelling has been provided in Figure 1 and Appendix A.

The terrain file has been included in the model and as such, the effect of terrain can be considered. An orthographic view of the terrain model is provided in Figures 1°-°4. This also includes the location of the Wood Centre (Southwood), and the townships of Glen Huon and Huonville.

Target receptors have been identified for both Glen Huon and Huonville.

Emission source inputs (Table 1), where available, have been provided by possible Power Station proponents and emission factors provided in *US EPA 1993, Emission Factor Documentation for AP-42 Section 1.6 Wood Waste Combustion in Boilers*.

The present stage of the air dispersion modelling represents a screening exercise and serves to indicate if there are significant air quality problems with the proposal. Further modelling would be carried out when more accurate stack emission discharge conditions are known.

Figure 1 - Wind Rose for Hobart Met file

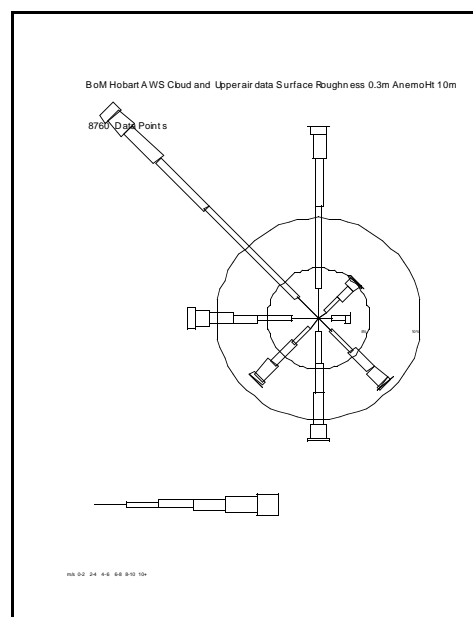


Table 1: Emission source details

<i>Stack details</i>	<i>Power Station (Ausplume stack 1)</i>	<i>Sawmill Heat plant (Ausplume stack2)</i>	<i>Rotary Veneer mill Heat plant (Ausplume stack3)</i>
Easting	484950	484510	484510
Northing	5232900	5233800	5232900
Ground Elevation	100 metres	60 metres	90 metres
Stack height	40 metres	35 metres	30 metres
Stack diameter	2.6 metres	0.25 metres	0.25 metres
Temperature	130 C	130 C	130 C
Exit Velocity	18 metres/second	18 metres/second	18 metres/second
<i>Emission rates</i>			
CO ¹	66.67 gm/second	12.14 gm/second	12.14 gm/second
NOx ¹	7.81 gm/second	1.34 gm/second	1.34 gm/second
Particulates ¹	5.21 gm/second	0.16 gm/second	0.16 gm/second
Arsenic ¹	12.795 kg/year	1.92 kg/year	1.92 kg/year
Cadmium ¹	3.18 kg/year	0.477 kg/year	0.477 kg/year
Lead ¹	231.9 kg/year	34.785 kg/year	34.785 kg/year
Dioxins & Furans ²	0.0006 kg/year I-TEQ	0.00009 kg/year I-TEQ	0.00009 kg/year I-TEQ

¹ US EPA 1995 AP42

² Environment Australia 1998

2. MODEL LIMITATIONS

There are a number of limitations with the modelling approach used in this report, these are described below:

- *Emission discharge rates have been sourced from published data rather than actual stack emission tests.* —Actual stack test data are currently not available. When the design of the Power Station and Heat plants are prepared the supplier of the combustion equipment will be asked to supply comparable stack test emission results. These can be included in the model and thereby improve the predictions.
- *No cold air drainage* — Cold air will drain down the river valley influenced by the terrain and the air temperatures carrying with it air pollutants. This feature is not present in the Ausplume model.
- *No fumigation as a result of inversion break up* —Air pollutants discharged over very low inversion can accumulate. When the inversion breaks up the plume can move down through the air column —described as a fumigation event. This feature is not present in the Ausplume model.

The emission rates that have been used were published by the US EPA and are widely used around the world. The data published by the US EPA are actually based on stack test emissions and can therefore represent reasonable estimates of the likely emissions that could be expected from the Power Station.

The emission rate for Dioxins and Furans I-TEQ³ is based on the upper limit recommended rate for clean wood for Australia (EA 1998). The upper limit has been selected to be conservative. The upper limit was for uncontrolled combustion. The Wood Centre, will in fact, have a very high level of control. The original source of this data as described in the *Environment Australia* report appears to be sourced from Netherlands data where the primary particulate control mechanism used were cyclones. The Wood Centre will use either ESPs or bag filters, both of which have greater particulate removal efficiency than cyclones. Therefore, the use of this emission rate is shown, once again, to be conservative.

³ I-TEQ —International Toxic Equivalents, based on toxicity studies that seek to express the relative toxicity of all Dioxins and Furans relative to 2,3,7,8-TCDD [2,3,7,8-tetrachlorodibenzo-p-dioxin]

For Lead [Pb] emissions, the source of the emission factor was AP42 (USEPA 1995). Both the Lead particulate levels and Lead trace levels were summed to give an emission rate of 0.000773 kg/tonne of combusted wood.

In relation to the *cold air drainage* and *inversion fumigation* issues, the likely impact of these meteorological events will be better understood with improved meteorological data. In the mean time the terrain model has been developed to give some indication of the possible impacts. The results presented in Table 2 indicate that there is considerable dispersion of the plume by the time the plume reaches either town. This would also occur in any *cold air drainage* or *inversion fumigation* event.

3. MODELLING RESULTS

The 99.9 percentile⁴ worst case for each pollutant plus the second highest⁵ predicted values for Glen°Huon and Huonville has been recorded in Table 2.

All predicted peak Ground Level Concentrations [GLCs] for the target receptors are below the NEPM objectives in all cases. In case of CO and NOx, the highest results are recorded from westerly winds. This result is in direct response to the terrain effects acting together with the low inversion levels. Further modelling using increased stack heights or exit velocities did little to alter the predicted location of the worst case GLC although increased velocities and increased stack height did lead to lower GLCs at receptor locations.

Table 2: Worst case effects for power station emissions [Hobart.met]

	NEPM objective (mg/m ³) (ug/m ³)		Predicted 99.9 percentile GLC (ug/m ³)	99.9 percentile GLC as a percentage of NEPM	Glen Huon (ug/m ³)	Huonville (ug/m ³)
CO	11.3	11,300	699	6%	11.3	6.28
NOx	0.25	250	167	67%	7.58	2.75
Particulates	0.05	50	12.9	26%	0.14	0.072
Arsenic	-	-	0.014 4	-	0.000 571	0.000 165
Cadmium	-	-	0.000 869	-	0.000 034 5	0.000 009 96
Lead	-	0.50	0.262	52%	0.010 3	0.002 99
Dioxins	-	0.000 002 6	0.000 000 403	20%	0.000 000 0164	0.000 000 006 04

All model conditions and results are presented in appendix B

⁴ 99.9 percentile —the observation used is 99.9th highest reading. This allows for any anomalous results in the model represented by the highest figure. Selecting the 99.9 percentile reflects regulatory convention.

⁵ The second highest reading is used to allow for anomalous results within the Air Dispersion model.

⁶ Objective is taken from the EPA Victoria 2000

Of particular note is the effect of terrain on westerly winds pushing the plume east from the power station. The accompanying figures, 1°—°4 shows the impact of Particulates, Oxides of Nitrogen, Carbon monoxide and Lead on the terrain surrounding the facility in an orthographic view. From the location of the Southwood facility and the surrounding terrain the plume tends to impact the surrounding terrain due east and on the ridge north of the facility.

It is apparent that Maximum GLC s are mostly found to be within 2000 metres of the site restricting off-site impacts. The terrain surrounding the Southwood facility has a strong impact on the location of peak GLC s.

The dioxin emission rate selected was deliberately conservative at 2 mg/tonne of wood burnt. If the lower dioxin emission rate of 1 mg/tonne of fuel burnt is used the predicted 99.9 percentile highest level is 2.03E-07 mg/m³. Given that the lower dioxin emission rate is based on particulate control by cyclones (usually 80% particulate removal efficiency) and the Power Station will actually use an electrostatic precipitator (usually 99% particulate removal efficiency), the actual dioxin levels are expected to be lower than 2.03E-07 mg /m³ (assume emission rate of 1 mg /tonne).

4. ADDRESSING THE DRAFT AIR QUALITY POLICY

The discussion paper on Air Quality Management and Policy Development (DPIWE 2000) recommends a four-tiered approach for managing and regulating air emissions from industrial facilities. This four-tiered approach is based on:

- Adopting Best Practice Environmental Management;
- Compliance with ambient air objectives;
- Setting limits for Ground Level Concentrations; and
- Setting limits for in-stack concentrations.

The design of the Wood Centre combustion sources has used this approach in the development of the site plan in the following manner:

Best Practice

- An Electrostatic Precipitator [ESP] pollution control device has been specified for the Power Station.
- The pollution control devices for the Saw Mill and Veneer Plant heat plants will require either Electrostatic Precipitators or baghouses.
- The combustion controls on the Power Station and Heat Plants will control the combustion within conditions to maximise efficiency of the combustion process and thereby reduce pollution.

Ambient Air Objectives

- The Air NEPM (National Environmental Protection Measure for Ambient Air Quality) sets out standards and goals for a number of common pollutants. The Ground Level Concentrations predicted for Carbon Monoxide, Nitrogen dioxide, Lead and Particles are all below the levels set in the Air NEPM. The portion of contribution of the Wood Centre to the Air NEPM objectives is set out in Table 2.

Ground Level Concentration Limits

- The predicted worst-case GLCs (99.9 percentile) for the Wood Centre generally occur within 2 kilometres of the Wood Centre. This is within an area of State Forest. This land should be seen as a buffer zone for the Wood Centre.

In Stack Pollutant Concentration Limits

- The stage of development of the Wood Centre project means that detailed process design has not been undertaken at present. The air dispersion modelling has been carried out using likely emission limits that would be encountered. Modelling should be repeated when more accurate stack emission levels are available. This modelling should seek to confirm assumptions made in the screening stage of the modelling exercise.

5. IMPROVEMENTS TO THE MODEL

The use of a more representative meteorological file would improve the model and provide a better understanding over the entire terrain model. Forestry Tasmania is seeking to obtain better meteorological data for the area through the establishment of a permanent weather station in the Huon valley and thereby improve the model.

Options for including cold air drainage and inversion fumigation events will be examined once more accurate stack emission data is available.

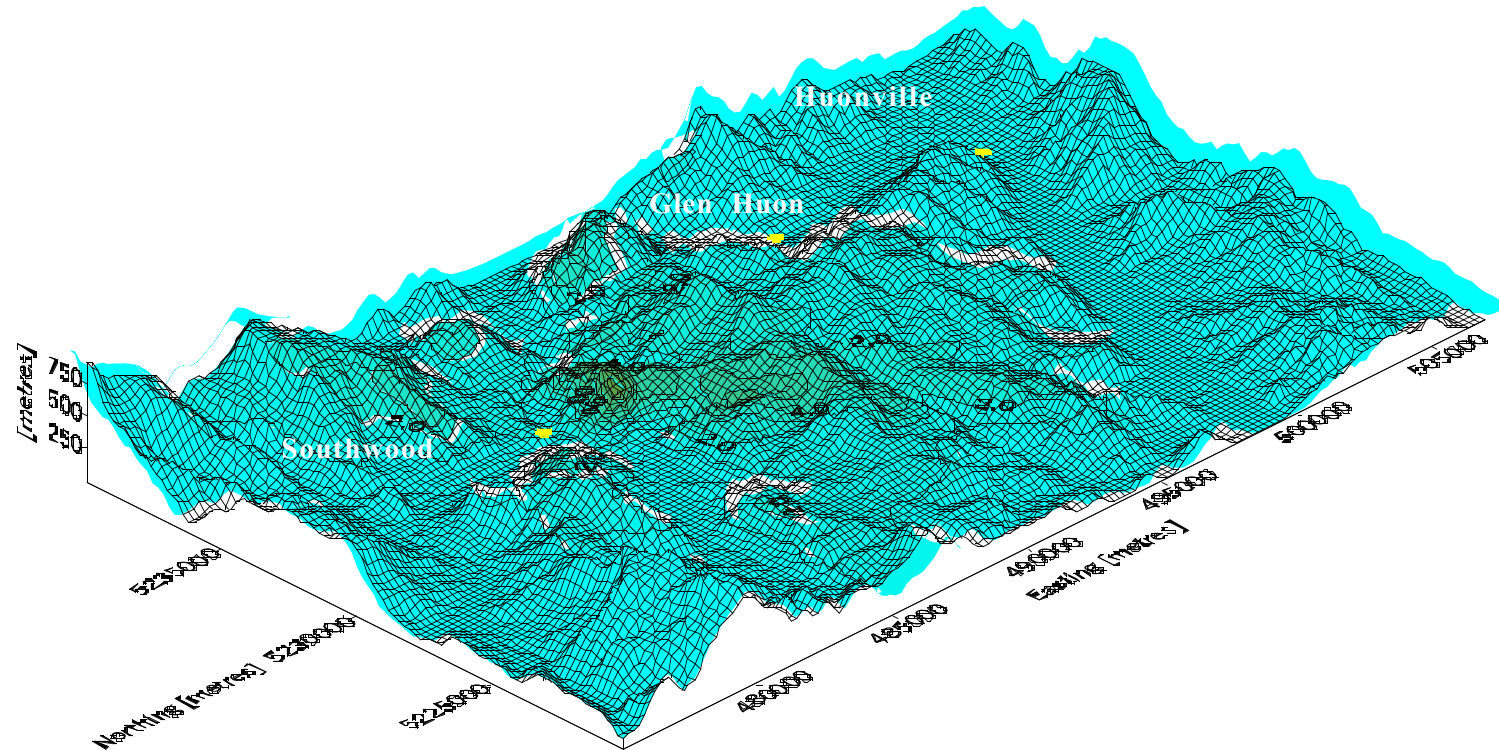


Figure 2: Particulate emissions — mg /m³

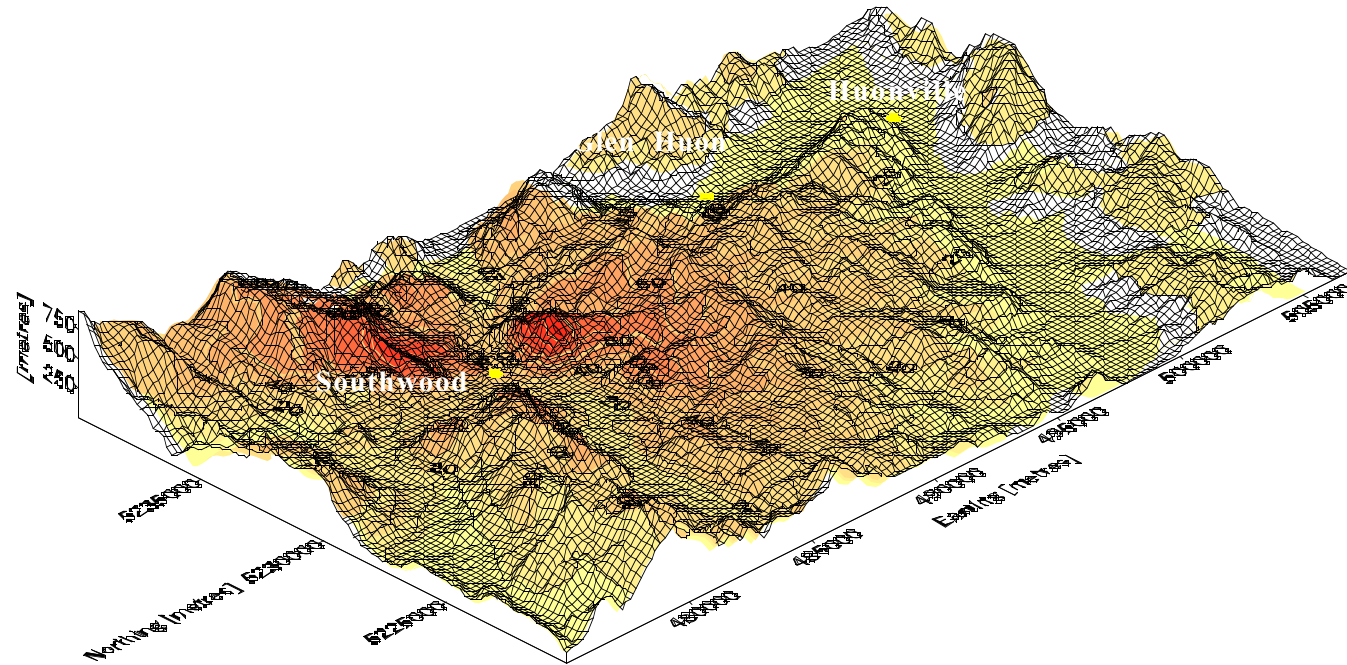


Figure 3: Oxides of Nitrogen emissions — mg / m^3

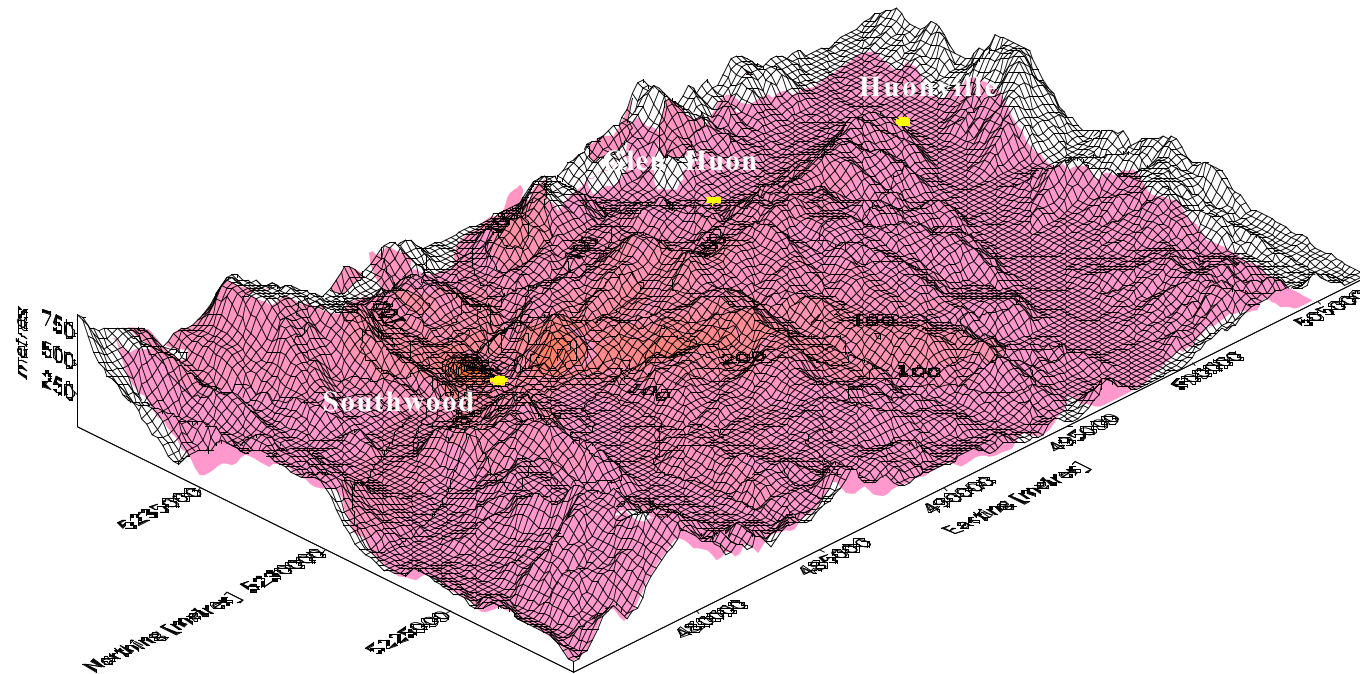


Figure 4: Carbon monoxide emissions — mg /m³

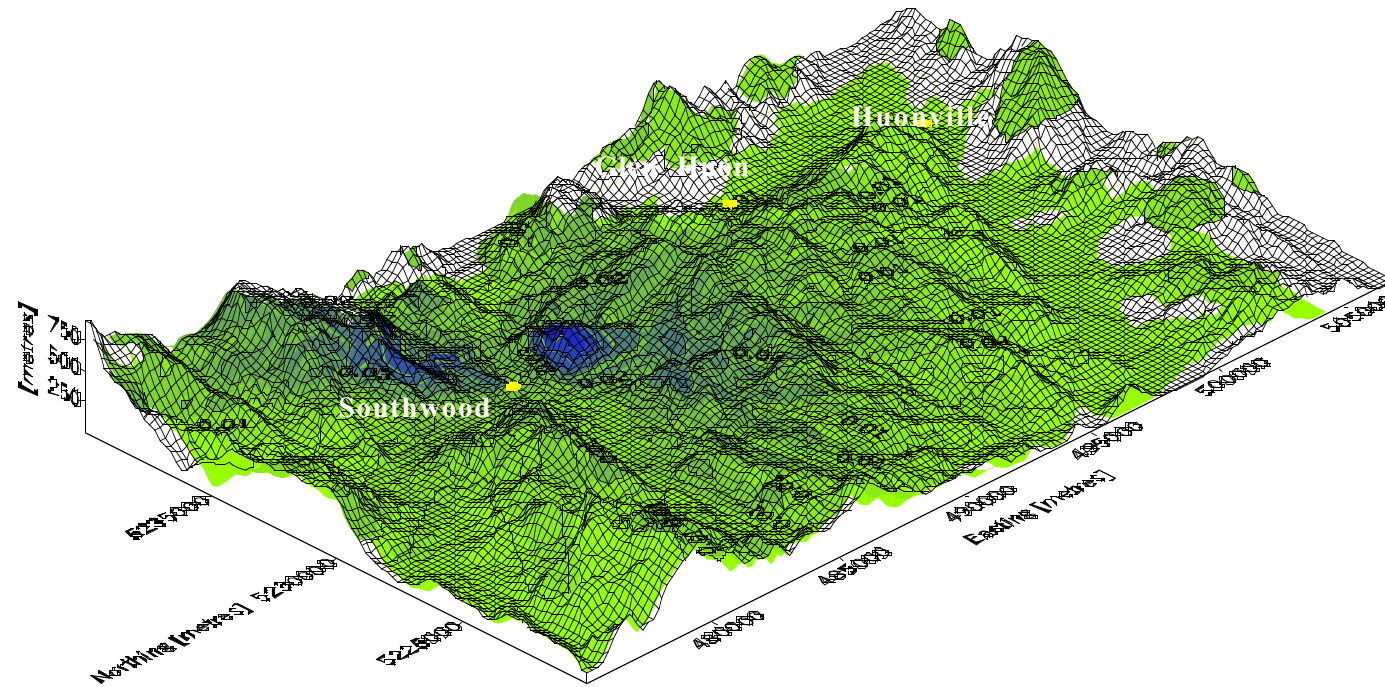


Figure 5: Lead emissions — mg / m^3

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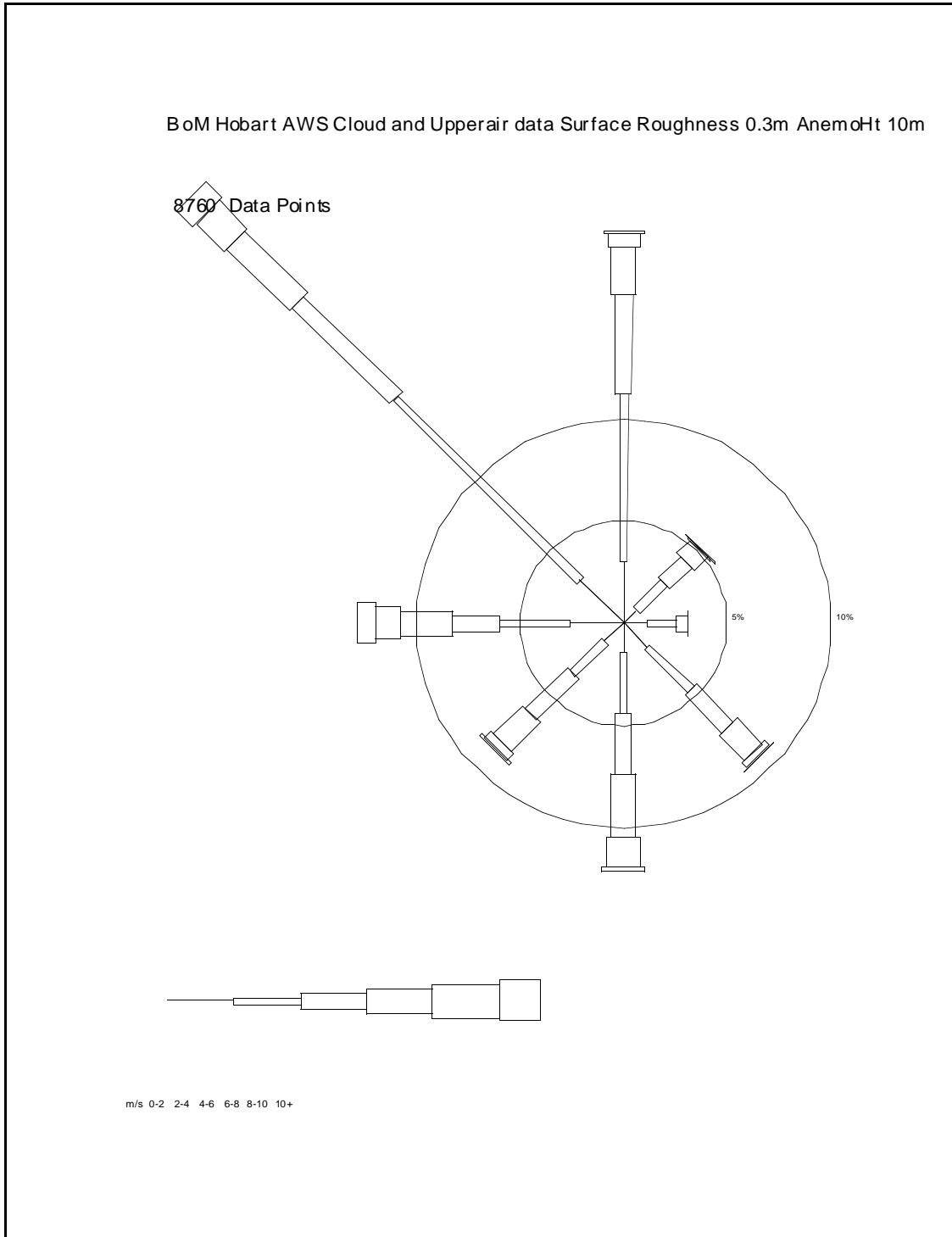
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Appendix A — Wind Rose

THE WOOD CENTRE DEVELOPMENT - SOUTHWOOD RESOURCES, HUON
Southwood Power Station and Heat Plants — Air Quality Modelling
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Appendix B - Ausplume Model inputs and 100 worst cases

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| ITPY CO - Power Station & 2 Heat Plants |
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Concentration or deposition	Concentration
Emission rate units	grams/second
Concentration units	microgram/m ³
Units conversion factor	1.00E+06
Background concentration	0.00E+00
Terrain effects	Egan method
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Averaging time for sigma-theta values	60 min.
Roughness height at the wind vane site	0.300 m

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.800m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES

8 hours

1

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SOURCE CHARACTERISTICS

STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	100m	40m	2.60m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 6.67E+01 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	80	80	80	80	80	80	80	80	80	80	80	80
Effective height	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	80	80	80	80	80	80	80	80	80	80	80	80
Effective height	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	80	80	80	80	80	80	80	80	80	80	80	80
Effective height	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0

(Constant) emission rate = 1.21E+01 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

(Constant) emission rate = 1.21E+01 grams/second

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Southwood Power Station and Heat Plants — Air Quality Modelling
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No gravitational settling or scavenging.

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SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 1.13E+01 @Hr24,27/07/00 2: 6.28E+00 @Hr24,09/04/00

1 Peak values for the 100 worst cases (in microgram/m3)
 Averaging time = 8 hours

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.15E+03	24,11/04/00	(484717, 5233919, 0.0)
2	9.77E+02	24,07/07/00	(484717, 5233517, 0.0)
3	7.90E+02	24,09/11/00	(484717, 5234120, 0.0)
4	7.81E+02	24,30/07/00	(484717, 5233517, 0.0)
5	7.77E+02	24,25/09/00	(484717, 5233718, 0.0)
6	7.45E+02	24,19/06/00	(484717, 5233718, 0.0)
7	7.32E+02	24,08/06/00	(484717, 5233919, 0.0)
8	7.03E+02	24,13/04/00	(484717, 5233919, 0.0)
9	6.99E+02	24,03/05/00	(484717, 5233718, 0.0)
10	6.53E+02	16,24/09/00	(484394, 5233718, 0.0)
11	6.46E+02	16,10/04/00	(484394, 5233919, 0.0)
12	6.29E+02	08,19/06/00	(484717, 5233517, 0.0)
13	6.21E+02	24,27/07/00	(484717, 5233718, 0.0)
14	6.18E+02	24,27/06/00	(484717, 5233919, 0.0)
15	6.07E+02	24,17/07/00	(484717, 5233718, 0.0)
16	6.05E+02	24,06/05/00	(484717, 5233718, 0.0)
17	5.95E+02	16,27/07/00	(484717, 5233718, 0.0)
18	5.73E+02	16,26/03/00	(484394, 5233718, 0.0)
19	5.56E+02	16,06/06/00	(484717, 5233517, 0.0)
20	5.51E+02	16,01/08/00	(484717, 5233517, 0.0)
21	5.49E+02	16,11/06/00	(484717, 5233718, 0.0)
22	5.48E+02	24,12/08/00	(484717, 5233517, 0.0)
23	5.30E+02	24,03/02/00	(484717, 5233919, 0.0)
24	5.22E+02	16,07/07/00	(484717, 5233919, 0.0)
25	5.09E+02	24,02/07/00	(484717, 5233517, 0.0)
26	5.09E+02	24,31/10/00	(485039, 5233718, 0.0)
27	4.81E+02	24,12/11/00	(484717, 5233718, 0.0)
28	4.79E+02	16,02/10/00	(484717, 5233718, 0.0)
29	4.77E+02	24,03/04/00	(484717, 5233517, 0.0)
30	4.75E+02	24,22/06/00	(484717, 5233718, 0.0)
31	4.68E+02	24,17/02/00	(484717, 5233718, 0.0)
32	4.67E+02	24,15/06/00	(484717, 5233517, 0.0)
33	4.66E+02	16,24/03/00	(484394, 5233718, 0.0)
34	4.65E+02	16,19/06/00	(484717, 5233718, 0.0)
35	4.63E+02	24,20/02/00	(484717, 5234120, 0.0)
36	4.59E+02	24,02/05/00	(484717, 5233919, 0.0)
37	4.58E+02	24,05/04/00	(484717, 5233316, 0.0)
38	4.55E+02	16,06/07/00	(484717, 5233718, 0.0)
39	4.53E+02	24,04/11/00	(484717, 5233718, 0.0)
40	4.52E+02	24,04/07/00	(484717, 5233718, 0.0)
41	4.51E+02	16,07/03/00	(484394, 5233919, 0.0)
42	4.50E+02	16,12/03/00	(484394, 5233718, 0.0)
43	4.50E+02	16,20/08/00	(484717, 5233919, 0.0)
44	4.48E+02	24,30/01/00	(484717, 5233517, 0.0)
45	4.46E+02	16,18/10/00	(484394, 5233919, 0.0)
46	4.46E+02	24,23/09/00	(484717, 5233517, 0.0)
47	4.43E+02	24,01/01/00	(484394, 5234120, 0.0)
48	4.39E+02	16,14/03/00	(484717, 5233718, 0.0)
49	4.34E+02	24,04/05/00	(484717, 5233517, 0.0)

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50	4.29E+02	24,19/10/00	(484717, 5234120,	0.0)
51	4.27E+02	16,05/05/00	(484717, 5233718,	0.0)
52	4.27E+02	24,11/11/00	(484717, 5234120,	0.0)
53	4.27E+02	16,12/04/00	(484717, 5233718,	0.0)
54	4.23E+02	16,16/03/00	(484394, 5233919,	0.0)
55	4.22E+02	08,02/07/00	(484072, 5234321,	0.0)
56	4.21E+02	16,10/01/00	(484394, 5233919,	0.0)
57	4.19E+02	24,24/01/00	(484717, 5233718,	0.0)
58	4.16E+02	24,06/02/00	(484717, 5233718,	0.0)
59	4.15E+02	24,28/10/00	(484717, 5233718,	0.0)
60	4.15E+02	16,24/04/00	(484717, 5233718,	0.0)
61	4.14E+02	24,29/07/00	(484717, 5233517,	0.0)
62	4.14E+02	24,06/04/00	(484717, 5233517,	0.0)
63	4.13E+02	24,28/08/00	(484717, 5233517,	0.0)
64	4.11E+02	24,31/01/00	(484394, 5233718,	0.0)
65	4.11E+02	24,27/09/00	(484717, 5233316,	0.0)
66	4.10E+02	24,02/06/00	(484717, 5233517,	0.0)
67	4.09E+02	08,12/07/00	(484717, 5233517,	0.0)
68	4.07E+02	24,24/02/00	(484717, 5233919,	0.0)
69	4.04E+02	08,05/07/00	(484717, 5233718,	0.0)
70	4.02E+02	24,20/06/00	(484717, 5233316,	0.0)
71	4.01E+02	24,30/10/00	(484717, 5233718,	0.0)
72	4.00E+02	24,06/09/00	(484717, 5233919,	0.0)
73	3.99E+02	16,22/10/00	(484394, 5233919,	0.0)
74	3.96E+02	24,08/09/00	(483750, 5233517,	0.0)
75	3.96E+02	24,09/12/00	(484717, 5233718,	0.0)
76	3.95E+02	16,21/08/00	(484394, 5233919,	0.0)
77	3.93E+02	16,09/01/00	(484394, 5233919,	0.0)
78	3.93E+02	24,15/07/00	(484717, 5233919,	0.0)
79	3.92E+02	24,24/03/00	(484717, 5233517,	0.0)
80	3.92E+02	16,13/06/00	(484717, 5233718,	0.0)
81	3.92E+02	24,30/08/00	(484717, 5233517,	0.0)
82	3.90E+02	24,29/08/00	(484717, 5233718,	0.0)
83	3.89E+02	16,23/09/00	(484717, 5233718,	0.0)
84	3.88E+02	16,18/11/00	(484717, 5233919,	0.0)
85	3.87E+02	24,05/06/00	(484717, 5233517,	0.0)
86	3.87E+02	08,11/07/00	(484717, 5233517,	0.0)
87	3.80E+02	24,21/06/00	(484717, 5233517,	0.0)
88	3.79E+02	24,20/10/00	(484717, 5233517,	0.0)
89	3.78E+02	24,06/03/00	(484717, 5234120,	0.0)
90	3.77E+02	24,18/08/00	(484717, 5233517,	0.0)
91	3.74E+02	24,06/12/00	(484717, 5233718,	0.0)
92	3.73E+02	24,06/07/00	(484717, 5233718,	0.0)
93	3.72E+02	24,25/04/00	(484717, 5233517,	0.0)
94	3.70E+02	16,30/07/00	(484717, 5233718,	0.0)
95	3.69E+02	16,28/06/00	(484717, 5233517,	0.0)
96	3.68E+02	24,03/07/00	(484717, 5233517,	0.0)
97	3.67E+02	24,07/09/00	(484717, 5234522,	0.0)
98	3.67E+02	24,23/02/00	(484717, 5233517,	0.0)
99	3.67E+02	24,05/11/00	(484717, 5234120,	0.0)
100	3.65E+02	24,10/05/00	(484717, 5233718,	0.0)

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| ITPY NOx Power Station & 2 heat plants |
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Concentration or deposition	Concentration
Emission rate units	grams/second
Concentration units	microgram/m3
Units conversion factor	1.00E+06
Background concentration	0.00E+00
Terrain effects	Egan method
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Averaging time for sigma-theta values	60 min.
Roughness height at the wind vane site	0.300 m

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.800m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES

1 hour

1

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| ITPY NOx Power Station & 2 heat plants |
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SOURCE CHARACTERISTICS

STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	100m	40m	2.60m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 7.81E+00 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 1.34E+00 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

(Constant) emission rate = 1.34E+00 grams/second

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No gravitational settling or scavenging.

SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 7.58E+00 @Hr20,02/05/00 2: 2.75E+00 @Hr24,09/04/00
=====

1 Peak values for the 100 worst cases (in microgram/m3)
 Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	2.67E+02	06,02/07/00	(484072, 5234321, 0.0)
2	2.05E+02	21,02/05/00	(483750, 5234321, 0.0)
3	1.97E+02	07,13/06/00	(483750, 5234522, 0.0)
4	1.89E+02	01,09/11/00	(483428, 5233718, 0.0)
5	1.86E+02	21,18/11/00	(484072, 5234924, 0.0)
6	1.69E+02	20,03/05/00	(486328, 5232110, 0.0)
7	1.67E+02	03,05/07/00	(486328, 5232110, 0.0)
8	1.67E+02	24,25/09/00	(486328, 5232110, 0.0)
9	1.67E+02	24,06/02/00	(486650, 5232914, 0.0)
10	1.67E+02	24,27/02/00	(486650, 5232914, 0.0)
11	1.66E+02	21,31/10/00	(486650, 5232914, 0.0)
12	1.65E+02	22,09/04/00	(486650, 5232914, 0.0)
13	1.65E+02	20,11/06/00	(486328, 5232110, 0.0)
14	1.65E+02	18,19/06/00	(486328, 5232110, 0.0)
15	1.61E+02	22,13/04/00	(486650, 5232311, 0.0)
16	1.60E+02	18,27/07/00	(486650, 5232311, 0.0)
17	1.57E+02	19,13/04/00	(486650, 5233517, 0.0)
18	1.57E+02	21,20/10/00	(486650, 5233517, 0.0)
19	1.56E+02	23,28/07/00	(486650, 5233517, 0.0)
20	1.56E+02	21,06/09/00	(486650, 5233517, 0.0)
21	1.56E+02	18,15/07/00	(486650, 5233517, 0.0)
22	1.56E+02	22,06/09/00	(486650, 5233517, 0.0)
23	1.52E+02	24,09/04/00	(486650, 5233115, 0.0)
24	1.50E+02	20,02/05/00	(486650, 5233115, 0.0)
25	1.50E+02	19,05/05/00	(486650, 5233115, 0.0)
26	1.50E+02	20,27/07/00	(486650, 5233115, 0.0)
27	1.49E+02	01,10/03/00	(486650, 5232512, 0.0)
28	1.49E+02	23,31/10/00	(486650, 5232512, 0.0)
29	1.48E+02	24,06/03/00	(486650, 5232512, 0.0)
30	1.48E+02	20,27/03/00	(486650, 5232512, 0.0)
31	1.47E+02	19,10/05/00	(486650, 5232512, 0.0)
32	1.39E+02	23,27/01/00	(484717, 5234522, 0.0)
33	1.37E+02	05,23/09/00	(484717, 5234522, 0.0)
34	1.25E+02	06,11/06/00	(486650, 5231708, 0.0)
35	1.24E+02	04,04/06/00	(486650, 5231708, 0.0)
36	1.24E+02	18,07/07/00	(486650, 5231708, 0.0)
37	1.24E+02	19,07/07/00	(486650, 5231708, 0.0)
38	1.24E+02	20,07/07/00	(486650, 5231708, 0.0)
39	1.23E+02	23,15/07/00	(486650, 5231708, 0.0)
40	1.22E+02	20,13/04/00	(486650, 5233718, 0.0)
41	1.22E+02	18,02/05/00	(486650, 5233718, 0.0)
42	1.21E+02	21,08/06/00	(486650, 5233718, 0.0)
43	1.19E+02	07,19/06/00	(485683, 5232512, 0.0)
44	1.19E+02	23,07/07/00	(485683, 5232512, 0.0)
45	1.19E+02	24,07/07/00	(485683, 5232512, 0.0)
46	1.18E+02	22,16/02/00	(486328, 5232914, 0.0)
47	1.18E+02	21,16/02/00	(486328, 5232914, 0.0)
48	1.18E+02	06,13/06/00	(483750, 5234321, 0.0)

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49	1.16E+02	05,05/07/00	(484072, 5234321,	0.0)
50	1.16E+02	07,17/07/00	(484072, 5234321,	0.0)
51	1.16E+02	03,10/05/00	(483428, 5233517,	0.0)
52	1.15E+02	21,09/11/00	(485039, 5234924,	0.0)
53	1.15E+02	21,20/02/00	(485039, 5234924,	0.0)
54	1.11E+02	23,16/02/00	(486650, 5234120,	0.0)
55	1.11E+02	23,25/02/00	(483750, 5234522,	0.0)
56	1.10E+02	18,02/07/00	(483750, 5234522,	0.0)
57	1.10E+02	19,15/07/00	(483750, 5234522,	0.0)
58	1.10E+02	19,27/06/00	(486650, 5234120,	0.0)
59	1.10E+02	23,20/02/00	(486328, 5232110,	0.0)
60	1.09E+02	20,27/06/00	(486650, 5234120,	0.0)
61	1.09E+02	20,15/07/00	(486650, 5234120,	0.0)
62	1.09E+02	19,03/04/00	(486650, 5234120,	0.0)
63	1.09E+02	21,17/06/00	(486328, 5232110,	0.0)
64	1.09E+02	19,29/08/00	(486328, 5232110,	0.0)
65	1.08E+02	20,29/08/00	(486328, 5232110,	0.0)
66	1.06E+02	24,25/02/00	(484072, 5234924,	0.0)
67	1.05E+02	22,08/02/00	(484717, 5234522,	0.0)
68	1.04E+02	23,04/11/00	(483428, 5233919,	0.0)
69	1.04E+02	05,05/08/00	(483750, 5230100,	0.0)
70	1.03E+02	02,08/07/00	(483750, 5230100,	0.0)
71	9.90E+01	08,28/07/00	(483750, 5234120,	0.0)
72	9.88E+01	23,09/04/00	(486328, 5232311,	0.0)
73	9.86E+01	03,04/07/00	(486328, 5232311,	0.0)
74	9.81E+01	18,06/05/00	(486328, 5232311,	0.0)
75	9.81E+01	23,22/06/00	(486328, 5232311,	0.0)
76	9.58E+01	22,19/10/00	(484717, 5234522,	0.0)
77	9.50E+01	24,15/06/00	(487294, 5229095,	0.0)
78	9.46E+01	19,03/07/00	(487294, 5229095,	0.0)
79	9.43E+01	19,07/03/00	(483750, 5234321,	0.0)
80	9.42E+01	21,27/07/00	(486328, 5232713,	0.0)
81	9.41E+01	06,23/09/00	(484072, 5234321,	0.0)
82	9.40E+01	07,23/09/00	(484072, 5234321,	0.0)
83	9.32E+01	23,09/12/00	(484717, 5233316,	0.0)
84	9.29E+01	21,24/02/00	(486650, 5233517,	0.0)
85	9.27E+01	22,01/01/00	(486650, 5233517,	0.0)
86	9.26E+01	22,23/10/00	(486650, 5233517,	0.0)
87	9.25E+01	18,23/10/00	(484717, 5234522,	0.0)
88	9.22E+01	02,16/07/00	(484717, 5233316,	0.0)
89	9.20E+01	19,25/05/00	(486650, 5233517,	0.0)
90	9.17E+01	21,05/07/00	(486650, 5233517,	0.0)
91	9.17E+01	09,02/08/00	(484717, 5234522,	0.0)
92	9.16E+01	22,05/07/00	(486650, 5233517,	0.0)
93	9.03E+01	21,05/05/00	(484717, 5233316,	0.0)
94	9.03E+01	22,20/06/00	(484717, 5233316,	0.0)
95	9.01E+01	17,28/09/00	(484717, 5233316,	0.0)
96	9.00E+01	23,02/02/00	(486650, 5233115,	0.0)
97	9.00E+01	18,03/06/00	(484717, 5233316,	0.0)
98	8.97E+01	21,05/04/00	(484717, 5233316,	0.0)
99	8.93E+01	17,17/12/00	(484717, 5233919,	0.0)
100	8.87E+01	07,30/06/00	(484072, 5234321,	0.0)

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| ITPY - PM10 Power Station & 2 Heat plants |
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Concentration or deposition	Concentration
Emission rate units	grams/second
Concentration units	microgram/m3
Units conversion factor	1.00E+06
Background concentration	0.00E+00
Terrain effects	Egan method
Smooth stability class changes?	No
Other stability class adjustments ("urban modes")	None
Ignore building wake effects?	No
Decay coefficient (unless overridden by met. file)	0.000
Anemometer height	10 m
Averaging time for sigma-theta values	60 min.
Roughness height at the wind vane site	0.300 m

DISPERSION CURVES

Horizontal dispersion curves for sources <100m high	Sigma-theta
Vertical dispersion curves for sources <100m high	Pasquill-Gifford
Horizontal dispersion curves for sources >100m high	Briggs Rural
Vertical dispersion curves for sources >100m high	Briggs Rural
Enhance horizontal plume spreads for buoyancy?	Yes
Enhance vertical plume spreads for buoyancy?	Yes
Adjust horizontal P-G formulae for roughness height?	Yes
Adjust vertical P-G formulae for roughness height?	Yes
Roughness height	0.800m
Adjustment for wind directional shear	None

PLUME RISE OPTIONS

Gradual plume rise?	Yes
Stack-tip downwash included?	Yes
Building downwash algorithm:	Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates	0.60,0.60
Partial penetration of elevated inversions?	No
Disregard temp. gradients in the hourly met. file?	No

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES

24 hours

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+-----+
| ITPY - PM10 Power Station & 2 Heat plants |
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SOURCE CHARACTERISTICS

STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	137m	40m	2.60m	100C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 5.21E+00 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 1.60E-01 grams/second
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 1.60E-01 grams/second

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No gravitational settling or scavenging.

SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 1.45E-01 @Hr24,27/10/00 2: 7.17E-02 @Hr24,27/10/00

1 Peak values for the 100 worst cases (in microgram/m3)
 Averaging time = 24 hours

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.29E+01	24,19/06/00	(486650, 5231909, 0.0)
2	9.95E+00	24,03/05/00	(486650, 5231909, 0.0)
3	9.93E+00	24,17/07/00	(486328, 5232110, 0.0)
4	9.65E+00	24,27/07/00	(486650, 5232311, 0.0)
5	9.56E+00	24,07/07/00	(486650, 5231909, 0.0)
6	9.32E+00	24,25/09/00	(486650, 5231909, 0.0)
7	9.31E+00	24,06/09/00	(486650, 5233517, 0.0)
8	9.22E+00	24,05/07/00	(486650, 5231909, 0.0)
9	8.01E+00	24,09/04/00	(486650, 5233115, 0.0)
10	7.69E+00	24,05/08/00	(486328, 5232110, 0.0)
11	7.40E+00	24,31/10/00	(486650, 5232713, 0.0)
12	7.21E+00	24,11/06/00	(486650, 5231909, 0.0)
13	7.09E+00	24,04/07/00	(486650, 5232311, 0.0)
14	6.99E+00	24,29/08/00	(486650, 5231909, 0.0)
15	6.96E+00	24,27/06/00	(486650, 5234120, 0.0)
16	6.37E+00	24,13/04/00	(486650, 5233517, 0.0)
17	6.32E+00	24,27/03/00	(486650, 5232512, 0.0)
18	6.13E+00	24,16/02/00	(486650, 5232914, 0.0)
19	5.96E+00	24,10/03/00	(486650, 5232713, 0.0)
20	5.88E+00	24,30/08/00	(486328, 5232110, 0.0)
21	5.86E+00	24,10/05/00	(486650, 5232512, 0.0)
22	5.71E+00	24,06/02/00	(486650, 5232914, 0.0)
23	5.68E+00	24,22/06/00	(486650, 5232311, 0.0)
24	5.61E+00	24,12/04/00	(486328, 5232110, 0.0)
25	5.58E+00	24,11/04/00	(486972, 5234120, 0.0)
26	5.52E+00	24,30/06/00	(486328, 5232110, 0.0)
27	5.48E+00	24,27/02/00	(486650, 5232914, 0.0)
28	5.29E+00	24,02/05/00	(486650, 5233115, 0.0)
29	5.25E+00	24,01/07/00	(486328, 5232110, 0.0)
30	5.15E+00	24,24/06/00	(486328, 5232110, 0.0)
31	5.04E+00	24,22/12/00	(486328, 5232110, 0.0)
32	4.91E+00	24,04/08/00	(486328, 5232311, 0.0)
33	4.85E+00	24,08/04/00	(486328, 5232110, 0.0)
34	4.84E+00	24,17/02/00	(486328, 5232110, 0.0)
35	4.84E+00	24,20/10/00	(486650, 5233517, 0.0)
36	4.80E+00	24,28/07/00	(486650, 5233517, 0.0)
37	4.77E+00	24,17/08/00	(486328, 5232110, 0.0)
38	4.76E+00	24,05/05/00	(486650, 5233115, 0.0)
39	4.64E+00	24,15/07/00	(486650, 5233517, 0.0)
40	4.57E+00	24,02/07/00	(482783, 5235326, 0.0)
41	4.55E+00	24,12/11/00	(486650, 5232311, 0.0)
42	4.54E+00	24,04/06/00	(486650, 5231909, 0.0)
43	4.52E+00	24,11/05/00	(486328, 5232110, 0.0)
44	4.40E+00	24,06/03/00	(486650, 5232512, 0.0)
45	4.36E+00	24,25/06/00	(486328, 5232110, 0.0)

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46	4.31E+00	24,18/06/00	(486328, 5232110,	0.0)
47	4.22E+00	24,18/08/00	(486328, 5232110,	0.0)
48	4.17E+00	24,08/06/00	(486972, 5234120,	0.0)
49	4.12E+00	24,28/08/00	(486328, 5232110,	0.0)
50	4.05E+00	24,17/06/00	(486650, 5231909,	0.0)
51	4.03E+00	24,28/06/00	(486328, 5232110,	0.0)
52	3.93E+00	24,06/05/00	(486650, 5232110,	0.0)
53	3.88E+00	24,01/11/00	(483428, 5231105,	0.0)
54	3.87E+00	24,13/06/00	(482783, 5234723,	0.0)
55	3.82E+00	24,07/09/00	(485683, 5236934,	0.0)
56	3.78E+00	24,16/07/00	(486328, 5232110,	0.0)
57	3.75E+00	24,29/07/00	(484717, 5233517,	0.0)
58	3.71E+00	24,02/10/00	(486328, 5232311,	0.0)
59	3.70E+00	24,12/08/00	(486328, 5232311,	0.0)
60	3.69E+00	24,02/04/00	(486650, 5232914,	0.0)
61	3.61E+00	24,06/07/00	(486328, 5232110,	0.0)
62	3.52E+00	24,26/02/00	(486328, 5232512,	0.0)
63	3.51E+00	24,12/06/00	(484717, 5233517,	0.0)
64	3.51E+00	24,02/03/00	(486328, 5232311,	0.0)
65	3.47E+00	24,25/03/00	(486650, 5231708,	0.0)
66	3.46E+00	24,27/08/00	(486650, 5231708,	0.0)
67	3.46E+00	24,24/04/00	(487617, 5229899,	0.0)
68	3.32E+00	24,19/08/00	(486650, 5232110,	0.0)
69	3.28E+00	24,21/05/00	(486328, 5232110,	0.0)
70	3.25E+00	24,20/03/00	(486328, 5232110,	0.0)
71	3.24E+00	24,21/07/00	(486328, 5232110,	0.0)
72	3.23E+00	24,03/07/00	(486328, 5232110,	0.0)
73	3.22E+00	24,15/08/00	(486328, 5232110,	0.0)
74	3.19E+00	24,23/08/00	(482139, 5234522,	0.0)
75	3.18E+00	24,09/06/00	(486328, 5232311,	0.0)
76	3.18E+00	24,20/04/00	(486328, 5232512,	0.0)
77	3.18E+00	24,11/07/00	(484717, 5233517,	0.0)
78	3.17E+00	24,10/08/00	(486650, 5233718,	0.0)
79	3.17E+00	24,06/12/00	(486328, 5232110,	0.0)
80	3.15E+00	24,17/09/00	(486328, 5232110,	0.0)
81	3.15E+00	24,20/01/00	(486005, 5232311,	0.0)
82	3.15E+00	24,08/07/00	(484717, 5234120,	0.0)
83	3.13E+00	24,15/06/00	(487294, 5229095,	0.0)
84	3.11E+00	24,01/01/00	(484394, 5234120,	0.0)
85	3.09E+00	24,05/09/00	(486328, 5232110,	0.0)
86	3.08E+00	24,03/06/00	(486328, 5232110,	0.0)
87	3.07E+00	24,12/12/00	(486328, 5232110,	0.0)
88	3.06E+00	24,29/06/00	(486328, 5232110,	0.0)
89	3.05E+00	24,01/08/00	(486650, 5231708,	0.0)
90	3.02E+00	24,11/11/00	(484717, 5234120,	0.0)
91	3.01E+00	24,23/02/00	(486328, 5232110,	0.0)
92	3.00E+00	24,22/09/00	(486328, 5232110,	0.0)
93	3.00E+00	24,07/10/00	(486328, 5232110,	0.0)
94	2.99E+00	24,16/10/00	(486328, 5232110,	0.0)
95	2.99E+00	24,06/06/00	(484717, 5233517,	0.0)
96	2.98E+00	24,12/09/00	(486328, 5232110,	0.0)
97	2.98E+00	24,30/07/00	(484717, 5233517,	0.0)
98	2.97E+00	24,27/05/00	(486328, 5232110,	0.0)
99	2.95E+00	24,15/09/00	(484717, 5233517,	0.0)
100	2.95E+00	24,17/10/00	(483750, 5230100,	0.0)

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1      +-----+
      | ITPY Arsenic - Power Station & 2 heat plants |
      +-----+

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Concentration or deposition          Concentration
Emission rate units                 kg/year
Concentration units                 micrograms/m3
Units conversion factor             3.17E+01
Background concentration            0.00E+00
Terrain effects                     Egan method
Smooth stability class changes?     No
Other stability class adjustments ("urban modes") None
Ignore building wake effects?      No
Decay coefficient (unless overridden by met. file) 0.000
Anemometer height                   10 m

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DISPERSION CURVES

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Horizontal dispersion curves for sources <100m high Pasquill-Gifford
Vertical dispersion curves for sources <100m high Pasquill-Gifford
Horizontal dispersion curves for sources >100m high Briggs Rural
Vertical dispersion curves for sources >100m high Briggs Rural
Enhance horizontal plume spreads for buoyancy? Yes
Enhance vertical plume spreads for buoyancy? Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust vertical P-G formulae for roughness height? Yes
Roughness height                    0.800m
Adjustment for wind directional shear None

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PLUME RISE OPTIONS

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Gradual plume rise?                 Yes
Stack-tip downwash included?        Yes
Building downwash algorithm:        Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions? No
Disregard temp. gradients in the hourly met. file? No

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and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIME: 3 minutes.

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1      +-----+
      | ITPY Arsenic - Power Station & 2 heat plants |
      | SOURCE CHARACTERISTICS |
      +-----+

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STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	100m	40m	2.60m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 1.28E+01 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 1.92E+00 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

(Constant) emission rate = 1.92E+00 kg/year
No gravitational settling or scavenging.

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SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
 AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 5.71E-04 @Hr20,02/05/00 2: 1.65E-04 @Hr12,29/10/00

1 Peak values for the 100 worst cases (in micrograms/m3)
 Averaging time = 3 minutes

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	2.17E-02	06,02/07/00	(484072, 5234321, 0.0)
2	1.52E-02	24,06/02/00	(486650, 5232914, 0.0)
3	1.52E-02	24,27/02/00	(486650, 5232914, 0.0)
4	1.51E-02	21,31/10/00	(486650, 5232914, 0.0)
5	1.51E-02	22,09/04/00	(486650, 5232914, 0.0)
6	1.46E-02	21,18/11/00	(484072, 5234924, 0.0)
7	1.46E-02	20,03/05/00	(486328, 5232110, 0.0)
8	1.44E-02	19,13/04/00	(486650, 5233517, 0.0)
9	1.44E-02	21,20/10/00	(486650, 5233517, 0.0)
10	1.44E-02	03,05/07/00	(486328, 5232110, 0.0)
11	1.44E-02	24,25/09/00	(486328, 5232110, 0.0)
12	1.44E-02	23,28/07/00	(486650, 5233517, 0.0)
13	1.43E-02	21,06/09/00	(486650, 5233517, 0.0)
14	1.43E-02	18,15/07/00	(486650, 5233517, 0.0)
15	1.43E-02	22,06/09/00	(486650, 5233517, 0.0)
16	1.41E-02	22,13/04/00	(486650, 5232311, 0.0)
17	1.41E-02	20,11/06/00	(486328, 5232110, 0.0)
18	1.41E-02	18,19/06/00	(486328, 5232110, 0.0)
19	1.40E-02	18,27/07/00	(486650, 5232311, 0.0)
20	1.37E-02	07,13/06/00	(483428, 5234723, 0.0)
21	1.26E-02	01,10/03/00	(486972, 5232512, 0.0)
22	1.26E-02	23,31/10/00	(486972, 5232512, 0.0)
23	1.26E-02	24,06/03/00	(486972, 5232512, 0.0)
24	1.25E-02	20,27/03/00	(486972, 5232512, 0.0)
25	1.25E-02	19,10/05/00	(486972, 5232512, 0.0)
26	1.17E-02	24,09/04/00	(486972, 5233316, 0.0)
27	1.16E-02	20,02/05/00	(486972, 5233316, 0.0)
28	1.16E-02	19,05/05/00	(486972, 5233316, 0.0)
29	1.15E-02	20,27/07/00	(486972, 5233316, 0.0)
30	1.13E-02	23,27/01/00	(484717, 5234924, 0.0)
31	1.12E-02	05,23/09/00	(484717, 5234924, 0.0)
32	1.09E-02	20,13/04/00	(486972, 5234120, 0.0)
33	1.09E-02	18,02/05/00	(486972, 5234120, 0.0)
34	1.08E-02	21,08/06/00	(486972, 5234120, 0.0)
35	1.08E-02	22,16/02/00	(486328, 5232914, 0.0)
36	1.07E-02	21,16/02/00	(486328, 5232914, 0.0)
37	1.05E-02	21,02/05/00	(483750, 5234321, 0.0)
38	9.74E-03	01,09/11/00	(483428, 5233718, 0.0)
39	9.65E-03	23,20/02/00	(486328, 5232110, 0.0)
40	9.56E-03	21,17/06/00	(486328, 5232110, 0.0)
41	9.56E-03	19,29/08/00	(486328, 5232110, 0.0)
42	9.55E-03	20,29/08/00	(486328, 5232110, 0.0)
43	9.46E-03	05,05/07/00	(484072, 5234321, 0.0)
44	9.44E-03	07,17/07/00	(484072, 5234321, 0.0)
45	8.76E-03	07,19/06/00	(487617, 5229899, 0.0)
46	8.74E-03	23,07/07/00	(487617, 5229899, 0.0)
47	8.74E-03	24,07/07/00	(487617, 5229899, 0.0)
48	8.62E-03	21,24/02/00	(486650, 5233517, 0.0)

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49	8.60E-03	22,01/01/00	(486650, 5233517,	0.0)
50	8.59E-03	22,23/10/00	(486650, 5233517,	0.0)
51	8.53E-03	19,25/05/00	(486650, 5233517,	0.0)
52	8.50E-03	21,05/07/00	(486650, 5233517,	0.0)
53	8.49E-03	22,05/07/00	(486650, 5233517,	0.0)
54	8.44E-03	24,15/06/00	(487294, 5228894,	0.0)
55	8.44E-03	06,11/06/00	(486005, 5232512,	0.0)
56	8.43E-03	04,04/06/00	(486005, 5232512,	0.0)
57	8.42E-03	18,07/07/00	(486005, 5232512,	0.0)
58	8.42E-03	19,07/07/00	(486005, 5232512,	0.0)
59	8.42E-03	20,07/07/00	(486005, 5232512,	0.0)
60	8.42E-03	23,15/07/00	(486005, 5232512,	0.0)
61	8.40E-03	19,03/07/00	(487294, 5228894,	0.0)
62	8.37E-03	23,09/04/00	(486650, 5232311,	0.0)
63	8.35E-03	03,04/07/00	(486650, 5232311,	0.0)
64	8.32E-03	24,25/02/00	(484072, 5234924,	0.0)
65	8.31E-03	18,06/05/00	(486650, 5232311,	0.0)
66	8.31E-03	23,22/06/00	(486650, 5232311,	0.0)
67	7.92E-03	22,10/03/00	(486328, 5232914,	0.0)
68	7.87E-03	19,26/09/00	(486328, 5232914,	0.0)
69	7.86E-03	20,02/04/00	(486328, 5232914,	0.0)
70	7.84E-03	20,22/06/00	(486328, 5232914,	0.0)
71	7.84E-03	22,03/08/00	(486328, 5232914,	0.0)
72	7.79E-03	08,28/07/00	(483750, 5234120,	0.0)
73	7.65E-03	21,27/07/00	(486328, 5232713,	0.0)
74	7.55E-03	05,05/08/00	(483750, 5229899,	0.0)
75	7.52E-03	02,08/07/00	(483750, 5229899,	0.0)
76	7.51E-03	21,09/11/00	(485361, 5235125,	0.0)
77	7.50E-03	21,20/02/00	(485361, 5235125,	0.0)
78	7.34E-03	17,17/12/00	(484717, 5233919,	0.0)
79	7.32E-03	06,23/09/00	(484072, 5234522,	0.0)
80	7.25E-03	12,09/04/00	(484717, 5233919,	0.0)
81	7.21E-03	07,23/09/00	(484072, 5234522,	0.0)
82	7.20E-03	07,30/06/00	(484072, 5234321,	0.0)
83	7.20E-03	23,04/11/00	(483750, 5233919,	0.0)
84	7.19E-03	22,19/10/00	(484717, 5234522,	0.0)
85	7.16E-03	20,25/05/00	(484072, 5234321,	0.0)
86	7.15E-03	23,25/02/00	(483428, 5234723,	0.0)
87	7.14E-03	02,22/12/00	(486328, 5232110,	0.0)
88	7.14E-03	18,02/07/00	(483428, 5234723,	0.0)
89	7.13E-03	19,15/07/00	(483428, 5234723,	0.0)
90	7.10E-03	03,08/04/00	(486328, 5232110,	0.0)
91	7.09E-03	22,10/01/00	(486328, 5232110,	0.0)
92	7.08E-03	23,17/02/00	(486328, 5232110,	0.0)
93	7.06E-03	23,06/12/00	(486328, 5232110,	0.0)
94	7.05E-03	21,17/02/00	(486328, 5232110,	0.0)
95	7.05E-03	05,17/07/00	(486328, 5232110,	0.0)
96	7.05E-03	03,30/08/00	(486328, 5232110,	0.0)
97	7.04E-03	01,25/04/00	(486328, 5232110,	0.0)
98	7.04E-03	21,03/05/00	(486328, 5232110,	0.0)
99	7.04E-03	03,07/07/00	(486328, 5232110,	0.0)
100	7.02E-03	20,12/04/00	(486328, 5232110,	0.0)

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1      +-----+
      | ITPY Cadmium - Power Station & 2 heat plants |
      +-----+

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Concentration or deposition          Concentration
Emission rate units                 kg/year
Concentration units                 micrograms/m3
Units conversion factor             3.17E+01
Background concentration            0.00E+00
Terrain effects                     Egan method
Smooth stability class changes?     No
Other stability class adjustments ("urban modes") None
Ignore building wake effects?       No
Decay coefficient (unless overridden by met. file) 0.000
Anemometer height                   10 m

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DISPERSION CURVES

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Horizontal dispersion curves for sources <100m high Pasquill-Gifford
Vertical dispersion curves for sources <100m high Pasquill-Gifford
Horizontal dispersion curves for sources >100m high Briggs Rural
Vertical dispersion curves for sources >100m high Briggs Rural
Enhance horizontal plume spreads for buoyancy? Yes
Enhance vertical plume spreads for buoyancy? Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust vertical P-G formulae for roughness height? Yes
Roughness height                    0.800m
Adjustment for wind directional shear None

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PLUME RISE OPTIONS

```

Gradual plume rise?                 Yes
Stack-tip downwash included?         Yes
Building downwash algorithm:         Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions? No
Disregard temp. gradients in the hourly met. file? No

```

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIME: 3 minutes.

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1      +-----+
      | ITPY Cadmium - Power Station & 2 heat plants |
      | SOURCE CHARACTERISTICS |
      +-----+

```

THE WOOD CENTRE DEVELOPMENT - SOUTHWOOD RESOURCES, HUON
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STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	100m	40m	2.60m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 7.70E-01 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 1.16E-01 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

(Constant) emission rate = 1.16E-01 kg/year
No gravitational settling or scavenging.

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SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
 AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 3.45E-05 @Hr20,02/05/00 2: 9.96E-06 @Hr12,29/10/00

1 Peak values for the 100 worst cases (in micrograms/m3)
 Averaging time = 3 minutes

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	1.31E-03	06,02/07/00	(484072, 5234321, 0.0)
2	9.17E-04	24,06/02/00	(486650, 5232914, 0.0)
3	9.15E-04	24,27/02/00	(486650, 5232914, 0.0)
4	9.08E-04	21,31/10/00	(486650, 5232914, 0.0)
5	9.07E-04	22,09/04/00	(486650, 5232914, 0.0)
6	8.82E-04	21,18/11/00	(484072, 5234924, 0.0)
7	8.76E-04	20,03/05/00	(486328, 5232110, 0.0)
8	8.70E-04	19,13/04/00	(486650, 5233517, 0.0)
9	8.69E-04	21,20/10/00	(486650, 5233517, 0.0)
10	8.65E-04	03,05/07/00	(486328, 5232110, 0.0)
11	8.65E-04	24,25/09/00	(486328, 5232110, 0.0)
12	8.64E-04	23,28/07/00	(486650, 5233517, 0.0)
13	8.63E-04	21,06/09/00	(486650, 5233517, 0.0)
14	8.62E-04	18,15/07/00	(486650, 5233517, 0.0)
15	8.62E-04	22,06/09/00	(486650, 5233517, 0.0)
16	8.51E-04	22,13/04/00	(486650, 5232311, 0.0)
17	8.51E-04	20,11/06/00	(486328, 5232110, 0.0)
18	8.51E-04	18,19/06/00	(486328, 5232110, 0.0)
19	8.41E-04	18,27/07/00	(486650, 5232311, 0.0)
20	8.28E-04	07,13/06/00	(483428, 5234723, 0.0)
21	7.61E-04	01,10/03/00	(486972, 5232512, 0.0)
22	7.60E-04	23,31/10/00	(486972, 5232512, 0.0)
23	7.58E-04	24,06/03/00	(486972, 5232512, 0.0)
24	7.54E-04	20,27/03/00	(486972, 5232512, 0.0)
25	7.51E-04	19,10/05/00	(486972, 5232512, 0.0)
26	7.04E-04	24,09/04/00	(486972, 5233316, 0.0)
27	6.98E-04	20,02/05/00	(486972, 5233316, 0.0)
28	6.98E-04	19,05/05/00	(486972, 5233316, 0.0)
29	6.95E-04	20,27/07/00	(486972, 5233316, 0.0)
30	6.82E-04	23,27/01/00	(484717, 5234924, 0.0)
31	6.76E-04	05,23/09/00	(484717, 5234924, 0.0)
32	6.57E-04	20,13/04/00	(486972, 5234120, 0.0)
33	6.54E-04	18,02/05/00	(486972, 5234120, 0.0)
34	6.53E-04	21,08/06/00	(486972, 5234120, 0.0)
35	6.49E-04	22,16/02/00	(486328, 5232914, 0.0)
36	6.46E-04	21,16/02/00	(486328, 5232914, 0.0)
37	6.34E-04	21,02/05/00	(483750, 5234321, 0.0)
38	5.89E-04	01,09/11/00	(483428, 5233718, 0.0)
39	5.81E-04	23,20/02/00	(486328, 5232110, 0.0)
40	5.75E-04	21,17/06/00	(486328, 5232110, 0.0)
41	5.75E-04	19,29/08/00	(486328, 5232110, 0.0)
42	5.75E-04	20,29/08/00	(486328, 5232110, 0.0)
43	5.72E-04	05,05/07/00	(484072, 5234321, 0.0)
44	5.70E-04	07,17/07/00	(484072, 5234321, 0.0)
45	5.28E-04	07,19/06/00	(487617, 5229899, 0.0)
46	5.27E-04	23,07/07/00	(487617, 5229899, 0.0)
47	5.27E-04	24,07/07/00	(487617, 5229899, 0.0)
48	5.19E-04	21,24/02/00	(486650, 5233517, 0.0)
49	5.18E-04	22,01/01/00	(486650, 5233517, 0.0)
50	5.17E-04	22,23/10/00	(486650, 5233517, 0.0)
51	5.13E-04	19,25/05/00	(486650, 5233517, 0.0)
52	5.12E-04	21,05/07/00	(486650, 5233517, 0.0)
53	5.11E-04	22,05/07/00	(486650, 5233517, 0.0)
54	5.10E-04	06,11/06/00	(486005, 5232512, 0.0)

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55	5.09E-04	04,04/06/00	(486005, 5232512,	0.0)
56	5.09E-04	18,07/07/00	(486005, 5232512,	0.0)
57	5.09E-04	19,07/07/00	(486005, 5232512,	0.0)
58	5.09E-04	20,07/07/00	(486005, 5232512,	0.0)
59	5.09E-04	24,15/06/00	(487294, 5228894,	0.0)
60	5.08E-04	23,15/07/00	(486005, 5232512,	0.0)
61	5.06E-04	19,03/07/00	(487294, 5228894,	0.0)
62	5.04E-04	23,09/04/00	(486650, 5232311,	0.0)
63	5.03E-04	03,04/07/00	(486650, 5232311,	0.0)
64	5.02E-04	24,25/02/00	(484072, 5234924,	0.0)
65	5.00E-04	18,06/05/00	(486650, 5232311,	0.0)
66	5.00E-04	23,22/06/00	(486650, 5232311,	0.0)
67	4.77E-04	22,10/03/00	(486328, 5232914,	0.0)
68	4.74E-04	19,26/09/00	(486328, 5232914,	0.0)
69	4.73E-04	20,02/04/00	(486328, 5232914,	0.0)
70	4.72E-04	20,22/06/00	(486328, 5232914,	0.0)
71	4.72E-04	22,03/08/00	(486328, 5232914,	0.0)
72	4.70E-04	08,28/07/00	(483750, 5234120,	0.0)
73	4.60E-04	21,27/07/00	(486328, 5232713,	0.0)
74	4.55E-04	05,05/08/00	(483750, 5229899,	0.0)
75	4.54E-04	21,09/11/00	(485361, 5235125,	0.0)
76	4.53E-04	21,20/02/00	(485361, 5235125,	0.0)
77	4.53E-04	02,08/07/00	(483750, 5229899,	0.0)
78	4.43E-04	17,17/12/00	(484717, 5233919,	0.0)
79	4.43E-04	06,23/09/00	(484072, 5234522,	0.0)
80	4.38E-04	12,09/04/00	(484717, 5233919,	0.0)
81	4.36E-04	07,23/09/00	(484072, 5234522,	0.0)
82	4.35E-04	07,30/06/00	(484072, 5234321,	0.0)
83	4.35E-04	23,04/11/00	(483750, 5233919,	0.0)
84	4.35E-04	22,19/10/00	(484717, 5234522,	0.0)
85	4.33E-04	20,25/05/00	(484072, 5234321,	0.0)
86	4.32E-04	23,25/02/00	(483428, 5234723,	0.0)
87	4.31E-04	18,02/07/00	(483428, 5234723,	0.0)
88	4.31E-04	19,15/07/00	(483428, 5234723,	0.0)
89	4.30E-04	02,22/12/00	(486328, 5232110,	0.0)
90	4.27E-04	03,08/04/00	(486328, 5232110,	0.0)
91	4.27E-04	22,10/01/00	(486328, 5232110,	0.0)
92	4.26E-04	23,17/02/00	(486328, 5232110,	0.0)
93	4.25E-04	23,06/12/00	(486328, 5232110,	0.0)
94	4.24E-04	21,17/02/00	(486328, 5232110,	0.0)
95	4.24E-04	05,17/07/00	(486328, 5232110,	0.0)
96	4.24E-04	03,30/08/00	(486328, 5232110,	0.0)
97	4.24E-04	17,28/09/00	(484717, 5233316,	0.0)
98	4.24E-04	01,25/04/00	(486328, 5232110,	0.0)
99	4.24E-04	21,03/05/00	(486328, 5232110,	0.0)
100	4.24E-04	03,07/07/00	(486328, 5232110,	0.0)

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1      +-----+
      | ITPY Lead - Power Station & 2 heat plants |
      +-----+

Concentration or deposition          Concentration
Emission rate units                 kg/year
Concentration units                 micrograms/m3
Units conversion factor             3.17E+01
Background concentration            0.00E+00
Terrain effects                     Egan method
Smooth stability class changes?     No
Other stability class adjustments ("urban modes") None
Ignore building wake effects?      No
Decay coefficient (unless overridden by met. file) 0.000
Anemometer height                   10 m

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DISPERSION CURVES

```

Horizontal dispersion curves for sources <100m high Pasquill-Gifford
Vertical dispersion curves for sources <100m high Pasquill-Gifford
Horizontal dispersion curves for sources >100m high Briggs Rural
Vertical dispersion curves for sources >100m high Briggs Rural
Enhance horizontal plume spreads for buoyancy? Yes
Enhance vertical plume spreads for buoyancy? Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust vertical P-G formulae for roughness height? Yes
Roughness height                    0.800m
Adjustment for wind directional shear None

```

PLUME RISE OPTIONS

```

Gradual plume rise?                 Yes
Stack-tip downwash included?        Yes
Building downwash algorithm:        Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions? No
Disregard temp. gradients in the hourly met. file? No

```

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIME: 3 minutes.

```

1      +-----+
      | ITPY Lead - Power Station & 2 heat plants |
      | SOURCE CHARACTERISTICS |
      +-----+

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THE WOOD CENTRE DEVELOPMENT - SOUTHWOOD RESOURCES, HUON
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STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484950	5232900	100m	40m	2.60m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 2.32E+02 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	60m	35m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 3.48E+01 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed
484510	5233800	90m	30m	0.25m	130C	18.0m/s

----- Effective building dimensions (in metres) -----

Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0

(Constant) emission rate = 3.48E+01 kg/year
No gravitational settling or scavenging.

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SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
AVERAGING TIME = 1 HOUR

At the discrete receptors:

1: 1.03E-02 @Hr20,02/05/00 2: 2.99E-03 @Hr12,29/10/00
=====

1 Peak values for the 100 worst cases (in micrograms/m3)
 Averaging time = 3 minutes

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	3.94E-01	06,02/07/00	(484072, 5234321, 0.0)
2	2.76E-01	24,06/02/00	(486650, 5232914, 0.0)
3	2.76E-01	24,27/02/00	(486650, 5232914, 0.0)
4	2.73E-01	21,31/10/00	(486650, 5232914, 0.0)
5	2.73E-01	22,09/04/00	(486650, 5232914, 0.0)
6	2.64E-01	21,18/11/00	(484072, 5234924, 0.0)
7	2.64E-01	20,03/05/00	(486328, 5232110, 0.0)
8	2.62E-01	19,13/04/00	(486650, 5233517, 0.0)
9	2.62E-01	21,20/10/00	(486650, 5233517, 0.0)
10	2.61E-01	03,05/07/00	(486328, 5232110, 0.0)
11	2.61E-01	24,25/09/00	(486328, 5232110, 0.0)
12	2.60E-01	23,28/07/00	(486650, 5233517, 0.0)
13	2.60E-01	21,06/09/00	(486650, 5233517, 0.0)
14	2.60E-01	18,15/07/00	(486650, 5233517, 0.0)
15	2.60E-01	22,06/09/00	(486650, 5233517, 0.0)
16	2.56E-01	22,13/04/00	(486650, 5232311, 0.0)
17	2.56E-01	20,11/06/00	(486328, 5232110, 0.0)
18	2.56E-01	18,19/06/00	(486328, 5232110, 0.0)
19	2.53E-01	18,27/07/00	(486650, 5232311, 0.0)
20	2.48E-01	07,13/06/00	(483428, 5234723, 0.0)
21	2.29E-01	01,10/03/00	(486972, 5232512, 0.0)
22	2.29E-01	23,31/10/00	(486972, 5232512, 0.0)
23	2.28E-01	24,06/03/00	(486972, 5232512, 0.0)
24	2.27E-01	20,27/03/00	(486972, 5232512, 0.0)
25	2.26E-01	19,10/05/00	(486972, 5232512, 0.0)
26	2.12E-01	24,09/04/00	(486972, 5233316, 0.0)
27	2.10E-01	20,02/05/00	(486972, 5233316, 0.0)
28	2.10E-01	19,05/05/00	(486972, 5233316, 0.0)
29	2.09E-01	20,27/07/00	(486972, 5233316, 0.0)
30	2.04E-01	23,27/01/00	(484717, 5234924, 0.0)
31	2.03E-01	05,23/09/00	(484717, 5234924, 0.0)
32	1.98E-01	20,13/04/00	(486972, 5234120, 0.0)
33	1.97E-01	18,02/05/00	(486972, 5234120, 0.0)
34	1.97E-01	21,08/06/00	(486972, 5234120, 0.0)
35	1.95E-01	22,16/02/00	(486328, 5232914, 0.0)
36	1.95E-01	21,16/02/00	(486328, 5232914, 0.0)
37	1.90E-01	21,02/05/00	(483750, 5234321, 0.0)
38	1.76E-01	01,09/11/00	(483428, 5233718, 0.0)
39	1.75E-01	23,20/02/00	(486328, 5232110, 0.0)
40	1.73E-01	21,17/06/00	(486328, 5232110, 0.0)
41	1.73E-01	19,29/08/00	(486328, 5232110, 0.0)
42	1.73E-01	20,29/08/00	(486328, 5232110, 0.0)
43	1.71E-01	05,05/07/00	(484072, 5234321, 0.0)
44	1.71E-01	07,17/07/00	(484072, 5234321, 0.0)
45	1.59E-01	07,19/06/00	(487617, 5229899, 0.0)
46	1.58E-01	23,07/07/00	(487617, 5229899, 0.0)
47	1.58E-01	24,07/07/00	(487617, 5229899, 0.0)
48	1.56E-01	21,24/02/00	(486650, 5233517, 0.0)
49	1.56E-01	22,01/01/00	(486650, 5233517, 0.0)
50	1.56E-01	22,23/10/00	(486650, 5233517, 0.0)
51	1.55E-01	19,25/05/00	(486650, 5233517, 0.0)

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52	1.54E-01	21,05/07/00	(486650, 5233517,	0.0)
53	1.54E-01	22,05/07/00	(486650, 5233517,	0.0)
54	1.53E-01	24,15/06/00	(487294, 5228894,	0.0)
55	1.53E-01	06,11/06/00	(486005, 5232512,	0.0)
56	1.53E-01	04,04/06/00	(486005, 5232512,	0.0)
57	1.53E-01	18,07/07/00	(486005, 5232512,	0.0)
58	1.53E-01	19,07/07/00	(486005, 5232512,	0.0)
59	1.53E-01	20,07/07/00	(486005, 5232512,	0.0)
60	1.52E-01	23,15/07/00	(486005, 5232512,	0.0)
61	1.52E-01	19,03/07/00	(487294, 5228894,	0.0)
62	1.52E-01	23,09/04/00	(486650, 5232311,	0.0)
63	1.51E-01	03,04/07/00	(486650, 5232311,	0.0)
64	1.51E-01	24,25/02/00	(484072, 5234924,	0.0)
65	1.51E-01	18,06/05/00	(486650, 5232311,	0.0)
66	1.51E-01	23,22/06/00	(486650, 5232311,	0.0)
67	1.44E-01	22,10/03/00	(486328, 5232914,	0.0)
68	1.43E-01	19,26/09/00	(486328, 5232914,	0.0)
69	1.43E-01	20,02/04/00	(486328, 5232914,	0.0)
70	1.42E-01	20,22/06/00	(486328, 5232914,	0.0)
71	1.42E-01	22,03/08/00	(486328, 5232914,	0.0)
72	1.41E-01	08,28/07/00	(483750, 5234120,	0.0)
73	1.39E-01	21,27/07/00	(486328, 5232713,	0.0)
74	1.37E-01	05,05/08/00	(483750, 5229899,	0.0)
75	1.36E-01	02,08/07/00	(483750, 5229899,	0.0)
76	1.36E-01	21,09/11/00	(485361, 5235125,	0.0)
77	1.36E-01	21,20/02/00	(485361, 5235125,	0.0)
78	1.33E-01	17,17/12/00	(484717, 5233919,	0.0)
79	1.33E-01	06,23/09/00	(484072, 5234522,	0.0)
80	1.31E-01	12,09/04/00	(484717, 5233919,	0.0)
81	1.31E-01	07,23/09/00	(484072, 5234522,	0.0)
82	1.30E-01	07,30/06/00	(484072, 5234321,	0.0)
83	1.30E-01	23,04/11/00	(483750, 5233919,	0.0)
84	1.30E-01	22,19/10/00	(484717, 5234522,	0.0)
85	1.30E-01	20,25/05/00	(484072, 5234321,	0.0)
86	1.30E-01	23,25/02/00	(483428, 5234723,	0.0)
87	1.29E-01	02,22/12/00	(486328, 5232110,	0.0)
88	1.29E-01	18,02/07/00	(483428, 5234723,	0.0)
89	1.29E-01	19,15/07/00	(483428, 5234723,	0.0)
90	1.29E-01	03,08/04/00	(486328, 5232110,	0.0)
91	1.29E-01	22,10/01/00	(486328, 5232110,	0.0)
92	1.28E-01	23,17/02/00	(486328, 5232110,	0.0)
93	1.28E-01	23,06/12/00	(486328, 5232110,	0.0)
94	1.28E-01	21,17/02/00	(486328, 5232110,	0.0)
95	1.28E-01	05,17/07/00	(486328, 5232110,	0.0)
96	1.28E-01	03,30/08/00	(486328, 5232110,	0.0)
97	1.28E-01	01,25/04/00	(486328, 5232110,	0.0)
98	1.28E-01	21,03/05/00	(486328, 5232110,	0.0)
99	1.28E-01	03,07/07/00	(486328, 5232110,	0.0)
100	1.27E-01	20,12/04/00	(486328, 5232110,	0.0)

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SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
AVERAGING TIME = 1 HOUR

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1      +-----+
      | ITPY Dioxins & Furans TEQ - Power Station & 2 heat plants |
      +-----+

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Concentration or deposition          Concentration
Emission rate units                 kg/year
Concentration units                  micrograms/m3
Units conversion factor              3.17E+01
Background concentration             0.00E+00
Terrain effects                      Egan method
Smooth stability class changes?     No
Other stability class adjustments ("urban modes") None
Ignore building wake effects?      No
Decay coefficient (unless overridden by met. file) 0.000
Anemometer height                   10 m
Averaging time for sigma-theta values 60 min.
Roughness height at the wind vane site 0.300 m

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DISPERSION CURVES

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Horizontal dispersion curves for sources <100m high Sigma-theta
Vertical dispersion curves for sources <100m high Pasquill-Gifford
Horizontal dispersion curves for sources >100m high Briggs Rural
Vertical dispersion curves for sources >100m high Briggs Rural
Enhance horizontal plume spreads for buoyancy? Yes
Enhance vertical plume spreads for buoyancy? Yes
Adjust horizontal P-G formulae for roughness height? Yes
Adjust vertical P-G formulae for roughness height? Yes
Roughness height                    0.800m
Adjustment for wind directional shear None

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PLUME RISE OPTIONS

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Gradual plume rise?                 Yes
Stack-tip downwash included?        Yes
Building downwash algorithm:        Schulman-Scire method.
Entrainment coeff. for neutral & stable lapse rates 0.60,0.60
Partial penetration of elevated inversions? No
Disregard temp. gradients in the hourly met. file? No

```

and in the absence of boundary-layer potential temperature gradients given by the hourly met. file, a value from the following table (in K/m) is used:

Wind Speed Category	Stability Class					
	A	B	C	D	E	F
1	0.000	0.000	0.000	0.000	0.020	0.035
2	0.000	0.000	0.000	0.000	0.020	0.035
3	0.000	0.000	0.000	0.000	0.020	0.035
4	0.000	0.000	0.000	0.000	0.020	0.035
5	0.000	0.000	0.000	0.000	0.020	0.035
6	0.000	0.000	0.000	0.000	0.020	0.035

WIND SPEED CATEGORIES

Boundaries between categories (in m/s) are: 1.54, 3.09, 5.14, 8.23, 10.80

WIND PROFILE EXPONENTS: "Irwin Rural" values (unless overridden by met. file)

AVERAGING TIMES

1 hour

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1      +-----+

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ITPY Dioxins & Furans TEQ - Power Station & 2 heat plants

SOURCE CHARACTERISTICS

STACK SOURCE: Stack1

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed						
484950	5232900	100m	40m	2.60m	130C	18.0m/s						
----- Effective building dimensions (in metres) -----												
Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	8	8	8	8	9	7	7	5	4	4	4	4
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	3	3	4	5	5	5	8	8	8	8	9	10
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	10	42	55	60	120	120	100	120	105	97	105	0
Effective height	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0

(Constant) emission rate = 6.00E-04 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack2

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed						
484510	5233800	60m	35m	0.25m	130C	18.0m/s						
----- Effective building dimensions (in metres) -----												
Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	120	120	120	120	120	120	120	120	120	120	120	120
Effective height	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

(Constant) emission rate = 9.00E-05 kg/year
No gravitational settling or scavenging.

STACK SOURCE: Stack3

X(m)	Y(m)	Ground Elev.	Stack Height	Diameter	Temperature	Speed						
484510	5233800	90m	30m	0.25m	130C	18.0m/s						
----- Effective building dimensions (in metres) -----												
Flow direction	10;	20;	30;	40;	50;	60;	70;	80;	90;	100;	110;	120;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flow direction	130;	140;	150;	160;	170;	180;	190;	200;	210;	220;	230;	240;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180
Effective height	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Flow direction	250;	260;	270;	280;	290;	300;	310;	320;	330;	340;	350;	360;
Effective width	180	180	180	180	180	180	180	180	180	180	180	180

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Effective height 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0

(Constant) emission rate = 9.00E-05 kg/year
 No gravitational settling or scavenging.

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1  +-----+
    | ITPY Dioxins & Furans TEQ - Power Station & 2 heat plants |
    |                                     RECEPTOR LOCATIONS |
    +-----+
    
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The Cartesian receptor grid has the following x-values (or eastings):

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475050.m 475372.m 475694.m 476017.m 476339.m 476661.m 476983.m
477306.m 477628.m 477950.m 478272.m 478594.m 478917.m 479239.m
479561.m 479883.m 480206.m 480528.m 480850.m 481172.m 481494.m
481817.m 482139.m 482461.m 482783.m 483106.m 483428.m 483750.m
484072.m 484394.m 484717.m 485039.m 485361.m 485683.m 486005.m
486328.m 486650.m 486972.m 487294.m 487617.m 487939.m 488261.m
488583.m 488905.m 489228.m 489550.m 489872.m 490194.m 490517.m
490839.m 491161.m 491483.m 491805.m 492128.m 492450.m 492772.m
493094.m 493417.m 493739.m 494061.m 494383.m 494705.m 495028.m
495350.m 495672.m 495994.m 496316.m 496639.m 496961.m 497283.m
497605.m 497928.m 498250.m 498572.m 498894.m 499216.m 499539.m
499861.m 500183.m 500505.m 500828.m 501150.m 501472.m 501794.m
502116.m 502439.m 502761.m 503083.m 503405.m 503728.m 504050.m
504372.m 504694.m 505016.m 505339.m 505661.m 505983.m 506305.m
506627.m 506950.m
    
```

and these y-values (or northings):

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5220050.m 5220251.m 5220452.m 5220653.m 5220854.m 5221055.m 5221256.m
5221457.m 5221658.m 5221859.m 5222060.m 5222261.m 5222462.m 5222663.m
5222864.m 5223065.m 5223266.m 5223467.m 5223668.m 5223869.m 5224070.m
5224271.m 5224472.m 5224673.m 5224874.m 5225075.m 5225276.m 5225477.m
5225678.m 5225879.m 5226080.m 5226281.m 5226482.m 5226683.m 5226884.m
5227085.m 5227286.m 5227487.m 5227688.m 5227889.m 5228090.m 5228291.m
5228492.m 5228693.m 5228894.m 5229095.m 5229296.m 5229497.m 5229698.m
5229899.m 5230100.m 5230301.m 5230502.m 5230703.m 5230904.m 5231105.m
5231306.m 5231507.m 5231708.m 5231909.m 5232110.m 5232311.m 5232512.m
5232713.m 5232914.m 5233115.m 5233316.m 5233517.m 5233718.m 5233919.m
5234120.m 5234321.m 5234522.m 5234723.m 5234924.m 5235125.m 5235326.m
5235527.m 5235728.m 5235929.m 5236130.m 5236331.m 5236532.m 5236733.m
5236934.m 5237135.m 5237336.m 5237537.m 5237738.m 5237939.m 5238140.m
5238341.m 5238542.m 5238743.m 5238944.m 5239145.m 5239346.m 5239547.m
5239748.m 5239949.m
    
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DISCRETE RECEPTOR LOCATIONS (in metres)

No.	X	Y	ELEVN	HEIGHT	No.	X	Y	ELEVN	HEIGHT
1	496750	5236100	55.0	0.0	2	503900	5235600	10.0	0.0
2	503900	5235600	10.0	0.0					

SECOND-HIGHEST RECORDINGS FOR EACH RECEPTOR (in micrograms/m3)
 AVERAGING TIME = 1 HOUR

1: 1.64E-08 @Hr20,02/05/00 2: 6.04E-09 @Hr24,09/04/00

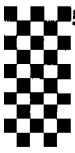
THE WOOD CENTRE DEVELOPMENT - SOUTHWOOD RESOURCES, HUON
Southwood Power Station and Heat Plants — Air Quality Modelling
Forestry Tasmania

1 Peak values for the 100 worst cases (in micrograms/m3)
Averaging time = 1 hour

Rank	Value	Time Recorded hour,date	Coordinates (* denotes polar)
1	5.68E-07	06,02/07/00	(484072, 5234321, 0.0)
2	4.37E-07	21,02/05/00	(483750, 5234321, 0.0)
3	4.20E-07	07,13/06/00	(483750, 5234522, 0.0)
4	4.10E-07	20,03/05/00	(486328, 5232110, 0.0)
5	4.07E-07	24,06/02/00	(486650, 5232914, 0.0)
6	4.06E-07	24,27/02/00	(486650, 5232914, 0.0)
7	4.05E-07	03,05/07/00	(486328, 5232110, 0.0)
8	4.05E-07	24,25/09/00	(486328, 5232110, 0.0)
9	4.03E-07	21,31/10/00	(486650, 5232914, 0.0)
10	4.03E-07	22,09/04/00	(486650, 5232914, 0.0)
11	4.03E-07	01,09/11/00	(483428, 5233718, 0.0)
12	3.99E-07	20,11/06/00	(486328, 5232110, 0.0)
13	3.99E-07	18,19/06/00	(486328, 5232110, 0.0)
14	3.97E-07	21,18/11/00	(484072, 5234924, 0.0)
15	3.92E-07	22,13/04/00	(486650, 5232311, 0.0)
16	3.87E-07	18,27/07/00	(486650, 5232311, 0.0)
17	3.83E-07	19,13/04/00	(486650, 5233517, 0.0)
18	3.83E-07	21,20/10/00	(486650, 5233517, 0.0)
19	3.81E-07	23,28/07/00	(486650, 5233517, 0.0)
20	3.80E-07	21,06/09/00	(486650, 5233517, 0.0)
21	3.80E-07	18,15/07/00	(486650, 5233517, 0.0)
22	3.80E-07	22,06/09/00	(486650, 5233517, 0.0)
23	3.69E-07	24,09/04/00	(486650, 5233115, 0.0)
24	3.66E-07	20,02/05/00	(486650, 5233115, 0.0)
25	3.66E-07	19,05/05/00	(486650, 5233115, 0.0)
26	3.64E-07	20,27/07/00	(486650, 5233115, 0.0)
27	3.63E-07	01,10/03/00	(486650, 5232512, 0.0)
28	3.62E-07	23,31/10/00	(486650, 5232512, 0.0)
29	3.61E-07	24,06/03/00	(486650, 5232512, 0.0)
30	3.60E-07	20,27/03/00	(486650, 5232512, 0.0)
31	3.58E-07	19,10/05/00	(486650, 5232512, 0.0)
32	2.97E-07	20,13/04/00	(486650, 5233718, 0.0)
33	2.96E-07	18,02/05/00	(486650, 5233718, 0.0)
34	2.96E-07	21,08/06/00	(486650, 5233718, 0.0)
35	2.95E-07	23,27/01/00	(484717, 5234522, 0.0)
36	2.92E-07	05,23/09/00	(484717, 5234522, 0.0)
37	2.89E-07	06,11/06/00	(486650, 5231708, 0.0)
38	2.88E-07	22,16/02/00	(486328, 5232914, 0.0)
39	2.87E-07	21,16/02/00	(486328, 5232914, 0.0)
40	2.87E-07	04,04/06/00	(486650, 5231708, 0.0)
41	2.86E-07	18,07/07/00	(486650, 5231708, 0.0)
42	2.86E-07	19,07/07/00	(486650, 5231708, 0.0)
43	2.86E-07	20,07/07/00	(486650, 5231708, 0.0)
44	2.85E-07	23,15/07/00	(486650, 5231708, 0.0)
45	2.70E-07	23,16/02/00	(486650, 5234120, 0.0)
46	2.67E-07	19,27/06/00	(486650, 5234120, 0.0)
47	2.66E-07	20,27/06/00	(486650, 5234120, 0.0)
48	2.66E-07	20,15/07/00	(486650, 5234120, 0.0)
49	2.65E-07	19,03/04/00	(486650, 5234120, 0.0)
50	2.65E-07	23,20/02/00	(486328, 5232110, 0.0)
51	2.63E-07	21,17/06/00	(486328, 5232110, 0.0)
52	2.63E-07	19,29/08/00	(486328, 5232110, 0.0)
53	2.63E-07	20,29/08/00	(486328, 5232110, 0.0)
54	2.53E-07	07,19/06/00	(485683, 5232512, 0.0)
55	2.53E-07	23,07/07/00	(485683, 5232512, 0.0)
56	2.53E-07	24,07/07/00	(485683, 5232512, 0.0)
57	2.50E-07	06,13/06/00	(483750, 5234321, 0.0)
58	2.48E-07	05,05/07/00	(484072, 5234321, 0.0)
59	2.47E-07	07,17/07/00	(484072, 5234321, 0.0)
60	2.46E-07	05,05/08/00	(483750, 5230100, 0.0)
61	2.46E-07	03,10/05/00	(483428, 5233517, 0.0)
62	2.45E-07	02,08/07/00	(483750, 5230100, 0.0)

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63	2.44E-07	21,09/11/00	(485039, 5234924,	0.0)
64	2.44E-07	21,20/02/00	(485039, 5234924,	0.0)
65	2.40E-07	23,09/04/00	(486328, 5232311,	0.0)
66	2.40E-07	03,04/07/00	(486328, 5232311,	0.0)
67	2.39E-07	18,06/05/00	(486328, 5232311,	0.0)
68	2.39E-07	23,22/06/00	(486328, 5232311,	0.0)
69	2.36E-07	23,25/02/00	(483750, 5234522,	0.0)
70	2.34E-07	18,02/07/00	(483750, 5234522,	0.0)
71	2.34E-07	19,15/07/00	(483750, 5234522,	0.0)
72	2.29E-07	21,27/07/00	(486328, 5232713,	0.0)
73	2.28E-07	24,25/02/00	(484072, 5234924,	0.0)
74	2.26E-07	21,24/02/00	(486650, 5233517,	0.0)
75	2.26E-07	22,01/01/00	(486650, 5233517,	0.0)
76	2.26E-07	22,23/10/00	(486650, 5233517,	0.0)
77	2.24E-07	19,25/05/00	(486650, 5233517,	0.0)
78	2.23E-07	21,05/07/00	(486650, 5233517,	0.0)
79	2.23E-07	22,08/02/00	(484717, 5234522,	0.0)
80	2.23E-07	22,05/07/00	(486650, 5233517,	0.0)
81	2.22E-07	24,15/06/00	(487294, 5229095,	0.0)
82	2.22E-07	23,04/11/00	(483428, 5233919,	0.0)
83	2.21E-07	19,03/07/00	(487294, 5229095,	0.0)
84	2.19E-07	23,02/02/00	(486650, 5233115,	0.0)
85	2.16E-07	18,08/08/00	(486650, 5233115,	0.0)
86	2.11E-07	08,28/07/00	(483750, 5234120,	0.0)
87	2.10E-07	22,10/03/00	(486328, 5232914,	0.0)
88	2.09E-07	19,26/09/00	(486328, 5232914,	0.0)
89	2.09E-07	20,02/04/00	(486328, 5232914,	0.0)
90	2.09E-07	20,22/06/00	(486328, 5232914,	0.0)
91	2.08E-07	22,03/08/00	(486328, 5232914,	0.0)
92	2.04E-07	22,19/10/00	(484717, 5234522,	0.0)
93	2.02E-07	02,06/07/00	(486650, 5231708,	0.0)
94	2.01E-07	02,12/07/00	(486650, 5231708,	0.0)
95	2.01E-07	23,28/06/00	(486650, 5231708,	0.0)
96	2.01E-07	22,25/06/00	(486650, 5231708,	0.0)
97	2.01E-07	21,01/08/00	(486650, 5231708,	0.0)
98	2.01E-07	19,07/03/00	(483750, 5234321,	0.0)
99	2.00E-07	06,23/09/00	(484072, 5234321,	0.0)
100	2.00E-07	07,23/09/00	(484072, 5234321,	0.0)



COMMONWEALTH OF AUSTRALIA

ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

DECISION THAT ACTION IS NOT A CONTROLLED ACTION

Pursuant to section 75 of the *Environment Protection and Biodiversity Conservation Act 1999*, I ROBERT MURRAY HILL, Minister for the Environment and Heritage, decide that the proposed action, set out in the Schedule, is not a controlled action.

SCHEDULE

The proposed action by Forestry Tasmania to develop an integrated timber processing facility, as described in the referral received under the Act on 17 May 2001 (EPBC 2001/291), encompassing preparation of the site, construction and operation of a central log segregation area, a rotary peeled veneer plant, a regrowth sawmill, a wood fibre mill, and a wood fired power station.

Dated this 30th day of June 2001

.....
MINISTER FOR THE ENVIRONMENT AND HERITAGE

SW Report: 2001/1012
PRELIMINARY HYDRO-GEOLOGICAL ASSESSMENT,
SOUTHWOOD RESOURCES - HUON
Integrated Timber Processing Project

Client: Forestry Tasmania

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PRELIMINARY HYDRO-GEOLOGICAL ASSESSMENT: Southwood Resources - HUON

SUMMARY

The proposed Southwood Resources - Huon development site is located predominantly on a gently sloping terrace (up to 9°) that almost encircles a North-South trending ridge. The terrace materials comprise alluvial and glacio-fluvial deposits and the local basement rock is Permian age siltstone.

Surficially, the development site appears to be a potential re-charge area for groundwater. However, engineering logs indicate that there are natural materials in the soil profile that act as a barrier to infiltration. It is expected that most infiltration will move along the top of these barrier materials that may not be continuous. The groundwater table beneath the ridge is expected to be relatively flat and, because of the presence of the Huon River, it is unlikely to be highly elevated. The vulnerability of the groundwater to pollution through infiltration is assessed as low. The vulnerability of the Huon River to pollution from surface run-off is assessed as possible, but with properly designed sub-surface intercept drains, the risk can be reduced to a very low level.

Mineral Resources Tasmania have no records of waterbores in the general vicinity of the proposed development site.

It is recommended that the extent and characteristics of the materials in the vicinity of settling and/or leachate ponds be further investigated. A source of suitable earth embankment materials may need to be located.

It is envisaged that excess process water waste will be generated by the Southwood development and that waste water will be generated from an on site sewage effluent treatment plant. An area recently cleared for tree plantation to the west of the proposed development site appears to be a suitably convenient area for irrigation of waste water. The presence of moderate to highly permeable sandy topsoils that act as natural filters and the presence of weakly cemented sands and layers of silt that act as natural barriers to infiltration affords protection to any groundwater resource that may occur at depth beneath the proposed irrigation area.

It is recommended that a more detailed assessment of the soils in the proposed irrigation area be undertaken to evaluate soil permeability, chemical composition and ability to absorb nitrogen and other waste water constituents. Providing irrigation is matched to soil dryness and applied in a manner to prevent surface run-off, it is anticipated that the plantation vegetation would be capable of taking up any applied nutrients and that this will minimise the potential for any environmental effects on groundwater or runoff quality. The assessment should also include recommendations regarding the monitoring of surface run-off.

B.D. Weldon BSc(Hons)

[2 August 2001]

1. INTRODUCTION

Mr Dario Tomat of Forestry Tasmania requested Mr Barry Weldon of Sloane Weldon Pty. Ltd. (Sloane Weldon) to provide a preliminary hydro-geological assessment of the proposed Southwood Resources - Huon integrated timber processing project.

The objectives of the assessment are:

- ¥ to identify potential hydro-geological conditions which might influence the proposed development, particularly in regard to groundwater quality;
- ¥ to provide advice on modifications or alternatives if warranted by the geological conditions, and
- ¥ to advise on the suitability of a nearby plantation area as an irrigation area for waste-water re-use.

The *General Notes & Conditions of Investigation* contained in the **Appendix** forms an integral part of this report.

2. METHODOLOGY

In the course of conducting this geotechnical assessment, Sloane Weldon Pty. Ltd. determined that the following actions were required:

1. Research of existing information about the site, including site plans, published and unpublished reports, geological maps covering the area, and other reference material considered relevant to site conditions.
2. Site visit to locate relevant boundaries and identify general features of the development and proposed irrigation sites.
3. Field investigations, including assessment of existing excavations and shallow hand dug excavations to assess the subsoil conditions of the proposed irrigation site.
4. Analysis and interpretation of the findings of investigations.
5. Preparation of recommendations.

3. HYDRO-GEOLOGY

Site Description

Coffey Geosciences in 2000 prepared a preliminary geotechnical assessment of the proposed integrated forest products development site near the confluence of the Arve and Huon Rivers. The report described the general geological and geomorphological settings of the proposed development site. Coffey indicated that the site is located predominantly on a gently sloping terrace (up to 9) that almost encircled a North-South trending ridge. The edge of the terrace is embayed in places and the outer slopes of the terrace locally steepen up to 14 with an escarpment of about 28 to 32 leading to the relatively narrow modern floodplain of the Huon River.

Test excavations logged by Coffey indicate that the terrace comprises alluvial and glacio-fluvial deposits and that the local basement rock is Permian age siltstone. Siltstone bedrock is also exposed in the bed of the Huon River. The alluvial and glacio-fluvial materials were subdivided by Coffey into four soil material units and two extremely weathered siltstone rock units.

Pools of water were present throughout the study area at the time of undertaking the test excavations in August 2000. At first this appears inconsistent with the sandy and gravelly materials commonly exposed at the surface and which have been quarried for road construction materials in the past. However the engineering logs indicate the presence of material with less permeability in the soil profile in almost every test excavation. The attached Table 1 presents a summary of the test excavation logs. The less permeable materials are identified by the use of **bold type** in Table 1.

The engineering logs recorded no water ingress into the test pits with the exception of TP2 where a trickle of water was noted from a sandy gravel layer. In this test pit the sandy gravel is underlain by gravelly sand and sandy clay layers.

The proposed site is situated on a North-South trending ridge and is almost encircled by drainage lines. Consequently, the site forms a sub-catchment adjacent to the Huon River. At the nearby bridge crossing of the Huon River, test excavations encountered Permian age sedimentary rocks in the bed of the River. Rapids both upstream and downstream expose these sedimentary rocks. It is presumed that these Permo-Triassic age sedimentary rocks underlie the alluvial and glacio-fluvial sediments on the ridge. Because of the geographic isolation of the ridge it is unlikely that there is any significant groundwater table beneath it. Groundwater was not intersected in the deepest test excavation TP3 (total depth 4.8m).

Groundwater Records

The Permian age sedimentary rocks act as fractured rock aquifers and over 300 waterbores have been drilled into these rocks throughout the State with a success rate of about 83%. The successful water bores on average have been sunk to about 36m for an average yield of 1.51 l/sec (or 1199 gph). Chemical analysis of water from 63 of these waterbores yielded a salinity range of 91 to 4160 mg/l with about 22% of the tests having salinity > 1000mg/l. In summary, fractured rock aquifers in the Permian age sedimentary rocks generally provide moderate yields of water acceptable for agricultural and other human activities. The position and elevation of the contact between the alluvial / glacio-fluvial sediments and the underlying Permian age sedimentary rocks is not known. However, relative isolation of the ridge from external run-off, the low elevation of the ridge, and the proximity of the Huon River suggest that the water table below the ridge would be relatively flat and probably not highly elevated.

Mineral Resources Tasmania do not hold records of any waterbores in the general vicinity of the proposed development site.

Hydro-geological setting

The engineering logs indicate that a natural barrier to infiltration occurs across the proposed site. This is also supported by observation of relatively large water ponds on the surface at the time of the test excavations. Where the silt and clay content of the surface silty sand and gravelly materials is sufficiently high, infiltration of surface water is impeded. However, it is considered that materials lower in the soil profile form a natural barrier to infiltration and these are highlighted with **bold type** on Table 1. A barrier material was not intersected in TP5 and TP11 and where intersected in the remaining test pits it varied in thickness from 200 to 1400+ mm. The in-situ coefficient of permeability of the barrier material has not been assessed but it is expected to be in the order of 10^{-7} m/s (i.e. suitable for lining a Category 1 landfill site, where the minimum required thickness is 1000mm). Additional investigation into the extent and characteristics of this natural barrier are recommended.

With careful planning, the existence of the natural barrier material can be used to advantage during the development of the site. As the barrier material impedes infiltration, cut-off drains keyed into it can be constructed around areas where there is a potential for contaminated leachate to arise (eg fuel storage areas, bark stripping yards etc.). These drains would form the first line of collection from specific identifiable potential pollutant sources. A perimeter cut-off drain around each development cell could be provided as a back-up measure.

In conjunction with careful management of surface run-off, it should be possible to intersect all potential contaminants within the development site. The topography of the site allows for the design and construction of cut-off drainage systems that rely on gravity for distribution. However, as the site is on a ridge, it may be necessary to consider holding ponds on either side of the ridge, or a deeper lined drain connecting any collection system on one side of the ridge to that on the other. The test excavations indicate that a deep trench can be constructed using a suitable excavator. It may be necessary to shore the trench to provide safe working conditions.

Specific locations for leachate containment ponds or dams have not been investigated. The slope on the western side of the ridge is not as steep as on the eastern side and the western side is therefore more suitable for this facility. Although a natural barrier material to infiltration is present over the development site, it will be necessary to prove its thickness at any containment site. It is probable that additional material will need to be imported for any earth embankment dam, probably from nearby areas where the Permo-Triassic sedimentary rocks are deeply weathered. Additional investigations will be necessary to assess the suitability of possible containment ponds and the availability of suitable liner materials.

Table 1. Summary of test excavations TP1 to TP11 at proposed Integrated Forest Products site, Huon (Depth from - depth to (m), Unified Soil Classification Symbol, Description)

TP 1	TP6
------	-----

0.00	-	0.30	SM	Silty SAND
0.30	-	0.50	GW	GRAVEL
0.50	-	1.10	SW	Gravelly SAND
1.10	-	1.25	GM	Silty GRAVEL
1.25	-	2.25	CL	Gravelly CLAY

TP2				
0.00	-	0.20	SM	Silty SAND
0.20	-	0.50	GP	Sandy GRAVEL
0.50	-	0.60	SW	Gravelly SAND
0.60	-	0.90	CL	Sandy CLAY
0.90	-	1.00	SP	SAND
1.00	-	2.10	GP	Sandy GRAVEL

TP3				
0.00	-	0.20	SM	Silty SAND
0.20	-	0.50	SW	Gravelly SAND
0.50	-	0.55	SP	SAND
0.55	-	0.80	CL	CLAY
0.80	-	4.80	GP	Sandy GRAVEL

TP4				
0.00	-	0.20	SM	Silty SAND
0.20	-	0.70	GP	Sandy GRAVEL
0.70	-	0.90	SP	SAND
0.90	-	1.10	ML-CL	Silty CLAY
1.10	-	1.80	CL	Gravelly CLAY

TP5				
0.00	-	0.25	SM	Silty SAND
0.25	-	0.70	SP	SAND
0.70	-	1.20	GP	Sandy GRAVEL
1.20	-	1.50	GP	Sandy GRAVEL
1.50	-	2.05	GW	Sandy GRAVEL

0.00	-	0.30	SM	Silty SAND
0.30	-	0.70	GC	Clayey GRAVEL
0.50	-	1.70	ML-CL	ilty SAND (XW siltstone)

TP7				
0.00	-	0.20	SM	Silty SAND
0.20	-	0.60	GC	Clayey GRAVEL
0.60	-	1.60	GP	Sandy GRAVEL

TP8				
0.00	-	0.30	SM	Silty SAND
0.30	-	0.50	ML	Sandy SILT
0.50	-	1.70	GP	Sandy GRAVEL

TP9				
0.00	-	0.30	SM	Silty SAND
0.30	-	0.50	SM	Silty SAND
0.50	-	0.85	GC	Clayey GRAVEL
0.85	-	1.10	ML	andy SILT (XW siltstone)

TP10				
0.00	-	0.40	SM	Silty SAND
0.30	-	0.50	GP	Sandy GRAVEL
0.50	-	0.90	ML-CL	Silty CLAY
0.85	-	1.80	ML-CL	Silty CLAY

TP11				
0.00	-	0.20	SM	Silty SAND
0.30	-	0.55	SW	Gravelly SAND
0.50	-	0.70	SM	Silty SAND
0.85	-	1.90	GW-SW	Gravelly SAND

NOTE: XW = Extremely Weathered

SUMMARY - Hydro-geology

In summary, the superficial evidence suggests that the development site, on a ridge, should be a re-charge area for groundwater. However, engineering logs indicate that there are natural materials in the soil profile that act as a barrier to infiltration. It is expected that most infiltration will move along

the top of the natural barrier materials which may not be continuous. Springs have not been observed around the outer slopes of the ridge but an inspection of the escarpment was undertaken only in the south where a road was constructed recently to provide access to the Huon River bridge crossing. The groundwater table beneath the ridge is expected to be relatively flat and, because of the presence of the Huon River, it is unlikely to be highly elevated. Sub-surface intercept drains keyed into the natural barrier materials can be used to intercept any potential contaminants or leachate. The vulnerability of the groundwater to pollution through infiltration is assessed as low. The vulnerability of the Huon River to pollution from surface run-off is assessed as possible, but with properly designed sub-surface intercept drains, the risk can be reduced to a very low level.

3. WASTE WATER RE-USE

It is envisaged that excess process water waste will be generated by the Southwood development and that waste water will be generated from an on site sewage effluent treatment plant. One available management option for the excess process water and water from the sewage polishing ponds is to re-use the waste water for irrigation. An area recently cleared for tree plantation to the west of the proposed development site may be a convenient area for irrigation. A reconnaissance assessment of the soils in this area has been undertaken.

The proposed irrigation area occurs at the edge of an undulating plain with heath/scrub vegetation. The proposed plantation area rises from the plain and locally has slopes up to 20°. An ephemeral drainage system has developed on the steeper slopes.

Soil profiles in proposed irrigation area

The topsoil in the plantation area has been disturbed by forest harvesting operations. Soil profiles were assessed from various road excavations made to landings across the lower slope of the plantation area and by hand dug excavations using a spade. At the edge of the plain the soil is generally complex with organic medium grey sandy silt topsoil. The topsoil layer varies in thickness from 50 to 150mm, has low plasticity and contains some coarse sand to fine gravel size fragments of quartzite, roots and rootlets. It is underlain by material that varies from white, almost pure quartz sand to low plasticity light yellow silt with some sand. In places, light grey weakly cemented sand layers were observed beneath these materials but light yellow sandy to gravelly silt materials were more common.

The white quartz sand content of the soil appeared to diminish with altitude and the topsoil was generally underlain by light yellowish brown, medium plasticity silty clay.

The soil structure is generally massive or uniform. The general absence of peds is interpreted to indicate that where the fine fraction predominates in the soil profile, the dominant material size is silt rather than clay. Evidence indicating that the soil is reactive and subject to volume changes through shrinkage and swelling was not observed on site. Shrinkage cracks are

potential conduits to deeper soil horizons and the absence of evidence for their occurrence is favourable with respect to waste water re-use.

Suitability for irrigation of waste water

Similarly with the Southwood development site, a natural barrier to infiltration occurs at the proposed waste water re-use irrigation site. Here, the cemented sand and sandy silt layers comprise the natural barrier to infiltration. As the topsoil is generally sandy and in places underlain by sand layers, the infiltration capacity of the soil is likely to be moderate to high but with prolonged irrigation or rainfall a point will be reached where there will be site runoff. However, as discussed earlier, the presence of the natural barrier to infiltration can be used to advantage by providing a base for a sub-surface cut-off drainage system.

The surface soil horizons are also expected to dry quickly during periods when evaporation exceeds rainfall. Table 2 provides climate averages for the Grove Research Station. This is the nearest weather station where evaporation measurements are collected. The climate data indicates a distinct wet season where rainfall exceeds evaporation (May to September) and a dry season (from November to March) where irrigation should be possible. It is noted that the average annual rainfall in the vicinity of the proposed irrigation area is expected to be in the range 1000 - 1250mm whereas the Grove Research Station is situated in an area where the average annual rainfall is expected to be in the range 750 - 1000mm. It is recommended that an evaluation and comparison of the Grove Research Station with other weather stations at Judbury, Arve Valley, Geeveston and Huonville where rainfall measurements are collected but not evaporation, be undertaken when assessing indicative water balance and hydraulic loading requirements.

Table 2. Extract of some climate data for Grove Research Station, Huon Valley

GROVE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Rain (mm)	46.7	46.8	48.3	64.6	61.7	60.1	75.4	75.5	71.2	69.9	68.2	64.4	752.9
Mean Daily Evaporation (mm)	5.0	4.6	3.1	2.0	1.2	0.8	1.0	1.4	2.2	3.2	3.8	4.5	2.7
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	365
Monthly evaporation (mm)	155	128.8	96.1	60	37.2	24	31	43.4	66	99.2	114	139.5	985.5
Net evaporation rainfall (mm)	108.3	82	47.8	4.6	-24.5	-36.1	-44.4	-32.1	-5.2	29.3	45.8	75.1	250.6

Note: (-)ve value indicates precipitation exceeds evaporation

SUMMARY - waste water re-use

In summary, sandy topsoil occurs on the lower slopes of a proposed plantation area to the west of the Southwood development site. The topsoil layer varies in thickness from 50 to 150mm and has been disturbed by forest harvesting operations. It is underlain by a variety of materials from almost pure sand to silt with some sand. This desk top study, supplemented by a brief field visit concludes that the proposed plantation area is suitable for waste water re-use because:-

the proposed irrigation area is in a region where evaporation on average exceeds precipitation from November to March,

the proposed irrigation area is ear-marked for a tree plantation which will increase evapo-transpiration of soil moisture and assist in absorbing nutrient loads,

the presence of moderate to highly permeable sandy topsoils that also act as natural filters,

the presence of weakly cemented sands and layers of silt to act as natural barriers to infiltration and afford protection to any groundwater resource that may occur at depth beneath the proposed irrigation area,

the presence of barrier materials can be used to locate the base of sub-surface intercept cut-off drains and leachate ponds on ephemeral drainage lines so as to afford additional protection for resources downslope of the proposed irrigation area.

It is recommended that a more detailed assessment of the soils in the proposed irrigation area be undertaken to evaluate soil permeability, chemical composition and ability to absorb nitrogen and other waste water constituents. Providing irrigation is matched to soil dryness and applied in a manner to prevent surface run-off, it is anticipated that the plantation vegetation would be capable of taking up any applied nutrients and that this will minimise the potential for any environmental effects on groundwater or

runoff quality. The assessment should also include recommendations regarding the monitoring of surface run-off.

B.D. Weldon *BSc(Hons)*

[2 August 2001]

APPENDIX

General Notes & Conditions of Investigation & Investigation Standards

GENERAL NOTES AND CONDITIONS OF INVESTIGATION

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The results and interpretation of conditions presented in this report are current at the time of investigation only. The investigation has been conducted in accordance with the client's requirements and/or with its servants or agents instructions. Professional care and skill has been applied in both conducting the investigations and reporting according to current geological and geotechnical practice.

It must be noted that this report contains observations and interpretations based often on limited subsurface evaluation. Where interpretative information or evaluation has been reported, this information has been identified accordingly and is presented on the basis of professional judgement. We do not accept responsibility for variations between interpreted conditions and those that may be subsequently revealed by whatever means.

It must be emphasised that due to the inherent possibility of variations in subsurface materials and conditions, the characteristics of materials may vary between sample intervals, test locations and other observation locations. The chance of these variations occurring is related to sample density. Therefore, no responsibility can be taken by Sloane Weldon for changed or unexpected variations in ground conditions which may affect any aspects of the eventual total project.

Where revealed subsurface conditions and materials, encountered during construction, are considered to be different to those assessed or interpreted in this report, we recommend that Sloane Weldon be consulted in order to provide additional assessment and advice.

INVESTIGATION STANDARDS

This investigation has been performed in a manner that is consistent with the following Australian Standards and Codes of Practice:

AS 1726 - 1993: *Geotechnical site investigations*,

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October 2000

**Water and Wastewater Report
for the
Wood Centre Development
Southwood Resources — Huon**

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1. OVERVIEW

The following report details the nature of water usage and wastewater generation within the proposed Huon Wood Centre Development.

This wastewater report is based on the following water flow diagrams, which can be found in the main Wood Centre Development DPEMP report.

Figure 18 — Preliminary Site Wide Water Circuit (Schematic)

Figure 24 — Merchandising Yard Water Flow Diagram

Figure 27 — Sawmill Water Flow Diagram

Figure 30 — Rotary Peeled Veneer Mill Water Flow Diagram

Figure 33 — Wood Fibre Mill Water Flow Diagram

Figure 36 — Wood Fired Power Station Water Flow Diagram

Figure 1 of this report summarises the water and wastewater circuit for the proposed Wood Centre as a whole.

2. WATER USAGE AND WASTEWATER GENERATION

The following table details the estimated quantities of water usage and wastewater generated by each site for each operation:

Table 1 Water usage and wastewater generation

Operation	Total Water Usage (ML/yr)	Water Lost/ Evaporated (ML/yr)	Wastewater Generated (ML/yr)
<i>Merchandising Yard</i>			
Truck Wash	5	1	4
Fuelwood Processor — Log wash	2	1	1
Sawlog Stockpile — Sprinklers	86	43	43
Domestic Usage	1	0	1
<i>Regrowth Sawmill</i>			
Green Mill — Log wash	2	1	1
Boiler Water Treatment	1	0	1
Heat Plant	2	1	1
Kilns - Reconditioning	1	0.7	0.3
Domestic Usage	1	0	1
<i>RP Veneer Mill</i>			
Boiler Water Treatment	1	0	1

THE WOOD CENTRE DEVELOPMENT, SOUTHWOOD RESOURCES - HUON
DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN

FORESTRY TASMANIA

Operation	Total Water Usage (ML/yr)	Water Lost/ Evaporated (ML/yr)	Wastewater Generated (ML/yr)
Veneer Drying (including Heat Plant)	3	2	1
Domestic Usage	5	0	5
<u>Wood Fibre Mill</u>			
Wood Fibre Processor & Log Wash	50	10	40
Domestic Usage	1	0	1
<u>Wood-Fired Power Station</u>			
Boiler Water Treatment	20	0	20
Power Station Boiler	120	8	12
Cooling Tower	1160	1040	120
Miscellaneous Uses	32	24	8
Domestic Usage	1	0	1

Note that the Power Station Boiler Total Water Usage of 20 ML/yr will pass through the Boiler Water Treatment. However, only 20 ML/yr is accounted for as Boiler Water Treatment Water Usage in the table because that is what evaporates from the Boiler Water Treatment system and this breakdown accounts for all water used by the Power Station without duplication.

The only water flow not shown in Table 1 is the contaminated stormwater run-off. The stormwater collected from each site passes through the same screening/interceptor system as the process wastewater, and then discharges to the storage ponds.

Table 2 Wastewater Destination

Operation	Storage Ponds (via Scr/Int System) (ML/yr)	Sewage Treatment Plant (ML/yr)	Direct to Irrigation (ML/yr)
<u>Merchandising Yard</u>			
Truck Wash	4	-	-
Fuelwood Processor — Log wash	1	-	-
Sawlog Stockpile — Sprinklers	43	-	-
Domestic Usage	-	1	-
<u>Regrowth Sawmill</u>			
Green Mill — Log wash	1	-	-
Boiler Water Treatment	-	1	-
Heat Plant	-	1	-

THE WOOD CENTRE DEVELOPMENT, SOUTHWOOD RESOURCES - HUON
DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN

FORESTRY TASMANIA

Operation	Storage Ponds (via Scr/Int System) (ML/yr)	Sewage Treatment Plant (ML/yr)	Direct to Irrigation (ML/yr)
Kilns - Reconditioning	-	0.3	-
Domestic Usage	-	1	-
<i>RP Veneer Mill</i>			
Boiler Water Treatment	-	1	-
Heat Plant	-	1	-
Veneer Drying	-	-	-
Domestic Usage	-	5	-
<i>Wood Fibre Mill</i>			
Wood Fibre Processor & Log Wash	40	-	-
Domestic Usage	-	1	-
<i>Wood-Fired Power Station</i>			
Boiler Water Treatment	-	-	20
Power Station Boiler	-	-	12
Cooling Tower	-	-	120
Miscellaneous Uses	-	-	8
Domestic Usage	-	1	-

The wastewater generated from the power station contains relatively high TDS levels (up to 1,400 mg/L), and is therefore sent directly to irrigation, to prevent TDS build-up in the storage ponds. All wastewater generated from domestic usage is sent directly to the sewage treatment plant.

3. WASTEWATER QUALITY

In terms of the wastewater quality that each site is producing, the equivalent of liquid trade waste regulations will be enforced on each site, to enable monitoring and regulate the levels of contaminants present in the wastewater streams crossing the site boundaries.

Table 3 Wastewater Characteristics

Contaminants	Indicative Contaminant level
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Total Petroleum Hydrocarbon	<10 mg/L
Total Suspended Solids	<600 mg/L
Total Dissolved Solids	<2500 mg/L

These levels in Table 3 are indicative of the limits specified in Plumbing Regulations, No. 160, 1994, Schedule 4 — Standards for acceptance of liquid trade waste to sewers.

The levels in Table 3 have been reduced to reflect the indicative maximum allowable contaminant levels of liquid waste to be discharged to the storage ponds.

4. SUMMARY

From Table 1, the following information can be derived:

Table 4 Water and Wastewater Summary

Site	Total Water Usage (ML/yr)	Water Evaporated (ML/yr)	Wastewater Generated (ML/yr)
Merchandising Yard	94	45	49
Regrowth Sawmill	7	2.7	4.3
RP Veneer Mill	9	2	7
Wood Fibre Mill	51	10	41
Wood-Fired Power Station	1233	1072	161
<i>Total</i>	1394	1131.7	262.3

Table 4 reflects the total water usage for each site, as well as the total amount of wastewater generated.

Table 5 Wastewater Destination Summary

Site	Storage Ponds (via Scr/Int System) (ML/yr)	Sewage Treatment Plant (ML/yr)	Direct to Irrigation (ML/yr)
Merchandising Yard	48	1	-
Regrowth Sawmill	1	3.3	-
RP Veneer Mill	-	7	-
Wood Fibre Mill	40	1	-
Wood-Fired Power Station	-	1	160

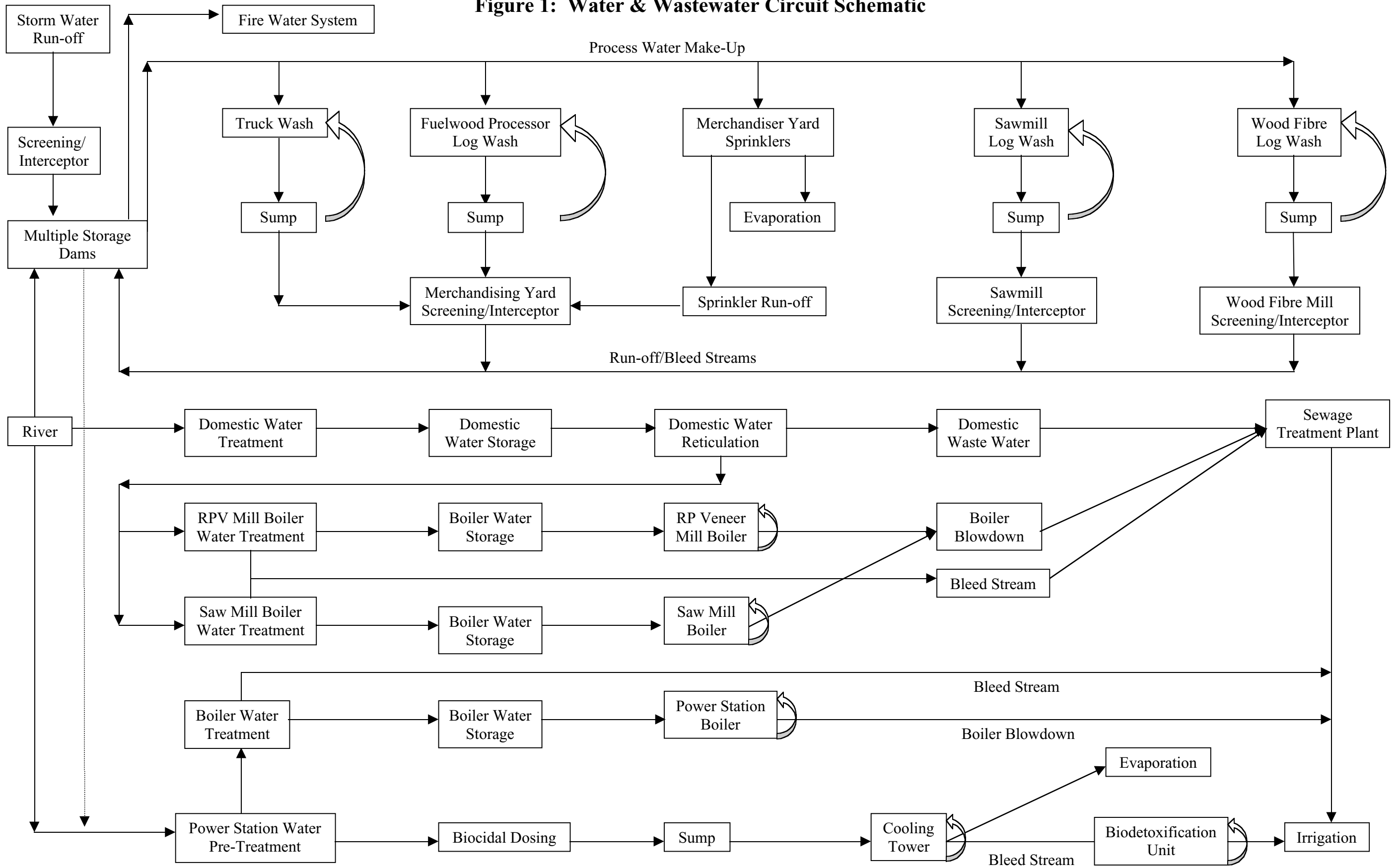
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<u>Total</u>	89	13.3	160
---------------------	-----------	-------------	------------

Of the total wastewater generated, 160 ML/yr from the power station is used for irrigation; 9 ML/yr from domestic sewage and 4.3 ML/yr from boiler unit operations goes to domestic sewage treatment, and the remaining 89 ML/yr is returned to the storage ponds.

Figure 1: Water & Wastewater Circuit Schematic





SOUTHWOOD

RESOURCES · HUON

WOOD-WISE, WASTE-WISE

supplement

the wood centre

development proposal & environmental management plan

August 2001



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Foreword

This document provides supplementary information regarding the Southwood Resources – Huon Wood Centre Development Proposal and Environmental Management Plan (DPEMP) for the purpose of planning and environmental assessment.

The Wood Centre Development will provide a wood wise, waste wise facility for hardwood and special timber processing. The site will consist of a:

- Merchandising yard;
- Regrowth sawmill;
- Rotary peeled veneer mill;
- Wood fibre production facility; and
- Wood-residue-fired power station.

This development requires planning, environmental approvals from the Tasmanian jurisdictions. The decision making authorities, the Board of Environmental Management and Pollution Control (the Board), the Council, the Resource Planning and Development Commission (RPDC), State and Commonwealth Government referral agencies and the general public were provided with the DPEMP. The document was prepared according to the guidelines provided by the Board to satisfy the requirements of the state as described below.

A DPEMP for the Tasmanian Level 2 development as required by the Tasmanian Board of Environmental Management and Pollution Control under the *Environmental Management Pollution Control Act 1994* (EMPCA).

The consolidated DPEMP document was on public exhibition in Tasmania from 15th September 2001 to 12th October 2001 but was extended by one week for those members of the public who had experienced difficulties in obtaining appropriate documentation. By 19th October 2001, 87 submissions from the public were received by DPIWE.

The Board requested that Forestry Tasmania (FT) prepare a supplement to the DPEMP as a response to the public submissions and Agency comment. This document responds to that request.

The Board will use this supplementary information to complete an assessment of the Project in accordance with EMPCA. Upon completion of its assessment, the Board will:

- Notify the Council of any condition or restriction it requires to be included in a permit granted by the Council; or,
- Direct the Council to refuse to grant a permit for the Project [s.25(3), (5) EMPCA].

Council will then make a decision on the permit application and if it is granted, exhibit the draft permit for public comment.

In parallel with the permit process, the Council considers the planning scheme amendment and may certify the draft amendment, which is then placed on public exhibition with the draft planning permit.

The Council and the Board then submit reports to the Resource Planning and Development Commission (RPDC) on the application and representations are received.

The RPDC will then hold public hearings on the proposed planning amendment and the permit application, and then make a final decision on both the amendment and the permit.

Structure of this Document

The purpose of this supplement is to provide a response to submissions from the public received by DPIWE and to respond to comments from Tasmanian Government Agencies. It also provides additional information regarding the Project and its potential environmental effects that was not available at the time of publication of the DPEMP.

The supplement is presented in four parts as follows:

Part 1: Tables of comments from public submissions, Tasmanian Government Agencies with FT's summary response to each issue.

Part 2: Further detail and explanation of issues where required and as referenced in Part 1. This section is structured to reflect the volume and chapter sequence in the DPEMP.

Part 3: Consolidated list of commitments. This includes all commitments contained in Volume 1, Chapter 12 of the DPEMP together with new or revised commitments contained in Parts 1 and 2 of the supplement. These tables of commitments supersede those contained in the DPEMP.

Part 4: Appendices, including maps, procedures and supporting material as referenced in Parts 1 and 2.

Document Availability

The supplement is available free of charge from:

Forestry Tasmania
79 Melville Street
Hobart 7000

Telephone: 03 6233 8203

The document may be viewed on Forestry Tasmania's website:

www.southwoodresources.com.au

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1.0 Summary of Responses

During the four week period in which the DPEMP was made available to the public and government agencies, the Board received a number of submissions and comments. The Board requested a supplement to the DPEMP to respond to the submissions. The following three subsections present the submissions and responses in tabular form. More detail about significant issues is provided in Section 2 and appendices are included as references. Note that all reference numbers relate to sections in the DPEMP unless stated otherwise.

1.1 Public Representations

The following table summarises the public representations and provides a response by FT.

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
Roles and Responsibilities	<ul style="list-style-type: none"> Now that it has been decided that FT will handle supply of raw logs, that John Holland will act as site manager and that DIER will be responsible for all road/traffic issues, does this change the substance of any aspects of the DPEMP and commitments/responsibilities made in the DPEMP? If so then these changes should be made public for comment and further assessment. Unclear as to what level of responsibility FT will have when the Wood Centre operational. As FT will not be the operator of the Wood Centre, it cannot substantiate the claim that “Forestry Tasmania is committed to operating the Wood Centre with respect to the environment” (ref. p.436). Not clear whether all wood processing activities will be required for project to go ahead. What will happen if investors only want to commit to part of project? 	<ul style="list-style-type: none"> FT is the applicant and will be the permit holder if a permit is granted. The operational details of how elements of the project are achieved do not change the DPEMP. The commitments made in the DPEMP are designed to be made permit conditions. The wood centre is still an FT project and FT has an on-going interest and commitment to a sustained success of the wood centre. FT is still in overall contractual control of the wood centre. The minimum configurations for the wood centre to be economic include the rotary peel veneer mill, the merchandising yard and wood fibre mill; page 7; section 1.4.
Alternative sites	<ul style="list-style-type: none"> Alternative sites have not been explored thoroughly enough. 	<ul style="list-style-type: none"> A summary of the 7 alternative sites assessed has been undertaken. Page 9; section 1.6.
Fauna	<ul style="list-style-type: none"> General concerns about impact on fauna. 	<ul style="list-style-type: none"> A detailed analysis is contained in Appendix H of the DPEMP.
	<ul style="list-style-type: none"> The fauna survey was not adequately done – needs a quadrant survey. 	<ul style="list-style-type: none"> Survey undertaken by professional zoologist using recognised industry standard techniques; Appendix H of the DPEMP.
Flora / Fauna	<ul style="list-style-type: none"> There is not enough discussion in the DPEMP relating to the import/dispersal of pests and weeds. 	<ul style="list-style-type: none"> Weed management has been identified but is a low level probability that will be readily managed on site by the Site Manager.
Flora	<ul style="list-style-type: none"> Initial survey was done when some plants would not have been identifiable (eg orchids) – further survey required. 	<ul style="list-style-type: none"> The site was surveyed on 3 occasions to identify the species present; 2/12/00, 13/01/01, 26/08/01; page 15 section 3.4. However, the species, <i>caladenia elata</i> has since been taken off the Threatened Species List, therefore the issue is considered resolved.

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
Water Quality	<ul style="list-style-type: none"> • General concern about pollution of the Huon River. 	<ul style="list-style-type: none"> • Detailed management and monitoring plans for all aspects of the development are outlined in DPEMP; page 194; section 5.7.4, page 245, section 6.3; page 281, section 7.3; page 319, section 8.3; page 351; section 9.3; page 389, section 10.3.
	<ul style="list-style-type: none"> • Wastewater Irrigation: <ul style="list-style-type: none"> - Concern that runoff during periods of high flows (1 in 10 year flood events) will impact negatively on organic farmers and other downstream users - should design for 1 in 50 year flood. - Concern about polluted run-off draining into the Huon if hydraulic capability of site is exceeded. 	<ul style="list-style-type: none"> • Downstream impacts have been assessed and are not considered to be significant with the proposed management measures and commitments in place. Designs are in accordance with parameters established for small dam structures. The 1 in 10 year 72 hour event is the maximum average rainfall likely to occur over a 72 hour period on average once every 10 years. The ponds are designed to be at maximum operational level and still cope with one such event. • The detailed Irrigation Management Plan, which will be provided for approval, will address irrigation. The irrigation plan will define methods of controlling soil moisture with the aim of minimising run off and/or leaching into ground water. Direction of water to different parts of the irrigation area will distribute the irrigation load and will be part of the on-going management regime for the irrigation site.
	<ul style="list-style-type: none"> • All discharges into the Huon should be monitored and reported. 	<ul style="list-style-type: none"> • A comprehensive monitoring and reporting process is detailed in the DPEMP p220
Water Quantity	<ul style="list-style-type: none"> • There is no discussion in the DPEMP about minimum flow requirements for protection of the Huon River and estuary ecosystems. • Suggest permit condition preventing extraction when flow is less than X mL/day. 	<ul style="list-style-type: none"> • Preliminary discussions with DPIWE water licensing section have indicated water supply requirements are minor compared to the natural river flow. The Water Management Act administered by DPIWE is designed to ensure water is only drawn under a licence system • DPIWE water licence will contain limitations

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
	<ul style="list-style-type: none"> General concern about the extraction of large quantities of water from the Huon River, and its effects on ecology and/or downstream users. 	<ul style="list-style-type: none"> Any water drawn from the river is based on licence under the Water Management Act. The extraction rate is discussed in DPEMP p68 section 3.3.2. The licence process considers impacts on other existing users and environmental issues.
	<ul style="list-style-type: none"> Extraction of water for the Wood Centre needs to be considered in relation to environmental flows required for maintenance of the Huon River ecosystem Water extraction quantities should be monitored and reported. The proposed water management strategy is not precise enough. Future climate change may reduce rainfall and hence water flows, therefore enhancing the impacts of water extraction. There is insufficient data in the DPEMP regarding water flows and quality to enable an informed discussion and decision. 	<ul style="list-style-type: none"> Water Management Act takes these issues into account in determining licence. Commitment to do this is to be in DPEMP p216 More details are to be provided in the Irrigation Management Plan; Commitment 52, page 200. Stormwater management is outlined on page 196. Climate change will be considered as part of on-going management by DPIWE of Water Management Act DPIWE determine the extraction under Water Management Act.
Wastewater Management	<ul style="list-style-type: none"> A closed loop water resource system should be developed. No water should be discharged into the Huon. P 391 of the DPEMP mentions possible biocide detoxification. The chemicals to be used should be identified, and any potential impacts assessed. Stormwater runoff collection ponds mentioned in geological report should be incorporated into the plan. 	<ul style="list-style-type: none"> Water use will be minimised by the reuse of water within the site; page 170; section 5.6. More detail in relation to the expected wastewater characteristics (quality and quantity) will be submitted as part of the irrigation planning process. This will be undertaken as part of the detailed design phase and submitted to DPIWE for assessment with the Irrigation Management Plan. Collection is in the DPEMP refer p196. Pond design will allow sufficient capacity to store a one in 10 year 72 hour stormwater event when the ponds are at maximum operating level. Disposal of the water from the ponds is by sustainable irrigation, refer p174
Solid Waste	<ul style="list-style-type: none"> Details of solid waste generation, handling and disposal procedures need to be provided. 	<ul style="list-style-type: none"> Details are provided refer DPEMP p204, and in each chapter for each facility. More detailed figures relating to quantities and types of solid wastes will be provided to

<u>PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES</u>		
General Issue	Specific Comments	Response
Noise	<ul style="list-style-type: none"> Noise limits should be placed on the boundary of the site, not at a point 6 km away. Noise limits should not only concern average levels, but also specify maximum allowable levels for intermittent noises. The assessment of noise impacts should have also taken into account the effects of topography. The assessment of noise impacts should have also taken into account the effects of tonality. 	<p>DPIWE as part of the detailed design of the project¹.</p> <ul style="list-style-type: none"> A qualified consultant in the field has undertaken a detailed noise assessment. Noise emissions will be minimised by a range of measures described in the DPEMP. Noise limits are normally determined by the location of the nearest sensitive receptor, in this case 6 km from the site. Intermittent noise levels have been taken into account, the only source of significant intermittent noise occurs from the safety valves of the boilers, these have been provided with silencers where the noise level exceeds limits. Noise impacts were calculated assuming that the topography was flat resulting in a worse case assessment. The hills around the site will in fact reduce the impact of noise. Due to the large distance between the site and the nearest residence, the equivalent noise levels (Leq) have been used. In addition, a further noise level survey will be carried out prior to commissioning. Commitment 54, page 203. Tonal components of noise may occur due to characteristics of particular equipment. An additional noise level survey will be carried out prior to commissioning and additional acoustic treatment provided if these are seen to be present. Commitment 54, page 203.
Air quality and greenhouse issues	<ul style="list-style-type: none"> General concern about local air pollution from power plant. 	<ul style="list-style-type: none"> A detailed assessment has been conducted and further monitoring and modelling will be undertaken prior to construction; Commitment 1, page 386; Commitment 36, page 406. Limits on emissions will be imposed in accordance with the Draft Tasmania policy on Air Quality.
	<ul style="list-style-type: none"> Maximum limits need to be set on ash emissions from power plant. 	<ul style="list-style-type: none"> Ash in air stream is measured by particulates; limits have been set in accordance with the Draft Tasmanian Policy on

¹ Commitment: Provide more details about the expected quantities and types of solid wastes to DPIWE when it becomes available (i.e. as part of the detailed design phase).

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
	<ul style="list-style-type: none"> • Measures should be outlined regarding the prevention of air pollution from stockpiles. • Some of the data relating to emissions from the wood fired power station is irrelevant and incomplete. • The proposed power station will emit 140-150 tonnes/hr of water vapour at 30-40 degrees C. Where are the studies to show there will be no adverse impacts? • The DPEMP guidelines requirement that local meteorological conditions be discussed and assessed has not been done. • Emission rates described in the appendices are far above maximum emission rates of wood fired power station permits overseas - proposal cannot be regarded as world best practice. • If Australia ratifies the Kyoto Protocol, the power station may not be acceptable at a national level. • Concern that if the Wood Centre closes, timber may still be 	<ul style="list-style-type: none"> • Air Quality for particulate soot and smoke. This should ensure emissions are kept within an acceptable range. Monitoring of the stack will be undertaken; Commitment 36, page 406. • Refer to Supplement Section 2.1. • A detailed assessment of air emissions has been undertaken, with additional modelling (Commitment 1, page 386), and monitoring (Commitment 36, page 406). • The release of water vapour from the power station is not considered to provide any adverse environmental impacts because water vapour is a natural component of the hydrological cycle. Finally, the quantity of water vapour will not cause any adverse impact on the air shed due to water vapour dispersion and the air shed size. • A commitment to gathering local climate data has been made discussions are progressing on establishing a local weather station. Commitment 31, page 192 • Emission will comply with all relevant air quality standards as set out in the Draft Tasmanian Policy, and the NEPM objectives (refer Appendix V of the DPEMP). • European countries use biomass station to help meet their greenhouse gas emission targets and reduce their consumption of coal, oil and gas. The greenhouse emissions are generated in any case in regeneration burns, capturing and converting the energy therefore avoids burning fossil fuels to produce an equivalent amount of energy and lowers overall greenhouse emissions. • Forest residues are those generated from harvesting, it is not intended to harvest forest only for fuel wood. • A detailed discussion on greenhouse gas emissions has been provided. Page 186, section 5.7.2.

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
	<ul style="list-style-type: none"> burnt in power station. Comprehensive greenhouse emission study needs to be undertaken to justify the claim of no net increase in emissions of greenhouse gases. Wood-fired power station should not be allowed because of the associated greenhouse gas emissions. 	<ul style="list-style-type: none"> A detailed discussion on greenhouse gas emissions has been provided. Page 186, section 5.7.2.
	<ul style="list-style-type: none"> Concern of vehicle emissions in terms of Greenhouse Gas impacts. 	<ul style="list-style-type: none"> Emissions have been assessed. Net vehicle emissions in the Huon Valley will not change refer to page 141.
Power Station	<ul style="list-style-type: none"> Uncertainty regarding the power station: <ul style="list-style-type: none"> - Will it be built and when? - What will its generating capacity be (contradictory figures given in DPEMP)? - Can continuous fuel supply be relied upon? - Can Aurora supply electricity during construction and when power station is shut down? Of what benefit to the electricity grid is an interruptible power supply? Will it make supply south of Huon more reliable? Where will ash be stored if there are no ash ponds on site (p 382 of DPEMP). The wood fired power station is inadequately described in that: <ul style="list-style-type: none"> - The size of the plant is, as yet, unknown - The nature and type of the burner and pollution control is unknown - The operator is unknown 	<ul style="list-style-type: none"> - Construction is likely in the period 2002-03 - Final figures will depend on detailed design and are based on fuel availability and economic size. - The size of the power station will be selected to ensure fuel from forest residues can be supplied in a sustainable manner. - Aurora has indicated it has capacity. The power station will assist in making supply more reliable but will not guarantee 100% reliability. Ash is stored in a sealed bin system not ash ponds, see page 376 DPEMP <ul style="list-style-type: none"> - DPEMP is developed around the impacts of the largest conceivable size of 50MW, more probable size is 30-35MW - Details of design of boiler and flue gas cleaning system are contained in DPEMP page 372 to 389. - Noted the operator will have to comply with the designs and conditions imposed by the permit.
	<ul style="list-style-type: none"> Acid rain is a potential outcome of the power station and could impact upon flora in the surrounding World Heritage Areas. 	<ul style="list-style-type: none"> High levels of oxides of sulphur and nitrogen generate acid rain. The low levels in the emissions from the power station will not result in any impact on flora.
Other Env. Issues	<ul style="list-style-type: none"> Conservation of upper Huon catchment is high priority under 	<ul style="list-style-type: none"> Ecological integrity and conservation has been assessed as

PUBLIC SUBMISSIONS – ENVIRONMENTAL ISSUES		
General Issue	Specific Comments	Response
	<p>NRM principle of protecting best natural assets. The area has ecological integrity and aspects of high conservation significance, and therefore the proposed site is inappropriate.</p> <ul style="list-style-type: none"> The lack of geological data makes it impossible for environmental, structural or engineering evaluations to be done effectively. 	<p>part of DPEMP and in gaining EPBC approval from the Commonwealth.</p> <ul style="list-style-type: none"> The amount of geological work undertaken allowed for site to be classified, as suitable. More detailed work will be undertaken should approval be granted for the development. The work will include more intense hydro-geological and geotechnical surveying to ensure appropriate foundations. A bore will be installed to allow ground water table depth to be determined.
Compliance with relevant legislation / standards	<ul style="list-style-type: none"> The proposal is contrary to the <i>Objectives of the Resources Management and Planning System</i> (as defined in Schedule 1) and also to the <i>Objectives of the Environmental Management and Pollution Control System of EMPCA</i>. The development proposal does not abide by several provisions of the <i>EMPCA 1994</i> (in particular provisions of Sections 4 (1), 5 (1,2 & 5(part 2a)), Section 20A Part 2A and Environmental Duties Sections 23A, 48(1), 50 (1), 51A(1), 53(1) and 81A(1). 	<ul style="list-style-type: none"> Development will be assessed against these objectives and the applicable Acts. Development will be assessed in accordance with the Act. The aim of the DPIWE environmental assessment is to determine the likelihood of compliance of the proposal with the provisions of the Act.
Monitoring and compliance	<ul style="list-style-type: none"> The DPEMP does not indicate what will be done if parameter limits are exceeded. Monitoring and review details as described in section 3.3.16 of the DPEMP guidelines should be covered in DPEMP. 	<ul style="list-style-type: none"> Contingency measures have been described in the DPEMP; eg; page 201; wastewater emissions. Sections on monitoring, reporting and review are provided in Section 5,6,7,8,9 and 10 of the DPEMP
Decommissioning	<ul style="list-style-type: none"> A decommissioning plan should be developed and approved before a permit is granted so that remediation requirements can be assessed. 	<ul style="list-style-type: none"> Commitment to prepare a decommissioning plan is contained in Section 5; page 214; Commitment 74.

PUBLIC SUBMISSIONS – TRAFFIC ISSUES		
<i>Environmental Considerations</i>		
Noise, dust and vibration	<ul style="list-style-type: none"> The Richmond study concluded that domestic building set back more than 10 metres would suffer no vibration impacts, but some (especially older) houses are less than 5 metres from the current road. Even if vibrations will not cause cracking of houses, the vibrations will be felt by buildings along the route and will cause disturbance to occupants. The assessment of traffic impacts only considered residences within 30m of the transport routes. Residences further away would also be affected, and should have been considered in the assessment. 	<ul style="list-style-type: none"> Traffic-related noise and vibration has been investigated by a qualified consultant and are described in the DPEMP; page 138. Their potential impacts are being evaluated as part of the Environment Impact Assessment process.
	<ul style="list-style-type: none"> The proposal for operation 6 days a week, 24 hours a day is unacceptable because (1) potential impacts are, in some cases, unknown (ref. p.128), and (2) the DPEMP indicates that proposed traffic volumes would cause sleep disturbances for 10% or more of the population. There is little noise from present traffic. The Wood Centre traffic will be loud – particularly when considering average frequency of truck movement every 15 to 20 minutes, day and night. Continuous (i.e. 24 hour) transport operations would cause undue stress to families living along the proposed transport route. The effect of increased noise upon the Ranelagh community has not been adequately addressed in the DPEMP (eg. “There may be occasions when the recommended guideline is exceeded, depending on a number of factors, and the impact on residents is unclear”). General concern about increased noise for residents near transport routes. 	<ul style="list-style-type: none"> The transport operating times are to be managed through a consultative committee process. Changes to hours may be made once the actual impacts are clearly defined. Experience by transport operators hauling from the Hampshire mill through Ridgley is that with selection of the correct vehicles, road surfaces and driver training, night time noise can be contained to limits acceptable to that community. That operation has more than 3 times the traffic flow proposed for Southwood

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	<ul style="list-style-type: none"> In spite of the additional 76 trucks per day and other increased traffic (Table 38), the proponent claims there will be no increase in vehicular emissions. How can this be so? 	<ul style="list-style-type: none"> The truck movements replace existing log trucks hauling wood from the Huon Valley. Page 141 of the DPMP shows how the emissions are created over time.
	<ul style="list-style-type: none"> Truck traffic generates quite substantial dust on sealed roads as well as on unsealed roads. 	<ul style="list-style-type: none"> Sealed roads with adequate sealed shoulders as proposed will minimise dust generation.
2. Other Considerations		
Visual amenity	<ul style="list-style-type: none"> General concern about loss of visual amenity from log truck traffic. 	<ul style="list-style-type: none"> Trucks hauling product from the site will be totally enclosed, the appearance is more that of a refrigerated container.
Safety	<ul style="list-style-type: none"> By having a log segregation yard at the site, less transport is required, thus reducing the amount of traffic along highways. This will give the region's roads greater amenity and safety. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> Traffic issues have not been adequately addressed in the DPMP, and a safety audit should be conducted. 	<ul style="list-style-type: none"> A safety audit was conducted by DIER refer to Appendix Q of the DPMP.
	<ul style="list-style-type: none"> Will the speed limit along North Huon Road be reduced and policed to ensure safety is maintained? 	<ul style="list-style-type: none"> DIER sets speed limits. Speed limits will be controlled through the Traffic Management Plan; Commitment 22; page 138.
	<ul style="list-style-type: none"> General concern for personal safety from increased traffic. 	<ul style="list-style-type: none"> Noted, appropriate new road upgraded by proponents will improve safety. Refer to Safety section; page 142-144.
	<ul style="list-style-type: none"> Glen Huon and North Huon Roads are not suitable for increased truck traffic, and will be unsafe if used for the transport route 	<ul style="list-style-type: none"> Proponents will upgrade North Huon Road at an estimated cost of \$4 million.
	<ul style="list-style-type: none"> A survey of 28 residences (<i>Ranelagh Road Use Survey – Attached</i>) revealed that 90% of residents surveyed were very concerned about the safety impacts of increased truck traffic along North Huon Road. 	<ul style="list-style-type: none"> Noted – A significant upgrade of roads is proposed. Speed limits state wide in built up areas are to be reduced to 50 kph. . Refer to Safety section; page 142-144
Traffic volumes	<ul style="list-style-type: none"> A footnote to <i>Table 22</i> assumes that 50% of vehicles will use Glen Huon Road. That being so, the daily increase in traffic volume is likely to be around 170. Because North Huon Road will require substantial upgrading, there will be considerable disruption to traffic along that route. 	<ul style="list-style-type: none"> Table 22 refers to construction traffic only Timing of construction of the upgrade will determine actual impact, Table 22 provides best available estimate.

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	<p>Thus it is likely that more traffic than estimated will pass along Glen Huon Road or through Geeveston and along Arve/Lidgerwood Roads.</p> <ul style="list-style-type: none"> • The statement that “there will be a significant reduction of wood flowing on public roads (p 99) cannot be supported. North of the Lollara Road intersection, any reduction in log traffic will be offset by processed wood traffic (footnote 5 to <i>Table 38</i>). Even assuming use of forestry roads there will be a slight increase in log traffic on the Huon Highway south of Geeveston (<i>Table 23</i>). • The total number of trucks per day carrying processed products is estimated by FT as 65 to 97 (<i>Tables 28-31 & 33</i>). It should be noted that <i>Table 37</i> conveniently uses the lower estimate. • The estimate of current truck movements through Ranelagh (ref. <i>Table 36</i>, p.123) is believed to be inaccurate. Further information about the methodology employed in estimating truck movements through Ranelagh should have been included in the DPEMP so that accuracy of the figures could be assessed. • If the proposed Judbury to Arve Road goes ahead, traffic through Ranelagh would be further increased. • It is assumed that log traffic from the south will travel via Hermons Road. Will that happen, or will much of the log traffic choose to pass through Geeveston and then via Arve Road?

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		<p>Geeveston will be reduced by reducing the number of total movements and eventually eliminated. FT can direct how traffic moves on FT roads so use of the bypass once open will be mandatory.</p>
<p>Transport route and means of transport</p>	<ul style="list-style-type: none"> Commitment 8 (p.103) is welcomed, but should be implemented as soon as possible. There hasn't been adequate community consultation regarding transport routes so far. It is assumed in the DPEMP that no outward truck traffic will use Glen Huon Rd. Is this assumption trustworthy when the distance difference between the two routes is only 5 km? The assumption that no log traffic will use Glen Huon road or Arve Road (ref. Table 23) is unrealistic. The DPEMP should more thoroughly assess the potential for using Surges Point and Cairns Bay as export ports. These sites were identified as deserving further consideration (Appendix S, DPEMP) as alternatives to Electrona, and still offer considerable benefits in transport cost savings. Alternative road routes should be considered, particularly a road across the Plenty Plains. Existing forestry and State roads should be used rather than North Huon Road. Table 22 (p.97) is misleading because it only regards vehicle movements on North Huon Road and Arve/Lidgerwood Roads. Construction traffic will also use Glen Huon Road (p96). 	<ul style="list-style-type: none"> DIER has recently commenced further consultations with the community. The upgrading of North Huon Road will mean Glen Huon Road will not be an attractive alternative for trucks. Noted – FT can and will impose conditions on the use of Arve Road in State Forest. There are no known timber resources that would cause log trucks to use Glen Huon Road. Government decision has been made that no facilities will be constructed if there is a possible impact on the aquaculture industry. Alternative routes have been carefully considered; page 107, section 4.5.4. Alternative routes have been carefully considered; page 107, section 4.5.4. Noted, Table 22 has a footnote to that effect.
	<ul style="list-style-type: none"> There is insufficient data included in the DPEMP to assess the selection of Option 1 as the preferred transport route. A financial analysis of the four options should be included in the DPEMP to allow for informed assessment of the transport options. 	<ul style="list-style-type: none"> Government commissioned an independent report on road options. Based on analysis of that independent report against the criteria of impact on residences, capital cost and operating costs, environmental impacts, infrastructure benefits for other users, Option 1 was determined to be the preferred route.

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	<ul style="list-style-type: none"> The Ranelagh community rejects option 1, and an alternative assessment of the four transport options is attached (Appendix 1 to this table). The roads along the proposed transport route can't support the proposed increases in truck traffic. 	<ul style="list-style-type: none"> Noted. A comprehensive upgrade package has been developed, roads will be widened and sealed as part of the package; Commitment 9, page 120. Southwood will fund North Huon Road upgrade.
	<ul style="list-style-type: none"> Of the four transport options, Option 1 is most objectionable because it will (1) impact the most residents, and (2) impact a community where there has not previously been an impact. Insufficient information is presented in the DPEMP to justify the choice of Option 1. The proposed transport route through Ranelagh is strongly opposed. 	<ul style="list-style-type: none"> Government commissioned an independent report on road options. Based on analysis of that independent report Option 1 was determined to be the preferred route.
	<ul style="list-style-type: none"> Support for the proposed transport route. 	<ul style="list-style-type: none"> Noted
Miscellaneous	<ul style="list-style-type: none"> 24 hour transportation movements inconsistent with what was earlier stated in regards to the Electrona port development. Creation of a Community Consultative Committee (ref. Commitment 8, p.103) must be a permit condition. The Committee must be made up of predominantly local residents who live along the transport route. An independent arbitrator should also be appointed. Proposed mitigation measures for traffic impacts are referred to on p.145. On p. 146 (para. 1) the DPEMP states, "These measures will also be implemented during the construction phase as far as practicable". This assertion needs to be more clearly defined. The DPEMP plays down the impact of increased traffic and over emphasises the extent and efficiency of mitigation measures. It reaches the surprising (and incorrect) conclusion "that any adverse impacts will be acceptable to the community" 	<ul style="list-style-type: none"> Loss of the Electrona development has considerably increased the transport task resulting in the need for longer operating hours. Commitments are expected to become conditions of the permit. The membership of the committee will comprise community representatives including residents along the transport route. Some aspects such as dedicated drivers are not practical during construction due to nature of activities. However, driver training will be undertaken as part of site orientation course. The change in traffic movements and the subsequent potential impacts have been carefully assessed. A number of detailed mitigation and management measures have been committed, as has an on-going consultation with the

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<p>(p 149).</p> <ul style="list-style-type: none"> • Many of the mitigation commitments are too loosely defined. The following aspects need to be clarified: <ul style="list-style-type: none"> (a) Commitment 1: What does ‘generally’ mean and how can it be measured? (b) Commitment 2: ‘Sensitive area’ should be defined. (c) Commitment 3: Details should be provided as to what training would be conducted. (d) Commitment 13: Design details should be provided. • Does the widening of the North Huon Road include the formation of footpaths? This will be important with the increased traffic volume. • It is stated in the DPEMP (eg. pp 104-6, 112, 118, 136-7 and 140) that modern transport vehicles will be used, and will be well maintained and regularly tested. How can FT make that commitment when it is outside of their control, and how will it be enforced? • There is commitment that truck drivers will have special training (pp 98, 137 & 145. Who will pay for the training and replacement drivers during training? How will the commitment be enforced? Does FT see the introduction of the State of special licensing regulations? • Site manager has no control of off site traffic, so how will (a) speed regulations developed in consultation with the community be enforced, and (2) voluntary curfews during sensitive hours (eg when school buses are running) be enforced. • An independent arbitrator should be appointed for the community consultation committee in case of disputes. • Traffic movement should be restricted to 12 hours a day for 5 	<p>community to address community concerns.</p> <ul style="list-style-type: none"> (a) Construction will normally occur during daylight, but for some activities, eg large concrete pours, work may continue into the evening. (b) Sensitive areas are through towns, near pedestrians, near zones where animals maybe near the road etc. (c) (d) These will be developed and publicised as part of the next stage of the project. Driver training will include such issues as speed limits, sensitive areas, braking procedures etc. <ul style="list-style-type: none"> • Footpaths are proposed for North Huon Road in Judbury and Ranelagh. • Permit conditions and contractual conditions will enable this to be enforced. • Proponents will pay for training with the commitment becoming a condition of the permit. Licensing is a function of DIER. • Site Manager has control of activities on site and administration of permit conditions. • This is a normal method of resolving such disputes. • A restriction in traffic hours will increase the frequency of

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	<ul style="list-style-type: none"> to 6 days per week. Any traffic issues consultative committee (ref. Commitment 8) should also be consulted by the relevant authorities during periods of road works. In spite of the additional 76 trucks per day, FT claims there will be no increase in vehicular emissions. How can this be correct? 	<p>traffic movement during these hours.</p> <ul style="list-style-type: none"> Agreed These truck movements from the site will replace current movements by log trucks.
	<p>There appears to be no provision in the DPEMP for the prevention of accelerated mud and dirt entry into the Huon River as a result of traffic movement moving North to the Wood Centre in wet conditions. This issue should be addressed.</p>	<p>The road has been constructed to comply fully with the Forest Practices Code (FPC) therefore drainage from the road into the Huon River should be appropriate and will prevent mud and dirt entry into the Huon River. Monitoring of the drainage and road condition will be conducted as per the FPC.</p>
Commitments and Conditions	<ul style="list-style-type: none"> Commitment 35 (p. 430) should be ongoing. Commitment 34 (p. 441) should include "and remedy". 	<ul style="list-style-type: none"> Noted Agreed – commitment will be modified – Refer to Supplement Section 3.0 Revised DPEMP Commitments Table.

<i>PUBLIC SUBMISSIONS – PLANNING ISSUES</i>		
<i>General Issue</i>	<i>Detailed comments</i>	
Assessment and approvals processes	<ul style="list-style-type: none"> Running rezoning and DPEMP processes in parallel is bulldozing the process. 	<ul style="list-style-type: none"> The development is being progressed in accordance with the provisions of Section 43A of the Land Use Planning and Approvals Act.
	<ul style="list-style-type: none"> Rezoning Application – details not available to public at time of commenting on DPEMP. 	<ul style="list-style-type: none"> Public gets a chance to comment on rezoning and permit conditions during next round of consultation
	<ul style="list-style-type: none"> Failure to gazette Huon River Reserve, which covers part of site, is not acceptable and shows failure of RFA process. 	<ul style="list-style-type: none"> The reserve was initially proposed to protect an <i>E. globulus</i> flora community that subsequently was found not to exist on the site.
Land Use	<ul style="list-style-type: none"> DPEMP fails to mention that the pump station site is also on crown land. 	<ul style="list-style-type: none"> Noted – see Part 2 Supplement and Appendix B of the Supplement for additional detail.
	<ul style="list-style-type: none"> Need to enlarge riparian reserves around areas affected by development (reserves need to be proportion to the waterways they protect) and any new roads eg Weld Track upgrade. 	<ul style="list-style-type: none"> Reserves of 100m apply to the Huon River. The facilities are all set back further than this amount from the Huon River.
	<ul style="list-style-type: none"> The boundaries of the land to be used have not been clearly defined. 	<ul style="list-style-type: none"> Boundaries of land are clearly identified, HVC has a detailed plan as part of its rezoning.
	<ul style="list-style-type: none"> Industrial sites should be contained in areas already zoned as industrial. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> Siting of industrial complex and logging areas should not be allowed so close to world heritage areas. 	<ul style="list-style-type: none"> Noted, considered as part of EPBC approval process that has confirmed there are no controlled actions on the site. The site is over 10 km from the nearest approach of the Southwest National Park.
Cultural heritage	<ul style="list-style-type: none"> DPEMP should indicate what action would be taken if Aboriginal sites are discovered at a later stage (either at the site or at harvesting sites). 	<ul style="list-style-type: none"> Action in relation to cultural heritage sites is set out in legislation. The DPEMP indicates action to be taken at page 211 if a cultural heritage site is identified on site. Practices at harvesting sites are outlined on page 42 of the DPEMP.
	<ul style="list-style-type: none"> General concern about impact on aboriginal heritage sites. 	<ul style="list-style-type: none"> Noted refer to pages 42 and 211
	<ul style="list-style-type: none"> The Aboriginal community should have been consulted to ascertain if the area has Aboriginal heritage significance. 	<ul style="list-style-type: none"> DPEMP sets out consultation with the Aboriginal community on page 80.

<i>PUBLIC SUBMISSIONS – PLANNING ISSUES</i>		
<i>General Issue</i>	<i>Detailed comments</i>	
	<ul style="list-style-type: none"> The archaeological assessment team has asked for time to conduct further research after the site has been cleared - this should be required. 	<ul style="list-style-type: none"> This will be undertaken as part of the construction management plan if project is approved.
	<ul style="list-style-type: none"> Consultation with the Tasmanian Aboriginal community has resulted in clear statements expression no support for the project. 	<ul style="list-style-type: none"> Noted, consultation with the Aboriginal community over forestry issues is continuing.
Miscellaneous	<ul style="list-style-type: none"> Positioning of pump house at the riverside is aesthetically unacceptable (visual and noise) and an environmental risk. 	<ul style="list-style-type: none"> Details of the proposed pump house are included in the Supplement, the pump station is located alongside the bridge and will not be visible. There are no elements of the pump house that are likely to impose an environmental risk.
	<ul style="list-style-type: none"> Which houses/land will be purchased to widen the road? Forestry Tasmania should pay rates on the site and also on all State Forest areas. DPEMP should be rejected because Southwood is an affront to good planning. 	<ul style="list-style-type: none"> No houses have been identified as requiring acquisition on the proposed North Huon route. DIER is talking to owners who may be impacted by land loss. The site will pay rates to Huon Valley Council Noted, the planning processes have fully complied with all extant legislation.
	<ul style="list-style-type: none"> The final development is likely to be different to that proposed in the DPEMP. What alterations to the initial proposal would be acceptable before a new Development Application is necessary? 	<ul style="list-style-type: none"> The development application refers to the development as described in the DPEMP. Changes to the development and any additional industries that establish in the future will be required to comply with the requirements of LUPAA and EMPCA. Modifications to the stage 1 proposal will require a review of permit conditions, carried out by Council and DPIWE. A major departure from the stage 1 proposal will require a new development application. Any new key developments on site, for example another sawmill or a plywood plant, will require a new development application and DPEMP.
	<ul style="list-style-type: none"> Application is premature and should be deferred until investors undertaking project are known and rezoning application approved. 	<ul style="list-style-type: none"> Application fully complies with LUPAA and EMPCA.

<i>PUBLIC SUBMISSIONS – PLANNING ISSUES</i>		
<i>General Issue</i>	<i>Detailed comments</i>	
	<ul style="list-style-type: none"> • Would an operator be able to vary permit conditions, and would any such change require public consultation? • Rezoning decision should be reversed, as Council did not see proper application. • Rezoning issues should have been covered in the DPMP. • Huon Valley Council should not allow Ranelagh playground to be destroyed. • The Board should require the Council to: <ul style="list-style-type: none"> - Develop a landscape conservation plan to important landscape values - Develop a wildlife protection plan - Implement land clearing controls to protect native vegetation - Implement a plantation establishment plan. • Does Forestry Tasmania have the legal right and power to deal in Crown Land designated State Forest with a view to establishing a major industrial development? 	<ul style="list-style-type: none"> • Variations to permit conditions trigger statutory processes that are designed to protect the community. • The Council has only decided that it is prepared to consider the rezoning application. It has not as yet approved the rezoning. The required application documents were lodged with Huon Valley Council in conformance with their processes and LUPA on 5 September 2001. • DPMP summarised planning issues page 51. • Noted if the playground does have to be acquired, a new playground located in consultation with the community and fully complying with Australian Standards will be developed. • Noted • Minister for Forests has the power to deal with State Forest. The permission of the Minister for Forest has been obtained to allow the development application to be lodged.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
General process	<ul style="list-style-type: none"> Time allowed for reading, researching, assessment and reply to the DPEMP was severely inadequate for such a large document. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> All claims and estimates made by Forestry Tasmania contained in the DPEMP should be exposed to fully independent economic, social and environmental scrutiny, examination and substantiation by a fully independent body – not associated with Tasmanian Government or FT. 	<ul style="list-style-type: none"> Professionals in DPIWE undertake the environmental impact assessment in an independent manner with input from other departments, local government and the community.
	<ul style="list-style-type: none"> Fact that the proposal has been allowed to proceed so far raises questions in relation to the effectiveness and legitimacy of the Tasmanian planning and control systems as well as the Board. 	<ul style="list-style-type: none"> Noted.
Community consultation	<ul style="list-style-type: none"> Initial community consultation was good, but more recently consultation with Ranelagh residents has diminished. Further consultation of Ranelagh residents is required to achieve satisfactory outcomes. The Transport Value Management workshop process, held in early 2001, needs to be investigated, as some participants claim that no clear consensus was reached at this meeting. 	<ul style="list-style-type: none"> DIER was requested to take responsibility for road issues on the transport route following independent advice to Government on the route. FT as completed the transfer of information and DIER expects to complete the consultation in the next 4 weeks. Report of the VM study notes the objections of two participants to the position reached by the group that included 14 residents mainly from Ranelagh.
	<ul style="list-style-type: none"> The consultation process between Forestry Tasmania and the Ranelagh community was flawed, as the community was not kept up to date with information (eg. many North Huon Road and Ranelagh residents have only just had confirmation that the transport route includes North Huon Rd and Ranelagh. 	<ul style="list-style-type: none"> DIER was requested to take responsibility for road issues on the transport route following independent advice to Government on the route. FT as completed the transfer of information and DIER expects to complete the consultation in the next 4 weeks.
	<ul style="list-style-type: none"> Report produced by Corporate Communications misrepresents efforts and concerns of residents in the area. Number of people opposing the project is in reality higher than indicated in this above mentioned report. 	<ul style="list-style-type: none"> The report covers the issues raised by a wide cross section of the community at a variety of venues. The report is not designed to measure support or opposition but to report on the feedback received from the community to the date of the report.
Documentation	<ul style="list-style-type: none"> Many documents were of poor quality and some were illegible. 	<ul style="list-style-type: none"> Where problems were advised, copies of clearer materials

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		were forwarded.
	<ul style="list-style-type: none"> The documentation (web site, CD version and Hard copy) contained irrelevant and outdated material relating to the route to use the Electrona Port Poorly labelled or explained diagrams, graphs and charts. Inaccuracies relating to the so called consultation process 	<ul style="list-style-type: none"> The investigations were conducted and reported over a 12 month time frame; changes during the process did not invalidate the conclusions.
	<ul style="list-style-type: none"> Suppositions, inadequate and or irrelevant data relating to important issues like air quality and water quality and flow. The period for public comment should begin again from when documents of an appropriate quality become available. 	<ul style="list-style-type: none"> All data has been gathered from available sources. Commitments to installing pre-construction monitoring where required have been made.
	<ul style="list-style-type: none"> The DPEMP is contradictory which makes commenting on it very difficult as you don't know what the truth is (for example in one place it says <i>E. amygdalina</i> is poorly reserved and another says it is adequately reserved). 	<ul style="list-style-type: none"> <i>E. amygdalina</i> is poorly reserved on private land but adequately reserved in State Forest. The land proposed for the development is State Forest.
Limitations Statement	<ul style="list-style-type: none"> The DPEMP limitations statement indicates that none of the information upon which the proposal is based can be assumed as correct. Verification of the content is necessary as it forms the basis for approval/disapproval. The summary of environmental commitments in the DPEMP are empty promises in light of the Limitation Statement. 	<ul style="list-style-type: none"> The DPEMP sets out the intentions of Forestry Tasmania. The detail contained in the report has been compiled from authoritative sources. It is not normal to verify information from bodies such as the Bureau of Metrology, Hydro Tasmania and the like. The limitations statement highlights that information received from these bodies has not be verified (as the bodies are considered reputable) Commitments will become conditions of the permit and will then be legally enforceable.
Commitments and conditions	<ul style="list-style-type: none"> All commitments should be made into permit conditions. All permit conditions should be measurable so as to assess compliance FT has not committed to compensate the community in event of environmental damage. 	<ul style="list-style-type: none"> The EMPCA Board will determine whether commitments should become environmental conditions to be incorporated in the permit. Noted The environmental assessment is designed to identify whether the proposal complies with the provisions of

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
		EMPCA. If environmental damage occurs due for example to a spill, it is handled under EMPCA, which provides for penalties and remediation.
Monitoring and compliance	<ul style="list-style-type: none"> The project should not go ahead until a monitoring and remediation system that the community accepts is agreed to. 	<ul style="list-style-type: none"> The environmental impact assessment process is designed to achieve this. A comprehensive monitoring program has been developed and committed to in the DPEMP.
	<ul style="list-style-type: none"> FT will not be directly responsible for the operation due to leasing and subleasing. Therefore, how will FT be held responsible for the operation and how can a leasee be held to permit conditions? 	<ul style="list-style-type: none"> The environmental responsibilities for each facility will be transferred through contractual arrangements. Environmental officers and the community have powers to control activities under EMPCA.
Legal Issues	<ul style="list-style-type: none"> The situation in regard to legal liability needs to be described as the taxpayer supports FT (i.e. who will pay for expenses to contractors/leasees from FT's poorly researched assumptions and assertions. 	<ul style="list-style-type: none"> Proponents establishing on the site conduct their own feasibility studies, there is no liability on the taxpayers.
	<ul style="list-style-type: none"> Issuing of water rights should be coordinated with DPEMP assessment so that relevant complimentary conditions can be included in any permit conditions. 	<ul style="list-style-type: none"> Water rights are coordinated within DPIWE as is assessment of the DPEMP. An application for a water licence has been lodged and is being processed by DPIWE's Water Resources Division.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
Timber resourcing / Forestry management issues	<ul style="list-style-type: none"> • A set of conditions should be set so that certain components will never be constructed or operated unless certain other conditions are met. For example: <ul style="list-style-type: none"> - End old growth logging in entire resource area supplying Southwood - Merchandising yard outputs at least 85% of non eucalypt species harvested as speciality timber or high grade speciality veneer - Veneer mill outputs at least 5% of Southwood supply area total harvest tonnage. - A Tasmanian plywood mil (preferable on site) uses at least 85% of total output of veneer mill. - Saw mill outputs at least 25% of Southwood supply areas total harvest - Chip mill outputs at most 35% of Southwood supply area total harvest - Power station consumes no more than %5 of Southwood supply area total harvest 	<ul style="list-style-type: none"> - Management of forests is conducted under different legislation - The merchandising yard will seek to gain maximum value from all timber, but it is difficult to place arbitrary limits, however, the figures provide a useful target, production against target will be reported. - Difficult to place an arbitrary limit, but this is a good first target value. Production against targets will be reported annually. - This is the next investment aimed for the site - Difficult to place arbitrary limit, but these are worthy targets, production against targets will be reported annually.
	<ul style="list-style-type: none"> • Old growth forests should not be logged. 	<ul style="list-style-type: none"> • Noted – area of old growth logged is progressively reducing
	<ul style="list-style-type: none"> • Because the proposed development is primarily a regrowth operation, logging of old growth forest will be reduced. • Concern about the creation of more plantations to meet additional demand. • Because of the large investment involved in this project, the cessation of old growth logging will be harder to achieve. 	<ul style="list-style-type: none"> • Noted • The total area of plantation in public forest is being developed to ensure a sustainable solid wood supply. In total 5% of public forest areas state-wide will be plantation. • This proposal will only processes regrowth and plantation wood in the sawmill, veneer plant and wood fibre plant. Forest residues for fuel will conform to the Renewable Energy Act requirements.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	<ul style="list-style-type: none"> Concern that logging of old-growth forests reduces vital habitat for rare and threatened species. Page 45 (DPEMP) states that the “Wood Centre is developed around the concept of young wood processing, with the primary feedstock coming from regrowth and plantation timbers” – but the report does not substantiate how this could be done. Plantation establishment, either by clearing native forest or conversion of farmland, must be limited to meet acceptable social and environmental outcomes. 	<ul style="list-style-type: none"> Noted Only logs from regrowth and plantation areas will be sent to the site for conversion to sawn timber, rotary peel veneer and wood fibre. Forest residues for fuel will conform to the Renewable Energy Act requirements. Noted
	<ul style="list-style-type: none"> DPEMP should address the impacts associated with the logging. 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act.
	<ul style="list-style-type: none"> Concern about the effects of logging on flora and fauna. Conditions should be imposed to ensure that no additional areas of rainforest that are of importance to beekeepers are destroyed or degraded 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act.
	<ul style="list-style-type: none"> Concerns about negative impacts from the use of poison to control native animals. Use of 1080 should not be allowed. 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act.
	<ul style="list-style-type: none"> The forestry industry should not be allowed so much self-regulation. Clearing large areas of forest will impact on greenhouse emissions. 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act.
	<ul style="list-style-type: none"> Forestry practices not sustainable nor best practice. 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act.
	<ul style="list-style-type: none"> Southwood proposal is primarily a woodchip proposal. The issues of paper conservation, alternative fibres and / or more comprehensive recycling programs are not mentioned. 	<ul style="list-style-type: none"> Southwood is about the use of pulpwood for development of rotary peel veneer, recovering greater quality from logs that are harvested. Paper recycling is not an issue for DPEMP
	<ul style="list-style-type: none"> Dissatisfaction with strategic planning and financial 	<ul style="list-style-type: none"> Noted not an issue for the DPEMP

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	management of Forestry Tasmania.	
	<ul style="list-style-type: none"> Development of industrial woodchipping (in Tasmania) has led to job losses and decline of local timber mills. 	<ul style="list-style-type: none"> Noted not an issue for the DPEMP
	<ul style="list-style-type: none"> Concern about the safety of pets in areas where 1080 is used to kill native animals. 	<ul style="list-style-type: none"> Noted not an issue for the DPEMP
	<ul style="list-style-type: none"> In the DPEMP there is no mention of wood coming from outside the area, yet information provided by proponents indicates that 60-70,000 tonnes p.a. will be sourced from east and north of Hobart. 	<ul style="list-style-type: none"> The catchment area for wood to the site is shown in Figure 7 page 48 of the DPEMP this shows that peeler billets for the rotary peel veneer mill are sourced from west and north of Hobart.
	<ul style="list-style-type: none"> A commercially viable tract of native forest should be set aside in the ‘southern forests’ for the long-term production of specialty timbers. Concern that genetically modified species of <i>Eucalypt</i> may be grown (such varieties are less palatable to native herbivores). If hybridisation with natural populations occurs, food sources for native animals would be reduced. Forest areas that contribute to the maintenance of High Quality Wilderness as defined by the RFA and the World Heritage values of the adjacent World Heritage Area must be excluded from logging operations. Hot regeneration burns should not be allowed. Specialty timbers must be harvested according to demand and not selected from trashed forests as an afterthought. 	<ul style="list-style-type: none"> Forest management is regulated by Forestry Act and Forest Practices Act. FT has set aside 7900 ha for the long-term production of specialty timbers No genetically engineered species are grown by FT. The RFA identified and protected over 95% of High Quality Wilderness Areas. Buffer areas have been included in the areas protecting World Heritage. Noted not an issue for the DPEMP Specialty timbers are managed and recovered as part of normal forest harvesting. An annex of Specialty Timbers will be established at the site to ensure recovery of these logs and to help monitor market demand.
	<ul style="list-style-type: none"> All wood supplied to the Southwood site must fully comply with the provisions of the Forest Practices Code. 	<ul style="list-style-type: none"> Wood supply will fully comply
	<ul style="list-style-type: none"> Waste wood is an extremely valuable habitat for flora and fauna. Despite regeneration burns, significant amounts of dead wood are left unburnt. By burning this “waste” wood, the power station will be removing valuable habitat. 	<ul style="list-style-type: none"> Management processes are being developed in conjunction with the Forest Practices Board to address maintenance of habitats.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	<ul style="list-style-type: none"> Concern that <i>E. amygdalina</i> ecosystems (which are under reserved) present around the proposed site will be affected. 	<ul style="list-style-type: none"> Noted. Impacts on the community will be minimised, refer DPEMP page 209; native vegetation will be retained in areas of the site that are not developed.
	<ul style="list-style-type: none"> FT's assertion that the RFA absolves them of any additional reservation responsibilities cannot be sustained. FT must be required to comply with the terms of the RFA in either avoiding destruction of informal reserves or to explicitly identify and secure equivalent alternative areas for reservation. 	<ul style="list-style-type: none"> Not issue for DPEMP Not issue for DPEMP but FT complies with all RFA requirements.
Choice of Technology	<ul style="list-style-type: none"> Investment in wood-fired power technology would be better spent on solar and wind power technologies. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> The new saw milling and peeling processes are a major step forward in the development of the forest industry. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> If regeneration burns are no longer necessary (according to Forestry), why promote pollution and greenhouse emissions by burning wood waste in power stations? 	<ul style="list-style-type: none"> DPEMP does not claim regeneration burns are not necessary, but that the power station will reduce wood burnt in regeneration burns
	<ul style="list-style-type: none"> The commercial production of power by burning wood is outdated, inefficient and polluting, and should not be permitted. 	<ul style="list-style-type: none"> Using forest residues for power production in power stations using modern technology is undertaken in most developed nations with large forests such as Scandinavia, United States and Canada. The power station will contribute to beneficially using energy that is otherwise wasted in a regeneration burn.
Socio-Economic	<ul style="list-style-type: none"> Destruction of Ranelagh playground would undermine community spirit. 	<ul style="list-style-type: none"> Noted, if the playground does have to be acquired, a new playground located in consultation with the community and fully complying with Australian Standards will be developed. Options for a route that does not impact on the playground continue to be researched.
	<ul style="list-style-type: none"> Increased trespass and theft from properties near site. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> Increased heavy traffic will have negative impact on the community 	<ul style="list-style-type: none"> Road improvements and footpaths will mitigate to a degree the increase in traffic.
	<ul style="list-style-type: none"> The proposed development would decrease quality of life for 	<ul style="list-style-type: none"> On the whole, the benefits of the proposal are assessed as

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	residents in the region as a result of noise and visual pollution.	greater than the impacts
	<ul style="list-style-type: none"> The proposed development would increase quality of life for residents in the region. 	<ul style="list-style-type: none"> On the whole, the benefits of the proposal are assessed as greater than the impacts
	<ul style="list-style-type: none"> Huon Citizens for Southwood’s candidates gained 65% of the primary vote in the last Council election. Extrapolation of the number of ballots cast indicates 80% local support for the development. 	<ul style="list-style-type: none"> Noted
	<ul style="list-style-type: none"> Residents may leave the Ranelagh area if the project proceeds. This would cause significant community disruption. Any new playground needs to be in central area and there need to be foot paths to gain safe access to it. There should be a comparative discussion on the potential community impacts if the wood centre produced a different mix of products e.g. furniture. The noise and visual impacts on users of the South-West Conservation Area should be assessed. The development would negatively impact Tasmania’s ‘clean, green’ image. There is a need to ensure that areas identified as important by tourism operators are securely protected from degradation by incompatible uses. There is no mention in the DPMP as to if crafts people will be allowed to continue scavenging for timber. 	<ul style="list-style-type: none"> The Southwood development will provide a range of opportunities, it is hoped that the whole Valley will benefit from the development. Noted and agreed The planning scheme amendment makes provision for any wood based value adding to occur on site. The community has proposed several ideas for activities that may occur on the site. It is expected that over time investment to make those ideas a reality will occur. Assessment has been made both of noise and visual impacts refer page 83- 85 and page 203. Noted the project improves value adding to our timber and reduces emissions particularly from regeneration burning. Noted Forest management is regulated by Forestry Act and Forest Practices Act and does not form part of the DPMP. Specialty timber will be segregated at the wood centre and will be available for sale through Specialty Timbers.
	<ul style="list-style-type: none"> Concern that reduced water flow in the Huon River will negatively impact upon downstream users. 	<ul style="list-style-type: none"> River flows are managed by DPIWE under the Water Management Act. Water can only be drawn by a licence, which has conditions to maintain flow.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	<ul style="list-style-type: none"> Concern that aquaculture operations will be negatively impacted. 	<ul style="list-style-type: none"> Direct discharge into the Huon River may only occur in event of a 1 in 10 year 72 hour rainfall event. An extensive monitoring program for both biomonitoring and physical-chemical monitoring of water parameters will be implemented. Consultation with the aquaculture industry has not raised these concerns.
	<ul style="list-style-type: none"> Concern about potential negative impacts to bee-keeping operations. 	<ul style="list-style-type: none"> Noted –FT has to date ensured industry has had greater access then ever, including creation of sites for location of hives in State Forest. FT has an agreement with the Tasmanian Beekeepers Association, which includes agreed protocols of the management of leatherwood trees for honey production.
	<ul style="list-style-type: none"> Concern about a negative impact upon tourism in the region caused by log trucks and the wood centre. 	<ul style="list-style-type: none"> Noted proposals have been developed to integrate tourism activities on the site.
	<ul style="list-style-type: none"> Concern that the organic farming industry will be negatively affected by increased air pollution from regeneration burns and the wood-fired power station. 	<ul style="list-style-type: none"> The emissions for the power station are lower than from regeneration burns. Ground level concentrations of emissions are well within national guidelines. Refer to page 385, section 10.2.
	<ul style="list-style-type: none"> Doubt about the figures for net job creation numbers given in the DPEMP - will new jobs just replace existing jobs in the industry. 	<ul style="list-style-type: none"> Additional processing and value adding are the reasons there is job growth
	<ul style="list-style-type: none"> It is likely that a big haulage contractor will get the job of carting logs. This will severely impact on the small local cartage contractors and will probably result in a net loss of jobs. The DPEMP claims that 200 to 250 jobs will be created. However, employment figures should be given as full-time equivalents as suggested in the Guidelines (Section 3.2.6). Impacts of log trucks on tourism should be addressed as stated under section 3.2.6 of the DPEMP preparation guidelines. A breakdown of the types of jobs that will be created, including 	<ul style="list-style-type: none"> There are no plans for a single contractor to be responsible for log hauling. Appendix D of DPEMP shows the jobs are FTEs at page 39-41 Appendix D of DPEMP considers impact of forest activities on tourism page 8 – 9 Refer Appendix D of DPEMP page 38-41

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	<ul style="list-style-type: none"> potential labour sources, should be provided in the DPEMP. Forestry Tasmania’s exemption from normal corporation laws mean that tourist operators cannot protect their investment from damage caused by deforestation of nearby areas. Because the proposed development is primarily a regrowth operation, it will promote the silviculture industry. The DPEMP has not convinced that the development would have a beneficial economic impact on local community. Tourist traffic to Hartz Mountains and to Tahune Airwalk will be inconvenienced. Insufficient discussion on the effect of rates revenues for Huon Valley Council. There is insufficient discussion on how land values around the site, along the transport route and in the region in general will be affected. Insufficient discussion on the long term effects on the region if the Wood Centre does not proceed. 	<ul style="list-style-type: none"> Noted – FT has not relevant exemptions in this context. Noted Noted refer to Appendix D of the DPEMP This traffic uses roads that are provided and maintained by the forest industry. Extensive upgrading of these roads has been undertaken to assist tourist traffic. The site will pay rates to the Huon Valley Council. Decisions on how these will be applied rest with Council not the proponent. Appendix D of DPEMP discusses current land values at page 23 The consequences of not proceeding with the development have been discussed on page 6, section 1.3.2. The socio-economic impacts of the development are discussed in section 2.9, page 60, and in Appendix D.
	<ul style="list-style-type: none"> DPEMP does not adequately assess the potential impacts upon existing jobs. 	<ul style="list-style-type: none"> There is no discernible impact on existing jobs, timber supply commitments to existing customers will not change so there are no identifiable impacts in the current forest industry. No impacts have been identified on existing jobs in other sectors
	<ul style="list-style-type: none"> Southwood could force out other local saw milling operations. 	<ul style="list-style-type: none"> Not so, local sawmills are provided with timber under contracts of supply that will be fulfilled
	<ul style="list-style-type: none"> Concern about the loss of property values. 	<ul style="list-style-type: none"> Appendix D of DPEMP discusses current land values at page 23
	<ul style="list-style-type: none"> Veneer is only a low value added product. 	<ul style="list-style-type: none"> Rotary peel veneer has more than 3 times the value of current alternative uses for pulpwood.

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
	<ul style="list-style-type: none"> Concern about the loss of land or houses in Ranelagh. 	<ul style="list-style-type: none"> Noted, where acquisitions are required owners will receive compensation. It is not expected that any houses will be lost in Ranelagh with the North Huon Road option.
	<ul style="list-style-type: none"> Not clear that project is economically viable and need to know that operators with sufficient experience are willing and able to operate the various different parts of the project. 	<ul style="list-style-type: none"> Investment banks will only lend for viable projects that are sustainable and operators that are experienced. Experienced operators and developers have been selected and will invest only if the project is viable.
	<ul style="list-style-type: none"> Statistics in DPEMP suggest the Huon area is not economically depressed relative to other parts of Southern Tasmania – and benefits of job creation will be marginal Statement in DPEMP (p.51) about economic benefits is unsupported. A full, independent cost/benefit analysis should be undertaken. 	<ul style="list-style-type: none"> Noted, page 21 of Appendix D indicates that unemployment rates in the Huon area are high so job creation will assist in improving the economy. Refer Appendix D of DPEMP Noted
	<ul style="list-style-type: none"> Concern about economic impact on Ranelagh Nursery from (1) road widening which may destroy commercially important stock plants that cannot be easily relocated, and (2) a negative impact from increased truck traffic. An adjacent property purchased with intent to establish eco tourism facility will be useless for this purpose if Southwood goes ahead. Owner will suffer economic loss. 	<ul style="list-style-type: none"> Road design plans for this area are being provided to Council. DIER is consulting affected property owners. A resolution on the transport route will be finalised this month. There are no plans or other documents that support this statement are lodged with any planning body.
	<ul style="list-style-type: none"> The destruction and relocation of Ranelagh playground is an unacceptable option because of (1) the community's historical links to the site, (2) the community's commitment to the current site, (3) the safe and secure environment provided at the current site and (4) the low level of vandalism at the site. Other sites would most likely not have these features. 	<ul style="list-style-type: none"> Noted, consultation with the community on this issue is continuing
	<ul style="list-style-type: none"> Any infrastructure requirements should be paid by the proponent and not from government tax revenue 	<ul style="list-style-type: none"> All site infrastructure is being provided by the proponents and the proponents will pay for upgrading North Huon Road
	<ul style="list-style-type: none"> Local processing of timbers will provide additional employment and other economic benefits for local residents. 	<ul style="list-style-type: none"> Noted

<i>PUBLIC SUBMISSIONS – OTHER ISSUES</i>		
<i>General issue</i>	<i>Detailed comment</i>	
Miscellaneous	<ul style="list-style-type: none"> DPEMP needs to indicate that Electrona is no longer an option for export of wood chips (several references in the DPEMP appendices still refer to Electrona as a potential export port). 	<ul style="list-style-type: none"> Appendices were compiled from studies over a 12 month period. Electrona was a proposal by Hobart Ports Corporation, which they are no longer pursuing. The conclusions of those reports remain valid.
	<ul style="list-style-type: none"> The potential impacts of power lines and corridors should have been assessed in the DPEMP. The DPEMP should have described and mapped power line corridors. 	<ul style="list-style-type: none"> A separate Development Application will be submitted for these developments. The power line follows Lidgerwood/Arve Roads, a standard pole mounted line is planned.
	<ul style="list-style-type: none"> Lack of discussion of pulp production. 	<ul style="list-style-type: none"> Pulp is not intended to be produced on site
	<ul style="list-style-type: none"> Environmental damage cannot be assuaged by compensation. The ongoing effects of degraded social impressions of the area cannot be "managed" to continue to accommodate alternative expectations for the area. 	<ul style="list-style-type: none"> Noted

1.2 Tasmanian Agencies – Comments

The following table summarises the Tasmanian agencies (other than DPIWE) representations and provides a response by FT.

AGENCY	DETAILED COMMENT	
General	Difficulty was experienced with the quality of the information provided. At least one appendix on the CD Rom was unreadable (Coffeyre.pdf).	Noted, the document became illegible due to conversion of the report into pdf format. Hard copies were provided when requested. A legible word document is included in this supplement (Appendix A).
Dept. Infrastructure, Energy and Resources Mineral Resources Tasmania	<p>The Sloane Weldon report identifies a heterogeneous sequence of thin beds of materials that are discontinuous across the site, which indicates lateral heterogeneity. It is likely that water will infiltrate the heterogeneous sequence of thin beds of materials that are spread discontinuously across the site (as identified in <i>Appendix W “Preliminary Hydro-Geological Assessment Southwood Resources”</i>) once these beds have been disturbed during construction activities. Water infiltration may also be enhanced by the proposed wastewater re-use scheme. There is therefore the potential to raise the local water table and affect slope stability in places.</p> <p>The assumption that the potential for groundwater contamination is low is based on a very limited site investigation and may not be fully representative of the site.</p> <p>The location of the proposed power station close to the site of an existing landslide requires a detailed assessment of the long-term stability of the area prior to construction of the power station. This assessment should consider issues such as the proposed foundation design and operating methods of the power station.</p>	<p>More detailed hydrogeological and geotechnical investigations will be undertaken during the engineering design phase to ensure appropriate foundations and groundwater investigations are completed before the final design and tender documentation is prepared². The investigation will include <i>in-situ</i> permeability</p>

² Commitment: Hydrogeological and geotechnical investigations will be undertaken prior to construction undertaken during the engineering design phase to ensure appropriate foundations and groundwater investigations are completed before the final design.

AGENCY	DETAILED COMMENT	
	<p>Therefore it is recommended that a more detailed combined hydrogeological and geotechnical investigation be conducted prior to construction. This work should incorporate <i>in-situ</i> permeability tests to at least the maximum excavation depth. In addition, the depth of the groundwater table is to be further investigated by installing at least one deep monitoring bore.</p>	<p>tests to the maximum excavation depth and a groundwater monitoring bore will be installed and monitored³. The location of the groundwater monitoring bore will be chosen in consultation with DPIWE.</p>
	<p>The proposed settling ponds (i.e. the sewage polishing pond and the processing wastewater / stormwater storage ponds at the Wood Centre as well as the sewage storage pond at the irrigation site) would have the potential to produce a significant vertical hydraulic gradient should leakage occur.</p> <p>To ensure the lagoon liner design is satisfactory for the site conditions, adequate baseline data for groundwater underlying the site should be obtained prior to commencement of construction. The proposed DPIWE standards applying to Liner Construction for Sewage Lagoons could be used as a <u>minimum</u> standard for the proposed liner design. Following the completion of the pre-construction detailed geotechnical and hydrogeological investigations of the site, the information pertinent to the proposed site of the lagoons should be assessed in detail by a recognised, suitably qualified and experienced hydrogeologist, to ensure that the design is appropriate to the site. The assessment should ensure that the attenuation / adsorption characteristics of the proposed design will meet the attenuation / adsorption characteristics for groundwater protection embodied in the relevant Australian and International Guidelines and Standards for sewage lagoon or landfill liner design. Compliance with relevant Australian and other standards should be regularly monitored to ISO</p>	<p>Settling pond liners will conform to DPIWE standards applying to Liner Construction for Sewage Lagoons⁴. In addition, compliance with relevant Australian and other standards will be regularly monitored to ISO 9000 during construction of the liner.</p> <p>The groundwater and unsaturated zone at the site will be regularly and frequently monitored during and post construction to ensure the construction is appropriate to on-site conditions, and remediation work will be undertaken where necessary.</p>

³ Commitment: Conduct permeability testing to maximum excavation depth and install and monitor one groundwater bore on-site.

⁴ Commitment: Construct settling pond liner to conform to DPIWE standards applying to Liner Construction for Sewage Lagoons and relevant Australian standards. Groundwater will be monitored during and after construction.

AGENCY	DETAILED COMMENT	
	<p>9000 during construction of the liner. With clay liners, sources of suitable material need to be identified and representative samples of material should be subjected to testing, including permeability tests at suitable recompacted densities. Alternatively, a compound lining system (incorporating a synthetic membrane) could be considered.</p> <p>The groundwater and unsaturated zone at the site should be regularly and frequently monitored during and post construction to ensure the construction is appropriate to on-site conditions, and remediation work undertaken where necessary.</p> <p>It needs to be confirmed that settling pond liners will conform to these requirements.</p>	
	<p>Cut-off drains should be constructed with due regard to material permeability's and to prevent ingress into the slopes.</p>	<p>Noted, proposed and included as a commitment⁵.</p>
	<p>Irrigation Area: The potential for soil salinisation in the waste water re-use area should perhaps be assessed because of the apparent surface evaporation noted in <i>Appendix W</i>. The suggested number of monitoring of groundwater bores at the irrigation area appears insufficient and advice should be sought from an experienced hydrogeologist to ensure that these areas are</p>	<p>Noted and advice from appropriately qualified professionals will be used to assist in developing irrigation plans. If deemed necessary by the professional, the potential for soil salinisation</p>

⁵ Commitment: Construct cut-off drains with regard to material permeability to prevent ingress into slopes.

⁶ Commitment: Consult a qualified professional to develop the irrigation plan and assess the potential for soil salinisation.

AGENCY	DETAILED COMMENT	
	adequately monitored.	will be assessed ⁶ .
	Regular monitoring of groundwater (<i>i.e.</i> with respect to the Wood Centre site as well as the irrigation site) should commence prior to work beginning, and a monthly for six months regime is suggested. Hydrocarbon contamination is possible at the site, and it is recommended that the number of parameters routinely analysed be increased to include Total Petroleum Hydrocarbons and Polyaromatic Hydrocarbons.	Noted and will be implemented ⁷ . The results of this monitoring will be used as baseline information to compare to monitoring results following commencement of operations.
Dept. Infrastructure, Energy and Resources Transport Division	The proponent should commit to facilitating noise and environmental awareness training for transport operators, and also the adoption by operators of a Code of Good Driving practise.	Commitment 19 Chapter 4 covers the use of trained drivers. In addition, operators will adopt a Code of Good Driving Practise ⁸ .
	DIER welcomes the commitment to prepare a Traffic Management Plan and offer assistance in its preparation. Further consultation with DIER will be required during the implementation phase.	Commitment 22 Chapter 4, Section 4.5.5 refers to the Traffic Management Plan. It is noted that DIER will assist in its preparation and ongoing dialogue with DIER will continue during implementation ⁹ .
Inland Fisheries Services	In relation to Section 3.3.2 ‘Huon River Hydrology’ (Table 14), it is noted that the conversion of cumecs to daily megalitres is inaccurate. These figures should be revised and resubmitted	Source for this comment cannot be identified, conversions are correct.
	Under Section 5.5.1 ‘Description of Operation and Equipment’ the description of the proposed Water Pumping Station is not sufficiently detailed. There may be potential fish passage issues during the construction phase, as water will be diverted around the excavation area. In addition, there may be on-going impacts on fish populations if the pumping station is not designed with appropriate consideration of	Detailed designs for the pumping station will be prepared as part of the construction phase. The concept design drawings are

⁷ Commitment: Groundwater monitoring at the Wood Centre and irrigation sites will be undertaken prior to initiation of the development at monthly intervals for a period of six month with frequency thereafter to be reviewed based on an evaluation of monitoring data. Analysis will include Total Petroleum Hydrocarbons and Polyaromatic Hydrocarbons in addition to regular parameters.

⁸ Commitment: Operators and drivers will adopt a Code of Good Driving Practise.

⁹ Commitment: Consult DIER about the preparation and implementation of a Traffic Management Plan.

AGENCY	DETAILED COMMENT	
	<p>these issues. For example, it may be necessary to screen the intake and place deflection panels on either side of the intake to minimise the uptake of aquatic fauna. These issues are of particular importance considering the potential presence of a threatened fish species, the Australian grayling (<i>Protroctes maraena</i>), in the area.</p> <p>More construction detail is required with regards to the pumping station to make an assessment of the potential aquatic fauna impacts.</p>	<p>shown in the Appendix B of this Supplement.</p> <p>Approaches to minimising impact on fish and fish habitat as a result of water abstraction are provided in Section 2.2 of this Supplement.</p>
	<p>The DPEMP should specify how the disturbance of riparian vegetation associated with the intake structure and delivery pipe will be minimised.</p>	<p>Refer to Section 2.2.1 of this supplement for details on riparian vegetation mitigation measures as they relate to the water abstraction pump and pipeline.</p>
	<p>DPEMP should indicate how material cleaned out of the sump (river rocks & debris) will be disposed of.</p>	<p>It is not anticipated that the sump will accumulate debris due to the intake design.</p>
	<p>The DPEMP should indicate what water metering device will be used to measure Huon River extraction levels.</p>	<p>The water metering device will meet the requirements of the license under the Water Management Act.</p>
	<p>Chemical thresholds indicate acceptable working limits. These thresholds should be based on baseline data (if available) as well as recognised state and national standards. As the proposed site is the uppermost development on the Huon River that could potentially affect water quality thresholds should be calculated accordingly and noted based solely on ANZECC Guidelines.</p>	<p>Proposed water quality monitoring (Section 5.8.2, DPEMP) will be undertaken to ensure that the site conforms to the recognised state and national standards. Threshold water qualities values will be developed from the baseline data collected prior to commencement of operations. Water quality objectives that are based on Protected Environmental Values (PEV) are currently being developed for the Huon River. The Wood Centre will comply with the water quality objectives when they are available.</p>
<p>State Emergency Service</p>	<p>Satisfied that public safety issues have been considered and dealt with appropriately.</p> <p>Some concerns remain in relation to potential for increased accident risk due to the transport of material, especially on the link roads to and from the ITPS.</p> <p>Notwithstanding the measures outlined in the INDEC report, the</p>	

AGENCY	DETAILED COMMENT	
	<p>probability of accidents occurring is likely to increase. The issue may warrant an examination by emergency services of response capabilities within the area.</p> <p>Relevant parts of the DPEMP have been forwarded to the Southern Region Disaster Planning Group (SRDPG) for consideration and comment if applicable.</p>	<p>Noted, and comments by SRDPG will be adopted as commitments by FT if they are considered significant to the safety of the operation.</p>
Tasmania Fire Service	<p>Sufficient commitments are contained in the DPEMP for TFS to accept that the bushfire hazard will be addressed appropriately. The discussion in Chapter 5 provides an appropriate description of the proposed fire and emergency management plans & the commitments provided are considered adequate</p>	<p>Noted</p>
Tourism Tasmania	<p>The proposal needs to effectively balance the interests of forestry operations and tourism to ensure that the State gains maximum advantage from the use of its forests.</p>	<p>The proposal will contribute to the development of both tourism and forest industries in the State. This issue is discussed in Socio-Economic Report, Appendix D of the DPEMP. The site will have a tourism component, as tours will be made available to view the industrial component.</p>
Co-ordinating Group for Wastewater Reuse	<p>The CG acknowledges that a detailed Site Management Plan is to be developed at a later stage. The CG will consider the proposed Irrigation Scheme once this information is available.</p>	<p>The Irrigation Management Plan will be submitted.</p>
	<p>On the basis of the preliminary information contained in the DPEMP, the CG offers several suggestions in terms of key issues likely to require careful consideration:</p> <ul style="list-style-type: none"> - Local climatic data will be required to develop a water budget; - Lining of the wastewater storage lagoon situated at the irrigation site will be required; - Soil characteristics will need to be investigated by means of a detailed field survey; which should include physical (e.g. permeability) and chemical (e.g. nutrient status, salinity risk); 	<p>Weather monitoring station installation is being planned. The data provided by the station will be used to develop the water budget.</p> <p>All issues noted will be addressed as part of the Irrigation Management Plan.</p>

AGENCY	DETAILED COMMENT	
	<ul style="list-style-type: none"> - Detailed hydraulic, nutrient and salt budgets will be required; - Moisture monitoring is likely to be a requirement; - Health implications for the public and workers on site will require consideration. 	
<p>Dept. of Health and Human Services</p>	<p>Cooling towers: Cooling towers are to be registered with the local municipal council, as required in the Public Health Act (1997) and maintained /operated as specified including compliance with the 'Tasmanian Guidelines for Legionella' (2001) issued by the Department of Health and Human Services.</p>	<p>Noted – refer to Section 2.7 of the Supplement and Appendix C.</p>
	<p>OH&S: In general, a program of occupational safety and health that complies with the Workplace Health and Safety Act 1995 should be developed and implemented. This will usually require compliance with a specific auditable management system such as "SafetyMap" (Victorian Occupational Health and Safety Authority) and or Australian/New Zealand Standard 4804: 1997 'Occupational health and safety management systems - General guidelines on principles, systems and supporting techniques' (document currently under review).</p>	<p>Noted – refer to Section 2.8 of the Supplement.</p>
	<p>Noise Impacts: It would be worthwhile to assess noise-related impacts on human health in the context of a recent publication by the National Environmental Health Forum, "Environmental Noise and Health".</p>	<p>Noise-related impacts on human health will be assessed in the context of "Non-Auditory Health Effects of Noise" published by the National In-House Council when the publication becomes available. At present a standard for assessing noise-related impacts on human health is not available.</p>

1.3 DPIWE – Comments

The following table summarises the representations from submitted by DPIWE and provides a response by FT.

ISSUE	DETAILED COMMENT	
General	Difficulty was experienced in reading some of the diagrams due to poor reproduction of the maps etc. The quality of these documents was found to be fuzzy and illegible in some cases.	Noted – Image quality was reduced during the conversion to pdf format.
Earth Sciences	Geoconservation Issues: A field survey of the Wood Centre site is required to identify the location and value of geoconservation features. Regolith profiles (<i>i.e.</i> soil and unconsolidated material overlying bedrock) should be recorded during this survey. The survey is to be conducted prior to construction and the results should be taken into account in the development of the Construction Management Plan. Note that advice from DPIWE's Earth Science section should be sought in relation to required scope and detail of the survey.	Noted – Consultation with DPIWE will be sought regarding the scope and detail of a survey of geoconservation values. The survey will be undertaken prior to construction and the results will be integrated into the Construction Environmental Management Plan. ¹⁰
Fauna	Mt Mangana stag beetle: For the species in question, relocation may not a feasible option, as there may be no suitable habitats with a capacity to accommodate the beetle. Also, there is an issue with mixing genetically different populations. As a last resort, the proponent may in this situation seek permission from the DPIWE to disturb or destroy a threatened species. Whether this is required or not will depend on the outcome of the site survey to be conducted prior to construction works. Note that advice from DPIWE's Threatened Species Unit should be sought in relation to the required scope, detail and timing of such a survey.	Advice from DPIWE will be sought regarding the scope, detail and timing of the Mt. Mangana stag beetle survey (Commitment 68, page 210 of the DPMP). If the survey proves that the beetle exists on the Wood Centre site, consultation with DPIWE regarding actions to be taken will be sought.
Surface Water Issues	To assess possible impacts on river health on the Huon River and tributaries adjacent to Southwood irrigation coupes, a biomonitoring study should be undertaken at a series of locations as follows:	

¹⁰ Commitment: Conduct a survey of geoconservation features including regolith profiles prior to construction and integrated into the Construction Environmental Management Plan.

ISSUE	DETAILED COMMENT	
	<ul style="list-style-type: none"> • Kings Creek upstream of confluence with Huon River • Griggs Creek upstream of confluence with Huon River • Huon River upstream of Southwood development (control) • Huon River downstream of development <p>Possible impacts of the development on river health should be determined using a Before versus After/ Control Impact experimental design (BACI). Sampling should take place twice per year in Spring and Autumn using standard AUSRIVAS protocols to generate O:E outputs. It will be necessary to undertake surveys to establish a “pre-development” dataset for comparison with “post development” data. This output should be reviewed in conjunction with standard AUSRIVAS habitat assessment and water quality monitoring as detailed in the DPMP.</p>	<p>As discussed in Volume 1, Chapter 5, Section 5.8.2, bio monitoring will be implemented. The suggestions for biomonitoring locations will be adopted and the BACI approach will be applied¹¹. Refer to Section 2.3 of this supplement.</p>
<p>Industrial Practice</p>	<p>There are many indications in the body of the text that the principles of Best Practice Environment Management (BPEM) will be implemented during construction and subsequent operation of the proposed integrated timber-processing site.</p> <p>The implementation of an ISO 14001 (or equivalent) certified EMS system is considered as a crucial step in ensuring that BPEM is delivered, as it would ensure that principles of continuous review and improvement and strategic planning inherent in BPEM (as defined in EMPCA) will be applied an to both technology and management practices. Such an EMS should be in place for the construction phase, if possible.</p>	<p>John Holland and Forestry Tasmania each operate an Environmental Management System (EMS) independently certified to ISO 14000. Procedures complying with the EMSs will be in place throughout the construction and operational phases¹² – refer Section 2.9 of this supplement.</p>
	<p>It is indicated that fire-water contaminated from fire fighting will be collected in the stormwater / processing wastewater storage ponds.</p>	<p>Contamination of water storage ponds with fire water is expected to be an extremely rare event, the likely impacts will only last for a</p>

¹¹ Commitment: Conduct biomonitoring using the BACI design at the four defined sites on the Huon River and Kings Creek.

¹² Commitment: Operate EMS in conformance to ISO 14000 certification during construction and operation of the Wood Centre.

ISSUE	DETAILED COMMENT	
	<p>The potential for contamination of the water and implications for recycling operations should be considered, particularly in view of the proposal to reuse processing wastewater for cooling tower purposes.</p>	<p>brief period of time and will be managed by increasing the volume of water directed to irrigation from the first of the three storage ponds. By managing the ponds sequentially, clean water for use in the cooling towers can still be made available from the third storage pond in the worse case scenario.</p>
<p>Description of Processing Operations</p>	<p>Chapter 5: According to the DPEMP, only areas, which have not been developed, <i>i.e.</i> 25% of the total area, will continue to drain to natural drainage lines. It is not clearly specified what characterises an "undeveloped" area, but a reasonable assumption is that there will be no processing activities, no buildings or permanently installed equipment and no regular vehicular traffic. This requires clarification.</p>	<p>The intent of the DPEMP is in accordance with this assumption <i>i.e.</i> an "undeveloped area" on the Wood Centre is an area without processing activities, buildings, permanently installed equipment or regular vehicle traffic.</p>
	<p>Chapter 6 (Merchandising Yard): It should be clarified whether debarking will occur in the yard or in the forest.</p>	<p>Debarking will continue to occur in the forest.</p>
	<p>It is not indicated what the arrangements for stockpiling of unprocessed fuelwood or processed will be. Preference should be given to storage of such materials under cover and away from any stormwater collection system. The same comment applies in relation to the product (comminuted fuelwood).</p>	<p>The conceptual plan for the Wood Centre illustrates the location and size of the Power Station fuelwood stockpiles. One of the two stockpiles is covered. All fuelwood produced by other facilities on-site will be contained (e.g. fuel storage silo at the RPV Mill and the shavings bin at the Sawmill) or transported on covered conveyors as illustrated in Figure 27, Chapter 7. No will stockpiles will be required to supply the heat plants. The conceptual site layout diagram shows a processed woodfibre pile within the Wood Fibre Mill area (not the Merchandising Yard). The potential impacts and mitigation measures are covered in Chapter 9.</p>
	<p>From the information provided in the DPEMP, it is not clear whether the hogger will be enclosed or in the open. Page 229: "...some fuelwood processing activities will be conducted in an enclosed building". This is not reflected in the Description of Buildings Section (p. 233). This needs to be clarified.</p>	<p>The fuelwood processor/hogger is recognised as a source of noise from the Merchandising Yard. As a result, it will be located within a building as indicated by the closed box around the "Fuelwood Processor" Figure 5: Conceptual Layout.</p>

ISSUE	DETAILED COMMENT	
	<p>Page 232: Removal of fuelwood by loader has the potential to significantly increase airborne emissions and increase the loading on the wastewater treatment / storage system. This practice would not be considered to be BPEM. Enclosed conveyors / strips and / or automated blower system are preferred methods of delivery of fuelwood to the respective facilities.</p>	<p>Noted – loaders are intended to move fuel from stockpiles to bunkers (short distances only) or to load bins for longer distance transport such as for the fuelwood processor at the Merchandising Yard to the Sawmill or Rotary Peeled Veneer Mill.</p>
	<p>Page 234: “A central Wood Centre refuelling station will be provided within the Merchandising Yard.” Figure VII in Exec. Summary indicates otherwise (refuelling station outside of the Merch. Yard). This is important from an operational / licensing point of view and requires clarification.</p>	<p>The modified boundaries of the Merchandising Yard in Figure VII have been submitted to DPIWE. The modification includes the storage tank as part of the Merchandising Yard.</p>
	<p>Page 234 / 235, Refuelling Station: As the loading / unloading area will be sealed and graded back to the bunded area, it needs to be clarified whether this area will be roofed in addition to fuel tank. If a roof will not be provided, then a stormwater management plan for the bund needs to be provided.</p>	<p>The loading/unloading area and the fuel tank of the refuelling station will be roofed.</p>
	<p>Chapter 6, S. 6.1.4: Air emissions from the stockpiling stage are not recognised. These can be significant and should be addressed.</p>	<p>To provide clarification, air emissions from stockpiling were not recognised as a separate issue in Section 6.1.4, however, the activities of stockpiling are recognised and included in the third bullet point – Dust from vehicular movements and general site activities, and the fourth bullet point – Diffuse, fugitive sawdust and wood fibre particles associated with log cutting activities, fuelwood processor and vehicular movements in the yard.</p>
	<p>Chapter 6, commitment 19: Comment is made that no wood waste materials will be stockpiled for long periods of time. A time frame should be included here.</p>	<ul style="list-style-type: none"> • Refer to Section 2.5 of this supplement.
	<p>Chapter 7: It is not clear what controls, if any, will be applied to minimise the fire risk represented by wood fibre stockpiles which are to be located inside the Wood Centre’s ring road.</p>	<ul style="list-style-type: none"> • The sawlog stockpile within the ring road will be sprayed during dry weather conditions to maintain the sawlogs for milling. This is illustrated in Figure 26 and discussed in

ISSUE	DETAILED COMMENT	
		<p>Section 6.1.1. The water spray will aid in minimising the fire risk associated with the stockpile.</p> <ul style="list-style-type: none"> • The Fire Management strategy will take into account stockpile size and location in order to minimise the potential of self-combustion¹³. The wood fibre stockpile shown in the ring road will only be created in event of a technical requirement associated with the wood fibre operation. It is not intended that this be a permanent pile. Standard fire hydrants will be available to fight fires on the stockpile. Spontaneous combustion does not normally occur in hardwood wood fibre piles. • Heat plant stockpiles are contained in fuel bunkers not in open air stockpiles. • Location of stockpiles on site has been chosen to minimise likelihood of flammable/explosive substances impacting on the stockpile.
	<p>S. 7.2.2 of the DPEMP gives the impression that a dust collection system will also be installed at the green mill. However, the operations' description in Section 7.1.1 does not mention it. This requires clarification.</p>	<ul style="list-style-type: none"> • Sawdust will drop onto the conveyor and be relayed to an enclosed elevated sawdust hopper, illustrated in Figure 27 page 271 and described in Section 7.1.1 page 264.
	<p>Chapter 7 / 8 / 10: It should be confirmed that there will be appropriate arrangements for the storage of ash from the furnace grate of the boiler or heat plants, e.g. storage in a semi-enclosed area which is fire proof. Flue dust collection should be along similar lines.</p>	<ul style="list-style-type: none"> • There will be appropriate ash storage from the furnace grate of the heat plants. The storage will be a semi-enclosed fireproof area. Flue dust will be collected in a similar facility¹⁴.
	<p>Chapter 9, Table 73 (p. 346): Although the table is introduced as “emissions from wood fibre processing and vehicular activities”, vehicular emissions don’t appear to be represented.</p>	<ul style="list-style-type: none"> • Table 73 is incorrectly titled. Table 55 in Chapter 6 covers all vehicular emissions. The only vehicles operating at the Wood Fibre Mill facility will be forklifts from the

¹³ Commitment: The Fire Management Strategy will take into account stockpile size and location in order to minimise the potential of self-combustion and impacts from flammable or explosive substances.

¹⁴ Commitment: Store ash from heat plants in sealed fireproof containment.

ISSUE	DETAILED COMMENT	
	Such figures should be provided if available.	Merchandising Yard or vehicles moving off-site.
Heat Plants / Power Station	<p>According to Table 61 and Figure 28, the input into the sawmill heat plant will be 45,000 t /annum. According to Table 67 and Figure 31, the input into the veneer mill heat plant will also be 45,000 t/annum. Yet the sawmill heat plant will be designed to produce 5 MW vs. 15 MW at the Veneer Mill.</p> <p>Clarification is required.</p>	<ul style="list-style-type: none"> In Sections 7.1.1 and 8.1.1 the heat plants for the two facilities (Sawmill and RPV Mill) should be described as “designed to produce 15 MW”. Under this design, the heat plants will consume 45,000 tonnes per annum of fuelwood and produce the emissions described throughout the DPEMP. There was a typing error in reference to the Sawmill heat plant.
	<p>Section 6.1.1 explains that fuel supplied by the Fuelwood Processor will be dried to a moisture content of between 25 – 50% and blended to achieve a consistent moisture value. In addition, the moisture content is to be monitored by means of an automatic moisture meter.</p> <p>Clarification is required on whether the same approach will be used to monitor the moisture content of fuelwood being used for the sawmill and veneer mill heat plants, and if not, why not.</p>	<ul style="list-style-type: none"> The moisture of fuelwood to the Sawmill and RPV Mill will be monitored for a consistent moisture value and will be monitored by means of an automatic moisture meter¹⁵. By ensuring consistent moisture content the efficiency and clean combustion will be achieved in the heat plants.

¹⁵ Commitment: Fuelwood for the Sawmill and RPV Mill heat plants will be monitored for moisture content by means of an automatic moisture meter.

ISSUE	DETAILED COMMENT	
<p>Noise</p>	<p>Chapter 4, page 133: It was previously agreed that the criteria to be used for transport noise in this case would come from the NSW EPA - "Environmental Criteria for Road Traffic Noise" and that the Southwood-related traffic impacts were consistent with No. 8- "Land use developments with potential to create additional traffic on collector road". The criteria to be used allow a day-time (7 am to 10 pm) noise level of 60 dB LAeq (1hr) and a night time noise level of 55 LAeq (1hr).</p> <p>Dot point two on page 133 of the DPEMP suggests that a 2 dB(A) increase is acceptable to the noise levels where mitigation measures have been applied to reduce noise.</p> <p>This is not the intent of the NSW Policy nor was it the intent of the department to permit noise levels to rise more than 2 dB(A) over the existing levels <u>unless all reasonable steps had been taken to mitigate the noise from transport</u>.</p> <p>In any case, the NSW approach does not allow for an exceedance of the day and night criteria mentioned above. However, page 135 of the DPEMP notes that at times, noise levels may be exceeded in terms of peak noise events during the night.</p> <p>The information presented in the DPEMP does not provide a convincing argument that an environmental nuisance will not be generated as a result of transport activities related to the Wood Centre operation, particularly at night-time.</p>	<p>Noted -Refer to Section 2.4.1 of the Supplement.</p>
	<p>Power Station, p.389: Pearu Terts' report is not clear in terms of the expected noise level from the transformer (<i>i.e.</i> last line on page 7 contains two results, 17.2 and 0.8 dB(A); and the wrong figure appears to have been transferred into the DPEMP). Calculations by DPIWE staff indicate that the noise level will be appr. 14.4 dB(A) instead of -0.8 dB(A). This should be re-evaluated and Table 87 (Cumulative Effects) should</p>	<p>Noted -Refer to Section 2.4.2 of the Supplement.</p>

ISSUE	DETAILED COMMENT	
	be changed accordingly if necessary.	
	Table 87: It is not clear if safety steam release is reflected in the overall calculated noise level of 28.4 dB(A). Clarification is required.	The safety steam release has not been included as this event occurs rarely and does not last long.
Air Emissions	Page 387 contains statement: "(the Air Regulation Emission Levels shown in Table 80) will be met as part of the performance requirements." However, the Monitoring Section (page 406) does not mention that in-stack monitoring for NO _x , SO _x or CO will be undertaken. Note that BPEM in wood-fired power stations would normally require continuous in-stack NO _x monitoring, unless the air quality model clearly demonstrates that NO _x is not an issue. In-stack sampling requires appropriate sampling stations and therefore needs to be considered as part of the design. It needs to be clarified whether facilities will be designed to enable in-stack monitoring .	Noted -Refer to Section 2.1 of the Supplement. In stack monitoring stations will be provided ¹⁶ . More detailed air modelling has been committed to. If the results of that modelling indicate that continuous in stack monitoring is desirable then it will be implemented. Refer to Section 2.1 of the Supplement.
	The Air Quality Modelling Report recognises that local meteorological data will be necessary in order to come to a reasonably accurate prediction of potential impacts on air quality. Forestry Tasmania should indicate what progress, if any, has been made in respect of the installation of an appropriate monitoring station at the Wood Centre site. Forestry Tasmania should provide an outline of the scheduled further actions in terms of air quality modelling, with the aim of demonstrating how a comprehensive assessment of air quality impacts can be provided within the projected timeframes for commissioning of the proposed Wood Centre activities.	Planning installation of a weather station in the local area is progressing, it is anticipated that a station will be in place by December 2001. Weather data will be gathered for 12 months and a revised atmospheric model will be provided to DPIWE prior to commissioning of the power plant (in early 2003). The heat plants may be commissioned prior to the completion of the full year model. In the unlikely event that the Power Station is to be commissioned prior to December 2002, the atmospheric model will be run with the available data i.e. 6 to 12 months. This model will include the winter months and thereby provide a good model. Modelling will not be conducted for the heat plants alone because

¹⁶ Commitment: Provide in-stack monitoring stations and undertake continuous monitoring if the results of more detailed air modelling indicate this is desirable.

ISSUE	DETAILED COMMENT	
		a worse case scenario model of the power station and heat plants has already shown that no negative impact will result. Refer to Section 2.1 of the Supplement.
	<p>The DPEMP notes that background air quality at the site is expected to be good because of its remoteness. This assumption appears reasonable.</p> <p>However, because of the high reliance on domestic fuel heating in the region (containing Glen Huon and Huonville) and the potential for poor atmospheric dispersion, it is possible that the Air NEPM standard for PM 10 in the region may at times be exceeded. There is value in establishing ambient air monitoring (for particles) in a near-by community to evaluate air quality prior to and post construction of the proposed facilities. A minimum of 12 months monitoring is recommended.</p>	Agreed, an air monitoring program will be established in the region in consultation with DPIWE at least 12 months prior to commissioning of the power station ¹⁷ .
	<p>Table 55 provides estimates of vehicular emissions for the Merchandising Yard as well as an estimate of total green house gas production level on page 242.</p> <p>Similar estimates should be consistently provided for all facilities, or alternatively a total site-wide estimate could be provided in the Cumulative Impacts chapter.</p>	Noted -Refer to Section 2.1 of the Supplement for vehicular emissions for the Sawmill and RPV Mill. The Wood Fibre Mill and Power Station will utilise conveyors for transport of materials around the site and therefore vehicle emissions have not been considered.
	<p>Table 78 (p. 381) estimates annual NOx production as 225 tonnes. In contrast, the estimate provided on page 380 on the basis of “typical composition” of power station flue gas estimates that 960 tonnes will be produced.</p> <p>Clarification is required.</p>	Correction to data made. Refer to Section 2.1 of the Supplement.
Greenhouse Gas Emissions	<p>Statement on page xiii Exec. Summary: CO₂ emissions from wood combustion associated with the proposed operations will effectively not change from those currently arising from combustion of wood waste on the forest floor.</p> <p>This statement should be put in a local context, e.g. is the wood waste</p>	Forest residues are sourced within a 30 km average radius from the

¹⁷ Commitment: An air monitoring program will be established in the region prior to construction of the Power Station.

ISSUE	DETAILED COMMENT	
	going to be sourced from State Forest in the Huon District?	site.
	Veneer Mill, Table 6: It is unclear whether the NMVOC emission estimate provided in Table 67 includes emissions from the log steaming and veneer drying processes. This requires clarification.	Refer to Section 2.1 of the Supplement.
Solid Waste	Table 88: Sludge from the communal storage ponds should be shown as a waste in this table, as the quantities may be considerable. A quantity estimate should be provided, if possible.	It is not possible to estimate this quantity at this stage. However, the DPEMP includes a commitment (Commitment 44; p 198) to develop and implement a sludge maintenance program and a desludging protocol within 12 months of operation.
Wastewater	According to page 7 of the Exec. summary, “the minimum configuration of industries that need to be established on the site to make the Wood Centre economic include the veneer mill, merchandising yard and wood fibre mill. The power station will be subject to factors external to the project which impact on the overall economics of the power station development. It is hoped these will be resolved in time for the power station to be constructed within the 15 months first stage construction (phase).” The DPEMP proposes to utilise a large proportion of processing wastewater / stormwater as cooling water for the Power Station facility. If this arrangement should not be eventuate in reality, e.g. due to the power station coming on line later than other facilities, or technical considerations with regard to the wastewater quality, how will the surplus wastewater be dealt with?	Water usage on site is generally low except for cooling towers. Clean storm water will be used in processing where needed. The balance will be stored and irrigated. If the Power Station does not proceed for some unforeseen reason, FT are committed to providing an alternative wastewater management plan for approval prior to the commencement of construction activities for the proposed activities on the site ¹⁸ . The wastewater management plan will be developed in accordance with the approach described in the DPEMP (p. 173) to minimise overflow events from the storage ponds.
	The on-site screening / interceptor units should be designed to ensure that gross solids are removed as well as suspended solids (e.g. wood fines). This may require a 2-staged sedimentation approach.	Noted and will be implemented
Irrigation	A weather station should be installed at the proposed irrigation area to collect site-relevant data for the calculation of the water budget and wastewater storage requirement.	Planning for a weather station is underway.

¹⁸ Commitment: Provide an alternative wastewater management plan if the Power Station does not proceed.

ISSUE	DETAILED COMMENT	
	This information will be required as part of the Irrigation Site Management Plan.	
Traffic (general)	<p>Clarification is sought in relation to the exact location of the proposed traffic route. A site map should be provided which clearly shows all sections of the preferred traffic routes to and from the Wood Centre.</p> <p>This comment is made with particular reference to proposed export woodfibre truck movements through Ranelagh. Plate 2 in DPEMP is not sufficient for this purpose.</p>	<p>The proposed transport route is shown in the DPEMP in Figure 12 (p. 94) and described in Section 4.5.4 (p. 107). Revised map provided to DPIWE for clarification.</p> <p>Two options for routes through Ranelagh will be provided for simultaneous assessment.</p>
	Confirmation is sought that the Geeveston township will in fact be bypassed as is foreshadowed in the DPEMP on page 99 and the timing of the bypass construction relative to the commencement of operations at the Wood Centre should be specified.	Construction of a haul road parallel to the Huon Highway from Hastings to Lidgerwood Road is part of FT's long term road plans. A bypass of Geeveston as part of this road network will be created within two years of the wood centre being commissioned. Figure 11 on page 93 shows that there are about 34 truck movements per day currently on Arve Road through Geeveston. Until the bypass road is constructed these 34 movements will be replaced with 22 truck movements (Figure 14 page 110) with the direction in which loaded trucks move being reversed from north to south to south to north. The impact of log trucks in Geeveston will be reduced by reducing the number of total movements and eventually eliminated. FT can direct how traffic moves on FT roads so use of the bypass once open will be mandatory. Refer to Supplement for relevant data.
	<p>The assessment of traffic-related noise impacts is based on 48 truck movements per day. This assumes the use of 40 tonne payload trucks (HPV's).</p> <p>The DPEMP states that the use of HPV's is the preferred option, however, Table 33 lists both 28 tonne and 40 tonne vehicles under "Future Movements of Export Wood Fibre".</p> <p>It should be confirmed whether HPV's will be used. This issue needs to be clarified at this stage, due to the implications for traffic-related</p>	<p>The purpose of the conventional truck calculations was to illustrate the lowering of truck movements if HPV are used.</p> <p>HPVs will be used unless there is a sustained view put by the community in favour of conventional trucks and greater movement frequency.</p> <p>It is noted that the use of HPV's for the transport of export woodfibre has implications in relation to noise and the Board may</p>

ISSUE	<i>DETAILED COMMENT</i>	
	noise impacts.	impose an environmental condition requiring the use of HPVs for this purpose.

2.0 Detailed Responses and Supplementary Information

2.1 Atmospheric Emissions

This section contains supplementary information to Volume 1, Chapter 7- Sawmill, Section 7.2.1, Chapter 8 – Rotary Peeled Veneer Mill, Section 8.2.1, 8.2.2, Chapter 10 – Power Station 10.1.4

The following cumulative table provides the detail of the air emissions from each source and provides the total emissions. The sources include:

- Combustion source of the heat plant at the Sawmill;
- Combustion source of the heat plant at the RPV Mill;
- Combustion source of the Power Station;
- RPV Mill process emissions (log preparation and veneer drying);
- Vehicle emissions from the Sawmill;
- Vehicle emissions from the RPV Mill;
- Vehicle emissions from the Merchandising Yard; and
- Dust emissions from chip handling at the Wood Fibre Mill and the Power Station.

In addition, footnotes are provided to indicate the source of the values used to calculate the emission rates.

Much of this data is provided in the DPEMP but has not previously been illustrated in a cumulative table. Some data from the DPEMP has been superseded by the data provided in this Supplement (i.e. Table 78) and some revisions have been made.

Table 1: Atmospheric Emissions from the Wood Centre

	Stack emissions - Combustion			Fugative emissions - Process & Vehicle movements				Total emissions - All sources [kg/year]
	Sawmill & RPV mill heat plants [kg/year]	Power Station [kg/year]	Combustion - All sources [kg/year]	Vehicle emissions [kg/year]	Chipping process emissions [kg/year]	RPV Mill process emissions [kg/year]	Total all other sources [kg/year]	
PM10	n.d.	n.d.	n.d.	4,799 ^o	628 ^p	n.d.	5,428	5,428
TSP	7,650	25,500	33,150 ^a	26,112 ^o	1,328 ^p	106,313 ^q	133,753	166,903
N2O	67,500	12,300	79,800 ^c	7 ⁱ	n.d.	n.d.	7	79,807
NOx	67,500	225,000	292,500 ^d	4,272 ^j	n.d.	n.d.	4,272	296,772
CO	612,000	2,040,000	2,652,000 ^e	2,170 ^k	n.d.	n.d.	2,170	2,654,170
CO2	84,600,000	282,000,000	366,600,000 ^g	336,244 ^m	n.d.	n.d.	336,244	366,936,244
SO2	n.d.	n.d.	n.d.	560 ⁿ	n.d.	n.d.	560	560
CH4	3,780	12,600	16,380 ^b	20 ^h	n.d.	n.d.	20	16,400
NM VOC	6,120	20,400	26,520 ^f	761 ^l	n.d.	n.d.	761	27,281
VOC	9,900	33,000	42,900	781	n.d.	519,750	520,531	563,431

- a) PM: AP 42 Table 1.6-1
- b) CH₄: AGO Greenhouse Stationary Sources Table C.1 line 14
- c) N₂O: AGO Greenhouse Stationary Sources Table C.1 line 14
- d) NO_x: AP 42 Table 1.6-2
- e) CO: AP 42 Table 1.6-2
- f) NMVOC: AGO Greenhouse Stationary Sources Table C.1 line 14
- g) CO₂: AGO Greenhouse Stationary Sources
- h) CH₄: AGO Energy Workbook 98 Table A8 – Industrial Equipment
- i) N₂O: AGO Energy Workbook 98 Table A8 – Industrial Equipment
- j) NO_x: AGO Energy Workbook 98 Table A8 – Industrial Equipment
- k) CO: AGO Energy Workbook 98 Table A8 – Industrial Equipment
- l) NMVOC: AGO Energy Workbook 98 Table A8 – Industrial Equipment
- m) CO₂: AGO Energy Workbook 98 Table A2 – Industrial Equipment
- n) SO₂: AGO Energy Workbook 98 Table 1 page 68 – ADO
- o) PM10 and TSP: AP 42 Section 13.2.2.2 (USEPA 1998)
- p) PM10 and TSP: AP 42 Section 12.2.4 (USEPA 1998)
- q) TSP: AP-42 Wood Products Industry Plywood Manufacturing (10.5)

Note: Fractionated VOC emissions for the RPV mill operations are not available. In order to include these emissions, the emissions from all other sources have been summed under CH₄ & NM VOC. These emissions have then been summed with emissions from the RPV mill included under VOC ‘Total all other sources’.

With respect to the Power Station, the rate estimate of 960,000 kg/yr of NO_x (DPEMP p. 380) is based on an absolute maximum discharge concentration of 500 mg/Nm³ [NO_x production based on concentration]. 500 mg/Nm³ for NO_x had been the proponent's original target allowing for downward movement of regulated levels over the life of the Power Station. The *Discussion Paper on Air Quality Management and Policy Development* (DPIWE January 2000) has recommended a maximum concentration of 800 mg/Nm³ for NO_x.

The actual discharge rate of NO_x is 225,000 kg/yr, which is based on the actual discharge rate of 66.67 gm/s [\sim 120 mg/Nm³]. The figure of 66.67 gm/s NO_x is the likely discharge rate for the Power Station based on design and fuel quality.

The technology that will be used at the Wood Centre is compatible with the values used in the modelling and calculation of emission factors. The values used for modelling and calculations for the Power Station are based on the use of a wood fired boiler in combination with an electrostatic precipitator (AP-42 page 1.6-6 Table 1.6-1). This is the combination that the Power Station proponent has indicated will be used. This combination of technology is applicable to calculations of particulate matter.

The AP-42 emission factor values are based on experiments conducted on the specified pieces of equipment, however the fuel source has never been *Eucalyptus spp.* under experimental conditions as it will be in the case of the Wood Centre. The selection of the most conservative emission factor values was undertaken to overcome the issue of wood source.

The values in Table 78 (DPEMP) represent absolute maximum values. The values used for modelling have been calculated from AP-42, which provides emission rates that are the product of experiments conducted by authorities on the subject of air emissions and emission testing. In addition, the values from AP 42 are used as they are based on accepted Australian practices (AGO) and represent actual Power Station loads. The emission factors have been chosen in accordance with the technology proposed for the Wood Centre.

This section contains supplementary information to Volume 1, Chapter 10, Section 10.2.1, Fugitive Dust and Ash

Fugitive dust may also be generated from the fuelwood storage areas, both covered and uncovered. The generation of dust will be minimised by the use of screening barriers to reduce wind effects. Dust will be controlled such that no visible dust will travel across the site boundary.

This section contains supplementary information to Volume 1, Chapter 7 – Sawmill, Section 7.7.1, Chapter 8 – RPV Mill, Section 8.7.1 and Chapter 10 – Power Station, Section 10.2.2.

The facility for in-stack monitoring will be provided in each of the RPV Mill, Sawmill and Power Station stacks. Power Station monitoring will be undertaken for NO_x and SO_x following the commissioning of the Power Station¹⁹. Monitoring for these elements will also be undertaken should there be a significant change in fuel quality.

¹⁹ Commitment: Undertake in-stack monitoring for NO_x, and SO_x following Power Station commissioning and if there is a significant change in fuel quality.

Continuous monitoring of the stack emissions will be undertaken for O₂ and CO for process control purposes and as an indication of combustion efficiency²⁰.

2.2 Water Supply

The design of the water pumping station to mitigate impact on fish passage was raised as an issue by Inland Fisheries Service. A drawing of the planned intake is provided in Appendix B

The manipulation and diversion of river flows for the purpose of supply of water is known to create adverse effects on aquatic ecosystems and biota. In addition to reducing the flow and amount of fish habitat in a stream, pumping may directly remove fish from the stream, especially in the larval stage that are washed downstream from upstream breeding areas. These primary impacts may have secondary impacts. For example, a reduction in stream flow may cause an increase in water temperature and a loss of seasonal or short-term flow variability, which can have an impact on fish breeding or migration.

The primary impacts will be avoided by appropriate design of the intake and pumping station. The detailed designs for the intake and pump will incorporate mitigation measures to avoid the removal of fish and larvae. As shown on the Pump Station Concept Design, a twin rock filled box culvert will be buried in the shale riverbed. This structure will minimise the intake of fish and larvae.

As discussed in the DPEMP, environmental flows will be maintained to mimic natural flow regimes to avoid the aforementioned secondary impacts on fish habitat. In addition, the wastewater reuse system proposed will reduce the consumption of water and increase the efficiency of water use.

Safeguards against disturbance of the river and banks during construction will be adopted, such as:

- Energy dissipaters;
- Topsoil will be left undisturbed where ever possible, where it is not possible and grading of the river bank is required, the topsoil will be graded away from the river;
- Slopes used as an approach to the river will be kept stable at all times to ensure that sediment is not delivered to the watercourse. Erosion control measures will include use of:
 - Temporary drains placed at the top of the slope and at various points (not exceeding 50 m spacing) along the slope to prevent water from running directly down the slope.
 - Sediment retention fences at the ends of the drains to prevent soil and other surface materials from entering the watercourse or encroaching on the surrounding land. The sediment retention traps may take the form of woven geotextile, e.g. silt lock fencing.
 - Diversion berms must effectively direct water off the construction area by being constructed immediately down slope of the trench breaks.

²⁰ Commitment: Continuously monitor stack emissions for O₂ and CO for process control and combustion efficiency.

- Where possible, the operation of equipment within the river will be minimised in order to minimise the disturbance of flows, aquatic fauna and flora and effect upon water quality.

A Soil and Water Management Plan (SWMP) will be developed prior to construction of the Water Pumping Station. The SWMP will include clean-up and remediation measures to be conducted after the completion of construction. Inland fisheries will be consulted prior to construction to ensure adequate protection measures are incorporated.

2.2.1 Water Supply Impact on Riparian Vegetation

This section contains supplementary information to Volume 1, Chapter 5, Section 5.7.3

The purpose of this section is to specify how the disturbance of riparian vegetation associated with the intake structure and delivery pipe will be minimised. In addition, disturbance and mitigation measures of stream morphology are discussed.

In order to ensure minimum impact by the installation of the intake structure and delivery pipe an assessment of the present condition of the reach morphology that will be affected by the installation, will be undertaken prior to construction. A Before and After Control Impact (BACI) approach will be used and may be conducted in conjunction with the BACI for biomonitoring discussed in the following Section (2.3). The assessment will enable comparison of the reach before and after the construction and the need for subsequent rehabilitation to a form that is as close to the original as possible. Adjacent reaches should be considered during the assessment in order to determine how much variability there is in this region of the Huon River. The assessment will consider such elements as riparian vegetation species and density, volume of large woody debris and pool riffle sequences.

Riparian vegetation clearing resulting from the intake installation will be rehabilitated where possible. The areas where vegetation will not be rehabilitated are likely to be the site of the intake, the pipeline route, the pump house and an access route for maintenance purposes. Native riparian plant species with high root spread and rooting depth are preferable because the root systems are critical for stream bank stabilisation. Root cross-sectional area per shear area is a key parameter for determining a plant's stabilising performance (Phillips et al. 2001). Plants of local progeny will be utilised during bank stabilisation and rehabilitation particularly those with superior root characteristics²¹.

Large woody debris (LWD) plays a significant role in bank stabilisation in river systems. The volume of LWD depends on the size of the catchment and the available sources of LWD from the upstream river banks.

Pool riffle sequences are a fundamental feature of river morphology and their presence improves stream habitat by providing depth variation along the channel. The diversity in depth contributes to increased ecological diversity. It is not expected that the pool and riffle sequence of the Huon River will be impacted by the installation of the water supply intake because the sequence is dependent on environmental flow regimes. FT is committed to ensuring the

²¹ Commitment: Rehabilitate affected Huon River bank with local riparian vegetation progeny of particularly good root characteristics.

maintenance of the Huon River environmental flow however in the event that there is an impact, efforts will be made to rehabilitate the natural sequence.

River rocks and debris are not expected to collect in the sump because of the twin rock filled box culvert, which will prevent such accumulation. In the event that accumulation does occur due to damage or some other unforeseen event, the sump will be cleaned during low flow. A river flow diversion may be installed in-stream in order to gain access to the sump and the material will be removed by manual means. Heavy machinery will not be used in-stream to clean the sump.

2.3 Waste Water Issues

This section contains supplementary information to Volume 1, Chapter 5, Section 5.8.2.

In order to assess the possible impacts of the Wood Centre development on the Huon River and tributaries adjacent to Southwood irrigation coupes, a Before and After Control Impact (BACI) experimental design will be used for the biomonitoring study. The reason for using the BACI approach is to allow comparison of the water quality condition prior to and after the development is commissioned. The condition of the river prior to the development will be used to establish allowable thresholds. In addition, sampling will take place twice per year in spring and autumn using standard AUSRIVAS protocols to generate O/E outputs that indicate specific physical and chemical factors that may be contributing to biological degradation at a site.

The resultant datasets will be reviewed in conjunction with standard AUSRIVAS habitat assessment and water quality monitoring as detailed in the DPEMP.

The BACI study will include four sampling locations, including:

- Kings Creek upstream of the confluence with the Huon River;
- Griggs Creek upstream of the confluence with the Huon River;
- Huon River upstream of the Southwood development; and
- Huon River downstream of the development.

2.4 Noise Issues

2.4.1 Transport Noise

This section contains supplementary information to Volume 1, Chapter 4 – Transport, Section 4.5.5.

The noise assessment has determined that the NSW Criteria for day time and night time will be achieved. This is based on calculated noise levels for a Leq (1 hr). Therefore, in terms of the established noise criteria the proposed traffic from the Southwood development will be in compliance.

As stated in the DPEMP (page 134), in addition to an assessment of the noise levels based on a continuous noise (Leq), it is useful to attempt to assess the potential noise impact in terms of peak noise events. It should be noted however, that there are no definitive criteria for such an assessment. The assessment in the DPEMP suggests that there may be occasions when a calculated peak noise level of 70.9 dB(A) is exceeded, and that some sleep disturbance may occur.

However, it is not possible to quantify this, and the potential impact is dependent on a wide range of factors, including the mitigation measures, which are incorporated into the transport program.

The approach, suggested in the DPEMP, is to:

- introduce all reasonable and feasible noise mitigation measures (including control of engine noise, use of low noise brake systems and use of modern vehicles and highly trained drivers);
- monitor the impacts when the transport program is underway; and
- work closely with the potentially affected community to resolve any adverse impacts.

It is considered that this comprehensive approach is the most effective for this transport operation, given that the calculated noise levels comply with the NSW Criteria for Road Traffic Noise.

2.4.2 Geeveston Traffic Route

A survey of roads, laneways and homes from the Scotts Road intersection with the Huon Highway at the Gateway to the commencement of the State Forest on Arve road was conducted by FT. The total distance is 5.5 km. The following table outlines the results.

Table 2: Geeveston Traffic Route Features

Feature	Results
Roads Intersecting the Route	Brownells Street Church Street School Street Four Foot Road Cemetery Road Wilsons Road Judds Hill Road Hazelwood Road Howards Road Marshes Road Hankin-Robertsons Road
Number of laneways without names	77
Number of businesses fronting road	10
Number of homes on the route	79 Right hand side 30 Left hand side 49
Houses within 5 m of the road	3
Houses within 10 m of the road	11
Houses within 15 m of the road	11
Houses within 20 m of the road	23
Houses within 25 m of the road	4

Feature	Results
Houses within 30 m of the road	12
Houses greater than 35 m off the road	15

No account of the Geeveston business centre was included in this survey but the survey provides an indicative idea of housing density along the route.

On the North Huon Road option, 22 houses would be impacted. Most of the houses are ten metres or more from the road. Traffic will pass in front of the Ranelagh shops. Two houses will have to be acquired, one relocated and the other demolished. Multiple copies of the figure illustrating an alternative route through Ranelagh have been provided to DPIWE.

2.4.3 Noise from the Power Station Transformer

This section contains supplementary information to Volume 1, Chapter 10 – Power Station, Section 10.4.1.

There is an error in calculating the SWL of the 50 MVA transformer. The final sound pressure level at 6 km is -3.8 dB(A). Table 87 (from page 424 has been corrected from 0.0 to -3.8 dB(A). The overall log total is still 28.4 dB(A). All corrections are in bold.

“A 50 MVA transformer is likely to have a sound power level SWL of:

$SWL = 74 + 14 \log MVA = 74 + 14 \log 50 = \mathbf{97.8}$ dB(A). See As 2374.6-1994, Power Transformers, page 22.”

“At 6000 m the sound pressure level is likely to be:

$SPL = SWL - 20 \log r - 8.6(3) = \mathbf{97.8} - 20 \log 6000 - 8.6(3) = \mathbf{-3.8}$ dB(A).

The ultimate design could consist of two transformers – perhaps 30 MVA each so that one could be taken out of service for maintenance. With two 30 MVA transformers operating together (same frequency and phase) the sound pressure level at 6000 m is likely to be 0.9 dB(A). In any case the transformer or transformers are unlikely to be heard at 6000 m.”

Table 87: Summary of Main Noise Sources at Wood Processing Facilities (Terts 2001)

Facility / Activity	Noise Level dB(A) from 6 km	
	Lmax	Leq
Merchandising Yard		
• Log drops (mean)	19.6	
• Log loader		14.3
• Chainsaw		8.9
• Fuelwood Processor		19.1
Sawmill		
• General		10.3
• Log drops (mean)	19.6	
• Log loader		14.3

<ul style="list-style-type: none"> Chainsaw 		8.9
Rotary Peeled Veneer Mill <ul style="list-style-type: none"> General (machine hall noise) Log drops (mean) Log loader Chainsaw 	19.6	0.5 14.3 8.9
Wood Fibre Generation <ul style="list-style-type: none"> General Discrete noise events 	32 – 37.5	25.8
Wood Fired Power Station <ul style="list-style-type: none"> Power station (general) Transformer 		20.1 -3.8
Wastewater / Reuse Facility		9.3
LOGARITHMIC TOTAL	37.7	28.4

Calculations for Two 30 MVA Transformers:

$$\begin{aligned} \text{SWL} &= 74 + 14 \log 30 \\ &= 94.7 \text{ dB(A)} \end{aligned}$$

Two transformers of the same frequency and phase

$$\text{SWL} = 94.7 + 6 = 100.7 \text{ dB(A)}$$

At 6000 m

$$\begin{aligned} \text{SPL} &= \text{SWL} - 20 \log r - 8 - 6(3) \\ &= 100.7 - 20 \log 6000 - 8 - 18 \\ &= 100.7 - 101.6 \\ &= -0.9 \text{ dB(A)}. \end{aligned}$$

2.5 Solid Waste

This section contains supplementary information to Volume 1, Chapter 6, Section 6.5.2.

Wood waste that will not be used as fuel, for reasons of combustion incompatibility, will be stockpiled on-site for removal from the site once a fortnight²².

Forest residues awaiting processing will be limited to a maximum of two days worth (approximately 2000 tonnes). Fuelwood will generally be generated in pieces larger than 50

²² Commitment: Wood waste (not appropriate for combustion processes on-site) will be removed from the Wood Centre once a fortnight.

mm cube. The fuelwood processor and the power station operator will monitor fuel stockpiles under their respective control. Any stockpile showing signs of losing fines in windy weather will be dampened or covered²³. The stockpiles will be located on impermeable hardstand areas with water collection and piping to the used process water storage pond for disposal by irrigation. These measures will minimise the risk of fire.

Biomass for energy (bioenergy)

A new and exciting opportunity to help off-set Australia's greenhouse gas emissions rests with using biomass for energy or electricity generation. Conversion of biomass to energy can be achieved in a variety of ways - co-firing with coal briquette manufacture, gasification of wood to drive micro-turbines, and ethanol production. Using biomass for energy effectively substitutes the wood product for fossil fuels. And because the wood was grown from sequestered atmospheric carbon dioxide, bioenergy systems are more or less energy neutral and are the best way for forests to perpetually mitigate greenhouse gas emissions.

Sources of biomass for energy can come from wood waste (e.g. sawdust), residues and non-commercial thinnings of native forests and plantations, and by harvesting of plantations grown specifically for bioenergy consumption (CSIRO 2001).

2.6 Visual Issues

This section contains supplementary information to Volume 1, Chapter 5 – Site-Wide Issues, Section 5.7.11 and Chapter 10 – Power Station, Section 10.2.1.

The visual impact of the water vapour emissions from the Power Station cooling towers is discussed in Section 10.2.1 of the DPEMP. The issue is not mentioned in Section 5.7.11 where the visual impacts of the whole site are discussed. However it is recognised that the cooling tower will emit water vapour and that a water vapour plume may be visible from sites within the area during periods of cool temperature and/or high humidity weather.

2.7 Power Station Atmospheric Emissions

This section contains supplementary information to Volume 1, Chapter 11, Section 11.1.5.

The purpose of this section is to outline the regulatory standards for Cooling Towers in Tasmania that will be applied to the Wood-residue-fired Power Station's Cooling Tower. This provides the measures used to prevent impacts to human health.

All cooling towers in Tasmania must be registered with the local municipal council as required in the Public Health Act (1997). The Wood-residue-fired Power Station cooling towers will be no exception²⁴. In addition, all cooling towers in Tasmania must be operated and maintained in compliance with the Tasmanian Guidelines for Legionella (2001) issued by the Department of Health and Human Services (Appendix C). Within the Guidelines, compliance with Australian Standards (AS/NZS 3666.1, 3666.2, 3666.3, 4276.3.1) is detailed.

Legionella bacteria cause legionnaires disease. There are over twenty species of Legionella, of which *Legionella pneumophila* is responsible for many of the cases of legionnaires disease.

²³ Commitment: Fuelwood stockpiles will be dampened or covered in windy conditions.

²⁴ Commitment: Register the Cooling Tower on-site with the Huon Valley Council.

The bacteria are associated with water and are naturally widespread in the environment. It has been found in lakes, rivers, creeks, hot springs and other bodies of water and soils.

Legionella is also found in artificial environments such as cooling towers associated with industrial processes. These artificial systems can provide conditions, which allow Legionella bacteria to breed in large numbers. Legionella infection is acquired through breathing the aerosols, which contain the bacteria. It is not contagious. Although many people are exposed to Legionella relatively few become ill. Those at risk are elderly, sick, heavy smokers and drinkers and those with impaired immune systems. The disease is more common in males.

By complying with the Guidelines for Legionella and the Australian Standards identified above, the Wood Centre will be ensuring the best-known practices for the prevention of the spread of Legionella bacteria and the spread of legionnaires disease.

2.8 Occupational Health and Safety

This section contains supplementary information to Volume 1, Chapter 11.

Forestry Tasmania is committed to ensuring a Safety Management Plan is developed for the Wood Centre and for each facility on the site²⁵. The Plans will be an auditing tool designed to assist the Wood Centre facilities in improving the health and safety management on-site. The aim of the Plans is to protect people at work by promoting safer working environments.

The plan will be used within each facility infrastructure to:

- measure the performance of the health and safety systems;
- implement continuous improvement programs;
- benchmark the health and safety performance; and
- gain recognition for the standards achieved in the health and safety systems.

2.9 Industrial Practice

This section contains general supplementary information to Volume 1, Chapter 12.

Best Practice Environmental Management (BPEM) will be implemented during construction and operation of the proposed Wood Centre. This will be achieved by applying an Environmental Management System (EMS) to the Wood Centre throughout the construction and operation phases of the site. The EMS operated by John Holland Development and Investment Pty. Ltd. will apply to the Wood Centre site during the construction phase of the site. The EMS operated by Forestry Tasmania will apply to the Wood Centre during the operation of the site. The principles of continuous review and improvement and strategic planning will be applied to both technology and management practices as a consequence of these two EMSs. As indicated in commitment 13 of this supplement, an EMS will operate in conformance to ISO 14000 certification during construction and operation of the Wood Centre.

²⁵ Commitment: Ensure a Safety Management Plan is developed for the Wood Centre and for each facility on the site.

3.0 Revised DPEMP Commitments Table

The following table of commitments is the revised version of the commitments table in Chapter 12 of the DPEMP. Commitments that have been added since the DPEMP are identifiable by their bold text.

Table 3 Summary of Environmental Commitments

(CM: Road Construction Manager; SM: Wood Centre Site Manager; FM: Facility Manager; FT: Forestry Tasmania)

Note: Timing (Year) 1: Includes construction

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
TRANSPORT ISSUES					
1	Construction traffic will generally be restricted to daylight hours.	CM	✓		98
2	Speed restrictions for construction traffic will be imposed in sensitive areas.	CM	✓		98
3	Drivers and operators will adopt a Code of Good Driving Practice.	CM/FT	✓	✓	Sup
4	Drivers will be given training with respect to operation on sensitive sections of the route during construction.	CM	✓		98
5	Erosion control measures detailed in the Forest Practices Code will be implemented during the construction program.	CM	✓		98
6	Conduct preliminary survey to identify vertebrate roadkill 'hotspots' prior to construction and apply appropriate mitigative measures where necessary.	CM/FT	✓		98
7	Seal those road sections where dust is a problem to residents on sections of Denison Road	CM	✓		102
8	Monitor road kill on Weld and Denison Road during first two years operation.				102
9	Truck operating times will be reviewed and amended with the Community Consultative Committee.	SM	✓		103
10	Ensure that upgrading work to meet the operating requirements of all road users is completed before production commences at the Wood Centre.	CM	✓		120
11	Standard planning and development application process will be followed for any new road construction.	CM	✓		120
12	No commitment, Terts reference.				129
13	Utilise HPVs for wood fibre transport if accepted by the community.	SM		✓	136
14	Design HPVs and other product transport vehicles to minimise noise generation.	SM	✓	✓	136
15	Schedule trucks to avoid school bus operating times.	SM		✓	136
16	Schedule trucks in accordance with the limitations of the Central Scheduling and Traffic Management Plan.	SM		✓	136

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
17	Enforce speed restrictions in consultation with community.	SM		✓	137
18	Reduce braking and acceleration of vehicles.	SM		✓	137
19	Minimise size of transport fleet.	SM		✓	137
20	Use of trained drivers.	SM		✓	137
21	Use modern well-maintained vehicles.	SM		✓	137
22	HPV and Log truck trailers will be provided with air bag suspension systems.	SM		✓	137
23	Prepare Traffic Management Plan	SM	✓		138
24	Consult DIER about the preparation and implementation of a Traffic Management Plan	SM	✓		Sup
25	Apply appropriate sealing finishes near residential areas.	CM	✓	✓	138
26	Seal sections of gravel road adjacent to residences if dust is identified as a problem.	CM	✓	✓	140
27	Seal and upgrade North Huon Road.	CM	✓		140
28	Improve road route prior to commencement of HPV transport.	CM	✓		142
29	Vehicles will carry appropriate State Road Traffic Act Regulation and National HVAS notice.	SM		✓	144
30	Fit vehicles with Road Friendly Suspension and carry appropriate certification.	SM	✓	✓	145
31	Drivers will be dedicated to the operation.	SM		✓	145
32	Drivers will take special precaution on road sections where the line of sight is limited.	SM		✓	145
33	Drivers will take particular care in the vicinity of school bus routes.	SM	✓	✓	145
34	Trucks will not operate past the Showground on Huon Valley Show Day.	SM	✓	✓	146
35	Develop a new playground to meet Australian Standards at a location agreed with the community.	SM	✓		147
36	Implement erosion control measures for road works in accordance with the Forest Practices Code.	CM	✓	✓	148
37	Monitor transport at representative locations after 12 months operation, and provision of a report to DPIWE.	SM	✓		148
WOOD CENTRE (SITE WIDE) ISSUES					
1	Construction Operate EMS in conformance to ISO 14000 certification during construction and operation of the Wood Centre.	SM	✓		Sup
2	Establish a temporary boundary prior to construction to limit construction disturbance.	SM	✓		153
3	Erect sediment control fences to contain sediment to designated areas.	SM	✓		153
4	Monitor soil-retaining measures daily.	SM	✓		153
5	Divert uncontaminated runoff to storage ponds via earthen drainages during construction.	SM	✓		154

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
6	Provide an effective system for managing sewage during construction.	SM	✓		154
7	Develop a Construction Environmental Management Plan to control soil disturbance during the construction phase.	SM	✓		154
8	Implement rehabilitation and/or stabilisation works during construction to limit erosion.	SM	✓		154
9	Prepare a dust minimisation strategy for the construction phase.	SM	✓		156
10	Monitor dust generation daily, and implement suppression measures as required.	SM	✓		156
11	Ensure visible dust is effectively suppressed so that none leaves the site during construction.	SM	✓		156
12	Emergency Measures Implement management measures to minimise fire hazards on-site.	SM	✓	✓	159
13	The Fire Management Strategy will take into account stockpile size and location in order to minimise the potential of self-combustion and impacts from flammable or explosive substances.	SM	✓	✓	Sup
14	Install a suitable ring main and adequate fire hydrants	SM	✓		159
15	Maintain firebreaks around the site.	SM	✓	✓	160
16	Develop and implement an emergency response plan.	SM	✓	✓	161
17	Implement energy management measures to comply with BPEM conditions.	SM	✓	✓	165
18	Liaise with DPIWE to develop management measures for water extraction during periods of low water flow.	SM	✓	✓	170
19	Develop a water budget once technical specifications are available.	SM	✓		172
20	Ensure a Safety Management Plan is developed for the Wood Centre and for each facility on the site.	SM	✓	✓	Sup
21	Terrestrial A capacity of 65 ML will be maintained at all times for a 72 hour, 1 in 10 year storm event.	SM		✓	173
22	Assess storage dam capacities as component of detailed design stage of the development.	SM	✓		174
23	Document and record the glacio-fluvial terrace system where it is to be disturbed.	SM	✓		182
24	Establish boundaries during construction and operation to limit surface disturbance by vehicular activities.	SM	✓		182
25	Cut and fill batters will be less than 1.5 horizontal to vertical.	SM	✓		183
26	Minimise areas exposed to excavation.	SM	✓		183
27	Plant and mulch areas as soon as possible.	SM	✓		183
28	Construct a stormwater management system during the construction period to prevent erosion.	SM	✓		183
29	Collect and treat all stormwater from the site during construction.	SM	✓		184

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
30	Hydrogeological and geotechnical investigations will be undertaken prior to construction during the engineering design phase to ensure appropriate foundations and groundwater investigations are completed before the final design.	SM	✓		Sup
31	Conduct permeability testing to maximum excavation depth and install and monitor one groundwater bore on-site.	SM	✓		Sup
32	Conduct a survey of geoconservation features including regolith profiles prior to construction and integrated into the Construction Management Plan.	SM	✓		Sup
	<i>Atmospheric Emissions and Greenhouse Effect</i>				
33	Seal the internal ring road.	SM	✓		191
34	Undertake good housekeeping to prevent build up of soil, woodchips and dust on roads.	SM	✓	✓	191
35	Revegetate disturbed areas to prevent generation of windblown soil and dust.	SM	✓	✓	191
36	Cover stockpiles and truck cargoes with tarpaulins during construction	SM		✓	191
37	Install and monitor weather station on the site to provide data for air quality modelling prior to commissioning.	SM	✓	✓	192
38	Implement management measures to reduce the potential for nuisance odour generation.	SM		✓	192
39	Erect and maintain signage with a contact number for notification of problems.	SM	✓	✓	193
40	Investigate record and remedy odour complaints.	SM		✓	193
41	Provide in-stack monitoring stations on all stacks and undertake continuous monitoring if the results of more detailed air modelling indicate this is desirable.	SM		✓	Sup
42	An air monitoring program will be established in the region prior to construction of the Power Station.	SM	✓	✓	Sup
	<i>Water Supply</i>				
43	Create additional water storage on-site if water extraction from the Huon River during low flow periods has to be reduced.	SM	✓	✓	193
44	Predict optimal abstraction timing using DPIWE ongoing monitoring data.	SM		✓	194
45	Rehabilitate affected Huon River bank with local riparian vegetation progeny of particularly good root characteristics.	SM	✓		Sup
46	Ensure optimal use of water.	SM		✓	194
	<i>Wastewater Emissions</i>				
47	Conduct biomonitoring using the BACI design at the four defined sites on the Huon River and Kings Creek.	SM	✓		Sup
48	Direct stormwater from rooves to screening/interceptor system and onto site-wide storage ponds.	SM		✓	197
49	Drainage from undeveloped areas will continue to flow in natural drainage lines.	SM		✓	197

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
50	Provide on-site wastewater treatment at each facility.	SM		✓	197
51	Manage stormwater on-site.	SM		✓	197
52	No stormwater overflow will occur during non-storm conditions.	SM		✓	198
53	Monitor vegetation sprayed with treated water for signs of contamination or damage due to application.	SM		✓	198
54	Remove sludge from stormwater settling ponds when it has reached 10% of the total storage or as determined necessary, and beneficially reuse where possible. The sludge maintenance program and desludging protocol will be implemented within 12 months of operation.	SM		✓	198
55	Ensure the sewage treatment plant is designed to manage boiler water treatment chemicals.	SM	✓		199
56	Direct all sewage from all facilities to the on-site sewage treatment plant.	SM		✓	199
57	Utilise portable toilets during construction with regular disposal by contractor.	SM	✓		199
58	Collect and direct domestic wastewater to appropriately designed on-site treatment plant.	SM		✓	199
59	Monitor water quality to determine if other methods of treatment need to be implemented.	SM		✓	199
60	Line storage ponds with impermeable clay liner.	SM	✓		200
61	Design, construct and maintain wastewater reticulation piping in accordance with industry best practice.	SM	✓	✓	200
62	Develop Irrigation Management Plan prior to irrigation program implementation. Address the potential for groundwater contamination at the irrigation site in the plan.	SM	✓		200
63	Construct settling pond liner to conform to DPIWE standards applying to Liner Construction for Sewage Lagoons and relevant Australian standards. Groundwater will be monitored during and after construction.	SM	✓		Sup
64	Construct cut-off drains with regard to material permeability to prevent ingress into slopes.	SM	✓		Sup
65	Consult a qualified professional to develop the irrigation plan and assess the potential for soil salinisation.	SM	✓		Sup
66	Groundwater monitoring at the Wood Centre and irrigation sites will be undertaken prior to initiation of the development at monthly intervals for a period of six months with frequency thereafter to be reviewed based on an evaluation of monitoring data. Analysis will include TPH and PH in addition to regular parameters.	SM	✓		Sup
67	Provide an alternative wastewater management plan if the Power Station does not proceed.	SM	✓		Sup
68	<i>Noise Emissions</i> Select and maintain machinery to minimise noise emissions.	SM	✓	✓	203

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
69	A noise level survey will be undertaken prior site commissioning.	SM	✓		203
70	Investigate and record noise complaints.	SM		✓	203
71	House water supply pump station in building with soundproofing.	SM	✓	✓	204
Solid Waste Generation					
72	Regular removal of solid waste and screenings from the site-wide wastewater management system.	SM		✓	204
73	Store solid waste in a lidded hopper and disposed of by a licensed waste contractor.	SM		✓	204
74	Provide more details about the expected quantities and types of solid wastes to DPIWE when it becomes available (i.e. as part of the detailed design phase).	SM	✓		Sup
75	Wood waste (not appropriate for combustion processes on-site) will be removed from the Wood Centre once a fortnight.	SM		✓	Sup
Hazardous Waste					
76	Site Manager will ensure safe operation of communal diesel facility.	SM		✓	207
77	Store hazardous substances in accordance with AS-1940.	SM		✓	207
78	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	SM		✓	207
79	Maintain a spill-kit on-site and contain spills.	SM		✓	207
80	Employ licensed clean-up crew when required.	SM		✓	207
81	Maintain an inventory of hazardous substances on-site.	SM		✓	208
82	Emergency spill response procedures and staff training to be implemented at each facility	SM/FM		✓	208
83	Report all significant hazardous material incidents that have the potential to cause environmental harm to DPIWE within 24 hrs.	SM		✓	208
Flora and Fauna					
84	Conduct survey of riparian zone for <i>Westringia angustifolia</i> prior to conducting activities, which have potential to disturb vegetation in the riparian zone.	SM	✓		209
85	Investigate the possible existence of the Mt Mangana Stag Beetle within wet <i>E. obliqua</i> forest and delineate appropriately.	SM	✓		210
Aboriginal Heritage and Culture					
86	Undertake an Aboriginal heritage survey upon clearing the site in preparation for development.	SM	✓		211
87	Aboriginal sites encountered will be protected and/or managed in an approved manner.	SM	✓	✓	211
Decommissioning and Rehabilitation					
88	Maintain a riparian buffer of 120 m between the Wood Centre and the Huon River.	SM	✓	✓	212
89	Develop and adhere to a landscaping master plan.	SM	✓	✓	212

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
90	Retain native vegetation within the 10 metre prescribed planning set back from the site boundary adjacent to Weld Road.	SM	✓	✓	212
91	Submit a decommissioning and rehabilitation plan to DPIWE in the event of closure.	SM	✓		214
<i>Site-Wide Monitoring</i>					
92	Appoint a Site Manager with responsibility for common use services.	FT	✓		214
93	Establish an environment committee for the implementation and management of site-wide environmental issues.	FT	✓		214
94	Site Manager will ensure disturbance does not exceed site boundaries.	SM	✓	✓	215
95	Site Manager will ensure dust suppression.	SM	✓	✓	215
96	Site Manager will ensure success of rehabilitation treatment.	SM	✓	✓	215
97	Log and monitor river water abstraction rates.	SM		✓	216
98	Monitor water quality from the storage ponds.	SM		✓	216
99	Receive and maintain copies of wastewater quality from each facility.	SM		✓	216
100	Sample at storage ponds on a weekly basis for the first 6 months for internal management purposes and provide results on the Wood Centre web site.	SM	✓		216
101	Report water quality data for the process wastewater storage ponds to DPIWE quarterly for the first 12 months of operation.	SM	✓		217
102	Review frequency of sampling and analysis after 12 months and modify as appropriate.	SM	✓	✓	217
103	Undertake ongoing monitoring of wastewater quality within the WWTP for internal operational purposes.	SM		✓	218
104	Monitor domestic wastewater quality at the sewage treatment plant outlet monthly.	SM		✓	218
105	Ensure sustainability of the irrigation program by testing water quality parameters after the sewage treatment plant commissioning.	SM	✓		218
106	Forward results of water quality tests to DPIWE every 6 months.	SM		✓	219
107	Establish groundwater monitoring bores at the irrigation sites.	SM	✓		219
108	Monitor groundwater quarterly for the first year and six monthly or yearly thereafter depending on the results.	SM	✓	✓	219
109	Make water sampling results publicly available through a regularly updated web site.	SM		✓	220
110	Collect representative soil samples from each reuse area and monitor on an annual basis.	SM		✓	221
111	Test soil samples for heavy metals.	SM		✓	221
112	Report soil sample results to DPIWE annually and publish on web page.	SM		✓	221

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
113	Maintain a log of sludge removed from the sewage treatment plant and stormwater dams for disposal, including information regarding the method and site of disposal.	SM		✓	221
114	Monitor (visually) vegetation within reuse areas for <i>Phytophthora cinnamomi</i> infection symptoms.	SM		✓	222
115	Noise monitoring will be conducted to ensure statutory requirements and commitments are met.	SM	✓		222
116	Obscuration monitoring of combustion plant discharge will be conducted and reported to the Site Wide Manager.	SM		✓	222
117	Maintain a log of complaints regarding general site issues and record outcomes of the investigation(s).	SM		✓	222
118	Environmental Committee will create a Site Wide Management Plan for hazardous materials.	SM	✓		222
119	Develop an incident response and notification protocol for site wide issues.	SM	✓		223
120	Establish a Community Consultative Committee.	SM	✓		226
121	The Site Manager will convene regular meetings of the Community Consultative Committee.	SM		✓	226
122	The Site Manager will place minutes of meetings on a regularly updated web page.	SM		✓	226
123	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	SM	✓	✓	227
MERCHANDISING YARD AND FUELWOOD PROCESSOR					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	244
2	Sweep log sorting and fuelwood processor areas regularly to control fugitive sawdust and wood fibre.	FM		✓	244
3	Use covered conveyors.	FM		✓	244
4	Seal high traffic areas of the Merchandising Yard and use street sweeper to clean up wood fibre and sawdust if watering is an inadequate dust control measure.	FM		✓	244
5	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	244
	<i>Wastewater Emissions</i>				
6	Treated wastewater will be used for appropriate purposes in the Merchandising Yard.	FM		✓	246
7	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	246
8	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	247
9	Test potentially contaminated bund water, organise for its approved disposal and maintain records.	FM		✓	247
	<i>Noise Emissions</i>				
10	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	250

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
11	Ensure forklifts and loaders are fitted with standard noise control equipment.	FM	✓	✓	250
12	Modify sound levels of alarms if found to be a cause of nuisance.	FM		✓	250
13	Control sound intensity of PA system speakers and shift sirens.	FM		✓	250
14	Orientate buildings openings away from nearest residence and utilise noise absorbent insulation in the roof and walls of buildings containing noisy machinery.	FM	✓		250
15	Locate the fuelwood processor adjacent to buildings that will provide a noise barrier.	FM	✓		251
16	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM	✓		251
	Solid Waste Generation				
17	Maximise use of all wood waste for power generation.	FM		✓	251
18	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	252
19	No wood waste will be disposed of on-site.	FM		✓	252
20	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	252
21	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to a licensed landfill.	FM		✓	253
	Hazardous Materials				
22	Conduct vehicle maintenance only in workshops.	FM		✓	253
23	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	255
24	Maintain an inventory of hazardous substances on-site.	FM		✓	255
25	Employ licensed clean-up crew when required.	FM		✓	255
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	255
27	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain record of waste oil quantities.	FM		✓	256
28	Design an emergency response plan for the Merchandising Yard and provide training.	FM	✓	✓	256
29	Report all hazardous material emission to DEM within 24 hours of becoming aware.	FM		✓	256
	Monitoring and Review				
30	Visually monitor dust emissions and control dust by watering.	FM		✓	256
31	Daily inspection and cleaning of the solids removal system.	FM		✓	257
32	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	257

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
33	Monitor water quality (BOD, TPHC and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report results to the DEM annually.	FM		✓	257
34	Record noise emission complaints with details of investigations and actions.	FM		✓	257
35	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	258
36	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	258
37	Maintenance of internal management records regarding hazardous materials storage and usage.	FM		✓	258
38	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	261
SAWMILL					
	<i>Atmospheric Emissions</i>				
1	Use of late model diesel engines, modern combustion systems and normal vehicle maintenance.	FM		✓	279
2	Utilise and maintain appropriately designed ventilation system to manage dust and fugitive emissions.	FM		✓	279
3	No dust from on-site activities will leave the site.	FM		✓	280
4	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	280
5	Seal high traffic areas of the Sawmill site and use street sweeper to clean-up wood fibre and sawdust if watering is an inadequate dust control measure.	FM	✓	✓	280
6	Fuelwood for the Sawmill heat plant will be monitored for moisture content by means of an automatic moisture meter.	FM		✓	Sup
7	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM	✓		280
8	Open fires will not be permitted on the site.	FM		✓	280
	<i>Wastewater Emissions</i>				
9	Contaminated process wastewater and stormwater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	282
10	Annual reporting of wastewater monitoring results to the DEM.	FM		✓	283
11	Undertake controlled disposal of contaminated water from bunds.	FM		✓	283
12	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	283
	<i>Noise Emissions</i>				
13	Select and maintain equipment to minimise noise emissions.	FM	✓	✓	285
14	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	286

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
15	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		286
16	A noise assessment will be undertaken following selection of equipment and provision of technical specifications.	FM/SM	✓		286
Solid Waste Generation					
17	Utilise all appropriate wood by-product for power generation.	FM		✓	287
18	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	287
19	Store ash from heat plants in sealed fireproof containment.	FM		✓	Sup
20	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	288
21	Collect and store general refuse in a waste hopper for collection by a licensed waste contractor and disposal in an approved landfill.	FM		✓	288
Hazardous Materials					
22	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		291
23	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	291
24	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	291
25	Design an emergency response plan for the Sawmill site and provide training.	FM	✓	✓	291
26	Maintain a spill-kit on-site and contain spills.	FM		✓	292
27	Employ licensed clean-up crew when required.	FM		✓	292
28	Maintain an inventory of hazardous substances on-site.	FM		✓	292
29	Collect waste oil in drum(s) for removal and recycling by waste contractor and maintain a record of quantities.	FM		✓	292
30	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	292
Monitoring and Review					
31	Visual dust monitoring and control dust by watering.	FM		✓	293
32	Atmospheric monitoring will be conducted if complaints are received.	FM		✓	293
33	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM	✓	✓	293
34	Monitor water quality (TPHC, BOD and TSS) regularly and continuously monitor flow rate of screening/interceptor system at site outlet. Report the results to the DEM annually.	FM		✓	293
35	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	293

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
36	Continuously monitor stack emissions with an obscuration meter and alarm system. In case of poor emissions, immediately adjust fuel-to-air ratio.	FM		✓	294
37	Provide sampling ports in the heat plant stack for use as required.	FM	✓		Sup
38	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	294
39	Record noise emission complaints with details of investigations and actions.	FM		✓	294
40	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	294
41	Monitoring data will be submitted to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	294
42	The facility manager will develop and implement an incident response and notification protocol.	FM	✓	✓	295
43	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	295
44	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM	✓	✓	297
ROTARY PEELED VENEER MILL					
<i>Atmospheric Emissions</i>					
1	Dust suppression of highly trafficked unpaved areas will be achieved by watering.	FM		✓	316
2	Seal highly trafficked areas of the RPV site and use street sweeper if watering is an inadequate dust control measure.	FM	✓	✓	316
3	Ensure dust is confined to the site.	FM		✓	316
4	Design and operation of fuelwood transfer to minimise dust generation.	FM	✓	✓	317
5	Provide personnel with appropriate protection equipment.	FM		✓	317
6	Installation and on-going operation of an appropriately designed ventilation system in the main RPV production building.	FM	✓	✓	317
7	Conduct air quality modelling once engineering specifications and weather data for the site is available.	FM		✓	317
8	Open fires will not be permitted on-site.	FM		✓	318
9	Fuelwood for the RPV Mill heat plant will be monitored for moisture content by means of an automatic moisture meter.	FM		✓	Sup
10	Utilise modern vehicles with appropriate exhaust management equipment.	FM		✓	319
<i>Wastewater Emissions</i>					
11	Collection of contaminated stormwater and screening prior to diversion to the site-wide storage pond.	FM		✓	320
12	Treat boiler water treatment system bleed stream and heat plant blowdown in sewage treatment plant.	FM		✓	321
13	Regular solids removal from wastewater screens.	FM		✓	321
14	Reuse or dispose solid waste from boiler water treatment system in an approved manner.	FM		✓	321

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
15	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	321
16	Test potentially contaminated bund water, organise for its approved disposal and maintain records of disposal.	FM		✓	321
Noise Emissions					
17	Select and maintain machinery to minimise noise emissions.	FM	✓	✓	323
18	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM	✓	✓	323
19	Conduct veneer product loading operations within the RPV building where possible.	FM		✓	324
20	Modify sound levels of alarms if found to be cause of nuisance.	FM		✓	324
21	Control sound intensity of PA system speakers and shift sirens.	FM		✓	324
22	Investigate and record all noise complaints.	FM		✓	324
Solid Waste Generation					
23	Wood by-products will be reused as fuelwood in the heat plant on-site.	FM		✓	325
24	Regularly dispose of screening/interceptor system solids and oils for beneficial reuse operations and/or approved landfill.	FM		✓	326
25	Collection and beneficial reuse of screened solids and ash.	FM		✓	326
26	Store ash from heat plants in sealed fireproof containment.	FM		✓	Sup
27	Regular collection of general refuse for disposal at approved landfill by waste contractor.	FM		✓	327
28	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	327
29	Empty glue containers will be disposed of to an approved landfill.	FM		✓	327
Hazardous Materials					
30	Storage of minor quantities of hazardous materials over relocatable bunds or similar facility as required by AS-1940.	FM		✓	328
31	Design and construction of the diesel storage to meet appropriate standards and legislation.	FM	✓		328
32	Display of relevant material safety data sheets and signage in storage locations.	FM		✓	328
33	Design an emergency response plan for the RPV Mill site and provide training.	FM	✓	✓	330
34	Maintain a spill-kit on-site and contain spills.	FM		✓	330
35	Employ licensed clean-up crew when required.	FM		✓	330
36	Maintain an inventory of hazardous substances on-site.	FM		✓	330
37	Collection of waste oil in drums for removal and recycling by waste contractor.	FM		✓	330

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
38	Report accidental emission to DEM within 24 hours of becoming aware of it.	FM		✓	330
39	Monitoring and Review Undertake visual monitoring and water for dust suppression as necessary.	FM		✓	331
40	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	331
41	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor outlet continuously. Report results to the DEM annually.	FM		✓	331
42	Daily monitoring of blowdown and bleed streams from heat plant for TDS, pH and BOD.	FM		✓	332
43	Continuous obscuration monitoring of the heat plant stack emissions.	FM		✓	332
44	Provide sampling ports in the heat plant stack for use as required.	FM	✓		Sup
45	Annual reporting of heat plant stack monitoring results to the DEM.	FM		✓	332
46	Record noise emission complaints with details of investigations and actions.	FM		✓	332
47	Maintenance of internal management records regarding hazardous materials storage and use.	FM		✓	332
48	Notification of emissions that exceed statutory requirements and provision of a report to the DEM.	FM		✓	333
49	Develop and implement an incident response and notification protocol.	FM	✓	✓	333
50	Regular visual inspection of sawdust and wood fines handling systems and solids removal.	FM		✓	333
51	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	336
WOOD FIBRE MILL					
1	Atmospheric Emissions Conveyors and hoppers will be covered to reduce fugitive sawdust emissions.	FM		✓	350
2	Dust suppression of highly trafficked unpaved areas watering.	FM		✓	350
3	Seal high traffic areas of Wood Fibre Mill area and use street sweeper to clean up wood fibre and sawdust.	FM		✓	350
4	Ensure no dust leaves the site	FM		✓	351
5	Wastewater Emissions Fume extraction system will be provided in babbitt metal work area.	FM		✓	351
6	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	352

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
7	Pass water through screening/interceptor system prior to discharge to storage ponds and regularly test for TPHC, BOD and TSS. Continuously monitor flow rate from the system.	FM		✓	352
8	All machine and vehicle maintenance will be undertaken in the workshop area where clean-up materials will be immediately available.	FM		✓	353
9	Collection of rotary screw condensate in a sump and regular disposal.	FM		✓	353
10	Undertake controlled disposal of contaminated water from bunds.	FM		✓	353
11	Test potentially contaminated bund water and organise for its approved disposal and maintain records.	FM		✓	353
	Noise Emissions				
12	Orientate building openings away from nearest residence and utilise noise absorbent insulation in roof and walls of buildings containing noisy machinery.	FM	✓		357
13	Enclose the Wood Fibre Mill in a building designed for acoustic suppression.	FM	✓		357
14	Undertake noise impact assessment once technical specifications for Wood Fibre Mill equipment are available.	FM	✓		357
15	Enclose re-chipper in a building designed for acoustic suppression.	FM	✓		358
16	Ensure forklifts and loaders are fitted with reversing alarm volume control and flashing lights where possible.	FM		✓	358
17	Application of standard practices in the case of discrete noise sources.	FM		✓	358
18	Investigate and implement remedial measures in response to noise complaints.	FM		✓	359
	Solid Waste Generation				
19	Utilise all wood waste for power generation.	FM		✓	359
20	No wood waste will be disposed of on-site.	FM		✓	359
21	Regularly dispose of screening/interceptor system solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	360
22	Dispatch blade sharpening waste to licensed landfill.	FM		✓	360
23	Solid waste will be stored in a lidded hopper and disposed of by a licensed waste contractor to an approved landfill.	FM		✓	360
24	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	361
	Hazardous Materials				
25	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	363
26	Store hazardous substances in a secure safe building or bund with material safety data sheets and signage in storage locations.	FM		✓	363

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
27	Bunds will be inspected daily for spilt material that will be promptly mopped up or treated with absorbent material and any leaks will be promptly repaired.	FM		✓	363
28	Design an emergency response plan for the Wood Fibre Mill site and provide training.	FM	✓	✓	363
29	Maintain a spill-kit on-site and contain spills.	FM		✓	363
30	Employ licensed clean-up crew when required.	FM		✓	363
31	Maintain an inventory of hazardous substances on-site.	FM		✓	364
32	Collection of waste oil in drum(s) for removal and recycling by a waste contractor. Maintain a record of quantities.	FM		✓	364
33	Report hazardous material emission to DEM within 24 hours.	FM		✓	364
Monitoring and Review					
34	Visually monitor dust emissions and effectiveness of control by watering.	FM		✓	364
35	Daily inspection and cleaning of solids removal system to ensure at least 25% capacity is available.	FM		✓	365
36	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	365
37	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously. Report results to the DEM annually.	FM		✓	365
38	Record noise emission complaints with details of investigations and actions.	FM		✓	365
39	Submit monitoring data to the Director of Environmental Management annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	366
40	Maintain internal management records for hazardous material storage and use.	FM		✓	366
41	Develop and implement an incident response and notification protocol.	FM	✓	✓	366
42	Conduct staff health monitoring of knife sharpening staff.	FM		✓	366
43	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	368
WOOD FIRED POWER STATION					
Atmospheric Emissions					
1	Undertake air quality modelling for the Power Station and heat plant stack emissions once engineering specifications and site weather data are available.	FM	✓		386
2	Equipment will be designed and operated to comply with the four-tiered approach recommended by the Discussion Paper on Air Quality Management and Policy Development (January 2000).	FM	✓		387
3	Conveyors will be covered to control fugitive dust.	FM		✓	388
4	Ash will be wetted following discharge from the ash bin.	FM		✓	388

No	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
5	Fuelwood stockpiles will be dampened or covered in windy conditions.	FM		✓	Sup
6	Seal highly trafficked areas of the Power Station and use street sweeper if watering is an inadequate dust control measure.	FM		✓	388
7	Water highly trafficked unpaved areas to suppress dust.	FM		✓	388
8	No dust will travel beyond the site boundary as an air emission.	FM		✓	388
9	Installation and maintenance of a coarse filter system and ESP will maintain the emissions below 80 mg/Nm ³ .	FM	✓	✓	389
10	Adjust fuel-to-air ratio immediately if stack emission opacity exceeds 20% and shut the Power Station down for repairs if opacity continues to exceed 20%.	FM		✓	389
11	Register the Cooling Tower on-site with the Huon Valley Council.	FM	✓		Sup
Wastewater Emissions					
12	Contaminated wastewater will pass through a screening/interceptor system prior to discharge to the site wide storage ponds.	FM		✓	390
13	Undertake controlled discharge of uncontaminated stormwater from external hazardous materials stores.	FM		✓	391
14	Test potentially contaminated bund water and organise for its approved disposal.	FM		✓	392
Noise Emissions					
15	Safety valves will vent through a silencer and venting will only occur during day-time hours.	FM		✓	394
16	Utilise soundproofing and orientate openings toward the Wood Centre.	FM	✓		395
17	Install silencers on equipment as appropriate and select and maintain equipment to minimise noise emissions.	FM	✓	✓	395
18	Stack design will allow for tuning stubs to be installed if necessary.	FM	✓		395
19	Undertake noise modelling when final equipment selection has been made.	FM	✓		395
20	Investigate and apply appropriate mitigation measures if a noise complaint is received.	FM		✓	395
Solid Waste Generation					
21	Store ash from heat plants in sealed fireproof containment.	FM		✓	Sup
22	Ash and unusable solid waste will be removed from the site to a licensed landfill or for appropriate reuse.	FM		✓	396
23	Ensure solid waste minimisation by following the waste management hierarchy and investigating all options for reuse upon commissioning.	FM		✓	396
24	Regularly dispose of screening/interceptor solids and oils to beneficial reuse operations and/or approved landfill.	FM		✓	396
Hazardous Materials					
25	All hazardous substances will be stored with signage and fire control measures according to AS-1940.	FM		✓	399

NO	DESCRIPTION	RESPONSIBILITY	TIMING (YEAR)		PAGE No.
			1	ON-GOING	
26	Store hazardous substances in a secure safe building or bund with material data safety sheets and signage in storage locations.	FM		✓	399
27	Maintain an inventory of hazardous substances on-site.	FM		✓	399
28	Collection of waste oil in drum(s) for removal and recycling by waste contractor. Maintain a record of quantities.	FM		✓	399
29	Design an emergency response plan for the Sawmill site and provide training.	FM	✓		400
30	Maintain a spill-kit on-site and contain spills.	FM		✓	400
31	Employ licensed clean-up crew when required.	FM		✓	400
32	Report significant hazardous material incidents with potential to cause environmental harm to DPIWE.	FM		✓	400
33	Report accidental emission to DEM within 24 hours.	FM		✓	400
34	Conduct a detailed HAZOP study prior to commencement of Power Station construction.	FM	✓		405
	Monitoring and Review				
35	Visually monitor dust emissions and control dust by watering.	FM		✓	405
36	Where practicable, daily inspection and removal of the solids from the solids removal system.	FM		✓	405
37	Weekly inspection of wastewater screening/interceptor system to ensure effective operation. Review system after six months of operation.	FM		✓	406
38	Monitor water quality (TPHC, BOD and TSS) regularly and flow rate from the screening/interceptor system outlet continuously and report to the DEM annually.	FM		✓	406
39	Monitoring of boiler stack emissions and modification of boiler operation if opacity exceeds 20%.	FM		✓	406
40	Undertake in-stack monitoring for NO_x and SO_x following Power Station commissioning.	FM	✓		Sup
41	Continuously monitor stack emissions for O₂ and CO for process control and combustion efficiency.	FM		✓	Sup
42	Annual reporting of Power Station stack monitoring results to the DEM.	FM		✓	406
43	Record noise emission complaints with details of investigations and actions.	FM		✓	407
44	Submit monitoring data to the DEM annually. In the case of an emergency emission full details will be submitted within 5 days.	FM		✓	407
45	Develop and implement an incident response and notification protocol.	FM	✓		407
46	Review EMP after 12 months of operation and as agreed with DPIWE thereafter.	FM		✓	409

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Appendices

Appendix A: Preliminary Geotechnical Assessment Proposed Integrated Forest Products Yard Huon District

Appendix B: Pumping Station Concept Design Drawings

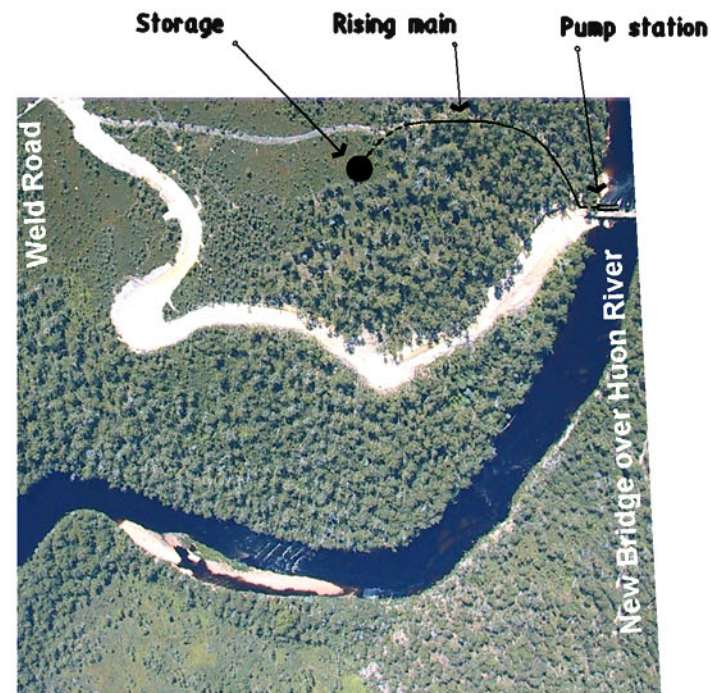
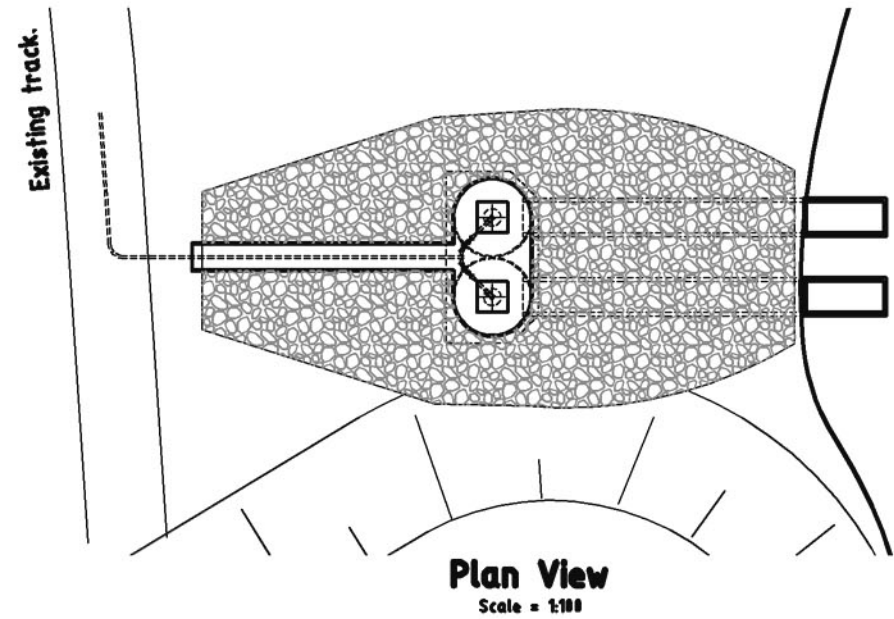
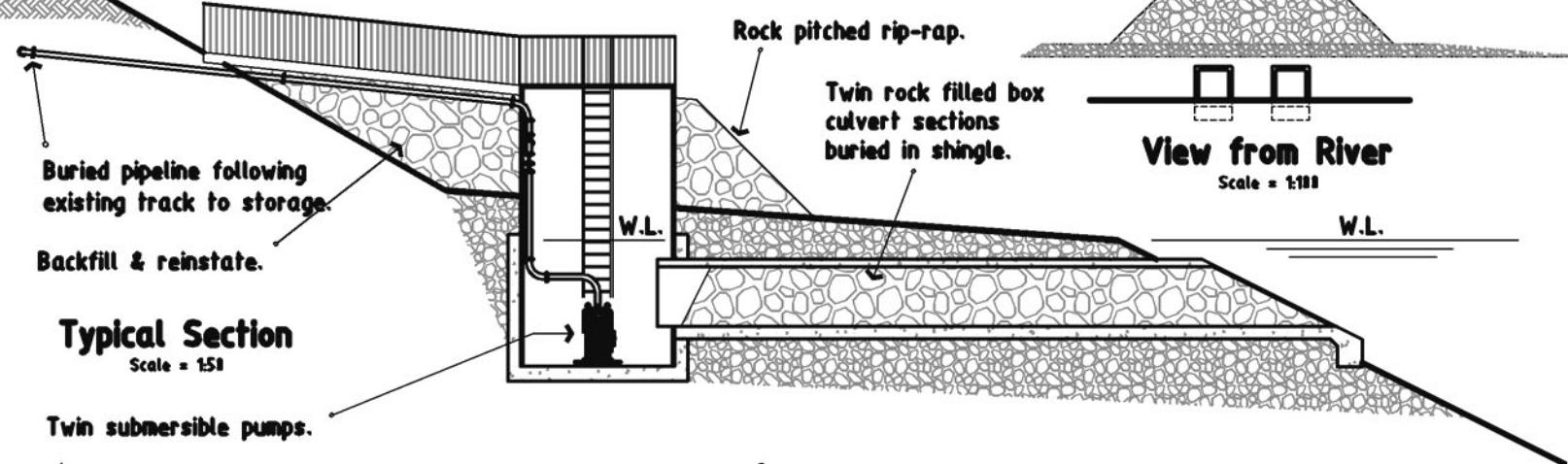
Appendix C: Tasmanian Guidelines for Legionella (2001)



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Document

Appendix A: Preliminary Geotechnical Assessment Proposed Integrated Forest Products Yard Huon District

Appendix B: Pumping Station Concept Design Drawings



No.	Revisions/Issues	Date

ENGINEERING BRANCH
(03) 6233 8155 (03) 6233 8128



THE WOOD CENTRE

Pump Station Concept Design

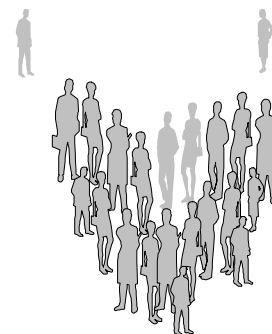
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SCALE = As Shown

Appendix C: Public Health Act 1997

GUIDELINES FOR LEGIONELLA 2001

Department of Health and Human Services

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Public and Environmental
Health Service

GUIDELINES FOR LEGIONELLA

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PART 1 GENERAL

INTRODUCTION AND DEFINITIONS

1 INTRODUCTION

- 1.1 This document contains information and the Guidelines. The Guidelines are issued under the *Public Health Act 1997* and appear in Part 2 in bold text. It is a legal requirement to comply with the Guidelines. Failure to do so may result in significant fines. The maximum fine that may be imposed under the *Public Health Act 1997* for failure to comply with the Guidelines is \$5000.
- 1.2 The Guidelines set out important requirements, which apply to *regulated systems* which may involve a risk to human health from legionella.

2 SCOPE

- 2.1 The *Public Health Act 1997* makes provision for the Director of Public Health to require registration of specified classes of *regulated systems*. *Cooling towers* and *warm water systems* are required to be registered pursuant to the Act. Owners of premises where these *regulated systems* are installed must not operate them unless they have been registered.
- 2.2 The purpose of the registration is to assist in tracing possible environmental sources of legionella infection. It is also to improve the maintenance and operation of *cooling tower* and *warm water systems* to minimise opportunities for legionella spread. The intention of these Guidelines is to provide specific requirements about maintenance and operation of these *regulated systems* to reduce public health risks.
- 2.3 Although these Guidelines have been prepared by the Department of Health and Human Services, local councils carry out registration of *regulated systems*. Applications for registration and queries about the registration process should be made to the appropriate council.

GUIDELINES FOR LEGIONELLA

3 REVIEW

- 3.1 Regulatory control of legionella is a rapidly evolving area. The Director of Public Health intends to review these Guidelines in late 2002. Any queries about these Guidelines or suggestions for review in the meantime are welcomed.
- 3.2 In particular, comments are sought on the concept of the next version of the Guidelines requiring:
- (a) compliance with the whole of the performance based standard AS/NZS 3666.3 for all *cooling towers*. This would extend the current requirement to comply with parts of AS/NZS 3666.3 in these Guidelines.
 - (b) that all existing and new *cooling towers* have the following engineering features:
 - Automatic chemical dosing systems for biocides and other water chemicals;
 - Automatic bleed off.
- 3.3 Revised draft Guidelines will be circulated for public comment in late 2002. The revised draft Guidelines will require all existing *cooling towers*, regardless of whether they are associated with ventilation or industrial processes, to be fitted with drift eliminators as specified in AS/NZS 3666.1.
- 3.4 Any comments and queries should be sent to:
Director of Public and Environmental Health,
Public and Environmental Health Service,
Department of Health and Human Services, 34 Davey Street, Hobart 7000.
Phone (03) 6233 2898 Fax (03) 6223 1163 e-mail: public.health@dchs.tas.gov.au

4 COMPLIANCE WITH THE GUIDELINES IS LEGALLY ENFORCEABLE

- 4.1 The Guidelines contain both legally enforceable requirements and information which is intended to assist *persons* using the Guidelines. The legally enforceable requirements are set out in Part 2, highlighted in bold text.
- 4.2 **There are penalties under the *Public Health Act 1997* for failure to comply with these requirements.**

GUIDELINES FOR LEGIONELLA

- 4.3 Text which is not highlighted in bold text is for information and guidance purposes only.

5 DEFINITIONS

5.1 In these Guidelines-

“accredited laboratory” means a NATA accredited laboratory or a laboratory accredited by an equivalent quality assurance certifying body approved by the Director (to NATA approved standards or equivalent quality assurance standards approved by the Director).

“Act” means the *Public Health Act 1997*.

“engineer” means an engineer registered with the National Professional Engineering Registration Board (NPER) to the level of NPER-3 and registered to practice in the area of building services;

“council” means a council within the meaning of the *Local Government Act 1993*;

“system” means a *warm water system*, or a *cooling tower*.

“water treatment expert” means a person who is a tertiary qualified chemist, chemical engineer, engineer or microbiologist and who has expertise in treating water to reduce legionella risks.

5.2 The following terms have the same meaning in the Guidelines as in the Act.

- *authorised officer*;
- *cooling tower*;
- *Director*;
- *premises*;
- *regulated system*;
- *warm water system*.

5.3 Apart from words or phrases defined in the Act or above, a word or phrase defined in AS/NZS 3666.1 *Air Handling and Water Systems of Buildings – Microbial Control Part 1, Design, Installation and Commissioning* and used in these Guidelines, has the same meaning in the Guidelines as in the Standard.

GUIDELINES FOR LEGIONELLA

INFORMATION

6 THE ROLE OF COUNCILS

6.1 Councils are responsible for registering *cooling towers* and *warm water systems*. Councils may impose conditions on registrations to address legionella risks which are specific to the *regulated system* or *premises* and which are not addressed by these Guidelines. These specific legionella risks could be identified through inspection of the *regulated system* or *premises*.

7 RELATIONSHIP BETWEEN THE GUIDELINES AND BUILDING LEGISLATION

7.1 The *Building Regulations 1994* and the Building Code of Australia require new *cooling towers* associated with ventilation systems in buildings to comply with AS/NZS 3666.1 Air Handling and Water Systems of Buildings – Microbial Control, Part 1, Design, Installation and Commissioning. These Guidelines do not affect this requirement. Any queries about building legislation requirements should be directed to the relevant council.

7.2 These Guidelines require relocated *cooling towers*, and new *cooling towers* which are not associated with ventilation systems in buildings, such as those associated with refrigeration plants and industrial processes, to comply with AS/NZS 3666.1.

8 ADDITIONAL INFORMATION

8.1 Appendix 1 of these Guidelines contains additional background about legionella and information for users of the Guidelines.

PART 2 GUIDELINES

9 COMPLIANCE WITH AUSTRALIAN STANDARDS - GENERAL

- 9.1 The owner of any *cooling tower* that is relocated after these Guidelines are issued or any new *cooling tower* which is not associated with a ventilation system in a building must ensure that the *cooling tower* complies with AS/NZS 3666.1.
- 9.2 The owner of a *cooling tower* must ensure that the *cooling tower* is operated and maintained in accordance with AS/NZS 3666.2 *Air Handling and Water Systems of Buildings – Microbial Control, Part 2 Operation and Maintenance*.
- 9.3 The owner of a *cooling tower* must ensure that a process designed to control microbial growth is developed for the *cooling tower* and that the process is:
- (a) operational at all times; and
 - (b) annually certified by a *water treatment expert* as being an effective process of disinfection of the *cooling tower*; and
 - (c) sufficiently effective that no water sample taken from the *cooling tower* exceeds the criteria specified in clause 11 of these Guidelines.
- 9.4 The owner of a *cooling tower* is not required to comply with clause 2.5 of AS/NZS 3666.2 if the council has approved alternative compliance with AS/NZS 3666.3 in response to an application from the owner.

10 TESTING

- 10.1 A person operating a *cooling tower* must ensure that each month -
- (a) a representative sample of water from the *cooling tower* is taken in accordance with Appendix A, AS/NZS 3666.3 while the *cooling tower* is in use; and
 - (b) the representative sample is tested in an *accredited laboratory* for Heterotrophic Colony Count (HCC) in accordance with AS 4276.3.1 using the 35 degree method.

GUIDELINES FOR LEGIONELLA - ENFORCEABLE REQUIREMENTS

- 10.2** A person operating a *cooling tower* must ensure that every six months a representative sample of water from the *cooling tower* is taken in accordance with Appendix A, AS/NZS 3666.3 immediately before the *cooling tower* is cleaned and is tested in an *accredited laboratory* for legionella in accordance with AS 3896.

NOTE: Validated and accredited tests which are equivalent to AS 3896 and AS 4276.3.1 may also be used.

11 ACTION BASED ON RESULTS OF TESTING

- 11.1** If a test result from a representative sample of water from a *cooling tower* indicates that legionella bacteria are present at a level greater than or equal to 10 colony forming units/ml, the owner of the *cooling tower* must ensure that a control strategy is immediately initiated in accordance with Table 3.1 and the flow chart in Figure 3.1 of AS/NZS 3666.3.
- 11.2** If a test result from a representative sample of water from a *cooling tower* indicates a Heterotrophic Colony Count greater than or equal to 100,000 colony forming units/mL, the owner of the *cooling tower* must ensure that a control strategy is immediately initiated in accordance with Table 3.2 and Figure 3.2 of AS/NZS 3666.3.

Note: The Director of Public Health has issued a notice which lists various diseases, human pathogenic organisms and contaminants which are notifiable. Legionella species and Heterotrophic Colony Count are notifiable contaminants. In summary, laboratories must notify the Director of Public Health where tests indicate the presence of any legionella species, or heterotrophic colony count at a level exceeding 100, 000 colony forming units, in *regulated systems*. Where the laboratory is located outside Tasmania, the person initiating the testing has the responsibility to notify the Director of Public Health. The *Guidelines for Notification of Notifiable Diseases, Human Pathogenic Organisms and Contaminants* contain more details about notification requirements and are available on the internet at:

<http://www.dchs.tas.gov.au/services/publichealth/pdf/NOTDIS.pdf>.

12 COMPLIANCE WITH AUSTRALIAN STANDARD – SPECIAL COOLING TOWERS

- 12.1** A person who wishes to comply with AS/NZS 3666.3 instead of clause 2.5 of AS/NZS 3666.2 in relation to a *cooling tower*, must first apply to the council where the *cooling tower* is registered.
- 12.2** If the council has approved compliance with AS/NZS 3666.3 in substitution for clause 2.5 of AS/NZS 3666.2 for a *cooling tower*, then the owner of that *cooling tower* must ensure that it is managed in accordance with AS/NZS 3666.3 *Air Handling and Water Systems of*

GUIDELINES FOR LEGIONELLA - ENFORCEABLE REQUIREMENTS

Buildings - Part 3: Performance Based Maintenance of cooling water systems as in force from time to time.

13 RISK ASSESSMENT

13.1 A person who is applying to register or renew registration of a *cooling tower* or premises where a *cooling tower* is located must attach to the application a risk assessment of the *cooling tower* as referred to in AS/NZS 3666.3, which has been conducted by an *engineer*.

13.2 Compliance with paragraph 13.1 is only required once for each *cooling tower*, unless there have been substantial changes to the *cooling tower* as referred to in paragraph 14.1(e).

Note: Council should consider including any remedial measures, additional testing or maintenance requirements that are recommended in the risk assessment as conditions of registration of the *cooling tower*.

14 INFORMATION TO BE PROVIDED WITH APPLICATIONS FOR REGISTRATION OR RENEWAL OF A COOLING TOWER

14.1 The following information if applicable must accompany an application to register or renew registration of a *cooling tower*:

- (a) Results of all water testing for the *cooling tower* including records of action arising from the results for the previous twelve months.**
- (b) Specifications of the maintenance program for the *cooling tower*, including water treatments and disinfection.**
- (c) A statement from a water treatment expert that a process which effectively disinfects the *cooling tower* is in operation.**
- (d) A statement from the person responsible for the maintenance program, that the maintenance of the *cooling tower* has been carried out as specified.**
- (e) If the *cooling tower* has had significant modifications, another risk assessment undertaken in accordance with clause 13.1 and details of compliance with any additional maintenance or testing requirements arising from that risk assessment.**

15 WARM WATER SYSTEMS – CLEANING AND DISINFECTION

15.1 All pipework, fittings and storage tanks of a *warm water system* must be cleaned and disinfected -

- (a) immediately before the system is first used; and**
- (b) immediately prior to start up if the system has been idle for at least a month.**

GUIDELINES FOR LEGIONELLA - ENFORCEABLE REQUIREMENTS

15.2 All storage tanks of *warm water systems* must be drained and cleaned to remove sediment at intervals not exceeding twelve months unless it can be demonstrated that the tanks remain free of sedimentation and fouling without compliance.

15.3 All *warm water systems* must be disinfected:

- (a) monthly by heat or chlorination; or**
- (b) continuously, by automatic low level chlorination; or**
- (c) by an alternative method demonstrating that legionella organisms are not detected in samples of water taken from the system each month for a period of twelve months and, if legionella organisms are not detected in any sample taken during the twelve months period, thereafter at intervals not exceeding three months; or**
- (d) when and as requested by an *authorised officer*.**

16 WARM WATER OUTLETS

16.1 All outlets of a *warm water system* not in use for a week must be flushed at full flow before reuse. Where outlets have the facility to mix warm and cold water, both warm and cold sections must be flushed. The period of flushing must be sufficient to remove all stagnant water leading to the outlet, and for the temperature of the system to be reached at the outlet.

17 LEGIONELLA CONTAMINATED *WARM WATER SYSTEMS*

17.1 Where Legionella organisms are detected in a water sample from a *warm water system*, the following procedure must be immediately implemented:

- (a) the system must not be used until cleaning and disinfection has been undertaken (see (b) below);**
- (b) the system must be cleaned and disinfected by heat or chlorination;**
- (c) the operation and maintenance program for the system must be reviewed;**
- (d) any faults detected must be corrected and any necessary changes implemented;**
- (e) approximately 48 hours after completing step (a), further water samples must be taken from the system and tested for legionella organisms.**

17.2 If, after following the procedure in section 17.1, the tests referred to in section 17.1(e) still indicate the presence of Legionella organisms, the steps in section 17.1 must be repeated until Legionella organisms are no longer detected in two consecutive water samples, taken approximately one week apart.

GUIDELINES FOR LEGIONELLA - ENFORCEABLE REQUIREMENTS

18 DECONTAMINATION OF WARM WATER SYSTEMS

- 18.1** When a *warm water system* is system is suspected or implicated as the source of infection in a case or an outbreak of legionella disease, it must be decontaminated by heat or chlorine.
- 18.2** Whenever decontamination is required under paragraph 18.1, water samples must be taken and tested for Legionella organisms immediately before decontamination. Decontamination must commence as soon as the water samples have been taken. The system must not be used until subsequent water tests show that the water is legionella free.

19 CONTAMINATION BY HEAT

- 19.1** Decontamination by heat must be carried out by raising the water temperature to 70°C for one hour and progressively flushing the hot water outlets around the system to a minimum temperature of 60°C for two minutes.
- 19.2** During decontamination by heat, appropriate precautions must be taken to prevent accidental scalding.

20 DECONTAMINATION BY CHLORINE

- 20.1** Decontamination by chlorine must be carried out by following the procedure set out below:
- (a)** Isolating the heat source;
 - (b)** Draining any sludge from the bottom of the warm water storage system;
 - (c)** Ensuring that an air break is incorporated between the water supply main and the *warm water system* to prevent contamination of the water distribution system;
 - (d)** Adding sodium hypochlorite solution to produce a free chlorine residual of 10mg/L in the warm water storage system, and maintain the pH of the water between 7.0 and 7.6;
 - (e)** Ensuring thorough mixing and circulation throughout the warm water storage system and any ring main;
 - (f)** Flushing each outlet in turn until there is a distinct smell of chlorine. If there is any doubt, check the free chlorine level with a test kit;
 - (g)** Checking that the free chlorine residual in the water is not less than 7mg/l at the outlet at the furthest point downstream of the warm water storage system;
 - (h)** Allowing the water to stand for one hour;
 - (i)** Checking that the free chlorine residual in the water is no less than 2mg/L at the outlet mentioned above;

GUIDELINES FOR LEGIONELLA - ENFORCEABLE REQUIREMENTS

- (j) Repeating the above procedure if the free chlorine residual is less than 2mg/L;**
- (k) When the free chlorine residual is 2mg/L or greater, draining the warm water storage system and refill and recommission the system;**
- (l) When the system has been recommissioned, recording the details in a maintenance book.**

21 INFORMATION TO BE PROVIDED WITH APPLICATIONS FOR REGISTRATION OR RENEWAL OF A *WARM WATER SYSTEM*

21.1 The following information if applicable must accompany an application to register or renew registration of a *warm water system*:

- (a) Results of all water testing for the *warm water system* including records of action arising from the results for the previous twelve months.**
- (b) Specifications of the maintenance program for the *warm water system*, including water treatments and disinfection.**
- (c) A statement from the person responsible for the maintenance program, that the maintenance of the *warm water system* has been carried out as specified.**

22 CONFLICT BETWEEN GUIDELINES AND STANDARDS

22.1 Where the provisions of these Guidelines and AS/NZS 3666.2 or AS/NZS 3666.3 are in conflict, the provisions of these Guidelines shall prevail.

GUIDELINES FOR LEGIONELLA – APPENDICES

APPENDIX 1 ADDITIONAL INFORMATION

1 INTRODUCTION

- 1.1 This Appendix is not an enforceable part of these Guidelines. It is designed to provide additional information and assistance to users of the Guidelines.

2 INFORMATION ABOUT LEGIONELLA

- 2.1 Legionnaires disease is caused by legionella bacteria. There are over twenty species of legionella, of which legionella pneumophila is responsible for many of the cases of legionnaires disease.
- 2.2 Legionella is a bacteria associated with water and is widespread in the environment. It has been found in lakes, rivers, creeks, hot springs and other bodies of water and soils.
- 2.3 Legionella is also found in artificial environments such as *cooling towers* associated with air conditioning and industrial processes, as well as in reticulated *warm water systems*, where the temperature of the water is kept between 30⁰C and 50⁰C. These artificial systems can provide conditions which allow legionella bacteria to breed to large numbers.
- 2.4 Legionella infection is acquired through breathing in aerosols (very fine droplets of water) which contain the bacteria. It is not contagious. Although many people are exposed to legionella only relatively few become ill. Those at particular risk are the elderly, sick, heavy smokers and drinkers and those with impaired immune systems. The disease is more common in males.

Sources of legionella

- 2.5 *Cooling towers* are used to provide cooling for a variety of industrial processes, including refrigeration and freezer plant, commercial size air conditioning and water-cooled compressors. A prime function of *cooling towers* is to recirculate water that would otherwise be run to waste. Evaporative condensers, which incorporate a refrigeration condensing coil, are also possible sources of legionella organisms.
- 2.6 During the normal operation of a *cooling tower*, aerosol droplets are formed which may be carried into the environment through the tower exhaust. If legionella are present in the tower water, breathing the aerosols can result in infection. Poorly maintained *cooling towers* have been implicated in outbreaks of Legionnaires' disease.
- 2.7 Warm (tepid) water systems store water for bathing and showering, particularly in nursing homes and hospitals, at reduced temperatures to

GUIDELINES FOR LEGIONELLA – APPENDICES

reduce the risk of accidental scalding. Legionella bacteria may multiply in this environment.

- 2.8 Other possible sources of legionella infection are public spa pools which contain water at temperatures where aerosols can be generated and legionella can grow.
- 2.9 Potting mixes used in horticulture by home gardeners may occasionally be associated with some individual cases of legionella infection. These are not regulated by the *Act*, but are labelled with appropriate precautions for handling.

Registration requirements

- 2.10 Registration may also reduce the occurrence of legionnaires disease by highlighting to all *cooling tower* owners the maintenance standards required by the *Act* and these Guidelines.
- 2.11 *Warm water systems* are also required to be registered, except for those in domestic premises. Systems using thermostatic mixing valves generally do not need to be registered.
- 2.12 Legionella control of public spa pools is regulated by the *Guidelines for Health and Safety in Public Places* as these places are not *regulated systems*. However, public spa pools are subject to the licensing regime for places of assembly under the *Act*. Contact the Public and Environmental Health Service for more details.

3 AUSTRALIAN STANDARDS

- 3.1 There are three Australian/New Zealand Standards and a Handbook relevant to legionella control:
 - (a) AS/NZS3666.1 (1995) Air Handling and Water Systems of Buildings- Microbial Control Part 1: Design Installation and Commissioning

This is referenced in Tasmanian Building Regulations. All new buildings with *cooling towers* must comply with this standard.
 - (b) AS/NZS 3666.2 (1995) Air Handling and Water Systems of Buildings- Microbial Control Part 2: Operation and Maintenance

The requirements of this Standard include monthly inspection, and six monthly cleaning and maintenance records. These maintenance requirements are very basic and in practice are usually supplemented by regulatory guidelines.
 - (c) AS/NZS 3666.3 (Int):1998 Air Handling and Water Systems of Buildings- Microbial Control Part 3: Performance Based Maintenance of Cooling Water Systems

GUIDELINES FOR LEGIONELLA – APPENDICES

This standard is performance-based.

AS/NZS 3666.3 was developed as an alternative performance based standard to AS/NZS 3666.2.

AS/NZS 3666.3 requires a risk assessment of the tower and stricter maintenance and monitoring procedures, aiming to keep the tower free of detectable legionella organisms, to substitute for the six monthly cleaning requirements of AS/NZS 3666.2. However, there is interest in applying the risk assessment and performance-based approach of AS/NZS 3666.3 more widely than the current application.

Apart from its use as an alternative to AS/NZS 3666.2, AS/NZS 3666.3 documents procedures that can usefully augment the basic procedures in AS/NZS3666.2, including water sampling procedures and decision trees for dealing with legionella test results. These parts of AS/NZS 3666.3 have been referenced into these Guidelines

- (d) HANDBOOK SAA/NNZ HB32:1995 *Control of Microbial growth in air handling and water systems in buildings* is not a regulatory document. It provides general explanatory material and background to the three AS/NZS3666 standards.
- (e) Another useful source of information about legionella is the booklet *Guidance for the Control of Legionella*, National Environmental Health Forum Monograph, Water Series No 1, from the Environmental Health Branch, Department of Human Services

GUIDELINES FOR LEGIONELLA – APPENDICES

4 PURPOSE OF THE GUIDELINES

- 4.7 A summary of the two alternatives approaches to compliance with these Guidelines, as MOST TOWERS or SPECIAL TOWERS follows:

MOST TOWERS

Compliance with all of AS/NZS 3666.2, including monthly inspection, record keeping

- AND Additional requirement: six monthly legionella and monthly plate count water testing as per Appendix A of AS/NZS 3666.3
- AND Decision tree on what to do with the test results is to be as per AS/NZS 3666.3
- AND initial risk assessment prior to re-registration plus another risk assessment if the tower is significantly modified.

SPECIAL TOWERS

ONLY BY SPECIAL APPLICATION TO COUNCIL

Compliance with AS/NZS 3666.2 including record keeping
EXCEPT Clause 2.5 Maintenance

- AND Compliance with ALL of AS/NZS 3666.3 (Performance Based) which includes a risk assessment of the tower, monthly water testing for legionella, plate count and others, and a decision tree on what to do with the results.

- 4.8 The overall intent of these Guidelines is to keep *cooling towers* and *warm water systems* legionella free. Note however, that legionella grows in the biofilm attached to the wetted surfaces in contact with the water in the system. Anything that disturbs the biofilm such as turning a *cooling tower* on and off can cause the measured levels of legionella in the circulating cooling water to fluctuate. Results of legionella testing will only reflect what was in the water about ten days previously, because of the long period required for laboratory culture of the organism. Hence, relying wholly on legionella results to determine adequacy of maintenance is not appropriate. There is the potential for low legionella test results to generate a false sense of security and cause reductions in the strictness of maintenance regimes.
- 4.9 It is recognised that these Guidelines and the possible changes suggested for future versions will impose additional maintenance costs on *cooling tower* owners and operators. It is likely that in future versions of these

GUIDELINES FOR LEGIONELLA – APPENDICES

Guidelines, there will be a requirement for existing *cooling towers* to have drift eliminators, automatic chemical dosing systems for biocides and water treatment chemicals, and automatic bleed of. However, owners should be encouraged to fit such systems now.

- 4.10 In some cases, particularly with older and/or smaller *cooling towers*, it may be commercially attractive to switch to air cooled systems. The maintenance requirements for air cooled systems are minimal in comparison and there is no legionella risk. Some sites such as hospitals that are occupied by many susceptible individuals have switched to air cooled systems for this reason. However, air cooled systems may be less efficient to run, particularly when very large.

GUIDELINES FOR LEGIONELLA – APPENDICES

APPENDIX 2 WHERE TO OBTAIN COPIES OF THE GUIDELINES AND THE ACT

Copies of the Guidelines are available from the Printing Authority of Tasmania: 2 Salamanca Place, Hobart, phone: (03) 6233 3168; fax: (03) 6224 1617, free call: 1800 030 940, and online at <http://www.dchs.tas.gov.au/services/publichealth/pages/ligisl.html>.

Copies of the *Public Health Act 1997* are available from the Printing Authority of Tasmania, and online at <http://www.thelaw.tas.gov.au>.

HO 53/1-AB
23rd August 2000

Forestry Tasmania
79 Melville St
HOBART TAS 7000

Attenti Mr Dario Tomat
on:

Dear Sir,

**R PRELIMINARY GEOTECHNICAL ASSESSMENT
E: PROPOSED INTEGRATED FOREST PRODUCTS YARD
HUON DISTRICT**

This letter presents our report on a geotechnical assessment completed for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers.

If you have any questions related to this report or we can be of further assistance, please do not hesitate to contact Mr Barry Weldon or the undersigned.

**For and on behalf of
COFFEY GEOSCIENCES PTY LTD**

DAN O'TOOLE

Distribution: Original held by Coffey Geosciences Pty Ltd
1 Copy Coffey Geosciences Pty Ltd Library
3 Copies Forestry Tasmania

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- 1 FORESTRY TASMANIA: GEOTECHNICAL ASSESSMENT PROPOSED INTEGRATED TIMBER PROCESSING YARD**

Important information about your Coffey Report

APPENDIX

- A** Explanation sheets - soil descriptions (2 pages)
- B** Engineering logs TP1 to TP12

1. INTRODUCTION

This report presents the results of a preliminary geotechnical assessment undertaken by Coffey Geosciences Pty Ltd (Coffey) for a proposed integrated forest products development site near the confluence of the Arve and Huon Rivers. Mr D Thomat of Forestry Tasmania following a submission by Coffey to Dr J McCambridge at SEMF Holdings Pty Ltd commissioned the assessment (ref HO 53.1(P)-AA dated 11th July 2000).

It is understood that Forestry Tasmania plan to develop an integrated forest products site in a 40ha area. The development will include log storage and sorting facilities, saw, veneer and woodchip mills, in addition to an on-site power station plant that will be fed by waste from these operations.

Forestry Tasmania provided an excavator to excavate a number of test pits on the 11th August 2000. The preliminary assessment comprised a desktop review of available information, a series of test pits and reconnaissance of the geology and geomorphology of the area.

2. BACKGROUND INFORMATION

The proposed Huon integrated forest products site is located on a low ridge, trending roughly North-South. The dominant vegetation is button grass and tea tree. A recently constructed road and former access tracks to gravel deposits cross the proposed site. The light grey to white quartzite gravel has apparently been quarried for road construction materials.

The proposed Huon site is mapped on the Geological Atlas 1:250,000 digital series Geology of Southeast Tasmania produced by Mineral Resources Tasmania (1999 edition) as Permian Age siltstone and sandstone deposits. More detailed information is provided in a report to Forestry Tasmania (Huon Forest District) prepared by Mr C Sharples in November 1994 entitled, *Geomorphic Values Survey: Barnback Block, Huon Forest District*.

In that report, Sharples confirms the underlying bedrock geology as Permian marine siltstones and sandstones. He mapped the edge of a fluvio-glacial terrace escarpment that encircles the ridge and described the surface deposits as Pleistocene glacio-fluvial deposits of cobble and boulder grade. The glacio-fluvial landforms of the Weld Plains are shown by Sharples on Map Four as potentially vulnerable features of geoconservation significance in the Barnback block. The glacio-fluvial landforms include the high level terrace remnants at 484850mE 5233600mN, which is roughly centred on the proposed integrated forest products site. The landforms are classified by Sharples as *Representative at the State level* and *Outstanding at the Regional level* and he considered them to be "... vulnerable to degradation of specified values if disturbed by specific

activities". Sharples infers that the specific activity is excavation as he goes on to state that the terrace remnants are "... *vulnerable to excavation; some quarrying has already taken place – features are still in good condition but future quarrying should be monitored to ensure important features are preserved.*"

A trench like feature that was encountered during preliminary assessment of the access road across the proposed site, marks the edge and head scarp region of a major rockslide that occurred in the past. Some of the tension cracks associated with the movement were revealed during construction of the road to the Huon River crossing downstream from its confluence with the Arve River. A power station is proposed on the terrace remnant at the southern end of the ridge above the old landslide feature. The landslide feature does not appear to extend upslope to the terrace remnant.

3. RESULTS OF ASSESSMENT

The reconnaissance geomorphologic mapping confirms that the site is located predominantly on a terrace that almost encircles a North-South trending ridge. The slope on the terrace is gentle with local slopes up to 9°. The edge of the terrace is embayed in places and slopes may steepen up to 14°. Around the eastern and southern edge of the terrace, an escarpment slope of about 28° to 32° leads to the relatively narrow modern floodplain of the Huon River.

An old rockslide has occurred on the slope below the terrace remnant at the southern end of the project site. During the present site assessment no new evidence of slope instability was observed at the terrace or ridge level. However, the natural vegetation of tea tree and button grass can be deceptive and provide the illusion of a relatively even ground surface especially when viewed from above. Test pit locations consequently were selected to provide a range of topographic settings and were not confined to the terrace remnant on the ridge.

A total of eleven test pits were excavated on the proposed site. The approximate locations are shown on Figure 1. Engineering logs are presented in the Appendix and are preceded by descriptive terms and symbols used in their preparation.

In general the proposed site is underlain by alluvial and glacio-fluvial deposits that comprised:-

Unit 1: Silty SAND to Sandy GRAVEL, dark grey to black, subrounded quartzite gravel, roots and rootlets, organic.

Unit 2: Sandy GRAVEL to Gravelly SAND, light grey to white, subrounded quartzite gravel, some cobbles.

Unit 3: Silty GRAVEL to SAND, dark brown to black, subrounded quartzite gravel, sometimes cemented.

Unit 4: Gravelly CLAY to Sandy GRAVEL, mottled yellow-orange-brown, subrounded quartzite gravel, trace cobbles

Unit 5: Silty CLAY to Sandy SILT, extremely weathered siltstone rock with soil-like properties.

Unit 6: SILTSTONE, orange – grey, distinctly weathered siltstone rock with rock mass defects.

Unit 1 has a peaty characteristic, is the topsoil horizon and should be easily removed by grader or bulldozer blade and backhoe or excavator bucket. The material should be stockpiled for landscaping and re-spreading as topsoil.

Unit 2 is generally a gravel product that is medium dense to dense and has an estimated allowable bearing capacity of 200kPa. It has a distinctive light grey to white colour and in the past the material has been quarried for road construction purposes. The gravel was not sampled for laboratory testing during this investigation but was visually assessed as suitable for road base-course gravel and as a base for extensive areas of hard standing, paved areas and concrete floors that may be required for the various timber processing buildings. Where levelling is required, consideration should be given to stockpiling the material for re-laying as a founding material. The unit is usually underlain by a dark brown to black silty gravel to cemented sand that could be used as a visual marker to indicate the vertical extent of the material. Dozer or grader blade and backhoe or excavator bucket should be able to excavate Unit 2 materials. Unsupported long term cut and fill batters in this material should not be made any steeper than 1.5:1 (H:V) and should be topsoiled to encourage revegetation to reduce potential surface erosion.

Unit 3 is a dark coloured layer, it is usually thin and appears to contain organic material. It is unlikely to be useful as a road construction material. It is cemented in places and if the overburden materials are stripped to this layer, it is expected to form a trafficable crust that will generally prevent the ingress of surface water to lower levels. To assist surface drainage, it may be necessary to rip through this layer to provide egress of water to lower layers. The Forestry Tasmania nursery at Perth had drainage problems associated with a hardpan layer and it is believed that deep ripping and / or the installation of deep drains was necessary to overcome the drainage problems. Unit 3 is estimated to have an allowable bearing capacity of 250kPa. The cemented nature of the unit may allow steep unsupported long term cut and fill batters but the unit is generally thin (depth range of 0.1 to 0.3m) and cut and fill batter slopes of 1.5:1 (H:V) or flatter are recommended.

Unit 4 is variable in composition but is considered to represent Pleistocene age glacio-fluvial gravels. An attempt was made at test pit 3 to assess the depth of this layer but the unit continued beyond the limit of the excavator reach at about

4.8m below ground surface. The unit comprises medium dense to dense gravel and very stiff gravelly clays. The estimated allowable bearing capacity is 200kPa. Depending on the composition, the gravelly portions of the unit are expected to be suitable as sub-base gravel whereas the clayey portions should be suitable as a selected fill. Long term unsupported cut and fill batters in this material should be constructed at 1.5:1 (H:V) or flatter. Some of the access road fills have been constructed from this unit at 1:1 batter slopes and are showing evidence of erosion. In other places, tension cracks have developed in the shoulder and shallow slumps and landslides can be expected in some fill batters between test pit locations 5 and 6 approximately. The tension cracks are likely to have been caused by settlement due to inadequate compaction at the edge of the fill.

Unit 5 was extremely weathered siltstone rock that has an estimated allowable bearing capacity of 150 to 200kPa. The material is expected to be suitable for use as fill. Excavations in this unit are expected to be achieved using excavator bucket or bulldozer ripper and blade. Long term cut and fill batter slopes should be constructed at 2.5:1 (H:V) or flatter in this material.

Unit 6 is distinctly weathered siltstone rock. This unit was encountered in test pit 9 that was located in a hollow and had the lowest elevation of all test pits. It is unlikely that the proposed development on the terrace level will encounter this material. In this material, long term cut batter slopes will be controlled by defects in the rock mass and an assessment of slope stability should be undertaken if the unit is exposed in any excavations. The unit is expected to require ripping prior to excavation. Fill batter slopes of 1:1 should be possible in this unit.

Throughout the study area there is evidence of quarrying and areas have been stripped of Unit 1, and Unit 2 has been quarried and removed from parts of the study area. Units 5 and 6 are considered to be in-situ weathered Permian bedrock. Remnant bedding planes in test pit 6 dip to the south southwest at about 45° and provide support for a northwest – southeast trending fault inferred at this location by Sharples. The bedding in test pit 9 dips towards the southwest to west southwest at between 5° and 15° and is consistent with dips and direction recorded on the Geological Atlas.

4. CONCLUSIONS AND RECOMMENDATIONS

This preliminary geotechnical assessment indicates that the proposed integrated forest products development site is located on a glacio-fluvial terrace situated on a north south trending ridge that is underlain by Permian age sedimentary rocks. Apart from the organic topsoil layer, these materials have an estimated allowable bearing capacity of 200kPa or higher and from a geotechnical aspect the site is considered suitable for the proposed development.

Sharples has indicated that the glacio-fluvial terraces have potential geoconservation value. It is concluded that the development has the potential to further devalue the geoconservation potential of the site. In order to develop the proposed integrated forest products yard it will be necessary to document and record the soil profiles.

The light grey to white quartzite gravel/sand of Unit 2 is assessed as a natural sub base to base course gravel suitable for use beneath standing areas, paved areas and concrete floors. It should be carefully managed during earthworks with provision being made to quarry and stockpile any excess material for use as a base course elsewhere on the project site, or as a road construction material.

If the project proceeds further on this site, Coffey are able to assist with the development of a program to document and record the soil profiles and other morphological and geological factors that may be of interest from a geoconservation point of view. It is recommended that additional geotechnical investigations be undertaken for structures located toward the southern or river end of the terrace above the area where a rockslide has been identified in the Permian bedrock to assess the footing conditions for any proposed future structures in this area.

Should you have any queries regarding the above please do not hesitate to contact either Barry Weldon or the undersigned.

For and on behalf of
COFFEY GEOSCIENCES PTY LTD

DAN O'TOOLE

REFERENCE:

Sharples, C., 1994. Geomorphic Values Survey: Barnback Block, Huon Forest District, A report to Forestry Tasmania (Huon Forest District).

HO 53/1-AB
23rd August 2000

1

APPENDIX A

EXPLANATION SHEETS - SOIL DESCRIPTIONS

Information

Important information about your **Coffey** Report



Coffey

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

Your report is based on project specific criteria

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site; other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

Subsurface conditions can change

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of the subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

Interpretation of factual data

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Your report will only give preliminary recommendations

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

Your report is prepared for specific purposes and persons

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they have incorporated the report findings.

Data should not be separated from the report*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment. Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design toward construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

** For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical Information in Construction Contracts" published by the Institution of Engineers Australia, National Headquarters, Canberra, 1987.*

Soil Description

Explanation Sheet

DEFINITION:

In engineering terms soil includes every type of uncemented or partially cemented inorganic material found in the ground. In practice, if the material can be remoulded or disintegrated by hand in its field condition or in water it is described as a soil.

Other materials are described using rock description terms.

AS1726-1993

The descriptive terms used by Coffey are given below. They are broadly consistent with AS1726-1993.

UCS & SOIL NAME

Soils are described in accordance with the Unified Soil Classification (UCS) as shown in the table on the following page.

MOISTURE CONDITION

Dry Looks and feels dry. Cohesive and cemented soils hard, friable or powdery. Uncemented granular soils run freely through hands.

Moist Soil feels cool and darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.

Wet As for moist but with free water forming on hands when handled.

CONSISTENCY OF COHESIVE SOILS

TERM	UNDRAINED STRENGTH S_u (kPa)	FIELD GUIDE
Very Soft	<12	A finger can be pushed well into the soil with little effort.
Soft	12 – 25	A finger can be pushed into the soil to about 25mm depth.
Firm	25 – 50	The soil can be indented about 5mm with the thumb, but not penetrated.
Stiff	50 – 100	The surface of the soil can be indented with the thumb, but not penetrated.
Very Stiff	100 – 200	The surface of the soil can be marked, but not indented with thumb pressure.
Hard	>200	The surface of the soil can be marked only with the thumbnail.
Friable	–	Crumbles or powders when scraped by thumbnail.

DENSITY OF GRANULAR SOILS

TERM	DENSITY INDEX (%)
Very loose	9 – 15
Loose	15 – 35
Medium Dense	35 – 65
Dense	65 – 85
Very Dense	85 – 100

PARTICLE SIZE DESCRIPTIVE TERMS

NAME	SUBDIVISION	SIZE
Boulders		>200 mm
Cobbles		63 mm to 200 mm
Gravel	coarse	20 mm to 63 mm
	medium	6 mm to 20 mm
	fine	2.36 mm to 6 mm
Sand	coarse	600 μ m to 2.36 mm
	medium	200 μ m to 600 μ m
	fine	75 μ m to 200 μ m

MINOR COMPONENTS

TERM	ASSESSMENT GUIDE	PROPORTION
Trace of ...	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component.	Coarse grained soils: $\leq 5\%$ Fine grained soils: $\leq 15\%$
With some ...	Presence easily detected by feel or eye, soil properties little different to general properties of primary component.	Coarse grained soils: 5 – 12% Fine grained soils: 15 – 30%

SOIL STRUCTURE

ZONING		CEMENTING	
Layers	Continuous exposure or sample	Weakly cemented	Easily broken up by hand in air or water
Lenses	Discontinuous layers of lenticular shape	Moderately cemented	Effort is required to break up the soil by hand in air or water
Pockets	Irregular inclusions of differential material		

SOIL STRUCTURE

WEATHERED IN PLACE SOILS

Extremely weathered material Structure and fabric of parent rock visible.

Residual soil Structure and fabric of parent rock not visible.

TRANSPORTED SOILS

Aeolian soil Deposited by wind

Alluvial soil Deposited by streams and rivers

Colluvial soil Deposited on slopes (transported downslope by gravity)

Fill Man made deposit. Fill may be significantly more variable between tested locations than naturally occurring soils.

Lacustrine soil Deposited by lakes

Marine soil Deposited in ocean basins, bays, beaches and estuaries



SOIL CLASSIFICATION INCLUDING IDENTIFICATION AND DESCRIPTION

		FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 63 mm and basing fractions on estimated mass)		GROUP SYMBOLS	TYPICAL NAMES	
COARSE GRAINED SOILS More than 50% of material less than 60 mm is larger than 0.075 mm	GRAVELS More than half of coarse fraction is larger than 2.36 mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.	GW	Well graded gravels, gravel-sand mixtures, little or no fines.	
		GRAVELS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing.	GP	Poorly graded gravels, gravel-sand mixtures, little or no fines, uniform gravels.	
		CLEAN SANDS (Little or no fines)	Non-plastic fines (for identification procedures see ML below)	GM	Silty gravels, poorly graded gravel-sand silt mixtures.	
			Plastic fines (for identification procedures see CL below)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.	
	SANDS More than half of coarse fraction is smaller than 2.36 mm	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate sizes	SW	Well graded sands and gravelly sands, little or no fines, uniform gravels.	
		SANDS WITH FINES (Appreciable amount of fines)	Predominantly one size or a range of sizes with some intermediate sizes missing.	SP	Poorly graded sands, gravelly sands, little or no fines, uniform gravels.	
			Non-plastic fines (for identification procedures see ML below).	SM	Silty sands, poorly graded sand-silt mixtures.	
		Plastic fines (for identification procedures see CL below).	SC	Clayey sands, poorly graded sand-clay mixture.		
	FINE GRAINED SOILS More than 50% of material less than 60 mm is smaller than 0.075 mm	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2 mm.				
		SILTS & CLAYS Liquid limit less than 50	DRY STRENGTH	DILATANCY	TOUGHNESS	ML
None to Low			Quick to slow	None		
Medium to High			None to very slow	Medium		
SILTS & CLAYS Liquid limit greater than 50		Low to medium	Slow	Low	OL	Organic silts and organic silt - clays of low to medium plasticity.*
		Low to medium	Slow to none	Low to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit.*
		High to very high	None	High	CH	Inorganic clays of high plasticity.*
	Medium to high	None to very slow	Low to medium	OH	Organic clays of high plasticity.*	
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.			Pt	Peat and other highly organic soils.	

* Low plasticity - Liquid Limit W_L less than 35%. Medium plasticity - W_L between 35% and 50%.

DEFECTS

TERM	DEFINITION	DIAGRAM
PARTING	A surface or crack across which the soil has little or no tensile strength. Parallel or sub parallel to layering (eg bedding). May be open or closed.	
JOINT	A surface or crack across which the soil has little or no tensile strength but which is not parallel or sub parallel to layering. May be open or closed.	
SHEARED ZONE	Zone in clayey soil with roughly parallel almost planar boundaries containing closely spaced, smooth or slickensided, curved intersecting joints which divide the mass into lenticular or wedge shaped blocks	
SHEARED SURFACE	A near planar smooth, polished or slickensided surface in clayey soil. The polished or slickensided surface indicates that movement (in many cases very little) has occurred along the defect.	

TERM	DEFINITION	DIAGRAM
SOFTENED ZONE	A zone in clayey soil, usually adjacent to a defect in which the soil has a higher moisture content than elsewhere.	
TUBE	Tubular cavity. May occur singly or as one or a large number of separate or inter-connected tubes. Walls often coated with clay or strengthened by denser packing or grains. May contain organic matter	
DYKE	Sheet or wall like body of soil substance or mass with roughly planar to irregular near parallel boundaries which cuts through a soil mass. Some dykes are formed by infilling of open joints.	
TUBE CAST	Roughly cylindrical elongated body of soil different from the soil mass in which it occurs. In some cases the soil which makes up the tube cast is cemented.	

Excavation No. **TP1**
 Sheet 1 of 1
 Office Job No.: **HO53/1**
 Date started: **11.8.2000**
 Date completed: **11.8.2000**
 Logged by: **KdeC**
 Checked by: *allw*



Engineering log - Excavation

Client: **Forestry Tasmania**
 Principal:
 Project: **Integrated Timber Processing Yard, Huon**
 Test pit location:

equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information				material substance											
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	100 hand penetrometer kPa	200	300	400	structure and additional observations
1	2	3			RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.							
E							SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD					
					0.5		GW	GRAVEL; fine to coarse (5mm - 60mm), light grey, subrounded quartzite, low liquid limit silt to coarse sand fines	M to W	MD-D					
					1.0		SW	GRAVELLY SAND; fine sand, light grey to white, trace of low liquid limit silt, subrounded quartzite gravel fine to coarse (5mm - 60mm), trace of cobbles (60mm - 200mm)	M	MD					
					1.5		GM	SILTY GRAVEL; fine to medium subrounded quartzite gravel, dark brown to black low liquid limit silt fines, organics GRAVELLY CLAY; medium plasticity clay, mottled yellow-orange-brown, trace of red. Fine to medium sand and fine to coarse subrounded quartzite gravel, trace of cobbles	M to D	MD-D					Isolated pocket of grey clay measured at 100kPa with Pocket Penetrometer
					1.5		CL			St-VSt					
					2.0										
					2.5			Test pit TP1 terminated at 2.25m							
					3.0										

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Form GEO 5.2 Issue 3 Rev.2 TESTPIT HO53.GPJ COFFEY.GDT 22.08.00

Engineering log - Excavation

Client: **Forestry Tasmania**
 Principal:
 Project: **Integrated Timber Processing Yard, Huon**
 Test pit location:

Excavation No. **TP2**
 Sheet 1 of 1
 Office Job No.: **HO53/1**
 Date started: **11.8.2000**
 Date completed: **11.8.2000**
 Logged by: **KdeC**
 Checked by: *Blw*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3			RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
U					0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, angular quartz gravel (5mm to 200mm), rootlets & organics	M-W	MD		
					0.5		GP	SANDY GRAVEL; fine to medium sand with quartzite gravel (5mm to 200mm), pale grey				
					0.8		SW	GRAVELLY SAND; medium grained sand in irregular dark brown to black band, angular gravel and cobbles	M	MD-D		Water trickling into test pit through sandy gravel layer
					0.8		CL	SANDY CLAY; medium to high plasticity clay, some fine sand, mottled orange-yellow-brown		St-VSt		
					0.8		SP	SAND; fine to medium, orange		MD		
					1.0		GP	SANDY GRAVEL; medium sand, mottled orange-brown-grey, angular gravel (40mm-70mm) and cobbles (up to 180mm), pockets of orange high plasticity clay				
					2.0							
					2.5			Test pit TP2 terminated at 2.1m				
					3.0							

Sketch

TESTPIT_HO53.GPJ COFFEY.GDT 22.08.00

Form GEO 5.2 Issue 3 Rev.2

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 no resistance ranging to refusal 2 3 4 water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP3**

Engineering log - Excavation

Sheet 1 of 2

Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *SEN*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 10m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer			structure and additional observations
	1	2	3								100 kPa	200 kPa	300 kPa	
E					0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD				
							SW	GRAVELLY SAND; fine to medium sand, pale grey, angular to subrounded quartzite gravel (10 to 20mm)		MD-D				
							SP CL	SAND; fine to medium, cemented in places, dark brown to black CLAY; medium plasticity, mottled orange-yellow-brown, trace of fine sand		MD VST				
					1.0		GP	SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit silty material		MD				
					1.5									
					2.0									
					2.5									
					3.0									

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP3**
 Sheet 2 of 2
 Office Job No.: **HO53/1**
 Date started: **11.8.2000**
 Date completed: **11.8.2000**
 Logged by: **KdeC**
 Checked by: *[Signature]*



Engineering log - Excavation

Client: **Forestry Tasmania**
 Principal:
 Project: **Integrated Timber Processing Yard, Huon**
 Test pit location:

equipment type and model: CAT 325B		Pit Orientation:		Easting: m	R.L. Surface:							
excavation dimensions: 10m long 1.6m wide		Northing: m		datum:								
excavation information				material substance								
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
	1	2	3									
U					3.5 4.0 4.5			SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit silty material (continued)	M	MD		
					5.0 5.5 6.0			Test pit TP3 terminated at 4.8m				

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP4**

Engineering log - Excavation

Sheet 1 of 1
Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *ADW*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
excavation dimensions: 4m long 1.6m wide Northing: m datum:

excavation information					material substance								
method	penetration	support	water	notes samples, tests, etc	depth RL	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1	2	3										100 300 400	
						0.5		SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
								GP	SANDY GRAVEL; angular quartzite gravel and cobbles (up to 160mm) in matrix of fine sand, mottled orange, yellow to red. Some pockets of red, low liquid limit, silty material				
						1.0		SP	SAND; fine to medium, cemented in places, dark brown to black		VD		
								ML to CL	SILTY CLAY; medium plasticity clay, mottled orange, yellow & brown, trace of fine silt		VSt		
						1.5		CL	GRAVELLY CLAY; medium plasticity clay, mottled yellow-orange-brown, trace of red. Fine to medium sand and fine to coarse subrounded quartzite gravel, trace of cobbles				
						2.0			Test pit TP4 terminated at 1.8m				
						2.5							
						3.0							

Sketch

Form GEO.5.2 Issue 3 Rev.2 TESTPIT_HO53.GPJ_COFFEY.GDT 22.08.00

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP5**

Engineering log - Excavation

Sheet 1 of 1
Office Job No.: **HO53/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *ADW*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
excavation dimensions: 4.5m long 1.6m wide Northing: m datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
1 2 3					RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
E							SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
					0.5		SP	SAND; fine to medium, cemented in places, dark brown to black				
					1.0		GP	SANDY GRAVEL; rounded to subangular quartz gravel, pale grey medium to fine sand		D		
					1.5		GP	SANDY GRAVEL; rounded to subangular quartz gravel, dark brown medium to fine sand, cemented in places		MD-D		
					2.0		GW	SANDY GRAVEL; quartz gravel and cobbles up to 70mm, medium sand and pockets of clay, mottled orange, red and yellow	M-D	MD		
					2.5			Test pit TP5 terminated at 2.07m				
					3.0							

Sketch

Form GEO 5.2 Issue 3 Rev.2 TESTPIT_HO53.GPJ COFFEY.GDT 22.08.00

method N natural exposure X existing excavation B† backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water ▽ water level on date shown ► water inflow ◄ water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering log - Excavation

Client: **Forestry Tasmania**
 Principal:
 Project: **Integrated Timber Processing Yard, Huon**
 Test pit location:

Excavation No. **TP6**
 Sheet 1 of 1
 Office Job No.: **HO53/1**
 Date started: **11.8.2000**
 Date completed: **11.8.2000**
 Logged by: **KdeC**
 Checked by: *[Signature]*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 3.5m long 1.6m wide Northing: m datum:

excavation information				material substance									
method	penetration	support	water	notes samples, tests, etc	RL	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer	structure and additional observations
	1 2 3								soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
EI								SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
						0.5		GC	CLAYEY GRAVEL; medium to high plasticity clay, pale yellow-cream to light brown, angular quartz gravel (20mm-100mm)				
						1.0		ML to CL	SILTY CLAY; low plasticity clay with silt fines, mottled orange to grey, some remnant dropstones		VSt-H		Extremely weathered siltstone bedrock, remnant dropstones & bedding, orientation 192/46 degrees & 204/47 degrees. (Magnetic dip direction and dip).
						1.5						X	
						2.0			Test pit TP6 terminated at 1.7m				
						2.5							
						3.0							

Sketch

Form GEO 5.2 Issue 3 Rev 2 TESTPIT HO53 GPJ COFFEY.GDT 22.08.00

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water water level on date shown water inflow water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP7**

Engineering log - Excavation

Sheet 1 of 1
Office Job No.: **H053/1**

Client: **Forestry Tasmania**

Date started: **11.8.2000**


Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**



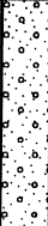
Logged by: **KdeC**

Test pit location:

Checked by: 







equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
excavation dimensions: 3.2m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth RL metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index	hand penetrometer			structure and additional observations
	1	2	3								100 kPa	200 kPa	300 kPa	
E					0.5		SM	SILTY SAND; fine to medium sand, dark brown to black, angular to rounded quartz gravel (5mm to 60mm), subrounded to rounded cobbles up to 180mm	M	MD				
					0.5 - 1.0		GC	CLAYEY GRAVEL; medium plasticity, mottled orange-red to yellow rounded cobbles up to 190mm, angular gravel 20mm to 60mm, some fine sand to silt						
					1.0 - 1.6		GP	SANDY GRAVEL; rounded, coarse gravel (70mm) and fine gravel (5mm - 10mm) in angular to subangular medium to coarse sand, mottled orange-red, pale grey to white at base of pit						
Test pit TP7 terminated at 1.6m														

Sketch

Form GEO 5.2 Issue 3 Rev.2 TESTPIT_H053.GPJ COFFEY.GDT 22.08.00

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4  no resistance ranging to refusal water  water level on date shown  water inflow  water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet Wp plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Excavation No. **TP8**
 Sheet 1 of 1
 Office Job No.: **HO53/1**
 Date started: **11.8.2000**
 Date completed: **11.8.2000**
 Logged by: **KdeC**
 Checked by: *SLW*



Engineering log - Excavation

Client: **Forestry Tasmania**
 Principal:
 Project: **Integrated Timber Processing Yard, Huon**
 Test pit location:

equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 3.1m long 1.6m wide Northing: m datum:

excavation information				material substance										
method	penetration			notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/density index				structure and additional observations
	1	2	3							100 kPa	200 kPa	300 kPa	400 kPa	
E					0.5		SM	SILTY SAND; fine sand, pale grey, rounded gravel (90mm) and small angular quartz gravel, rootlets	M	L				
							ML	SANDY SILT; fine sand & silt, dark brown to black, some rootlets		MD				
					1.0		GP	SANDY GRAVEL; fine sand, orange-red (upper layer) to medium grained & pale yellow-grey (bottom of pit)						
					1.5									
					2.0			Test pit TP8 terminated at 1.7m						
					2.5									
					3.0									

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration water 	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering log - Excavation

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *ADW*



equipment type and model: CAT 325B Pit Orientation: Easting: m R.L. Surface:
 excavation dimensions: 4.2m long 1.6m wide Northing: m datum:

excavation information				material substance								
method	penetration	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material	moisture condition	consistency/density index	hand penetrometer kPa	structure and additional observations
	1 2 3				RL			soil type: plasticity or particle characteristics, colour, secondary and minor components.			100 200 300 400	
W							SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	MD		
					0.5		GP	SANDY GRAVEL; medium to coarse sand, angular, rounded to subangular quartz gravel (50mm), pale grey		VSt		
							ML to CL	SILTY CLAY; medium plasticity clay, mottled orange-yellow, some fine silt, rootlets				
					1.0		ML to CL	SILTY CLAY; medium plasticity clay, pale grey to stained pink-red, low plasticity silt		VSt - H	X X X	Remnant defects in the extremely weathered bedrock (i.e joints and bedding)
					1.5						XX	
					2.0			Test pit TP10 terminated at 1.8m			600	
					2.5							
					3.0							

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 no resistance ranging to refusal water ▽ water level on date shown ▲ water inflow ▼ water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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Engineering log - Excavation

Client: **Forestry Tasmania**

Date started: **11.8.2000**

Principal:

Date completed: **11.8.2000**

Project: **Integrated Timber Processing Yard, Huon**

Logged by: **KdeC**

Test pit location:

Checked by: *[Signature]*



equipment type and model:	CAT 325B	Pit Orientation:	Easting:	m	R.L. Surface:
excavation dimensions:	4m long 1.6m wide		Northing:	m	datum:

excavation information				material substance											
method	penetration 1 2 3	support	water	notes samples, tests, etc	depth metres	graphic log	classification symbol	material soil type: plasticity or particle characteristics, colour, secondary and minor components.	moisture condition	consistency/ density index	hard penetration meter			structure and additional observations	
											100 kPa	300 kPa	400 kPa		
E	[Penetration symbols]	[Support symbols]	[Water symbols]		0.5	[Graphic log symbol]	SM	SILTY SAND; fine to medium sand, black to dark grey, low liquid limit silt, roots and rootlets, organics	M	L					
						[Graphic log symbol]	SW	GRAVELLY SAND; medium sand with angular to subrounded quartz gravel (5mm to 60mm), pale grey							MD
					1.0	[Graphic log symbol]	SM to SW	SILTY SAND; fine to medium sand, dark grey to brown, angular quartz gravel (~40mm) GRAVELLY SAND; medium sand, orange to pale brown, subrounded to angular quartz gravel and rounded cobbles (60mm to 150mm)							
					2.0			Test pit TP11 terminated at 1.9m							
					2.5										
					3.0										

Sketch

method N natural exposure X existing excavation BH backhoe bucket B bulldozer blade R ripper E excavator	support S shoring N nil penetration 1 2 3 4 [Symbol] no resistance ranging to refusal water [Symbol] water level on date shown [Symbol] water inflow [Symbol] water outflow	notes, samples, tests U ₅₀ undisturbed sample 50mm diameter U ₆₃ undisturbed sample 63mm diameter D disturbed sample V vane shear (kPa) Bs bulk sample E environmental sample R refusal	classification symbols and soil description based on unified classification system moisture D dry M moist W wet W _p plastic limit W _L liquid limit	consistency/density index VS very soft S soft F firm St stiff VSt very stiff H hard Fb friable VL very loose L loose MD medium dense D dense VD very dense
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