

16. Potential Environmental Impacts and Management Measures

16.1 Introduction

This chapter provides details of the potential impacts of construction and operation of the Workers Accommodation Facility component only. The potential impacts have been assessed using the impact assessment methodology described in Chapter 4.

16.2 Land Use and Planning

16.2.1 George Town Council Planning Scheme 1991 - Use, Zone and Permit Status

Workers Accommodation Facility

A development of this nature is not a defined use in the Planning Scheme, nor is it included in the land uses definitions within the General Industrial zoning controls. The workers accommodation facility, for the purposes of the Planning Scheme and the relevant zoning controls, is therefore considered a Discretionary Use or Development, namely "Any other use not in 5.7.2 or 5.7.4", as detailed in the zoning controls for the General Industrial zone.

The proposed development is broadly consistent with the purpose of the General Industrial zone. The facility is ancillary development directly associated with, and necessary for, the construction of a major industrial development, namely the Bell Bay pulp mill. The facility will have no adverse effects on the environmental quality standards of the neighbouring zones, and furthermore has been designed to a standard that will maintain the amenity of the zone.

An amendment to the Planning Scheme will not be required to reflect the approval of the workers accommodation facility. Under a Project of State Significance (POSS), a development may be approved notwithstanding any conflicting provisions of the applicable planning scheme. Nevertheless, if there were a conflict, an amendment to reflect the POSS approval decision would be appropriate.

Industrial subdivision

Following closure and decommissioning of the workers accommodation facility, the site will be converted to an industrial estate. It is expected that the presence of the pulp mill in the region will increase demand for a range of industrial operation and maintenance services. The industrial subdivision will provide opportunities for new business to establish and meet these needs.

A subdivision layout plan is provided in Appendix 40, Volume 14. The subdivision layout complies with the relevant requirements specified in the General Industrial zoning controls for minimum lot size, lot dimension and road reserves.

The necessary road, stormwater, sewerage and electrical infrastructure to service the industrial subdivision will be installed when the temporary accommodation facility is constructed. This will provide for the long-term sustainable use of resources and infrastructure.

The proposed industrial subdivision is consistent with the purposes of the General Industrial zone.

16.2.2 Management Measures

Management measures to address potential impacts identified above, include:

- ▶ Design and installation of road, stormwater, sewerage and electrical infrastructure to meet the requirements of the Planning Scheme.

16.2.3 Summary of Impacts and Management Measures

The workers accommodation facility is not contrary to the intent of the relevant planning zone and development standards.

A summary of potential impacts, management measures to minimise the impact and an overall rating associated with land use and planning is provided below.

Table 16-1 Summary of potential impact rating and management measures – land use and planning

Potential Impact	Impact Rating	Proposed Management	Management Impact	Overall Rating
Land Use and Planning				
Inconsistencies with definitions of George Town Planning Scheme 1991	Minor negative impact	Design consistent with Planning Scheme Requirements	Minor positive impact	Insignificant impact

Overall impacts on land use and planning are considered to be insignificant.

16.3 Infrastructure and Services

16.3.1 Buildings

There are no existing structures on the site and no off-site structures will be impacted by the accommodation facility.

Single level accommodation units will be provided for up to 800 pulp mill construction workers. Communal facilities, which will service the entire accommodation facility population, will be single level buildings.

16.3.2 Services

Water Supply

Water will be supplied from a 200 mm water main passing the southeast corner of the site. Detailed design will be undertaken in accordance with relevant Australian Standards. Sufficient capacity exists within the water supply network to cater for the facility.

Sewerage and Wastewater

All wastewater on the site will be directed to George Town Council's reticulated sewerage under a Trade Waste Agreement with the Council. It is expected that the accommodation facility will generate approximately 152 kL/day. Wastewater will then be directed to the George Town WWTP. This plant has a design capacity of 2500 kL/day, and is currently receiving 1200 kL/day. There is sufficient latent capacity in the plant to treat the expected quality and quantity of wastewater generated from the development.

Due to the cyclic nature of activities at the site (3 shifts per day), the expected discharge of wastewater from the site will not be at a constant rate. The three shifts and meal preparation/clean-up cycle has the potential to cause surges or 'slugs' of wastewater from the site. George Town Council has expressed some concern regarding the potential impact of wastewater surges from the site on the reticulated sewerage network and treatment plant (Pers. comm. Malcolm Aitken, George Town Council, cited in Pitt and Sherry, 2006b). The surging effect will nevertheless be less than what it would be if the operation of the accommodation facility was not committed to a staggered shift policy. A buffer holding tank may be used to dampen the surging effect. This will be considered during the detailed design.

Electricity

The After Diversity Maximum Demand for the accommodation site is expected to be in the order of 2 to 3MVA. Power will be supplied to the site at 22kV via two or three dedicated substations. Actual maximum demands and distribution requirements to each area of the site will be determined as part of the detailed design process.

Natural Gas

Natural gas will not be required at the accommodation facility.

Telecommunications

Telephone communication will be reliant on residents carrying personal mobile phones or company gold phones within the communal building facilities.

Internet connection will be available to each unit but residents will need to supply their own computers. Connections will also be available (for notebook computers) in the dry recreation room.

Sufficient capacity exists within the current telecommunications network to cater for this demand.

Rail

Rail to the accommodation site is not required.

Waste

Waste receptacles will be provided in all buildings and outdoor areas as appropriate. Staff and contractors at the site will be required to collect wastes and recyclable materials to a central, accessible waste depot. A waste contractor will regularly collect the waste. Calculations based on expected waste generation rates and waste collection frequency indicate that 10 covered skip bins will be required on site.

George Town Council's landfill is expected to be closed prior to or shortly after use of the facility commences. All waste will be transferred to the Launceston landfill. Sufficient capacity exists to cater for this waste generation.

16.3.3 Management Measures

Management measures to minimise potential impacts on services and infrastructure include:

- ▶ A detailed stormwater management plan will be prepared and submitted to Council for approval prior to construction.
- ▶ Further investigations will be undertaken on the need for a surge tank to be installed on the facility's connection to the municipal sewerage network.

16.3.4 Summary of Impacts and Management Measures

A summary of potential impacts, management measures to minimise the impact and a overall rating associated with infrastructure and services is provided below.

Table 16-2 Summary of potential impact rating and mitigation measures – infrastructure and services

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Infrastructure and Services				
Capacity of local stormwater services	Minor negative impact	A detailed stormwater management plan will be prepared and submitted to Council for approval prior to construction.	Minor positive impact	Insignificant impact
Capacity of Council's wastewater treatment plant to cope with surge effects from the facility	Minor negative impact	Further investigations will be undertaken on the capacity of the receiving sewerage network to ensure discharge volumes are within the existing capacity of the receiving network	Minor positive impact	Insignificant impact

- ▶ Overall, impacts on infrastructure and services is considered insignificant

16.4 Topography, Climate and Meteorology

16.4.1 Topography

Localised disturbance to the topography of the existing site will occur. The site is generally flat with elevation fluctuating between 20.5 to 26.0 m ASL. As part of the site preparation works, grading will occur to level the site, resulting in a change of the topography at a micro level. Potential impacts on the topography are considered to be insignificant.

16.4.2 Climate and Meteorology

Construction and operation of the workers accommodation facility will not impact on climate.

16.4.3 Management Measures

Potential impacts on the topography, climate and meteorology of the immediate and surrounding area are considered insignificant and no management measures are proposed.

16.5 Air Quality

There will, during the construction phase of the facility, be potential for impact on air quality from dust and airborne particulates generated during earthworks, including excavations and the transportation, stockpiling and placement of fill and construction vehicle emissions.

Implementation of management measures will minimise potential but insignificant impacts.

16.5.1 Management Measures

Dust will be controlled by provisions outlined in the Construction EMP.

16.5.2 Summary of Impacts and Management Measures

A summary of potential impacts, management measures to minimise the impact and a overall rating related to air quality is provided below.

Table 16-3 Summary of potential impact rating and mitigation measures – air quality

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Air Quality				
Generation of dust during construction	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact

Overall, impacts on air quality are considered insignificant.

16.6 Geology and Soils

Disturbance to surface soils will occur during site preparation works. Clearing of vegetation and levelling of the site will result in localised disturbance to the surface soils.

16.6.1 Management Measures

The following management measures will be implemented to minimise potential geological and soil impacts. These management measures will be included in the Environmental Management Plan and will be monitored and reported as specified (refer to Volume 4):

- ▶ preparation and implementation of Construction EMP detailing erosion, sediment and pollution control measures during site preparation and construction works; and
- ▶ water trucks and other dust suppression and erosion management measures will be implemented to stabilise soils subject to heavy construction traffic.

16.6.2 Summary of Potential Impacts and Management Measures

Potential impacts on geology and soils are anticipated to be minor and can readily be addressed through standard management strategies as outlined in the Workers Accommodation Facility Mitigation Management Plan (Volume 4 of the Draft IIS).

Table 16-4 Summary of potential impact rating and mitigation measures – geology and soils

Potential Impact	Impact Rating	Proposed Mitigation	Management Impact	Combined Rating
Geology and Soils				
Soil erosion	Minor negative impact	Construction Environmental Management Plan	Minor positive impact	Insignificant impact
	Minor negative impact	Erosion control measures to be installed prior to significant disturbance	Minor positive impact	Insignificant impact

Overall, with the implementation of appropriate management, geology and soil impacts are considered to be insignificant.

16.7 Groundwater and Hydrology

16.7.1 Groundwater

Construction activities will be undertaken using earthmoving and other mobile equipment and relevant management measures will be in place to minimise the potential for contamination of groundwater. While the facility is occupied normal domestic sewerage and wastewater services will be in place and will be maintained.

16.7.2 Drainage and Catchments

There is adequate fall across the site for stormwater to be gravity fed to George Town Council's stormwater system. A concept plan for stormwater is provided in Appendix 37, Volume 14. A more detailed stormwater management plan and design will be prepared to Council's satisfaction prior to construction. Given Council's existing stormwater infrastructure, connection of the facility to that infrastructure will have no adverse environmental impact. No management measures are therefore required.

16.7.3 Water Quality and Infrastructure

Construction and Decommissioning

Construction of the accommodation facility and its subsequent dismantling and conversion of the site to industrial land will involve extensive site preparation works to obtain appropriate levels for proper drainage and installation of necessary infrastructure such as roads and services. Despite the site being subject to only "low gully and rill erosion" (Pinkard 1980, cited in Pitt and Sherry 2006b), soil eroded during land disturbance could wash away and contaminate storm water, eventually contributing to overall pollutant loads in receiving waters, including the Tamar estuary. There will also be risks of water contamination due to spills of liquids and liquid wastes stored and handled on the site during the construction period.

Portable toilets will be provided for all workers to manage human wastes during construction.

Operation

There will be three main sources of wastewater on the site:

- ▶ Individual en-suites;
- ▶ Communal kitchen and eatery; and
- ▶ Site equipment wash down area.

The quality of the wastewater is expected to be similar to wastewater from a large hotel. Wastewater from individual en-suites will consist of grey and black water and will be directed to the site's reticulated sewerage system under a Trade Waste Agreement to be agreed with Council.

Due to concentrated biological oxygen demand, solids, fats and greases from food preparation and cleaning, and wastewater from the kitchen and eatery may require pre-treatment prior to discharge to the sewer. This will depend on the terms of the Trade Waste Agreement.

A vehicle wash down bay will be constructed on site for cleaning of waste receptacles, plant and equipment. This bay will also be made available to occupants for vehicle washing.

The quantity of wastewater generated by the facility will be a function of overall site occupancy. Wastewater infrastructure design and assessment of the capacity of the receiving sewerage treatment facility will be based on the maximum expected occupancy.

Typical household wastewater flows per person per day range from 190 L/person/day for households with standard fixtures down to 110 L/person/day for households with full water reduction facilities (refer Appendix D of Appendix 37, Volume 14). This standard household figure is supported by sewage flow

estimates from other literature (Corbitt 1998, cited in Pitt and Sherry 2006b) for “work of construction camps (semi permanent)”, also 190 L/person/day, and was used as a basis for calculating wastewater flows.

With an estimated design occupancy of up to 800 persons, each generating 190 litres of wastewater per day, the maximum daily wastewater flow expected is $800 \times 190 = 152,000$ L/day or 152 kL/day.

All wastewater on the site will be directed to George Town Council’s reticulated sewerage under a Trade Waste Agreement. A concept plan for the collection of wastewater from the site is attached in Appendix 37, Volume 14, Sewer Concept Layout Plan. Wastewater will then be directed to the George Town WWTP. This plant has a design capacity of 2500 kL/day, and is currently receiving 1200 kL/day. Therefore the treatment plant has sufficient capacity to treat the expected quality and quantity of wastewater generated from the development.

Due to the cyclic nature of activities at the site (3 shifts per day), the expected discharge of wastewater from the site will not be at a constant rate. In particular, the three shifts and meal preparation/clean up cycle has the potential to cause surges or ‘slugs’ of wastewater from the site. George Town Council has raised the potential impact of wastewater surges from the site on the reticulated sewerage network and treatment plant (Pers comm. Malcolm Aitken, George Town Council, cited in Pitt and Sherry, 2006b). A surge buffer tank may be installed, with the need for it being examined as part of detailed design.

16.7.4 Management Measures

To minimise potential impacts on groundwater and hydrology the following management measures will be implemented.

A storm water management plan, based on best practice storm water management principles and practices for construction sites, will be developed prior to construction and submitted to Council for approval prior to commencement of works on the site.

The plan will incorporate the following elements:

- ▶ Ensure that the least amount of land is exposed to the risk of erosion for the shortest period of time;
- ▶ Effectively control surface runoff entering and leaving the site;
- ▶ Effectively control the generation of dust, litter and debris within the site;
- ▶ Install erosion control works and measures to minimise the amount of site erosion;
- ▶ Install sediment collection devices to prevent the export of sediment from the site;
- ▶ Rehabilitate disturbed areas as soon as possible, where required;
- ▶ Maintain the erosion control and sediment collection devices;
- ▶ The Stormwater Management Plan will form part of the overall site Construction EMP. This approach is consistent with that prescribed by the State Policy on Water Quality Management ,1997; and
- ▶ All wastewater will be discharged to Council’s reticulated system under a Trade Waste Agreement. No wastewater will be discharged to stormwater.

16.7.5 Summary of Impacts and Management Measures

A summary of potential impacts, management measures to minimise the impact and an overall rating related to groundwater and hydrology is provided below.

Table 16-5 Summary of potential impact rating and mitigation measures – groundwater and hydrology

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Groundwater and hydrology				
Introduction of pollutants to groundwater	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact
Impacts on water quality from erosion	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact

Overall, impacts on groundwater and hydrology are considered insignificant,

16.8 Terrestrial Flora

16.8.1 Flora impacts

A total of 12 potential ecological impacts have been identified in relation to the proposed workers accommodation facility. These impacts are briefly described below. For more detailed descriptions of individual impacts, refer to Section 10.2.1 of Appendix 29, Volume 12.

1. Loss or damage to native vegetation (general)

The establishment of the workers accommodation facility will result in the direct loss of 4.6 hectares of non-threatened native vegetation in poor to moderate condition. It may also result in a localised reduction in species richness, via localised population reduction (within the site) of a small number of species. Similar habitat and vegetation communities are common within the local area.

2. Fragmentation of native vegetation

The site for the workers accommodation facility and the surrounding area has already been extensively fragmented by land clearing for industrial development, rubbish disposal and weed (gorse) control. Fragmentation of native vegetation is not considered to be a significant impact on this site.

3. Loss or damage to a population of a nationally significant flora species

No nationally threatened flora species have been identified within the workers accommodation facility site.

4. Loss or damage to a population of a state significant flora species

No state significant flora species have been identified within the workers accommodation facility site.

5. Introduction of environmental weeds

There is potential for the introduction of environmental weeds in the establishment phase and during the ongoing lifespan of the workers accommodation facility, particularly via heavy machinery that may be carrying viable weed seeds on their bodies or wheels. Appropriate wash-down procedures will be implemented.

6. Spread of existing environmental weeds

Existing environmental weeds at the workers accommodation facility site may be spread on or off site by trucks and construction vehicles. The weed species already present include *Acacia longifolia* subsp. *longifolia*, *Chrysanthemoides monilifera* subsp. *monilifera*, *Conium maculatum*, *Erica lusitanica*, *Galium aparine*, *Psoralea pinnata* and *Rubus fruticosus* aggregate. These species may also colonise recently cleared ground. Large infestations of *Ulex europaeus* (gorse) have recently been cleared by bulldozers but the species is still present in small numbers and has the potential to regenerate. Appropriate wash-down procedures will be implemented.

7. Introduction and spread of *Phytophthora cinnamomi*

One EVC, 'Eucalyptus amygdalina coastal forest and woodland' (DAC) occurring on the workers accommodation facility site has been identified as being highly susceptible to *Phytophthora cinnamomi* (Forest Practices Authority 2005). Plants within the Epacridaceae, Fabaceae, Proteaceae and Mimosaceae families are especially susceptible to the pathogen (Barker and Wardlaw 1995). There was no evidence of *Phytophthora cinnamomi* at the workers accommodation facility site. Appropriate wash-down procedures will be implemented.

8. Erosion and/or sedimentation

There is currently minimal evidence of soil erosion within the workers accommodation facility site. The establishment of the facility could, without appropriate management measures, result in increased on-site erosion, with corresponding levels of sediment deposited into nearby drains. A Sediment and Erosion Control Plan will be developed as part of the Construction EMP.

9. Altered surface water runoff into waterways

Following rainfall, surface water runoff may be directed into drains adjacent to the site. In the absence of mitigation measures, any such runoff may collect spills from the site during the construction phase and eventually deposit such materials in the Tamar River. A Sediment and Erosion Control Plan will be developed as part of the Construction EMP.

Inhibition of plant photosynthesis and reproductive capability due to airborne dust

During the establishment of the workers accommodation facility there will be some soil disturbance, which is likely to lead to the generation of dust. This, without the application of management measures, could result in a minor negative impact on plant species growth and seed viability in the vicinity.

10. Altered hydrology

Earthworks associated with the workers accommodation facility will not impact the groundwater table.

16.8.2 Mitigation measures

A number of mitigation measures can be undertaken to minimise the impact of the proposed development. Mitigation measures are listed below.

A. Minimising or altering the footprint of disturbance

. The footprint of the facility has been established to minimise disturbance to native vegetation. In particular the layout of the facility has been redesigned to enable the retention and protection of 0.6ha of the threatened forest community, of '*Melaleuca ericifolia* swamp forest' (NME).

B. Avoiding accidental loss or damage to native vegetation

Clearance of native vegetation will require a certified Forest Practices Plan, which will identify the area proposed to be cleared. These areas would be flagged clearly prior to operations commencing and maintained accordingly, in order to avoid any inadvertent damage to vegetation that is planned to be retained.

C. Development of a Vegetation Management Plan

A Vegetation Management Plan will be developed prior to the construction phase. Mitigation measures for dealing with the direct loss of any threatened EVCs will be considered, with the principles of such mitigation to be outlined in the Plan. The Plan would also incorporate aspects of weed and fire management. Development of a VMP will help to ensure that retained vegetation is appropriately managed for conservation purposes.

D. Retaining a seed bank for threatened species

In areas proposed to be disturbed where there are known populations of threatened species, and the area is proposed to be rehabilitated following disturbance, topsoil should be carefully scraped from the surface (5-10 cm depth) and stockpiled, in order to retain as much of the soil seed bank as possible, particularly seed of threatened species. Retained topsoil should then be used for rehabilitation works. Soil should be stockpiled for the shortest possible time to prevent 'premature' germination prior to use in site rehabilitation works. Where threatened species are known to not typically recruit from soil-stored seed, seed should be collected prior to vegetation clearing, in order to be used in rehabilitation works.

E. Minimising the introduction and spread of environmental weeds

To prevent the establishment of new environmental weeds or the spread of existing environmental weeds, a Weed Management strategy will be developed and incorporated in the Vegetation Management Plan. The strategy will be developed prior to construction and will include a specific program to monitor and control any weed invasions arising from the proposed works. Any environmental weeds that establish following the works will be eradicated as a matter of high priority. Vehicle wash-down points will be established (at the same location as the *Phytophthora* wash down point) to remove weed seeds from material attached to earth-moving equipment.

F. Minimising the spread and reducing the impact of *Phytophthora cinnamomi*

A series of measures will be undertaken to prevent the introduction and/or minimise the spread of *Phytophthora cinnamomi* within the pulp mill site. These include the following:

- ▶ Undertaking a formal assessment of the presence and extent of *Phytophthora cinnamomi* within the study area;
- ▶ Establishing wash-down points for vehicles and earthmoving equipment entering and departing the site, in order to prevent/minimise the spread *Phytophthora cinnamomi*;
- ▶ Avoiding the use of *Phytophthora*-infected gravel in track construction works;
- ▶ Minimising the area of soil disturbance and new road/track development where possible;
- ▶ Coordinating construction activities over summer (where practicable) when soils are dry and least likely to facilitate the spread of the pathogen; and
- ▶ Minimising vehicular movement between any infected and uninfected areas, and/or closely monitoring access to infected areas.

Management of *Phytophthora cinnamomi* will be in accordance with DPIW Interim *Phytophthora cinnamomi* Management Guidelines (Rudman 2005).

G. Development of a Fire Management Strategy

Not applicable.

H. Minimising the width of firebreaks

Not applicable.

I. Maintenance of native herbivore grazing regimes

Not applicable.

J. Rehabilitation of disturbed areas

Any revegetation/landscaping of temporarily disturbed areas should be undertaken using locally indigenous species appropriate to the position in the landscape. Detailed rehabilitation measures will be outlined in the Environmental Management Plan.

K. Timing of construction activities

The likelihood of impacts upon ecological values can be reduced through appropriate timing of construction activities.

L. Development of an Environmental Management Plan

An Environmental Management Plan (EMP) will be developed prior to the construction phase. The EMP will incorporate the recommendations made within this report. The EMP will also include dust suppression measures to minimise the impact of dust upon plant growth and reproduction.

16.8.3 Summary of Impacts and Mitigation Measures

A summary of the likelihood and consequence of occurrence for each potential impact, together with the significance of the impact, is outlined in Table 16-6. A range of potential mitigation measures to minimise the impact are also provided in this table, and an overall cost-benefit rating has been determined, assuming that all mitigation measures will be implemented.

Table 16-6 Summary of potential flora-related impacts and mitigation measures, including the overall rating if mitigation measures are fully implemented, Workers Accommodation Facility

Impact	Description of nature and extent of impact	Likelihood of impact	Consequence of impact	Significance of impact	Proposed mitigation	Overall Rating
Native vegetation loss (general)	Loss of 4.6 ha of non-threatened EVCs	Almost certain	Substantial	Very high	A, B, C, J	Major negative impact
	Potential loss of species richness in local area	Unlikely	Minor	Low	A, B, C, J	Insignificant impact
Fragmentation of native vegetation	Potential increased barrier to seed dispersal and subsequent loss of long-term genetic fitness in certain species	Unlikely	Minimal	Low	A, B, J	Minor negative impact
	Increased edge effect – greater likelihood of weed invasion	Likely	Moderate	High	A, E	Moderate negative impact
Loss or damage to a population of a nationally significant flora species	Potential loss of unrecorded species due to vegetation clearing	Highly unlikely	Major	Moderate #	A, B, C	Insignificant impact
Loss or damage to a population of a state significant flora species	Potential loss of unrecorded species due to vegetation clearing	Unlikely	Major	High	A, B, C	Insignificant impact
Introduction of environmental weeds	Potential for introduction of environmental weeds via machinery and colonisation of bare surfaces	Likely	Minor	Moderate	E	Moderate negative impact
Spread of existing environmental weeds	Potential for spread of environmental weeds via machinery	Possible	Minor	Moderate	E	Moderate negative impact
Introduction and spread of <i>Phytophthora cinnamomi</i>	Potential for introduction of <i>Phytophthora</i> via infected machinery	Possible	Substantial	Very high	F	Insignificant impact

Impact	Description of nature and extent of impact	Likelihood of impact	Consequence of impact	Significance of impact	Proposed mitigation	Overall Rating
	Potential for spread of existing infestation of <i>Phytophthora</i> via infected machinery and alteration to site hydrology	Unlikely	Substantial	High	F	Insignificant impact
Erosion and/or sedimentation	Potential damage to retained vegetation through removal of habitat by soil erosion	Unlikely	Minor	Low	K, L	Insignificant impact
	Potential damage to retained vegetation by sedimentation of waterways	Unlikely	Minor	Low	K, L	Insignificant impact
Altered surface runoff into waterways	Potential damage to retained vegetation by chemical spills, pollution, etc	Possible	Minor	Moderate	L	Insignificant impact
Inhibition of plant photosynthesis and reproductive capability due to dust	Potential short-term impact resulting in reduced growth and seed output in certain species	Possible	Minor	Moderate	L	Minor negative impact
Altered hydrology	Potential long-term impact on community structure and composition	Possible	Minimal	Low	None available	Minor negative impact

* Impact would not occur given current works footprint, but may occur if development strays outside this footprint

Impact dependent upon presence of threatened species, which has not been found during intensive surveys

¹ Based on TASVEG 1.0 data provided by Sib Corbett (DPIWE). It should be noted that bioregional and statewide extent of non-forest EVCs given here is usually a significant underestimate of the actual extent, owing to the scale at which TASVEG mapping has been undertaken (1:25 000). This mapping scale effectively excludes many highly localised non-forest EVCs (particularly ephemeral wetlands) from being mapped at a scale of 1:25 000, consequently resulting in an underestimate of total extent

16.8.4 Summary of Potential Impacts and Management Measures

Approximately 4.6 ha of non-threatened vegetation will be lost on the site as well as increased potential for the introduction of weeds. The site otherwise has been heavily disturbed in order to eradicate gorse from certain areas.

A range of management strategies have been identified which will form part of the Construction EMP which will be developed prior to any construction activities. Details of the requirements of this plan are outlined in the Mitigation Management Plans in Volume 4.

Table 16-7 Summary of potential impact rating and mitigation measures – terrestrial flora

Potential Impact	Impact Rating	Proposed Mitigation	Management Impact	Combined Rating
Terrestrial Flora				
Native Vegetation Community Loss	Major negative impact	Construction EMP	Minor positive impact	Major negative impact
Fragmentation of vegetation	Moderate negative impact	Construction EMP	Minor positive impact	Minor negative impact
Introduced pests	Major negative impact	Construction EMP	Minor positive impact	Moderate negative impact
Introduction of <i>Phytophthora cinnamomi</i>	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact
Erosion and Sedimentation	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact
Dust impacts on vegetation	Minor negative impact	Construction EMP	Minor positive impact	Insignificant impact
Changes in hydrology	Moderate negative impact	Construction EMP	Minor positive impact	Minor negative impact

Overall, the impacts on terrestrial vegetation from construction of the workers accommodation facility are considered to be minor.

16.9 Terrestrial Fauna

The terrestrial fauna component for the workers accommodation facility was considered as part of the effluent pipeline fauna assessment due to their close proximity.

Refer to Section 11.13 for discussion on the potential impact and management measures for the effluent pipeline component and the workers accommodation facility. A full report is provided in Appendix 30, Volume 13.

16.9.1 Summary of Impacts and Management Measures

Management Measures for the workers accommodation facility are discussed in Section 11.13.2.

In comparison to the Bell Bay section of the study area, the impacts to the accommodation facility sites are considered to be of lower significance, due to the siting of infrastructure within existing cleared areas. The accommodation facility site is substantially degraded, being a previous rubbish tip covered by gorse bush.

A number of mitigation measures have been proposed for works in this area. Overall, the impacts to these areas are considered to be minor at the regional level (i.e. within 5 km of the proposed works) if mitigation measures are enacted.

16.10 Reserves and Protected Areas

No reserves or protected areas will be impacted by the construction and operation of the workers accommodation facility.

16.11 Transport Infrastructure, Traffic and Access

The proposed workers accommodation facility site is bound by:

- ▶ Main Road to the north;
- ▶ Pembroke Street to the east (road to be constructed);
- ▶ South Street to the south (to be constructed); and
- ▶ Agnes Street to the west (to be constructed).

The three streets will be constructed to a suitable length to provide adequate access in and around the site.

For the purpose of the transport modelling, it was assumed that approximately 100 workers each shift will choose to travel to the pulp mill site per car and that there will be an average of 2 people in each car, for a total of 50 cars per shift.

Shuttle buses will be provided to transport 166 people per shift to and from the construction site. The shuttle bus service will transport residents to the pulp mill construction site. The start times for the three proposed shifts will be one hour apart.

There will be parking on site for approximately 260 vehicles and 20 trailer parking spaces.

The transport impacts associated with the construction of the workers accommodation facility will be largely localised, but will have some broader regional transport impacts extending mainly along the East Tamar Highway. The associated traffic impacts will predominantly affect the township of George Town.

Construction activities will result in a general increase in heavy and light vehicle traffic in the surrounding area.

Once the workers accommodation facility has been completed, traffic will be generated between the pulp mill site and the accommodation facility, as well as associated general traffic in and around George Town. These impacts will be experienced only during the construction phase of the pulp mill, and will peak around 18 months into the pulp mill's construction.

16.11.1 Management Measures

The traffic impact assessment report (Pitt and Sherry, 2006b, Appendix 37, Volume 14) made the following recommendations:

- ▶ Vehicles do not illegally park or obstruct the internal aisles in order that emergency access to is maintained;
- ▶ A short segregated left and right turn lane at the accommodation facility entrance based on the aaSIDRA analysis along with a short right turn dedicated slot (30m) to minimise delay to through movements;
- ▶ The intersection should be designed to accommodate a 40m bus;
- ▶ Additional ninety-degree angle parking could be provided on Pembroke Street if required as the current parking supply is considered to be insufficient;

To maintain capacity at the intersection for a separate left and right turn lane, the supplementary parking should not be implemented all the way to the intersection of Pembroke Street and Main Road.

16.11.2 Summary of Impacts and Management Measures

- ▶ The assessment concluded the following:
- ▶ The development of the site will not introduce an unacceptable level of traffic into the road network and that movements to and from the site can occur in a safe and efficient manner; and
- ▶ Internal road systems are appropriate for the land use proposed and the nature of traffic using the site and should not introduce any unacceptable risk or operational impact provided design guidelines are met.

A summary of potential impacts, management measures to minimise the impact and an overall rating related to transport infrastructure, traffic and access is provided below.

Table 16-8 Summary of potential impact rating and mitigation measures – transport infrastructure, traffic and access

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Transport Infrastructure, Traffic and Access				
Additional traffic generated from construction of workers accommodation facility	Major negative impact	Undertake detailed traffic impact assessment to determine appropriate access locations and traffic distribution.	Moderate positive impact	Minor negative impact
	Major negative impact	Undertake appropriate traffic management measures in George Town area to accommodate general increase in traffic.	Moderate positive impact	Minor negative impact

Overall, with the implementation of recommended management measures, impacts on traffic from the construction and operation of the workers accommodation facility are considered to be minor.

16.12 Noise and Vibration

The construction, operation and decommissioning of the workers accommodation facility will generate noise. If these activities are not appropriately managed they have the potential to cause impact on nearby neighbours, particularly residents. The construction, and to a lesser extent the decommissioning phases, are considered the most likely time for noise nuisance to occur and are the focus of this assessment.

Construction activities will not generate off-site vibration impacts.

The potential for nuisance noise during operation of the facility is considered very low. Given that the primary use of the site is residential, management of the facility to provide a liveable environment for mill construction workers will also ensure that off site noise impacts should be acceptable to the wider residential community.

Furthermore, noise-generating sources, i.e. the communal facilities, are located well within the accommodation facility, and at least 350 metres from the nearest noise sensitive receptor. The accommodation units and the neighbouring industrial facilities will provide significant screening attenuation for any noise that may be generated, and the 350 metre separation will provide attenuation by distance.

The potential for noise impacts from surrounding land uses on occupants of the facility is low. The site will be operated to support three-day time shifts at the pulp mill site, so occupants will generally not be sleeping at the site during normal working hours.

The focus of this assessment was therefore on the potential noise impacts arising from the construction and operation of the facility on nearby residents. Construction of the accommodation facility will occur over 6 – 8 months and potential sources of noise during this period include:

- ▶ Civil site works in preparation for construction;
- ▶ Construction of road network;
- ▶ Installation/fit out of accommodation units and associated infrastructure, i.e. water, sewerage, electricity, landscaping, access ways;
- ▶ Construction of central common area, e.g. kitchens, maintenance facilities etc.; and
- ▶ Increased vehicle activity to and from the site.

Key phases for construction and expected time frames are indicated in Table 16-9.

Table 16-9: Proposed accommodation facility construction timetable

Task	Month
Commence Construction of Accommodation Units	
Units 0-150	1
Units 150-300	2-3
Units 301-450	4
Communal Facilities	1
Construct Foundations	
Units 0-150	4
Units 150-300	5
Units 301-450	5
Communal Facilities	4
Installation of Units and Communal Facilities	
Units 0-150	5
Units 150-300	6
Units 301-450	7
Communal Facilities	6
Subdivision Works	
Bulk Earthworks	2
Underground Services	4
Pavements and Roadways	5

Major construction equipment is expected to include bulldozers, scrapers, excavators, graders and cranes. Minor construction equipment will include drills, hammers, circular saws and other handheld equipment.

The nearest residential area is on the northern side of Victoria St. The closest of these residences, 93 and 95 Victoria St, have been used for this assessment.

Assessment Criteria

The DPIWE released a *Draft Environment Protection Policy (Noise)* for public comment in January 2003. Due to concerns raised through the public comment process, the draft policy was withdrawn in November 2004 to allow the draft to be rewritten. That process is still under way, and there have been no further drafts released.

As an interim measure, pending the release and finalisation of the revised policy, the Environmental Management and Pollution Control (Miscellaneous Noise) Regulations 2004 have been updated. These regulations are the statutory controls governing noise in Tasmania.

In addition to the regulations, there is a general environmental nuisance provision in the *Environmental Management and Pollution Control Act 1994*. Under this provision, an offence of environmental nuisance may occur if an action unreasonably interferes with a person's enjoyment of the environment, including through the creation of noise.

Noise control seeks to limit the levels of noise measured at a receptor, when noise is emitted from a source. This can be achieved by attenuating noise at the source, by screening the receptor from the source or by controlling the operating hours of the source.

The regulations prescribe maximum allowable noise levels for specified equipment, including a variety of motor vehicles, mobile machinery and portable apparatus, when measured at a specified distance. The Director of Environmental Management (in DPIWE) may approve the operation of equipment that exceeds these emission limits.

The limits on noise emission at source ensure that equipment will meet basic noise criteria in a static, controlled situation. The limits do not directly determine the noise level measured at noise receptors during the operation of the equipment in practice. These levels will be determined by a combination of the basic noise emission levels, surrounding terrain, weather conditions and the way the equipment is operated.

A further control used by the regulations is to establish operating hours, outside which noisy equipment must not be used if it causes a noise limit to be exceeded at residential premises. Noise emitted from specified equipment, including the types of equipment likely to be used for the construction and maintenance of the proposed accommodation facility, must not exceed 45 dB (A) at a domestic premises outside the operating hours shown in Table 16-10.

Table 16-10 Allowed operating hours for noisy equipment

Equipment	Monday to Friday	Saturday	Sunday, Good Friday and Christmas Day
Mobile machinery, including tractors, trucks, cranes and excavators	7 am to 6 pm	8 am to 6 pm	10 am to 6 pm
Portable apparatus, including power tools, compressors, generators and cement mixers	7 am to 6 pm	9 am to 6 pm	10 am to 6 pm
Power lawnmowers	7 am to 8 pm	8 am to 8 pm	10 am to 8 pm
Chainsaws	7 am to 6 pm	9 am to 6 pm	10 am to 6 pm

From Schedule 7 of the Regulations, the 45 dB(A) limit does not apply within those hours (when the noise controls are the relevant emission limits for any particular piece of equipment).

The Director of Environmental Management may issue an approval to allow the operation of equipment that exceeds the specified emission limit. The Director may also issue a permit to allow the operation of equipment in a manner that causes the 45 dB(A) limit to be exceeded outside the prescribed hours.

The 45 dB(A) limit relates only to the noise due to the equipment itself, independent of the particular background noise that might exist at the time (When measuring compliance, the background noise needs to be excluded from the calculations). Where background noise levels are low, the noise from the equipment may be more readily perceptible than when background noise levels are high, and vice versa. Nevertheless, in both cases it is only the noise due to the equipment that is of relevance to compliance, irrespective of background noise.

However, background noise would be important if it was necessary to determine whether an environmental nuisance had been caused. A higher level of background noise would mean that an additional noise is less likely to be considered to be a nuisance.

In the absence of prescribed levels or noise management objectives in Tasmania to deal with noise from major constructions sites, policies and guidelines from interstate environmental protection agencies provide useful guidance. A summary of the relevant criteria, levels or objectives from New South Wales and Victoria is provided in Table 16-11.

Table 16-11 NSW and Victorian construction noise guidelines

State	Policy or guideline	Relevant Criteria, levels or objectives
Victoria	Noise Control Guideline TG302/92	<p>Normal working hours</p> <p>7:00am to 6:00pm Monday to Friday</p> <p>7:00am to 1:00pm Saturdays</p> <p>Noise level at any residential premises not to exceed background noise by:</p> <p>(i) 10 dB(A) or more for up to 18 months after project commencement.</p> <p>(ii) 5 dB(A) or more after 18 months.</p> <p>during the hours of:</p> <p>6:00pm to 10:00pm Monday to Friday</p> <p>1:00pm to 10:00pm Saturdays</p> <p>7:00am to 10:00pm Sundays and public holidays</p> <p>Noise inaudible within a habitable room of any residential premises.</p> <p>10:00pm to 7:00am Monday to Sunday</p>
New South Wales	Environmental Noise Control Manual (1984)	<p>Level restrictions (The NSW Department of Environment and Conservation advises that the level restrictions specified in the Noise Control Manual should be used as objectives not limits, pers. comm., Mr Chris Schulten, Noise Policy Section, 6/1/06)</p> <p><i>Construction period of 4 weeks and under</i> – the L₁₀ level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A)</p> <p><i>Construction period greater than 4 weeks and not exceeding 26 weeks</i> - L₁₀ level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A)</p> <p>Time Restrictions</p> <p><i>Monday to Friday</i> - 7 am to 6 pm</p> <p><i>Saturday</i> - 7 am to 1 pm, if audible on residential premises, 8 am to 1 pm</p> <p>Sundays/public holidays – no construction work</p> <p>10:00pm to 7:00am Monday to Sunday I</p>

For the purpose of providing an appropriate framework for assessing the potential noise impacts from the construction and decommissioning phases of the accommodation facility, the following assessment criteria will be used:

Construction period of 4 weeks and under – the L₁₀ level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 20 dB(A)

Construction period greater than 4 weeks - L_{10} level measured over a period of not less than 15 minutes when the construction site is in operation must not exceed the background level by more than 10 dB(A).

Although the Tasmanian *Draft Environment Protection Policy (Noise)* has been withdrawn and has no statutory status, the criteria specified above are broadly consistent with the limits that were originally proposed in the draft Policy.

The draft more generally uses 5 dB(A) as a noise limit for operational phases, and this limit similarly is a fair and reasonable guide to what would constitute an environmental nuisance during the operational phase.

Noise Management Objectives and Targets

The overarching objective for noise management is to minimise the impact of noise on nearby residents arising from the construction, operation and decommissioning of the accommodation facility.

To achieve this objective, there will be no construction or decommission work undertaken between the hours of:

- ▶ 6pm and 7am, Monday to Friday;
- ▶ 6pm and 8am Saturday;
- ▶ 6pm and 10am Sunday and Public Holidays;
- ▶ and the following noise targets (as assessed at the nearest residences in Victoria Street) will be adopted during other hours:
- ▶ Noise from the construction and decommissioning of the temporary accommodation facility will not exceed 10 dB(A) above background levels between the hours of 7am and 6pm Monday to Friday.
- ▶ Noise from the construction and decommissioning of the temporary accommodation facility will not exceed 10 dB(A) above background levels between the hours of 8am and 6pm on Saturdays.
- ▶ Noise from the construction and decommissioning of the temporary accommodation facility will not exceed 10 dB(A) above background levels, between the hours of 10am and 6pm Sunday and Public Holidays.
- ▶ Noise from the operation of the accommodation facility will not exceed 5 dB(A) above background levels at all times.

Potential Impacts

The potential for noise impacts during the construction/decommissioning and operational phases will be determined by several key factors:

- ▶ *Background noise levels* (LA_{90}) or ambient noise. LA_{90} is the A-weighted noise level exceeded for 90% of the measurement period, and is often considered to be a measure of the background noise level. Background noise levels in George Town do not vary significantly between day and night time periods. Previous measurements conducted by Comalco indicate that background

levels fluctuate between 37.5 and 42.0 dB (A). For the assessment of potential noise impacts during daytime periods a conservative figure of 40.0 dB(A) is proposed, which coincides with the description for noise area category 1, “Areas with negligible transportation”, as specified in AS 1055.1-1997.

- ▶ *The level of noise generated by specific plant or equipment*, either individually or collectively – construction equipment can be noisy. Typical levels for particular types of equipment, expressed as A-weighted sound power levels range from around 85 dB(A) for a compressor up to 120 dB(A) for large excavators, cranes, graders etc. There will be the need to use noisy equipment at certain times during the construction and decommissioning phases.
- ▶ *Characteristics of the noise* – noise has a number of other characteristics. *Continuous* noise is noise produced by machinery that operates without interruption. *Intermittent* noise is noise that comes and goes, and sometimes occurs in regular cycles. Impacts and explosions cause *impulsive* noise. Noise can have frequency characteristics, such as *tones*, where the sound pressure levels are concentrated in a specific frequency band. All of these characteristics contribute to how a receiver perceives the noise and ultimately the level of annoyance.
- ▶ *The degree of attenuation provided by the distance between the noise source and receiver* – noise is reduced over distance as the sound waves spread through the air. As a rule of thumb, as distance from the noise source is doubled the sound pressure level is reduced by around 6 dB(A). The closest residences to the site are located approximately 200 m from the site.
- ▶ *Barrier effects from other buildings such as industrial facilities* - a barrier between a noise source and a noise receptor will act to attenuate the noise and decrease noise levels at the receptor. The degree of attenuation is a function of the frequency of the noise under consideration and the longer path that noise must take to move around obstacles.

Buildings on the southern side of Victoria St will act as barriers and attenuate noise from the site. The degree of attenuation would depend on ambient conditions, the position of the source and the exact location of the barrier with reference to the source and the receiver, and also the characteristics of the noise and the buildings.

A worst-case scenario assessment of potential noise levels that could be experienced at the nearest residences is provided in Table 16-12. The assessment assumes a daytime (0700-1800) background level (L_{A90}) of 40 dB(A). An assessment for night time periods has not been conducted, as construction is not scheduled for this time period. The assessment is based only on attenuation by distance and does not include attenuation due to barrier effects from surrounding buildings. Actual levels are likely therefore to be less than those shown in the table. The assessment includes a comparison of the predicted sound pressure levels against the assessment criteria specified above.

Table 16-12 Predicted worst case sound pressure levels (Victoria St.) – assumes distance from source is 200 metres, therefore achieving 55 dB(A) attenuation

Noise Source	Typical* sound power level dB(A)	Predicted # worst case sound pressure level dB(A)	Assessment criteria 1	Assessment criteria 2
			60 dB(A) Construction work less than 4 weeks	50 dB(A) Construction work exceeding 4 weeks
Concrete Mixers	93	38	< criteria	< criteria
Dump truck	105	50	< criteria	< criteria
Excavator/grader	115	60	≤ criteria	> criteria by 10 dB(A)
Grinder	103	48	< criteria	< criteria
Electric drill	94	39	< criteria	< criteria
Circular saw	110	55	< criteria	> criteria, by 5 dB(A)
Standard compressor	95	40	< criteria	< criteria

*From Table D2 Typical A-weighted sound power levels from site equipment, *AS2436-1981 Guide to Noise Control on Construction, maintenance and demolition sites*, Australian Standard

#Based on attenuation over distance derived from *Figure b1. Amount to be subtracted from the A-weighted sound power level to determine the A-weighted sound pressure level dB(A) at some distance from the source, AS2436-1981*

The assessment indicates that construction activities in the northern areas of the site are not likely to exceed assessment criteria 1, i.e. 60 dB(A), for construction work less than 4 weeks. Construction activities involving excavators/graders are likely to exceed assessment criteria 2, i.e. 50 dB(A), for construction work exceeding 4 weeks.

Noise nuisance risk zones, in 50 metre increments from 200 out to 350 metres from the nearest noise sensitive receptors in Victoria Street, have been defined by mapping predicted noise attenuation over distance (Appendix 37, Volume 14). The timing and staging of works in this area, particularly zones 1 and 2, will need to consider potential noise impacts on residents in Victoria St.

Some of these activities are unavoidable and must be undertaken as part of the construction process. It is likely, however, that these activities will be intermittent and short term and confined to the early stages of construction.

There are a number of mitigation measures that can be implemented to reduce the impact on nearby residents, including:

- ▶ Limiting the hours within which potentially noisy activities in the northern area can be conducted, to avoid work at the very beginning and end of the day.
- ▶ Staging noisy activities in the nuisance noise risk zones to early in the construction phase, to avoid noisy activities being spread out over a prolonged construction period.

- ▶ Ensuring that noise emission limits for heavy plant and equipment comply with relevant legislative standards, by adopting a 'buy quiet' equipment policy for tendering contracts requiring tenderers to demonstrate compliance with emission limits.

16.12.1 Management Measures

Management measures during the construction, operation and decommissioning periods will ensure compliance with specified noise management objectives and targets.

Equipment, apparatus and plant on the site will comply with specified noise emission limits contained in the Environmental Management and Pollution Control (Miscellaneous Noise) Regulations 2004.

A site EMP, which will include noise management, will be prepared for the construction and decommissioning phases prior to commencement of works.

Construction and decommissioning activities in the nuisance noise risk zones 1 and 2 that may exceed Assessment Criteria 2 will be limited to between the hours of 9am – 5pm Monday to Saturday.

16.12.2 Summary of Impacts and Management Measures

Construction works for the facility will occur over a 6-month timeframe. During this period, noise levels will intermittently be significant when specific equipment is used. The use of excavators will primarily occur during initial works on the site.

The site is also within an existing industrial area which offers significant attenuation to surrounding residential areas.

A range of management strategies have been proposed including limiting working hours and timing of specific works on particular areas. These requirements will form key components of the Construction EMP.

A summary of potential impacts, management measures to minimise the impact and a overall rating related to noise and vibration is provided below.

Table 16-13 Summary of potential impact rating and mitigation measures – noise and vibration

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Noise and Vibration				
Noise impacts on surrounding sensitive receptors	Major negative impacts	Construction EMP	Minor positive impacts	Moderate negative impacts

Overall, noise impacts from the construction of the workers accommodation facility are considered to be moderate. Operational impacts are considered to be minor.

16.13 Waste Management

Calculations based on expected waste generation rates and waste collection frequency indicate that 10-covered skip bins will be required on site.

Waste receptacles will be provided in all buildings and outdoor areas as appropriate. Staff and contractors at the site will be required to collect wastes and recyclable materials to a central, accessible waste depot. A waste contractor will regularly collect the waste.

Although the majority of the buildings associated with this development are designed to be reusable, some waste will be produced during the construction and decommissioning of the site. Furthermore, the operation of the accommodation facility will produce a range of wastes normally associated with residential activities and these must be handled, stored and disposed in a manner that reduce the risks to human health and the environment.

16.13.1 Assessment Criteria

The Tasmanian waste management framework is provided by the:

- ▶ *Environmental Management and Pollution Control Act 1994* and Environmental Management and Pollution Control (Waste Management) Regulations 2000.
- ▶ Towards a Tasmanian Waste Management Strategy – Discussion Paper for Comment (March 2000)

The principal provision of the Act (section 51A) that is relevant to this proposal is that relating to the depositions of pollutants. The regulations also provide for specific management of controlled waste and general waste, as defined by the regulations. It is not expected that controlled wastes will be generated in the construction, operation and decommissioning of the facility. Some general waste will be generated.

A waste management hierarchy will be followed, in the following order or priority:

- ▶ waste avoidance and minimisation (through raw material substitution, production and process management, waste segregation, reuse, recycling, reprocessing);
- ▶ waste treatment to reduce toxicity and volume;
- ▶ waste disposal in a manner to minimise environmental harm.

16.13.2 Potential Impacts

Construction wastes

As the majority of buildings will be pre-built, transported to the site and installed on slabs or temporary footings there will be significantly less waste than normally generated by construction sites. However, a range of wastes are predicted, including:

- ▶ Concrete materials;
- ▶ Paving;
- ▶ Bituminous products;

- ▶ Timber;
- ▶ Formwork;
- ▶ Electrical offcuts;
- ▶ Plastics (draining and wrapping); and
- ▶ Putrescible waste.

Opportunities to minimise waste generation will be explored at all stages of the design, tendering and construction of the workers accommodation facility. Appropriate infrastructure will be provided on site to allow for separation of waste streams into reusables, recyclables and disposables. Only appropriately licensed waste contractors will be used to remove waste from the site.

The key to minimising waste on the site will be through the tendering and/or contracting phases. The specification will include a requirement for the preparation and submission of a waste management strategy for the site. The *Waste Reduction Guidelines for the Construction and Demolition Industry*, produced through the Wastewise Construction Program, will be used as a basis for developing tender criteria and assessing submitted waste management strategies from respective contractors.

Operation

At peak occupancy the site may accommodate up to 800 workers from which the following categories of waste are expected:

- ▶ Kitchen and catering wastes;
- ▶ Personal waste (e.g. packaging, newspapers, take away containers etc.); and
- ▶ Site cleaning and maintenance wastes (packaging etc.).

Construction wastes from the pulp mill site will not be taken to the accommodation facility.

Estimates of waste generation per person have been calculated using two methods. Firstly, a mixture of generator categories from environmental engineering literature that are considered to best approximate the operation of the site, and secondly by using waste generation rates used in the mining sector for remote workers accommodation facilities.

The estimates are provided in Table 16-14 and Table 16-15 respectively.

Table 16-14 Waste generation estimates based on literature

Category	Unit Waste Factor kg/person/day*	Site Total kg/day
Individual accommodation unit	0.16	126
Meals (breakfast, lunch, dinner)	0.97	773
	TOTAL (approximate)	896 kg/day

**Figure includes factor for cleaning and maintenance*

Rio Tinto is a large multinational materials, metals and energy company that operates a number of facilities in remote areas serviced by workers facilities. The following method uses the waste generation rates typically used by Rio Tinto when calculating waste generation rates from remote workers facilities.

Table 16-15 Waste generation estimates based on mining sector (Rio Tinto) standards

Category	Waste Generation Rate	Site Total
Annual waste generation	0.47 tonnes/person/year	376 tonnes/year
	OR	OR
	1.28 kg/person/day	1,024 kg/day

Projected levels of waste for both methods give a range of 896 – 1024 kg /day A conservative figure of 1,000 kg/day for the site has been used in the design of appropriate on site infrastructure for the collection and storage of waste streams. The storage, handling and collection of solid wastes will be addressed in more detail through the Site EMP - Operation.

Decommissioning

The majority of buildings, plant and equipment on the site will be reusable and thus removed from the site at completion. This will be addressed during the tender phase for the operation of the site. On-sale arrangements, either through tender or auction, will be made prior to the decommissioning phase. Roads and mains sewerage and water lines will be maintained to service the proposed industrial subdivision.

Concrete and aggregate wastes are expected to dominate the decommissioning waste streams. These wastes will be stockpiled on site and made available, either as is, or crushed for future uses on the site, i.e. industrial subdivision. Any residual inert waste that cannot be reused or recycled will be disposed of in the construction waste cell of the pulp mill's landfill site.

Putrescible waste from the accommodation facility will go either to the transfer station at George Town or directly to Remount Road.

16.13.3 Management Measures

The specification for the construction, operation and decommissioning of the site will require the preparation and submission of a detailed waste management strategy demonstrating how wastes from the site will be minimised. A number of recycling/reuse opportunities exist within the Bell Bay industrial estate.

Only appropriately licensed waste transporters will be used to remove wastes from the site.

All waste will be disposed at a licensed and approved waste disposal facility, either via an approved transfer station or direct to an approved landfill.

Specific strategies for waste minimisation and management will be included in the Site Environmental Management Plan for Construction, Operation and Decommissioning.

16.13.4 Summary of Impacts and Management Measures

Waste management during construction and operation of the facility will address waste minimisation and recycling opportunities wherever possible.

Significant volumes of waste will be generated during both phases of the development. Disposal of such waste is however well within the existing capacity of regional waste facilities.

A summary of potential impacts, management measures to minimise the impact and an overall rating related to waste management is provided below.

Table 16-16 Summary of potential impact rating and mitigation measures – waste management

Potential Impact	Potential Impact Rating	Proposed Mitigation	Mitigation Impact	Overall Rating
Waste Management				
Disposal of construction and operational wastes	Major negative impact	Waste reduction and recycling on-site	Minor positive impact	Moderate negative impact

Overall impacts on waste management are considered to be moderate.