Development Proposal and Environmental Management Plan
Revision 02

Tailings Storage Facility
Tasmania Mines Limited
Kara Mine Hampshire

Prepared for: Tasmania Mines Limited
Prepared by: Jim Lockley & Dr Michael Pollington
February 2010
Foreword

This Development Proposal and Environmental Management Plan (DPEMP) has been prepared to support a development application by Tasmania Mines Ltd (TML) to the Burnie City Council for a permit to construct and operate a new tailings storage facility at its premises near Hampshire in northwest Tasmania.

The location of the proposed new TML tailings storage facility is adjacent to the Kara Road approximately 5 km south of the Hampshire off the Ridgley Highway and approximately 30 km south of Burnie in Tasmania.

The purpose of this DPEMP is to provide:

- Support to the development application to the Burnie City Council;
- A basis for the Burnie City Council and the Tasmanian Environment Protection Authority (EPA) to consider the planning and environmental aspects of the proposal;
- A basis for the conditions under which any approval can be given; and
- A source of information for interested individuals and groups to gain an understanding of the proposal.


The development application will be advertised by the Burnie City Council in the Advocate newspaper and the DPEMP will be available for public scrutiny at the:

- Burnie City Council offices in Burnie;
- The Environment Protection Authority Division’s Internet site; and
- The Department of Primary Industries, Parks, Water and Environment library in Hobart.

For a period of 28 days following the formal newspaper advertisement of the application.

Any member of the public may submit a representation on the proposal, describing their comments and/or objections. Representations must be in writing and lodged within the statutory period with:

Mr Paul Arnold  
The General Manager  
Burnie City Council  
PO Box973  
Burnie TAS 7320

Council will consider the development application in accordance with its obligations under the Land Use Planning and Approvals Act 1993 and the Environmental Management and Pollution Control Act 1994.

Because the proposed activity is deemed a Level 2 activity under Schedule 2 of the Environmental Management and Pollution Control Act 1994, the Board of the Environment Protection Authority (the Board) will assess the potential environmental impacts and conditions for the proposed activity in accordance with the Environmental Management and Pollution Control Act 1994.

The environmental conditions from the Board’s assessment will be forwarded to the Burnie City Council for inclusion in the permit, if and when Council approves the proposed activity.
Any persons who made written representations on the proposal will be notified by the Board of its decision. Persons aggrieved by a decision to approve the development, or by the conditions or restrictions of the permit, may appeal to the Resource Management and Planning Appeal Tribunal (the Tribunal). The applicant, Tasmania Mines Ltd, may also appeal a refusal of the proposal by the Board, or appeal the conditions or restrictions imposed by the Board.

Appeals must be lodged in writing within 14 days of the Board’s decision.

The Tribunal will hear appeals. The Tribunal will independently reassess the proposal, and either confirm, overturn or modify the decision and/or the permit conditions and restrictions.

A Forest Practices Plan (FPP) has been developed by an appropriately qualified Forest Practices Officer. Although the FPP cannot be certified by the Forest Practices Authority, due to amendments to the Forest Practices Regulations 2007 dated 25 November 2009, it forms the basis for the management of vegetation clearance once a land use permit is issued by the Burnie City Council approving the project.

Approval under the Commonwealth’s Environment Protection and Biodiversity Act 1999 is not required for this project. No other planning or environmental approvals are deemed necessary.

An appreciation of the proposed new facility can be gained from the photograph of the existing facility below.
Executive Summary

Tasmania Mines Ltd (TML) proposes to develop a new Tailings Storage Facility (TSF) at the Kara Mine on Kara Road near Hampshire in Tasmania’s northwest.

TML currently undertakes mining and mineral processing of up to 350,000 t/y of magnetite and scheelite ore to produce concentrates for realisation. Magnetite and scheelite production from the operation is a valuable resource and of important socio-economic value to the local area and Tasmania.

As part of the processing a benign tailings is produced that needs to be stored. The tailings have no commercial value or reuse potential at the moment, hence the need for on site storage in a purpose made facility. Currently tailings are being stored in existing storage facilities which have a finite life.

The proposal is to construct a new TSF in three stages over approximately 10 years. The first stage will have a capacity of approximately 850 ML giving a life of approximately 5 years. Stage two will have a capacity of approximately 565 ML giving a life of approximately 4 years. Stage 3 will have a capacity of approximately 2,100 ML giving a life of approximately 15 years. This will give a total capacity of 3515 ML and a design life of approximately 24 years. The life spans are based on currently anticipated production levels.

The storage and handling of tailings is an integral component of the environmental management for any mining and mineral processing activity. The construction of the new tailings storage facility is a major environmental cost and commitment. The construction of the storage facility provides security for future operations, a significant reduction in potential environmental risks and compliance with regulatory requirements.

The proposed development will not result in an increase in any pollutants or a change in any current unit operations. The primary driver for the development application is the fact that the new tailings storage facility will be located off the previously designated premises on a new land parcel.

The proposed activity will be a level 2 under Schedule 2 of the *Environmental Management and Pollution Control Act 1994*. The environmental aspects of the proposal will be assessed by the Board of the Tasmanian Environment Protection Authority (EPA) and regulated by the EPA Division of the Department of Primary Industries, Parks, Water and Environment.

The proposed tailings storage facility will be located on a new Mining Lease 8M/2008 issued by the Minister for Energy and Resources 29 September 2008 and extend over the 2 previous leases 1M/1997 and 1371P/M. The land is managed by Forestry Tasmania and approval from Forestry Tasmania is required for the proposal to proceed. The facility will be an extension of the existing facilities being operated at the site.

The tailings storage operation will be regulated by the EPA Division under the conditions of a new permit (if the project is approved) and Mineral Resources Tasmania under the current Mining Leases requirements.

No new issues associated with the proposed new storage facility have been identified above those which already exist and which are being appropriately managed and regulated under the existing environmental management plans, the current Environment Protection Notice and the Mining Leases.

The new storage facility will receive the same tailings, with the same properties, using the same infrastructure; with the same decant water reuse in the mill and with the same environmental and operational certainty as is currently occurring to the satisfaction of the operator and the regulators.
A botanical survey and fauna habitat assessment was undertaken in December 2008 and the findings and recommendations are included in this assessment.

There will be no impact on flora of national or state significance as no species listed by either the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* or the *Tasmanian Threatened Species Protection Act 1995* were recorded in the study area or are thought likely to occur. There are two declared weeds, namely broom and gorse, that require action if the development is approved.

Impact to threatened fauna habitat is considered minimal although there is potential for the site to contain habitat for the following threatened species: spotted tailed quoll, Tasmanian devil, grey goshawk, masked owl, hydrobiid snail and giant freshwater crayfish.

An Aboriginal Heritage Assessment was undertaken in February 2009. No Aboriginal Heritage sites were located on the proposed project area and the potential for Aboriginal Heritage sites to exist is very low.

The area of the propose activity is relatively remote and there are no or residences within a 5 km radius of the area. The project is located in a relatively flat marshy area at the head waters of a class 4 drainage line which drains in a northerly direction through predominantly plantation forest for approximately 4 km before entering the Emu River 500 m upstream of the Upper Natone Road Bridge.

This DPEMP has been prepared according to the EPA’s *General Guidelines for the preparation of a Development Proposal and Environmental Management Plan for Level 2 activities and ‘called in’ activities 2008* and the EPA’s *Development Proposal and Environmental Management Plan Project Specific Guidelines for Tasmania Mines Ltd, Tailings Storage Facility (TSF) Kara Mine February 2009*.

The specific commitments contained in this DPEMP demonstrate that appropriate operational and management measures will be in place to minimise any potential impacts and to minimise any risks to the environment and human health.

The K Moore and Associates storage facility design report will be forwarded to the Tasmanian statutory Assessment Committee for Dam Construction for assessment during the DPEMP assessment process.

The DPEMP demonstrates that the proposal will comply with Tasmanian policies and legislation.

There are no apparent socio-economic disadvantages with the proposal. The proposal will give environmental and operational security to the mine and mineral processing activities from which the general community will benefit.

The local community will benefit from the increased local employment opportunities, local wages expenditure and local mine expenditure.
Table of Contents

Foreword

Executive Summary ................................................................. i

1. Introduction ........................................................................ 1
2. Proposal Description ............................................................ 2
   2.1 Proposal Outline ............................................................. 2
   2.2 Site Plan ........................................................................ 6
   2.3 General Location ........................................................... 7
   2.4 Off-Site Infrastructure .................................................... 9
   2.5 Technical and Management Alternatives ....................... 10
3. Existing Environment ............................................................ 11
   3.1 Planning Aspects ........................................................... 11
   3.2 Environmental Aspects ................................................. 11
   3.3 Socio-Economic Aspects ............................................. 31
   3.4 Alternative Sites ......................................................... 32
4. Potential Effects and their Management .............................. 33
   4.1 Air Emissions ............................................................... 34
   4.2 Liquid Waste/Surface Water ......................................... 36
   4.3 Groundwater ............................................................... 41
   4.4 Noise Emissions ........................................................... 44
   4.5 Solid and Controlled Waste Management .................... 46
   4.6 Dangerous Goods ....................................................... 48
   4.7 Biodiversity and Nature Conservation Values ............... 49
   4.8 Marine and Coastal ..................................................... 51
   4.9 Greenhouse Gases and Ozone Depleting Substances ....... 52
   4.10 Heritage ................................................................. 53
   4.11 Land Use and Development ........................................ 55
   4.12 Visual Effects ............................................................ 56
   4.13 Socio-Economic Issues .............................................. 56
   4.14 Health and Safety Issues ............................................ 56
   4.15 Hazard Analysis and Risk Assessment ....................... 57
   4.16 Fire Risk ................................................................. 58
   4.17 Infrastructure and Off-Site Ancillary Facilities ............. 58
   4.18 Environmental Management Systems ....................... 58
   4.19 Cumulative and Interactive Effects ............................. 58
   4.20 Traffic Impacts .......................................................... 58
5. Monitoring and Review ........................................................ 59
6. Decommissioning and Rehabilitation .................................. 59
7. Commitments ..................................................................... 60
8. Conclusion .......................................................................... 62
   8.1 Positive Environmental Effects ..................................... 62
   8.2 Negative Environmental Effects ................................... 62
   8.3 Summary ..................................................................... 62
Appendix A  (Uncertified) Forest Practices Plan  
Appendix B  Mining Leases  
Appendix C  K Moore and Associates Report  
Appendix D  Indicative Project Layout and Areas  
Appendix E  Land Information System of Tasmania Maps  
Appendix F  Photographs  
Appendix G  Environment Protection Notice #7409/1  
Appendix H  Rainfall and Water Quality Database  
Appendix I  Analytical Reports  
Appendix J  Tailings Database  
Appendix K  Botanical Survey and Fauna Habitat Assessment  
Appendix L  Aboriginal Heritage Survey  

© 2010 pitt&sherry  

This document is and shall remain the property of pitt&sherry. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form is prohibited.  

<table>
<thead>
<tr>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorised by:</td>
<td>Barry Neilsen</td>
<td>11 February 2010</td>
</tr>
</tbody>
</table>
1. Introduction

Tasmania Mines Limited (TML), a publicly listed company, is proposing to develop a new process tailings storage facility at its Kara No. 1 open cut mine (Kara mine) operation located approximately 30 kilometres south of Burnie and 5 km south of Hampshire in northwest Tasmania.

The open cut mine is situated southeast of the Old Park River/Emu River confluence, approximately 0.5 km south of the Emu River and approximately 0.3 km east of Old Park River. The pit is approximately 500 m above sea level.

Surface water drainage from the mine site is collected via existing onsite drainage lines and culverts and treated in existing onsite polishing ponds and wetlands before discharging into the receiving waters of the Old Park River and the Emu River.

The mine is permitted to process up to 350,000 tonnes of magnetite ore per annum from a northerly plunging synclinal skarn style mineralised deposit. Scheelite concentrate is also produced, when present in the ore, as a by-product of the magnetite mining and processing.

The mining operations consist of mechanised excavation of weathered (oxidised) ore and overburden and blasting of fresh ore and waste with production blast holes.

Up to 175,000 tonnes of magnetite concentrate is produced annually by gravity and magnetic separation methods. Scheelite concentrate, which is produced occasionally, involves gravity concentration, sulphide cleaning by flotation and removal of iron compounds by roasting and magnetic separation.

Waste rock is retained and relocated within the open cut. Approximately 175,000 t of tailings or 120,000 m$^3$ can be produced per year from the currently permitted throughput rates. The process tailings are permanently stored and managed in dedicated storage facilities.

The storage of the tailings is a crucial component of operations at the site. The proposal involves the construction of a new TSF consisting of three stages. The first stage will have a nominal capacity of approximately 850 ML giving a life of approximately 5 years. Stage two will have a nominal capacity of approximately 565 ML giving a life of approximately 4 years. Stage 3 will have a capacity of approximately 2,100 ML giving a life of approximately 16 years.

The 3,515 ML total storage capacity will ensure the proper tailings storage and management for the next approximately 24 years based on current production levels of 120,000 m$^3$/year.

The company has operated the Kara Mine for more than 15 years as a Level 2 activity (as outlined in Schedule 2 of the Environmental Management and Pollution Control Act 1994) regulated by the Director, Environment Protection Authority.

The TML operation at the Kara Mine has been regulated in the past under the former Licence to Operate Scheduled Premises #3364 updated in 1991 and more recently under Environment Protection Notice No. 7409/1 issued in 2006.

The new storage facility will be located on State Forest managed by Forestry Tasmania. A botanical survey and fauna habitat assessment and an Aboriginal Heritage survey have been undertaken and a Forest Practices Plan has been developed for the clearing of the 46 ha site to allow detailed geotechnical and civil engineering surveys to be undertaken.
Although the FPP cannot be certified by the Forest Practices Authority, due to amendments of the *Forest Practices Regulations 2007* dated 25 November 2009, it may form the basis for the vegetation clearance and management in the Council’s land use permit when approved and issued. The FPP is contained in Appendix A.

The premises boundaries (the Mining Lease boundaries) have been extended over the life of the mine. A consolidated Mining Lease 1371P/M was issued by Mineral Resources Tasmania on 7 May 1995. Another Mining Lease 1M/97 was issued on 28 September 2001 to accommodate the construction of the existing tailings storage facilities.

The latest Mining Lease 8M/2008 was issued by the Minister for Mines on 29 September 2008, to accommodate the proposed new tailings storage facility. These three Mining Leases will now form the new premise boundaries. Copies of the relevant Mining Leases are contained in Appendix B.

K. Moore and Associates (consulting structural and civil engineers) developed and submitted a preliminary Dam Assessment Report (DAR) for the new storage facility to the Director, Environment Protection Authority, and to the Department of Primary Industries and Water on 8 September 2008.

The engineering design has been changed from that originally submitted and the latest preliminary design is contained in a new report which is contained in Appendix C.

The K. Moore and Associates report is included in the DPEMP for submission by the Department of Primary Industries, Parks, Water and Environment to the Tasmanian statutory Assessment Committee for Dam Construction (ACDC) for assessment during the DPEMP assessment process.

*pitt&sherry* was commissioned by TML to prepare the Development Proposal and Environmental Management Plan (DPEMP) on 24 September 2008. A Notice of Intent was submitted to the Environment Protection Authority Board (Board) on 17 December 2008. Site specific guidelines were issued by the Board 6 February 2009.

This document has been drafted in accordance with the generic Level 2 activity DPEMP guidelines and the project specific guidelines issued by the Tasmanian Environment Protection Authority Board.

### 2. Proposal Description

**2.1 Proposal Outline**

The proposal involves the construction of a new tailings storage facility consisting of three separate stages constructed over a timeframe of approximately 10 years.

The resultant combined capacity of the new facility will be approximately 3,515 ML. The new TSF will be located adjacent to the eastern side of the existing tailings storage.

The construction of the new facility will involve the disturbance of approximately 46 ha of bushland in total and will be operated in the same manner and to the same standard as the existing tailings storage facilities on the premises.

The existing tailings pumping line from the mill to the existing TSF will be extended to the new TSF and a new decant line will be installed from the new TSF to the clean decant water dam for return back to the existing mill. The decant water from the new TSF stages will be gravity fed through overflow channels to the existing clean decant water pond for recycle to the mill, as per current operations.
In future, the Stage 3 facility may be used for clean decant water storage for recycle to the mill and the existing clean water pond may be used for tailings storage. This decision will be made at a future date.

The conceptual layout and areas of the new facility are contained in Appendix D. Note the indicative layout areas contained in Appendix D are areas extrapolated from a geographic information system.

The proposed facility design and general physical characteristics are described below. (Refer to the Appendix C for details)

- Three stages of construction over 10 years
- Constructed from compacted earth fill
- Lined with compacted clay
- Stage 1 footprint area approximately 13 ha
- Stage 2 footprint area approximately 12 ha
- Stage 3 footprint area approximately 21 ha
- Total footprint area of approximately 46 ha
- Stage 1 volume 850 ML
- Stage 2 volume 565 ML
- Stage 3 volume 2,100 ML
- Total volume at F.S.L. 3,515 ML
- Stage 1 life 5 years (at current production rates)
- Stage 2 life 4 years (at current production rates)
- Stage 3 life 15 years (at current production rates)
- Total life 24 years (at current production rates)
- Nominal maximum wall height of Stage 1 - 15 m
- Nominal maximum wall height of Stage 2 - 18 m
- Nominal maximum wall height of Stage 3 - 25 m

The final engineering design detail will be undertaken by K Moore and Associates following the approval of the project and following further detailed ground and geotechnical surveys.

The K Moore and Associates report in Appendix C gives preliminary design details on the following:

- Design freeboard
- Upstream Batter Slopes
- Downstream Batter Slopes
- Base width of the walls for each facility
- Depth of each facility
- RLs and AHD levels
- Overflow to clean decant water pond design
- Estimated fill for the walls for each facility
- Construction material requirements and supply
2.1.1 General

The general design may be modified according to the final ground and geotechnical survey data to that outlined above. However, no significant changes to the preliminary design information contained in the K.Moore and Associates report are envisaged at this time and the ‘low hazard’ assessment in the report is unlikely to change.

The new TSF will be operated in the same manner, to the same standard and under the same regulatory regime as the existing TSF on the premises. Basically a tailings water slurry will be pumped to the new storage facility where it will be beached and the clean decant water will separate from the solids and overflow from the new storage to the existing pond for recycled to the mill. The tailings solids left behind will consolidate in the storage facility over time.

2.1.2 Construction

Site Preparation Works

Partial site clearance work for the new TSF was undertaken in November 2009. The clearance work was undertaken so that information could be gathered for the project design and for inclusion in the DPEMP.

A full site clearance cannot be undertaken until a land use permit is issued by the Burnie City Council approving the project. The attached FPP may form the basis for the full site clearance.

Although the FPP cannot be certified by the Forest Practices Authority, due to amendments of the Forest Practices Regulations 2007 dated 25 November 2009, it may still form the basis for the site clearance.

The expected site preparation and construction works are summarised as follows:

- The vegetation in the new TSF footprint will be removed and windrowed in 2010 in accordance with the FPP
- The clearance will not extend more than 30 m outside the expected footprint of the new TSF
- A copy of the FPP will be present on site whenever operations are occurring
- Commercially viable trees will be separated and sold or managed as determined by the FPP
- Large vegetation, not suitable for commercial harvesting, will be removed and disposed of in accordance with the FPP
- The windrowing will be undertaken by a Tasmania Mines contractor and the burn off will be undertaken by Forestry Tasmania next autumn under controlled conditions
- The windrows will be at least 20 m from any class 4 stream
- Any refuelling equipment will be located at least 40 m from any water course
- Smaller vegetation and grasses were removed with the topsoil and stockpiled in windrows in accordance with the FPP
- Topsoils were stored or reused on surfaces to be rehabilitated as soon as possible to benefit from the viability of the topsoil seed bank
- Standard wash down procedures will be undertaken for equipment entering the site from outside the Mining Leases and leaving the Mining Leases from the project area
- Existing Kara Road and area tracks will provide access to the TSF site
Existing drainage systems will be kept functional during the preparation and construction works and will be left functional following the construction.

**Erosion Mitigation Measures**

Erosion mitigation measures to control any potential impacts from erosion and sediment transport arising from the new TSF preparation and construction activities are proposed.

The erosion mitigation works are summarised as follows:

- Site clearing will be restricted to the acceptable weather conditions. No clearance or construction works will be undertaken during high rainfall conditions that may present an unacceptable risk of sediment loss to the environment.
- Site clearing will not be undertaken during hot, windy conditions to minimise dust generation and dispersal of soil by wind.
- Silt stop fencing will be utilised where practical to prevent the transport of any eroded material into receiving waterways.
- Stockpiled topsoil will be managed to encourage water infiltration, microbial activity and prevent erosion in the period between stockpiling and use in site rehabilitation.
- Any area outside the footprint of the new TSF that requires clearance to facilitate construction will be rehabilitated with stockpiled topsoil and revegetated as soon as practicable.

**Plant Hygiene Measures**

The following plant hygiene measures will be undertaken to prevent the introduction and/or spread of introduced plant species, weeds, pests and diseases (such as *Phytophthora cinnamomi*) during the preparation and construction of the new TSF.

The plant hygiene works are outlined as follows:

- *Phytophthora cinnamomi*, myrtle wilt and weed management will be implemented.
- Machinery used in the TSF construction work will be washed down prior to moving to another site off the Mining Leases, to reduce the possibility of transmitting weed and soil pathogens in soil on machinery to other premises.
- The spread of myrtle wilt will be mitigated by minimising the damage to any adjacent trees when felling myrtle trees. Felling will be carried out so that the felled trees fall away from adjacent retained trees and removed from the site.
- Any material required from outside the Lease area will be sourced from suppliers that were certified to be free of *Phytophthora cinnamomi*.
- In the event that *Phytophthora cinnamomi* is detected, wash down procedures will be instigated in accordance with Appendix 5 (Washing down) of the Interim *Phytophthora cinnamomi Management Guidelines* produced by the former Department of Primary Industries and Water now Department of Primary Industries, Parks, Water and Environment.

**Construction Materials**

The current design requires the following material and project resources requirements (refer to the report in Appendix C).

- Stage 1 estimated nominal embankment fill required 400,000 m$^3$
- Stage 2 estimated nominal embankment fill required 500,000 m$^3$
- Stage 3 estimated nominal embankment fill required 900,000 m$^3$
- Stage 1 construction requirements may be resourced from the footprint excavations to 2 m and from existing mine waste rock (subject to confirmation).
- Stage 2 and Stage 3 construction requirements may be resourced from the footprint excavations and from existing mine waste rock (subject to confirmation).

The equipment expected to be used for the development is outlined below. However contractors may use different equipment to that specified.

- Bulldozers
- Excavators
- Front end loaders
- Trucks
- Rollers (including vibrating).

The proposed construction activities will be undertaken during all daylight hours. The facility needs to be built during the summer period to minimize the risk of wet weather interfering with construction schedules.

Completion of the construction during summer will minimize the risk of environmental impacts from having to complete the construction during inclement autumn/winter weather or delaying completion to next summer.

Commissioning

The new TSF will naturally capture incidental rainfall following construction. It is expected that each stage will be constructed during the summer period and nominally commissioned over approximately the next 6 months or when the facility is required.

During this nominal 6 months period approximately 0.3 m to 0.4 m of rainwater is expected to collect in the facility (Bureau of Meteorology - average annual rainfall 1.6 m minus average annual evaporation 1.0 m). This is beneficial as it will keep the clay saturated.

During commissioning of each facility the tailings will be deposited by extending the tailings delivery line to the closest corner and depositing the tailings onto the water using an open pipe or using spigots, until a beach is formed. The tailings beach will then be extended around and then into the centre of each facility.

The water level in each facility will be controlled using a decant tower or overflow channel weir, installed in or near each facility wall, to keep the level low enough to give optimum beaching and hence consolidation of the tailings.

At the same time the water level will be controlled to give an appropriate detention time and appropriate distance between the tailings deposition spigots and the decant to ensure adequate solids/liquid separation.

Once the facility is lined with the low permeability tailings the risk of post holing, channelling or the prevalence of high permeability areas is greatly reduced and the integrity of each facility greatly increased and secured.

2.2 Site Plan

The conceptual site plan for the new TSF is contained in the report in Appendix C. The conceptual site plan of the new TSF layout is also contained in Appendix D and Figure 3, and shows the indicative layout and areas of the project elements.
The transport route for the project will involve Kara Road, the western section of the Upper Natone Road and the Ridgley Highway. The nearest residence and township to the project area is Hampshire, which is located on the Ridgley Highway.

The site settings for the proposed new TSF are shown in Figure 1, Figure 2 and Figure 3 below.

2.3 General Location

The regional setting of the Kara mine site is shown in Figure 1.

![Figure 1. Regional setting and mine location](image)

The mine setting and layout of the existing Kara mine operations including existing infrastructure and water monitoring sites and the future north extension are shown in Figure 2 below.

A schematic layout of the proposed new TSF and indicative areas of the proposed new TSF area are also shown in Figure 2.
Figure 2. Mine setting, mine monitoring sites and infrastructure schematic

The project setting, showing the new TSF location including the indicative TSF areas and the existing mill infrastructure location are shown in Figure 3.
The figure also shows schematic representations of the existing tailings pipeline and existing decant pipeline.

Figure 3. Project setting showing new TSF indicative locations and areas

The proposal will not require any stream diversions. The TSF will be located on flat ground at the headwaters of two surface water drainage lines.

A perched groundwater table appears to exist in the project area during winter but it drains away in summer. No major groundwater recharge system is evident at the site as observed during the construction of the existing adjacent storage facilities. Kara Road acts as a large local cut off drain.

The proposed location and design will ensure a smooth integration of the new facility into the existing operations and minimise the risk to the environment.

2.4 Off-Site Infrastructure

The project is located on the 3 existing Mining Leases with the major proportion located on 8M/2008. The only new infrastructure required for the proposal will be an extension of the existing tailings pipeline to the new TSF and decant recovery system from the new TSF to the existing clean decant water recovery system (clean water pond).

The existing tailings clean decant water system recycles the water back to the mill, reducing the process water requirement taken from the Old Park River.

No new off-site ancillary facilities will be required to allow the proposal to proceed. Access to the project will be via the existing Kara Road. No new fencing will be installed for the new facility. The existing mine signposting, gating and security will be extended to the new TSF.
The product from Kara Mine is currently transported to the Burnie Port from the mine site at Hampshire by trucks. The cart route is:

- Kara Road
- Upper Natone Road - Kara Road to Ridgley Highway
- Ridgley Highway

The current mine product transport traffic is shown in the table below.

<table>
<thead>
<tr>
<th>Mine Product Cartage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
</tr>
<tr>
<td>Cart period</td>
</tr>
<tr>
<td>Truck capacity</td>
</tr>
<tr>
<td>Loads per day</td>
</tr>
<tr>
<td>Trips on route</td>
</tr>
</tbody>
</table>

Forestry logging traffic is not included as this is campaign based. The existing mine non-product traffic is estimated at an average of about 6 trips per day or 12 vehicle movements (in and out). This gives an average total of approximately 52 vehicle movements per day.

The project area will be accessed directly from Kara Road. There will be no need for equipment or personnel working on the project to enter the mining and mineral processing areas of the premises.

The project will result in a one off traffic increase of approximately 12 vehicle movements (light vehicles and low loaders with earthmoving equipment) on the Kara Road access route for project establishment and decamping the site.

It is predicted that approximately 8 light vehicle movements per day (4 to the site and the same from the site) will occur on Kara Road during the estimated construction timeframe of 6 month.

Kara Road is primarily a Forestry Tasmania road and Council manage the section of this road as it approaches the Upper Natone Road. The Upper Natone Road is a Council road and the Ridgley Highway is a Department of Infrastructure, Energy and Resources highway. Kara Road is used and maintained by Tasmania Mines and Forestry Tasmania under agreement with Forestry Tasmania.

The project construction movements will increase the traffic on Kara Road and the western end of the Upper Natone Road by approximately 15%. There are no residences on Kara Road or this section of the Upper Natone Road, so no residential impact will occur.

The nearest residences are located on the Ridgley Highway at Hampshire. The current traffic flows on the highway at Hampshire is in the range of 1500 to 4000 vehicles per day (DIER data).

The impact at Hampshire from the increase of 8 vehicle movements per day is negligible.

2.5 Technical and Management Alternatives

There are no other more appropriate technical and management alternatives to the proposal.

The location of the proposed new TSF is considered to provide the most appropriate solution for the ongoing disposal of mine tailings.
3. Existing Environment

3.1 Planning Aspects

The proposed new TSF will be located on the eastern side of the existing TSF at the Kara Mine site in the Municipality of Burnie: TasMap 1:25 000 series, Parrawe Sheet 3842.

The new TSF will be located on State Forest managed by Forestry Tasmania. The land adjacent to the proposed new TSF area is owned by Associated Forest Holdings Proprietary Limited.

A new Mining Lease 8M/2008 has been issued by the Minister for Energy and Resources to TML which covers the major proportion of the new tailings storage facility. A copy of the new Mining Lease is contained in Appendix B.

This proposal is to undertake the same tailings storage activities as are currently approved on the existing Mining Lease, but at a new adjacent TSF on the new adjacent Mining Lease.

The property identification (Property ID) and ownership details are outlined in the Land Information System of Tasmania (LIST) maps contained in Appendix E (E1).

The land zoning is rural forestry under the City of Burnie Planning Scheme 1989, with extractive industry being a discretionary use or development within that zone. The Planning Scheme Zones and Overlays in the area are shown in LIST Maps in Appendix E (E2).

There appear to be no overlays or sensitive land uses in the area that would prevent the proposed activities. A land capability survey of the area has been undertaken. Land capability in the wider area is shown in the LIST map contained in Appendix E (E3).

As part of the assessment process, this DPEMP and the K Moore and Associates report will be referred to the Tasmanian statutory Assessment Committee for Dam Construction (ACDC).

The project surveys have demonstrated that there are no Matters of National Environmental Significance impacted by the proposal and the project is therefore not a controlled action under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

No referral to the Commonwealth Government Department of Environment, Water, Heritage and the Arts is deemed necessary.

3.2 Environmental Aspects

No environmental aspects of significance have been identified in the project area. There are no official conservation reserves in the surrounding area or sensitive receiving environments.

The project is located approximately 5 kilometres from the nearest residences and 1 km from the nearest permanent surface water (Old Park River) but it is not located in this catchment.

The project is located in a class 4 drainage line which runs for 4 km through plantation forest to the Emu River. It is located in an active forestry operations region.
An appreciation of the area of the new TSF can be gained from the photographs contained in Appendix F.

The new facility will encroach slightly on an unofficial Forestry Tasmania reserve, but Kara Road and forestry activities exist on this unofficial reserve already.

The Old Park Reserve exists in the area but this will not be impacted by the project and is located on the opposite side of Kara Road.

A reserve exists on St Valentines Peak which is listed on the Register of the National Estate but this reserve is located over 5 km from the project area.

3.2.1 Topography
The proposed new TSF site occupies a north trending trough, or drainage line, with a low point of approximately 550 m Australian Height Datum (AHD) on the northern side.

The eastern, western and southern sides of the site have maximum heights of approximately 570 m AHD.

The site for the new TSF is relatively flat with winter time surface water evident in the middle of the site.

3.2.2 Geology

Regional Geology
Baillie et al.¹ have mapped the geology of the area. The geology of the regional area, shown in Figure 4 below, is diverse. The oldest rocks of the area consist of a mixed sequence of Middle Cambrian dominantly extrusive felsic to intermediate volcanic and associated sedimentary rocks.

These rocks are overlain by a sequence of Ordovician rocks consisting of siliceous conglomerate, bioturbated sandstone and minor conglomerate, and fossiliferous limestone.

The Cambrian and Ordovician rocks have been subject to significant deformation, including folding and faulting, and have been intruded by a medium to coarse-grained granite, the Housetop Granite, in the Devonian.

Contact metamorphism of the Ordovician limestone by intrusion of the granite has produced small local areas of magnetite skarn.

In the Tertiary, basalt was extruded over a wide area to the north, west and south. The siliceous Ordovician conglomerate has been more resistant to erosion, forming the elevated peaks of St Valentines Peak and Companion Hill to the south.

During the Quaternary, an extensive area of siliciclastic talus and scree has formed on the steep upper slopes of the eastern, southern and western sides of St Valentines Peak.

Small areas of alluvium have also been deposited along sections of the Emu River.

The Kara Mine is located on magnetite skarn developed as a result of contact metamorphism of the Ordovician Limestone by the intrusion of the Devonian Granite.

Magnetite skarns are associated with outcrops of the Housetop, Ringwood and Kara granites. A number of these magnetite bodies have been worked sporadically as sources of iron for steel making (e.g. Pearson’s workings in the Kara No 2 Main deposit). Some of the magnetite skarns also contain economic concentrations of scheelite (e.g. in the Kara No. 1 area).

The Kara deposit was discovered in 1950\(^2\). The geology of the Kara tungsten deposits has been described as follows (Burrett and Martin, 1989, p 282\(^3\)):

> “Several scheelite-bearing garnet-diopside-magnetite-amphibole-vesuvianite skarns have formed at a transitional boundary between siliceous sandstone and quartzwacke (Molina Sandstone) and overlying Gordon Group limestone. Most deposits are within a synformal structure in the Ordovician sedimentary rocks which are underlain and intruded by porphyritic and equigranular biotite-hornblende granite of the magnetite-series Devonian Housetop Granite.”

\(^2\) Solomon, M and Groves, DI, 2000. The Geology and Origin of Australia’s Mineral Deposits. Centre for Ore Deposit Research, University of Tasmania and Centre for Global Metallogeny, University of Western Australia.

"The main deposits at Kara, located near Hampshire, 40 km south of Burnie, are within a trough-like pendant of skarn within the Houstop Granite. At Kara No.1 (open pit), ore-grade scheelite mineralization forms an irregularly-shaped blanket draped 15-25 m above the granite. Between the skarn and the granite is a tungsten-poor, quartz-epidote reaction zone. Skarn lithologies are varied but there is a sharp (economic and mineralogic) division between magnetite dominant and grossular-andradite dominant units. Scheelite is distributed through all lithologies, but higher grade ore is associated with magnetite-amphibole skarn. Garnet skarn is only strongly mineralised adjacent to magnetite-rich skarn. Whilst the overall shape of the scheelite distribution is an irregular tabular body, there is considerable local enrichment in specific lithologies. Tin, in silicates, and molybdenum are minor components of the skarn, though scheelite concentrates contain 1-1.5% Mo. The skarn is deeply weathered and much of the scheelite in the high-grade zone is altered to secondary hydrous tungsten minerals (e.g. anthoindite)."

A geo-conservation search of the Department of Primary Industries and Water Natural Values Atlas Report on 1 October 2009, revealed no values in the area.

The WIST mapping indicates karsts may be present in the project area but this assumes that the highly metamorphosed limestones, if they indeed even exist in the area, contain karsts.

Geological advice⁴ is that the project area contains no karst formations. This is support by the initial project observations undertaken by K Moore and Associates, which indicate that there is no evidence to date that the area is unsound or unsuitable for the project.

### 3.2.3 Geomorphology

As indicated in Section 3.2.1, the site occupies the broad upper reaches of a north trending drainage line.

### 3.2.4 Catchments

The mine and associated facilities are located within the Emu River catchment towards the Emu River headwaters near St Valentines peak. It is located immediately southeast of the confluence of the Old Park River and Emu River.

The Emu River catchment is approximately 242 km² and it drains in a general NNE direction towards the north coast of Tasmania and into Bass Strait near the city of Burnie.

There have been no alterations to the major drainage systems of the area. The only known major upstream activity that may occasionally interfere with the surrounding hydrology is forestry.

Currently, all offsite drainage from the mine site is directed to the Emu River, with the exception of the mill site storm water which is discharged to the Old Park River.

Aqueous emissions from the mine site must maintain or enhance the quality of surface waters downstream of the site in accordance with the State Policy on Water Quality Management 1997 (State Water Policy).

⁴ Advice from Dr Michael Pollington (pitt&sherry), mine consultant Alan Fudge and from detailed site mapping by M'Intyre Mines (Aust) Pty Ltd 1982.
The former Department of Primary Industries, Water and the Environment (now the Department of Primary Industries, Parks, Water and Environment) and the Burnie City Council established and ratified the Protected Environmental Values (PEVs) for the Emu River and Old Park River under the State Policy for Water Quality Management in June 2003.

The document is entitled the *Environmental Management Goals for Tasmanian Surface Waters, North - Central Coast Catchments and the Greater Rubicon Catchment, Final Paper June 2003*.

The PEVs for the Emu and Old Park Rivers are interpreted (based on land tenure) to be the protection of modified (not pristine) aquatic ecosystems from which edible fish are harvested, primary and secondary contact water quality and aesthetic water quality.

That is, as a minimum, water quality management strategies should seek to provide water of a physical and chemical nature to support a modified (not pristine) aquatic ecosystem from which edible fish, shellfish and crustaceae are harvested and to maintain any contact and aesthetic qualities of the water.

The mine site regulatory discharge limits are set in Tables 2 and 3 of Schedule 5 of Environment Protection Notice (EPN) 7409/1 of 19 December 2006. The EPN is contained in Appendix G.

### 3.2.5 Climate

Long-term rainfall data for the site is not available. Rainfall has been recorded at the mine site from January 2001 to the present time. The site rainfall has averaged 1535 mm per annum.

The highest rainfall totals occur in winter and early spring (approximately 200 to 300 mm/month). Late summer and early autumn is the driest period (approximately 30 to 100 mm/month).

There are no temperature readings recorded at the mine site but the Bureau of Meteorology (BOM) has a station at Tewkesbury which is only 12 km to the northwest of the mine site and located at an altitude of 410 m.

The BOM data for the Tewkesbury station can be summarised as follows:

- Mean annual rainfall 1554 mm/year (1935-1995)
- Mean annual maximum temperature 13.5 °C (1939-1989)
- Mean annual minimum temperature 5.8 °C (1939-1989)
- Summer temperature spread 9 °C to 19 °C (1939-1989)
- Winter temperature spread 3 °C to 9 °C (1939-1989)

The prevailing winds at the site are predominantly north westerly to south westerly.

The BOM mean monthly Tewkesbury rainfall (1934 to 1995) compared to the BOM regional mean monthly Class A Pan evaporation is outlined in Table 1.

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall</td>
<td>69.2</td>
<td>71.0</td>
<td>74.9</td>
<td>121.0</td>
<td>150.5</td>
<td>165.1</td>
<td>212.7</td>
<td>194.7</td>
<td>146.5</td>
<td>133.4</td>
<td>106.7</td>
<td>102.6</td>
</tr>
<tr>
<td>Evaporation</td>
<td>150</td>
<td>125</td>
<td>100</td>
<td>60</td>
<td>40</td>
<td>30</td>
<td>30</td>
<td>40</td>
<td>60</td>
<td>70</td>
<td>125</td>
<td>150</td>
</tr>
<tr>
<td>Difference</td>
<td>-81</td>
<td>-54</td>
<td>-25</td>
<td>+61</td>
<td>+111</td>
<td>+135</td>
<td>+183</td>
<td>+155</td>
<td>+87</td>
<td>+63</td>
<td>-18</td>
<td>-47</td>
</tr>
</tbody>
</table>

Table 1. Mean monthly rainfall versus mean monthly Class A Pan evaporation
The annual rainfall of approximately 1550 mm exceeds the annual Class A Pan evaporation of 980 mm to 1000 mm by an average of 550 mm to 570 mm per annum.

The mine site rainfall data is contained in Appendix H (H1).

3.2.6 Mine Water Monitoring

Surface water monitoring is currently undertaken at the mine site in accordance with EPN 7409/1 on a monthly basis\(^5\) at the following four sites:

- WS1 - Old Park River, above the mine site: 397544E 5425268N - GDA94
- WS4 - Emu River, below polishing pond discharge: 397612E 5427235N - GDA94
- WS5 - Emu River at Upper Natone Road Bridge: 398993E 5430616N - GDA94
- WS6 - Discharge from the polishing pond: 397496E 5426749N - GDA94

The sites are shown in Figure 2 in Section 2.3.

The EPN requires analysis of all samples for the following:

- pH
- Total suspended solids
- Total metals (As, Cu, Fe, Mn, Pb & Zn)
- $\text{SO}_4$.

The historic database for the mine surface water monitoring program, from 1998 up to June 2009, is contained in Appendix H (H2).

Flow rates in the Old Park and Emu Rivers in the vicinity of the mine site are not measured.

The results indicate that there is no statistical difference in the water quality between the upstream WS1 site, the current discharge WS6 site and the downstream WS4 and WS5 sites using the pH and sulphate concentrations as the key indicators.

Some fluctuations in the key water quality indicators, such as pH, total suspended solids (TSS) and sulphate levels, in the discharge and downstream sites are evident in recent times and appear to coincide with similar fluctuations in the upstream water quality. Refer to Table 2 and Table 3 below.

\[\text{pH measurements should be undertaken in the field for meaningful results. Laboratory pH analysis should be undertaken within 6 hours from collection and this is not the case for most of the data. pH trends and comparisons should therefore be undertaken with this in mind.}\]

The upstream sulphate fluctuations also appear to coincide with upstream sediment loads. The upstream sulphate results, discharge sulphate results and downstream sulphate levels are shown in Figure 5, Figure 6 and Figure 7 below.

\[\text{There is currently no explanation for why sulphate concentrations changed from consistently low levels to higher levels but, whatever the reason, it is independent of the mine because it is equally evident in upstream samples as in downstream samples.}\]

\(^5\) Prior to May 2007, monitoring was undertaken on a three monthly basis.
Figure 5. Monitoring Site WS1 Sulphate trend

Figure 6. Monitoring Site WS4 Sulphate trend
The mine site water monitoring data indicates that although the levels of suspended solids, sulphate, manganese, iron and lead levels occasionally slightly exceed the discharge limits in the designated discharge (WS6), the impact on the downstream water quality in the Emu River appears minimal.

The current emissions do not appear to be jeopardising the PEVs and the associated water quality objectives for the Old Park River and the Emu River.

The levels of the key toxicants such as zinc, copper and lead in the upstream site are similar to the levels at the discharge site and downstream sites.

Although the key toxicant levels are elevated compared to the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC guidelines) 95% protection of aquatic ecosystems trigger values, there has been no historical evidence of environmental nuisance or harm.

The ANZECC guidelines recommend in the first instance the establishment of site specific water quality objectives (WQO) values where possible.

The site specific WQOs can be determined from the 80 percentile of the upstream site WS1 database. There is no upstream data for the Emu River.

Where no reference data exists, the WQOs revert to the ANZECC guideline trigger values.

The averages of the key parameters for the monitoring sites:
- Old Park River upstream of the mine site WS1
- Emu River WS4 and WS5 downstream of the mine discharge
- Discharge WS6

Are summarised in Table 2.

Also contained for reference in Table 2 for comparison are the:
- Site specific WQOs taken from the Old Park River upstream site WS1 data;
• Default ANZECC trigger value WQOs; and
• EPN discharge limits.

The averages data in the table are expressed as mg/L unless otherwise stated.

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>EC µS/cm</th>
<th>TDS</th>
<th>SS</th>
<th>SO4</th>
<th>Cl</th>
<th>Al</th>
<th>As</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>6.8</td>
<td>6.8</td>
<td>6.8</td>
<td>9.3</td>
<td>16.4</td>
<td>15.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS4</td>
<td>6.8</td>
<td>8.2</td>
<td>11.2</td>
<td>15.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS5</td>
<td>6.8</td>
<td>5.7</td>
<td>11.0</td>
<td>16.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS6</td>
<td>6.6</td>
<td>15.9</td>
<td>12.6</td>
<td>18.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WQO</td>
<td>7.2-</td>
<td>6.5</td>
<td>10.5</td>
<td>17</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from WS1</td>
<td>7.2-</td>
<td>6.5</td>
<td>3-350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANZECC</td>
<td>7.5-</td>
<td>6.5</td>
<td></td>
<td></td>
<td>0.055</td>
<td>0.013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPN discharge limit</td>
<td>6-8</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Existing Monitoring Sites - Key Indicator Averages and Water Quality Targets

EC = electrical conductivity; TDS = total dissolved solids; SS = suspended solids; SO4 = sulphate; Cl = chloride; Al = aluminium; As = arsenic; Cd = cadmium; Cr = chromium; Co = cobalt; Cu = copper; Pb = lead; Mn = manganese; Ni = nickel; Zn = zinc; Fe = iron.

<table>
<thead>
<tr>
<th></th>
<th>Cd</th>
<th>Cr</th>
<th>Co</th>
<th>Cu</th>
<th>Pb</th>
<th>Mn</th>
<th>Ni</th>
<th>Zn</th>
<th>Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>0.0103</td>
<td>0.010</td>
<td>0.033</td>
<td>0.028</td>
<td>0.352</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS4</td>
<td>0.0096</td>
<td>0.011</td>
<td>0.047</td>
<td>0.025</td>
<td>0.374</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS5</td>
<td>0.0104</td>
<td>0.011</td>
<td>0.036</td>
<td>0.043</td>
<td>0.418</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS6</td>
<td>0.0110</td>
<td>0.016</td>
<td>0.274</td>
<td>0.047</td>
<td>1.338</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WQO</td>
<td>0.015</td>
<td>0.02</td>
<td>0.05</td>
<td>0.04</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from WS1</td>
<td>0.0002</td>
<td>0.001</td>
<td>0.003</td>
<td>1.90</td>
<td>0.011</td>
<td>0.008</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANZECC</td>
<td>0.0014</td>
<td>0.003</td>
<td>1.90</td>
<td>0.011</td>
<td>0.008</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPN discharge limit</td>
<td>0.5</td>
<td>0.05</td>
<td>0.5</td>
<td>0.5</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 continued

Statistically, there is negligible difference between the average results for WS1, WS4 and WS5.

The average results for WS6 are similar to WS1, WS4 and WS5 except for the manganese and iron results. The average results for WS6 readily comply with the EPN limits.

The ANZECC trigger values for copper, lead and zinc are exceeded at all the sites.

A schematic diagram of the mine water system is summarised in the figure below.
Tailings storage facilities

Decant clean water pond

Mill and process area

Product storage area

Storage settling ponds

Mill SW wetlands settling ponds

Kara Pit

Mine water settling pond

Discharge polishing pond

E mu River

Old Park River
3.2.7 Project Water Monitoring

There are three potential surface water drainage lines emanating from the project area.

The main one is an unnamed class 4 drainage line which travels in a northerly direction for approximately 4 km before joining the Emu River approximately 500 m south of the Upper Natone Road Bridge over the Emu River.

Another unnamed drainage line runs for approximately 1 km from the project area to the NW where it joins the existing final mine discharge polishing pond before entering the Emu River.

The other drainage line travels south from the existing TSF area and joins the Old Park River approximately 1.5 km south of the mill site.

Project specific baseline monitoring was undertaken monthly for three months on the project area groundwater, the current TSF decant water and the tailings TCLP. The analytical reports are contained in Appendix I.

**Groundwater**

Ponding of water was evident in some areas of the project area during the winter sampling period. However, no surface water samples were taken as it was considered that the surface water sample and groundwater sample and results would be one and the same, due to the surface expression of the groundwater in the area.

Monitoring of the groundwater quality was undertaken monthly in an excavation in the new TSF project area over a three month period from June to August 2009. The results are contained in Appendix H (H3).

The averages of the key parameters from the groundwater data compared to the Old Park River upstream of the mine site WS1, Emu River WS4 and WS5 downstream of the mine discharge and Discharge WS6 are summarised in Table 3 below.

Also contained in Table 3 for reference are the site specific WQOs taken from the Old Park River upstream site WS1 data, the default ANZECC trigger value WQOs and the EPN discharge limits.

The averages data in the table are expressed as mg/L unless otherwise stated.

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>EC uS/cm</th>
<th>TDS</th>
<th>SS</th>
<th>SO4</th>
<th>Cl</th>
<th>Al</th>
<th>As</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>6.8</td>
<td>6.8</td>
<td>6.8</td>
<td>9.3</td>
<td>16.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS4</td>
<td>6.8</td>
<td>8.2</td>
<td>11.2</td>
<td>15.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS5</td>
<td>6.8</td>
<td>5.7</td>
<td>11.0</td>
<td>16.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS6</td>
<td>6.6</td>
<td>15.9</td>
<td>12.6</td>
<td>18.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground</td>
<td>5.3</td>
<td>75</td>
<td>52.3</td>
<td>3.3</td>
<td>4.3</td>
<td>9.3</td>
<td>1.0</td>
<td>0.0005</td>
</tr>
<tr>
<td>water</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WQO</td>
<td>7.2</td>
<td>10.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>from WS1</td>
<td>6.5</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANZECC</td>
<td>7.5</td>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.5</td>
<td>350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPN</td>
<td>6</td>
<td>30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>discharge</td>
<td>8</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Groundwater Monitoring Data compared to Existing Monitoring Sites and Water Quality Targets

EC = electrical conductivity; TDS = total dissolved solids; SS = suspended solids; SO4 = sulphate; Cl = chloride; Al = aluminium; As = arsenic; Cd = cadmium; Cr = chromium; Co = cobalt; Cu = copper; Pb = lead; Mn = manganese; Ni = nickel; Zn = zinc; Fe = iron.
The average results indicate that the groundwater water quality is generally very good.

The average results show a marginal exceedance of some of the ANZECC guidelines trigger values for 95% protection of aquatic ecosystems. The marginal exceedances were for aluminium, copper, chromium and zinc.

The presence of submicron colloidal clay may explain the aluminium content. There are no upstream activities that would result in elevation of the results.

The average groundwater pH level was low (5.3). Although the database is relatively small, the results were consistent (5.0, 5.3, 5.6) for the three results. The sample holding times of 6 hours were exceeded for the three pH analysis so the results should be considered as indicative only. Field measurements are normally preferred but analysis suits the mine’s mode of operations. West Coast surface waters typically have a low pH due to organic acids.

The low pH is possibly due to the decomposing vegetation from the thick vegetation in the area and the low EC and therefore buffering capacity of the groundwater.

**Tailings Decant Water**

Monitoring of the existing tailings decant water quality was undertaken monthly over a three month period from June to August 2009. The results are contained in Appendix H (H3).

The averages of the key parameters from the existing TSF clean tailings decant water data compared to the groundwater data, Old Park River upstream of the mine site WS1, Emu River WS4 and WS5 downstream of the mine discharge and Discharge WS6 are summarised in Table 4 below.

Also contained in Table 4 for reference are the site specific WQOs taken from the Old Park River upstream site WS1 data, the default ANZECC trigger value WQOs and the EPN discharge limits.

The data averages in the table are expressed as mg/L unless otherwise stated.
<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>EC uS/cm</th>
<th>TDS</th>
<th>SS</th>
<th>SO4</th>
<th>Cl</th>
<th>Al</th>
<th>As</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>6.8</td>
<td></td>
<td></td>
<td>6.8</td>
<td>9.3</td>
<td>16.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS4</td>
<td>6.8</td>
<td></td>
<td>8.2</td>
<td>11.2</td>
<td>15.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS5</td>
<td>6.8</td>
<td></td>
<td>5.7</td>
<td>11.0</td>
<td>16.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS6</td>
<td>6.6</td>
<td></td>
<td>15.9</td>
<td>12.6</td>
<td>18.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground water</td>
<td></td>
<td></td>
<td>5.3</td>
<td></td>
<td>75</td>
<td>52.3</td>
<td>3.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Tailings decant</td>
<td></td>
<td></td>
<td>7.3</td>
<td>183</td>
<td>107</td>
<td>24.3</td>
<td>7.7</td>
<td>15.3</td>
</tr>
<tr>
<td>WQO from WS1</td>
<td></td>
<td></td>
<td>7.2-6.5</td>
<td>10.5</td>
<td>17</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANZECC</td>
<td></td>
<td></td>
<td>7.5-6.5</td>
<td>3-350</td>
<td></td>
<td></td>
<td>0.055</td>
<td>0.013</td>
</tr>
<tr>
<td>EPN discharge limit</td>
<td></td>
<td></td>
<td>6-8</td>
<td>30</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Tailings Decant Water Monitoring Data compared to Existing Monitoring Sites and Water Quality Targets

EC = electrical conductivity; TDS = total dissolved solids; SS = suspended solids; SO4 = sulphate; Cl = chloride; Al = aluminium; As = arsenic; Cd = cadmium; Cr = chromium; Co = cobalt; Cu = copper; Pb = lead; Mn = manganese; Ni = nickel; Zn = zinc; Fe = iron.

<table>
<thead>
<tr>
<th>Cd</th>
<th>Cr</th>
<th>Co</th>
<th>Cu</th>
<th>Pb</th>
<th>Mn</th>
<th>Ni</th>
<th>Zn</th>
<th>Fe</th>
</tr>
</thead>
<tbody>
<tr>
<td>WS1</td>
<td>0.0103</td>
<td>0.010</td>
<td>0.033</td>
<td>0.028</td>
<td>0.352</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS4</td>
<td>0.0096</td>
<td>0.011</td>
<td>0.047</td>
<td>0.025</td>
<td>0.374</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS5</td>
<td>0.0104</td>
<td>0.011</td>
<td>0.036</td>
<td>0.043</td>
<td>0.418</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS6</td>
<td>0.0110</td>
<td>0.016</td>
<td>0.274</td>
<td>0.047</td>
<td>1.338</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground water</td>
<td>0.00005</td>
<td>0.0013</td>
<td>0.0008</td>
<td>0.0033</td>
<td>0.002</td>
<td>0.248</td>
<td>0.002</td>
<td>0.0297</td>
</tr>
<tr>
<td>Tailings decant</td>
<td>0.0001</td>
<td>0.0007</td>
<td>0.0005</td>
<td>0.009</td>
<td>0.011</td>
<td>0.365</td>
<td>0.001</td>
<td>0.042</td>
</tr>
<tr>
<td>WQO from WS1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANZECC</td>
<td>0.0002</td>
<td>0.001</td>
<td>0.0014</td>
<td>0.003</td>
<td>1.90</td>
<td>0.011</td>
<td>0.008</td>
<td></td>
</tr>
<tr>
<td>EPN discharge limit</td>
<td></td>
<td></td>
<td>0.5</td>
<td>0.05</td>
<td>0.5</td>
<td>0.5</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. continued

The results from decant water monitoring indicate a marginal exceedance of some of the water quality objectives and the ANZECC guidelines trigger values for 95% protection of aquatic ecosystems.

The guidelines were exceeded for aluminium, copper, lead and zinc. The WQOs were exceeded for manganese, iron and zinc.

On average, the clean tailings decant appears to have better water quality for sulphate, chloride, copper, lead and zinc than the existing discharge to the Emu River, but not for manganese or iron.

On average, the tailings decant also appears to have better water quality for sulphate, chloride and copper than the existing Emu River site WS4, but not for manganese, zinc and iron.

It should be noted that all the clean tailings decant water from the new TSF will report to the existing clean decant water pond for recycle to the mill under the currently approved management system.
There will be no design discharge or emergency overflow from the new TSF to the environment.

**Tailings TCLP**

Toxicity Characteristic Leaching Procedure tests (TCLP) were undertaken on the tailings over a three month period from June to August 2009, to give a worst case scenario indication of the tailings leachate. The TCLP data is contained in Appendix H (H3).

The results indicate that the tailings are relatively chemically stable with no leaching of contaminants to any notable extent at the TCLP pHs (initial 1.7 to 4.3 and final 5.1 to 6.0).

The leachate analyses classify the material as ‘low level contaminated soil’ due to the slightly elevated manganese levels leached from the solids. The analytical reports for the project water monitoring are contained in Appendix I.

The data is summarised in Table 5 below. The data averages in the table are expressed as mg/L unless otherwise stated.

<table>
<thead>
<tr>
<th>Tailings TCLP</th>
<th>Al</th>
<th>As</th>
<th>Cd</th>
<th>Cr</th>
<th>Co</th>
<th>Cu</th>
<th>Fe</th>
<th>Pb</th>
<th>Mn</th>
<th>Ni</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
</tr>
<tr>
<td>18-Jun-09</td>
<td>0.4</td>
<td>&lt;0.1</td>
<td>&lt;0.05</td>
<td>&lt;0.1</td>
<td>0.1</td>
<td>1.0</td>
<td>0.3</td>
<td>28.0</td>
<td>&lt;0.1</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>15-Jul-09</td>
<td>0.1</td>
<td>&lt;0.1</td>
<td>&lt;0.05</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>0.9</td>
<td>&lt;0.1</td>
<td>37.2</td>
<td>&lt;0.1</td>
<td>0.2</td>
<td></td>
</tr>
<tr>
<td>12-Aug-09</td>
<td>0.4</td>
<td>&lt;0.1</td>
<td>&lt;0.05</td>
<td>&lt;0.1</td>
<td>&lt;0.1</td>
<td>1.6</td>
<td>&lt;0.1</td>
<td>31.9</td>
<td>&lt;0.1</td>
<td>0.3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DPIPWE Bulletin #105 Low level</th>
<th>Al</th>
<th>As</th>
<th>Cd</th>
<th>Cr</th>
<th>Co</th>
<th>Cu</th>
<th>Fe</th>
<th>Pb</th>
<th>Mn</th>
<th>Ni</th>
<th>Zn</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
<td>mg/L</td>
</tr>
<tr>
<td>4.0</td>
<td>0.5</td>
<td>0.1</td>
<td>0.5</td>
<td>1.0</td>
<td>0.5</td>
<td>25.0</td>
<td>1.0</td>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. TCLP Data compared to Classification Criteria

**3.2.8 Tailings Properties**

**Chemical**

Analysis of tailings was undertaken monthly over a three month period from June to August 2009. The analytical reports are included in Appendix I. The analytical database is contained in Appendix H (H3).

The results indicate the following:

- The tailings are consistent with the DPIPWE Bulletin #105 criteria for ‘fill material’ for most of the contaminant. Only arsenic and manganese exceed the ‘fill material’ criteria
- The tailings contain negligible amounts of sulphur which is important for the acid producing potential assessment and for the potential dissolution of other key heavy metals
- The tailings are classified as ‘non acid forming’
- The TCLP tests indicate that the tailings are chemically quite stable
The tailings have a residual acid neutralising capacity

**Geotechnical**

Geotechnical laboratory analyses were undertaken by pitt&sherry on a sample collected by TML on 18 June 2009. Details of these determinations are summarised below and the full report is contained in Appendix J (J1).

The sizings distribution analysis is shown in Figure 8 below

- Coefficient of permeability $k$ (two samples): $6.6 \times 10^{-7}$; $2.7 \times 10^{-7}$
- Dry Density: Minimum: 1.53 t/m$^3$; Maximum: 2.08 t/m$^3$
- Soil Particle Density: 3.610 g/cm$^3$
- Wet Cylinder Settled Density, condition at 7 days:
  - Wet density: 1980 kg/m$^3$
  - Moisture content of sludge: 45.8%
  - Dry density: 1360 kg/m$^3$

The results indicate the following:

- The tailings have very good particle settling velocities
- The fundamental particles have high densities amenable to good settling
- The permeability indicates that the consolidated solids will be reasonably impermeable
- The material will contribute to the stability and impermeable nature of the TSF walls.

![Figure 8. Tailings Particle Sizings Analysis](image-url)
3.2.9 Natural Heavy Metal Soil Loadings

Although no specific investigations of natural heavy metal soil loadings have been undertaken in the TSF area, it is assumed that the soils do not have anomalous metal values.

This assumption is supported by the surface water quality monitoring undertaken by the Kara Mine since 1998, which indicates that there is minimal heavy metal contamination in the area, and by the site specific water monitoring program undertaken for June 2009 to August 2009.

It is also supported by the lack of impact from the construction of several existing TSFs in the area.

3.2.10 Land Systems

A number of land systems occur within the proposed TSF and surrounding areas because of the diverse nature of the local geology. The Land Systems of the area, as mapped by Richley\(^6\), are as follows:

682141 Guide River

Brown gradational soils have developed on the Tertiary basalt. These soils have a clay loam surface texture on the upper and lower slopes and a gravelly clay loam surface texture in the drainage lines.

Soil permeability is moderate and average depth ranges from 1.2 m on the upper slopes to > 2m on the lower slopes. These soils are prone to sheet and gully erosion, mass movement and stream bank erosion.

733341 St Valentines Peak

A variety of brown grey and yellowish uniform and gradational soils have developed on the Ordovician siliceous rocks of the area, reflecting the differences in rock types, slopes and position on slopes.

Most of these soils have a high permeability, a loam surface texture that has variable sand, clay and gravel content and an average depth that ranges from 0.3 m to 1 m. These soils are prone to high sheet and rill erosion on the steeper slopes, low sheet erosion on the lower slopes and high siltation in creek flats.

741231 Mt Housetop

Yellowish, reddish and brown gradational soils have developed on the Devonian granite in this area. These soils are gravelly on the low hills, swales and on steep slopes, and stony on the steep upper slopes and peaks. In areas of impeded drainage black sand soils with uniform texture have developed; in the flats the soils are peats.

The surface texture is: loamy clay on the steep slopes, sandy clay loam on the low hills, loamy sand in areas of impeded drainage and peat in the flats. The permeability of these soils is high in all areas except the peat flats where it is low. Average depth is quite variable, being shallow on the peaks, 0.3 m in areas of impeded drainage, 1.3 m on the low hills, >1.8 m in the peat flats and >2 m on the steep slopes.

These soils are prone to high sheet and rill erosion on the low hills and steeper slopes, high gully erosion on steep slopes, high siltation on flatter areas and moderate flooding in the peat flats.

---

Brown, reddish brown, yellowish red and olive grey gradational soils have developed on Tertiary basalt. They are stony on the scarps and stony and/or gravelly on the lower slopes.

These soils have a loam surface texture and variable permeability, ranging from high on the scarps and lower slopes to moderate on plateaux and low in creek flats. Average depth ranges from 0.3 m in the creek flats to 1.6 m on the plateaux. These soils are prone to moderate sheet erosion on the upper slopes and low sheet erosion on the lower slopes.

3.2.11 Land Capability

A land capability survey of the area has been undertaken\(^7\). The LIST land capability map for the wider area is shown in Appendix E (E3).

On the mine site, and a significant area to the north and south of the site, land capability has been mapped as: Exclusion Areas.

This is defined as “Land other than Private Freehold and Leased Crown Land, e.g. State Forests, State Reserves and Conservation Areas, Major Urban areas, major water bodies, National Parks and other Conservation areas”.

The area immediately to the north of the proposed new TSF is Class 5 land: “Land with slight to moderate limitations to pastoral use but which is unsuitable for cropping, although some areas on easier slopes may be cultivated for pasture establishment or renewal and occasional fodder crops may be possible.”

The area around the mine consists predominantly of land administered under the Crown Lands Act and land administered by the Forestry Tasmania.

3.2.12 Flora

An assessment of the botanical values of the site was undertaken by North Barker Ecosystem Services\(^8\). This report, summarised below, is contained in Appendix K.

**Vegetation**

The area has a diverse vegetation, with the following six native plant communities, all considered to be adequately reserved, identified on the site:

**Pure buttongrass moorland (MBP):** This mapping unit occupies a small area (0.4 ha) of shallow soils in the north east of the inundation area; it is generally dominated by *Gymnoschoenus sphaerocephalus*, with occasional other species including *Eucalyptus rodwayi*, *Leptospermum lanigerum*, *Callistemon viridiflorus* and *Gahnia grandis*.

**Melaleuca squarrosa scrub (SMR):** This mapping unit, which occupies about 1.7 ha of the inundation area, fringes the wet sclerophyll forests and rainforests where drainage is slow. The dominant *Melaleuca squarrosa* is about 12 m tall. The unit also includes *Leptospermum lanigerum*, *Nothofagus cunninghamii*, *Gahnia grandis*, *Bauera rubioides*, *Pittosporum bicolor*, *Pimelea drupacea* and a variety of ground and epiphytic ferns at low density.

---


\(^8\) North Barker Ecosystem Services, 2009. *Tasmania Mines Ltd. – Tailings Dam, Kara Road, Hampshire, Botanical Survey and Fauna Habitat Assessment*. 
Eucalyptus nitida forest over Leptospermum (WNL): This forest type, which occupies about 1.1 ha, occurs on higher ground on deeper, better drained soils between the scrub and rainforest communities. It is dominated by E. nitida trees up to 18 m tall. The small tree/shrub layer is low and extremely dense and comprised of Leptospermum scoparium, Acacia mucronata, Monotoca glauca, Bauera rubioides, and Leptospermum lanigerum. Gahnia grandis is also frequent. The high density of the small tree/shrub layer precludes ground layer species.

Eucalyptus delegatensis over rainforest (WDR): This mapping unit, which occupies about 4.6 ha and occurs locally between the scrub forest and buttongrass and the rainforest communities, represents a fire history related ecotonal vegetation type. It consists of larger Eucalyptus delegatensis with E. nitida trees from 20 to 30 m tall. The rainforest tree component, which consists of varying heights and species composition, is moderately dense and is dominated by Nothofagus cunninghamii and Phyllocladus aspleniifolius. The understorey varies with both sclerophyllous and rainforest species present including Cenarrhenes nitida, Anodopetalum biglandulosum, Nematolepis squamea, Bauera rubioides and Monotoca glauca. The tree fern Dicksonia antarctica is also present as are ground and epiphytic ferns.

Nothofagus / Phyllocladus short Rainforest (RMS): This mapping unit, which occupies 31.2 ha, is floristically simple with a relatively complex structure. The implicate type is short Nothofagus cunninghamii, Phyllocladus aspleniifolius and Eucryphia lucida and occasional Leptospermum lanigerum and Atherosperma moschatum just emerging over a dense tangle of Anodopetalum biglandulosum and Cenarrhenes nitida. Ground and epiphytic ferns also occasionally occur.

Nothofagus - Atherosperma Rainforest (RMT): This mapping unit, which occupies 10.7 ha on the fertile basalt derived soils in the western part of the study area, supports tall open rainforest. The canopy trees are in excess of 25 m tall with Nothofagus cunninghamii and Atherosperma moschatum dominant with occasional Acacia melanoxylan. Small trees/shrubs are moderately diverse but often represented by only single specimens including Pittosporum bicolor, Leptecophylla juniperina, Pimelea drupacea. The tree ferns Dicksonia antarctica are present as are a diverse range of epiphytic ferns and occasional ground ferns. In the occasional openings there are herbs.

It should be noted that the survey areas in total are slightly larger than the proposed TSF footprint.

Threatened Flora

Flora of National Significance
No plant species listed by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 were recorded in the study area or thought likely to occur.

Flora of State Significance
No plant species listed by the Tasmanian Threatened Species Protection Act 1995 were recorded in the study area and there is little likelihood of such listed species occurring there.

Flora of General or Regional Significance
A total of 15 species endemic to Tasmania were found in the study area; these species are listed in Appendix 4 of the Botanical Survey and Fauna Habitat Assessment in Appendix K.
**Introduced Plants**

Two declared weeds, *Cytisus scoparius* (english broom) and *Ulex europaeus* (gorse), were recorded from the area.

**Plant Pathogens**

*Phytophthora cinnamomi*

The site of the proposed TSF is within the climatic zone that favours the establishment and spread of *Phytophthora*, areas that receive above 600 mm of rainfall per annum and are below about 800 m altitude.

Some soil types, generally the low nutrient types that support healthy communities, are more conducive to the establishment and spread of *Phytophthora* than others.

There are also susceptible species in the rainforest and the scrub communities but these are generally only susceptible to infection when severely disturbed so that the soil temperature can be raised by sun exposure to a temperature suitable to sustain *Phytophthora*.

No symptoms of *Phytophthora cinnamomi* were recorded in the study area.

**Myrtle Wilt**

Myrtle wilt, which occurs naturally in rainforest where myrtle (*Nothofagus cunninghamii*) is present, is caused by a wind borne fungi (*Chalara australis)*.

Where forest clearance is undertaken and trees are damaged, there is often an increase in the incidence of myrtle wilt.

Symptomatic evidence of Myrtle Wilt was recorded within the study area adjacent to the existing TSF.

### 3.2.13 Fauna

A faunal habitat assessment of the site was undertaken in conjunction with the botanical survey by North Barker Ecosystem Services\(^9\). This report, summarised below and in Table 6, is contained in Appendix K.

The vegetation types within the area offer a range of potential habitat types typical of the higher rainfall areas of fertile northwest Tasmania.

There are few old growth eucalypts which could provide opportunities for hollow nesting bird species, but there are no rock overhangs or caves.

Logs may provide limited denning opportunities for quoll and Tasmanian devils.

Threatened fauna species that have previously been recorded within a 5 km radius of the area or that may be expected to occur are shown in Table 6 below.

---

\(^9\) North Barker Ecosystem Services, 2009.
### Conservation Status

<table>
<thead>
<tr>
<th>Species</th>
<th>Conservation Status</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mammals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Dasyurus maculatus</em> Spotted tailed quoll</td>
<td>vulnerable</td>
<td>Suitable habitat widespread in study area, occurs in wet forests and particularly rainforests.</td>
</tr>
<tr>
<td><em>Perameles gunnii</em> Eastern barred bandicoot</td>
<td>-</td>
<td>No suitable habitat. Thick forest does not provide habitat.</td>
</tr>
<tr>
<td><em>Sarcophilus harrisii</em> Tasmanian devil</td>
<td>vulnerable</td>
<td>Mosaic of rainforest and eucalypt forest provides suitable habitat. There are records for this species within 5 km of the site, likely to occur but no dens located.</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Aquila audax</em> Wedge-tailed eagle</td>
<td>endangered</td>
<td>Pair of birds seen harassed by crows. Although there are mature eucalypts there are no sheltered nesting sites so it is extremely unlikely that there is a nest present.</td>
</tr>
<tr>
<td><em>Accipiter novaehollandiae</em> Grey goshawk</td>
<td>endangered</td>
<td>Open rainforest is suitable habitat although not preferred nesting habitat. None seen.</td>
</tr>
<tr>
<td><em>Tyto novaehollandiae</em> Masked owl</td>
<td>endangered</td>
<td>Low density of mature eucalypts that may provide nesting hollows. Site is relatively high at 550 m to support Masked owl. Marginal habitat present. Low probability of presence.</td>
</tr>
<tr>
<td><strong>Invertebrates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Beddomeia protuberata</em> Hydrobiid snail</td>
<td>rare</td>
<td>Small creek running through centre of the study area may support hydrobiid snails. Although due to the high degree of speciation and restricted ranges in this genus it is likely to be another species. Site management could impact water quality downstream in the known range.</td>
</tr>
<tr>
<td><em>Astacopsis gouldi</em> Giant freshwater crayfish</td>
<td>vulnerable</td>
<td>The small creek may provide habitat for larval stages of the crayfish. Site management could impact water quality downstream.</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Prototroctes maraena</em> Australian grayling</td>
<td>vulnerable</td>
<td>There is no suitable habitat - the creek is only a class 4 in the study area. Although onsite management could impact water quality downstream.</td>
</tr>
</tbody>
</table>

Table 6: Fauna of conservation significance previously recorded within 5 km radius or likely to occur within the study area.
3.2.14 Aboriginal Cultural Heritage

An Aboriginal cultural heritage survey of the area has been undertaken\(^{10}\). The Aboriginal Heritage report is contained in Appendix L.

No Aboriginal Heritage sites, or areas of potential archaeological sensitivity (PAS), were identified within the study area. Surface visibility throughout the area was generally very poor (0-5%) due to heavy vegetative cover and access to much of the area was restricted due to dense vegetation.

Although these factors reduced the effectiveness of the field survey assessment, the negative survey results are considered to be an accurate reflection of the low archaeological sensitivity of the area.

This assessment is based on the environmental characteristics of the area, particularly the fact that it is generally low lying and prone to regular inundation from flooding and is covered by a very dense vegetation structure (which it is presumed was similar to the original vegetation structure prior to European occupation of Tasmania).

These factors in combination indicate that it is very unlikely that Aboriginal activity would have been focused in this area.

The report recommends in part that there are no specific areas of potential archaeological sensitivity identified within the bounds of the study area that would warrant further archaeological investigations.

This report has been discussed with and will be submitted to Aboriginal Heritage Tasmania as part of the DPEMP assessment process and it is anticipated at this stage that no further or post disturbance assessment will be required.

3.2.15 Historic Heritage

A specific historic heritage assessment of the proposed new TSF site has not been undertaken. The only identified feature of possible historic heritage in the area is an old sawmill site. The site, which is relatively small and well delineated, is close to Kara Road. Refer to photographs 7 and 8 in Appendix F.

An historic cultural heritage survey was undertaken by an appropriately qualified person as part of the FPP process. The survey assessed the site as being a good example of a local sawmill. It recommended that the area that the site be marked as a machinery exclusion zone with a 10 m buffer zone.

It is envisaged that it will not be in the footprint of the TSF and will not be disturbed by the TSF construction and operation. However, this will be determined at a later stage and, if disturbance is unavoidable, approval to disturb the site will be requested at that time with the appropriate regulatory authority.

3.3 Socio-Economic Aspects

The project has the potential to provide significant economic and social benefits at the local, regional and State scale.

Approximately 40 direct jobs (including both Tasmania Mines Limited - Kara Mine’s permanent employees and contractors) are currently associated with the existing operations.

\(^{10}\) CHMA, 2009. Proposed Tailings Dam at Kara Mine, North Tasmania, an Aboriginal Cultural Heritage Assessment.
Contractors are currently responsible for all in pit operations. The contractors provide all the equipment and personnel for the in-pit mining and transport activities. This is distinct from the processing operations, which are staffed by Kara Mine personnel.

It is anticipated that this proposal will secure the jobs of the existing workforce for the next 20+ years, with a potential future increase in the workforce if throughput rates are increased or alternative onsite mining areas are developed.

It is expected that construction of the new Stage 1 TSF, which will cost approximately $2M, will be undertaken by a local construction contractor, thereby benefitting the local community.

There do not appear to be any economic or social downsides to the project.

3.4 Alternative Sites

The proposed location of the new TSF has been identified as the most suitable location and no viable alternative sites were identified.

The proposed site has been selected for the following reasons:

- The site abuts the existing TSFs and is close to the existing processing plant.
- The site has acceptable topography, being relatively flat lying, thus maximising the capacity for a given footprint.
- The site has a good buffer distance of approximately 5 km to the nearest residences in Hampshire and potential sensitive land users.
- The site has a good drainage buffer distance of 1 km to the west to the Old Park River and 4 km to the north to the Emu River, mainly through plantation forests and some native wet forest. The class 4 drainage line at the new TSF site will not be scheduled aqueous discharge points as the TSF will be operated to recycle all the decant water including incident rainfall captured on the facility into the existing clean decant water recycle system.
- The groundwater levels in the project area are expected to be acceptable for the summer construction program and ongoing operations, based on the evidence from the existing infrastructure, the restricted recharge area with the site being located at the top of the drainage line and the existing infrastructure (road and existing TSF) acting as ‘cut off drains’.
- The site is secure and easily monitored.
- The existing infrastructure can be used.
- The recycled decant clean water can be gravity fed to the plant for reuse.
- Use of the site for the new TSF is appropriate, given the existing land use and ownership and ultimate mine closure strategy.
- The expected satisfactory geology, based on existing infrastructure in the area.
- Expected clay resource in the area that will facilitate the construction.
- Ultimately, a ‘consolidated’ TSF encompassing all the existing TSFs could be developed on the site, a situation that would be beneficial at ultimate mine closure.
### 3.4.1 Community Consultation

Initial consultation has been undertaken with the following stakeholders:

- Forestry Tasmania and the Forest Practices Authority
- Mineral Resources Tasmania, Environment Protection Authority (EPA) Division and Burnie City Council
- Department of Primary Industries, Parks, Water and Environment and the statutory Assessment Committee for Dam Construction (ACDC)
- Vegetation and fauna habitat: an appropriate survey of the project area has been undertaken in consultation with the EPA Division
- Aboriginal cultural heritage: an appropriate survey of the project area has been undertaken with Aboriginal consultation
- A Forest Practices Plan has been developed for the site and although the plan will not be certified due to recent amendments to the *Forest Practices Regulations 2007*, it will form the basis for Forestry Tasmania approval for Tasmania Mines to clear the site in the near future.

No extensive direct community consultation has been undertaken to date. The development is adjacent and part of an existing well-established operation that has wide community acceptance and extensive direct community consultation has therefore not been considered to be necessary.

### 4. Potential Effects and their Management

The construction and operation of a new TSF constructed in three stages on the new Mining Lease is an extension to the existing approved activities on the mine site.

The potential issues for the new TSF have previously been identified during the construction, operations and storage, management and closure strategies for these existing TSF.

The potential impacts, assessment and proposed management will concentrate solely on the new TSF except where the new proposal impacts on the existing management.

The key potential environmental issues identified for the new TSF site were:

- Threatened species identification and consideration
- Aboriginal Heritage identification and consideration
- Tailings materials transport, storage and handling.
- Tailings properties
- Integration with the existing TSF water reuse scheme
- Integration with the existing mine aqueous discharge system
- No increase in the current aqueous discharge loads to the Emu River
- Current and potential future land use and closure strategy.

The potential health impacts identified are:

- Dust and smoke generation during construction
- Emu River water quality.
The envisaged 10-year construction program for the new TSF of will proceed generally in accordance with the preliminary information contained in the K Moore and Associates report contained in Appendix C.

4.1 Air Emissions

The primary air pollutant sources will be dust and smoke from the construction activity and dust from dry tailings and TSF roads during operations.

There will be no designated or scheduled air emission stacks or vents.

4.1.1 Existing Conditions

Vegetation growth is relatively thick and diverse over the project area. Dust problems on and around the TSF site are negligible due to the vegetation cover and lack of activity.

Local exceptions may occur due to dust emissions from Kara Road from concentrate transport and timber harvesting operations in the area during hot dry weather.

Kara Road in the vicinity of the TSF is unsealed. It provides access to the mine site and will provide access to the TSF site for construction and operations.

4.1.2 Performance Requirements

Air emissions from TSF sites must comply with the following:

- Tasmanian OHS requirements (Workplace Health and Safety Regulations 1998)
- National Environment Protection Measure (Air) - PM10 and PM2.5 limits at the boundary of the premises
- Tasmanian Environment Protection (Air Quality) 2004
- Tasmanian Quarry Code of Practice 1999
- Tasmanian Environmental Management and Pollution Control 1994 environmental nuisance provisions.

4.1.3 Potential effects

Environmental factors play a large role in the nature of diffuse air pollution and dust emissions.

Dust has the potential to cause an environmental nuisance if it is blown beyond the boundary of the proposed construction and operating activities. It can cause respiratory annoyance or problems, reduce visual amenity and fall out onto land or surfaces in other ownership.

The Standard Recommended Attenuation Distance (SRAD)\textsuperscript{11} for a quarry extractive activity is 300 m to the nearest sensitive land use. This distance is readily met by the proposed activities.

In addition to nuisance to people, dust can also fall onto vegetation and in extreme cases retard plant growth by blocking photosynthesis.

Diesel exhaust fumes can cause an environmental nuisance and, like all fossil fuel exhausts, contribute to greenhouse gases. Construction of the tailings storage facility may result in the generation of the following air emissions:

- Dust generation during clearing of the site and stockpiling of soil for rehabilitation
- Dust generation during construction of the TSF, associated with movement of vehicles and machinery and excavation, transportation and emplacement of rock and soil
- Smoke and associated particulates during the burning off of the cleared vegetation
- Severe smoke and associated particulate impacts from the loss of control of vegetation burn offs.

Both dust and smoke could cause health impacts if appropriate management measures are not undertaken.

### 4.1.4 Avoidance and Mitigation Measures

The following mitigation measures will be utilised to minimise the generation of air emissions during construction and operations:

- Vegetation clearance will not be undertaken during hot, dry and windy periods.
- Extra care will be taken at times of high wind speed, or during other adverse weather conditions, to minimise dust emissions
- Construction roads will be watered as necessary during extremely hot, dry and windy conditions. If necessary works will be suspended during extreme weather conditions
- Burn offs of cleared vegetation will only be undertaken under the most appropriate meteorological conditions, using Forestry Tasmania personnel. This will minimise the potential health effects from smoke on the general community and construction and mine site workers
- Burn offs will be undertaken by qualified Forestry Tasmania people at the appropriate times
- Burn offs will not be undertaken whilst other activities are being undertaken in the TSF construction areas
- Reputable civil contractors using well maintained equipment will minimise exhaust emissions
- The construction works will be planned and supervised by a qualified engineer so that the construction of each facility is undertaken in the most efficient and effective manner
- Maintaining existing native trees for windbreaks and utilizing the existing topography and embankments to shield the new TSF and working areas from prevailing winds.

### 4.1.5 Assessment of Effects

Potential air emissions are expected to occur mainly during the construction phases.

Air emissions are expected to be negligible during the operational phases following construction, as the tailings will be in a slurry form when delivered and placed in the TSF.

The tailings generally remain well saturated even when the water level is 0.5 m to 1.0 m below the tailings surface.
The water bodies formed during the operational phases and under the existing closure strategy will result in the mitigation of long term dust emissions from the facility and encourage aquatic fauna and water fowl inhabitancy, as currently occurs.

Dust emission points will vary across the site over the construction period as dust generation will be related to the movement of vehicles and machinery and the excavation, transportation and emplacement of materials.

Smoke emission points will be determined by the organisation and orientation of the windrows of cleared vegetation. The 5 km buffer zone to the nearest residence will significantly reduce the risk of air emissions causing environmental nuisance or harm.

The adoption of the above mitigation measures during the construction phases as summarised in the following commitments will ensure the risks to the environment are minimised.

Commitment 1: Construction phase dust impacts will be minimised by road tanker watering as required in the first instance and by the suspension of construction activities in extreme weather conditions.

Commitment 2: Construction phase vegetation burn off smoke impacts will be minimised by qualified people undertaking the burn offs at appropriate times and in consultation with Forestry Tasmania.

4.2 Liquid Waste/Surface Water

The tailings slurry from the mill will be delivered to the new TSF through an extension to the existing tailings delivery pipeline as per the current operations.

The slurry will be allowed to separate out and the solids to consolidate in the TSF with the decant water being returned to the mill through the existing decant clean water pipeline system.

There will be no scheduled liquid waste or designated aqueous discharge point from the new TSF; it will be incorporated into the existing water management system.

During the construction phase a portable crib room and toilet may be required, and all liquid waste (including sewage) will be stored and removed from the site for disposal at an approved wastewater treatment plant.

A mobile fuel tanker will be used to refuel equipment. The key surface water risks sediment runoff during construction and potential fuel spills during construction.

4.2.1 Existing Conditions

There are currently no activities conducted on the designated site and no chemicals or fuels stored on site.

Vegetation growth is relatively thick and diverse over the project area. There are three main surface water drainage lines emanating from the project area.

The main one is an unnamed drainage line which travels in a northerly direction for approximately 4 km before joining the Emu River approximately 500 m south of the Upper Natone Road Bridge over the Emu River.

Another unnamed drainage line runs for approximately 1 km from the project area to the NW where it joins the existing final mine discharge polishing pond before entering the Emu River. The other drainage line travels south from the existing TSF area and joins the Old Park River approximately 1.5 km south of the mill site.
There is currently a very small seep from the existing TSF eastern wall entering the class 4 catchment but the flow is very low. The wall and the small seep will be covered by the new TSF anyway. Kara Road storm water runoff enters the three drainage lines, but the class 4 drainage line at the proposed new TSF appears to be the key one.

The clean decant water is currently of an acceptable quality for recycle and reuse in the mill. The quality does not currently interfere with the mill processes or the discharge water quality. The increased TSF area will result in the catchment of more rainwater which will improve the quality of the decant water and discharge water.

Currently the storm water around the existing TSF is directed to naturally occurring class 4 drainage lines around the facilities. The same will occur around the new TSF. Any potential impacts on the Old Park River and Emu River will be detected under the existing mine site monitoring regime.

Approximately 175,000 t/year of tailings and approximately 80,000 kL/year of water is pumped to the existing TSF. Approximately 40% of the water remains in the tailings and approximately 60% can be recycled. This equates to 48,000 kL/year or approximately 200 kL/day.

Extra to the tailings decant water that is returned to the existing clean decant water pond is the annual incident rainfall which falls onto the existing 14 ha TSF. This equates to the collection on average of approximately 80,000 kL/year or 300 kL/day of rainwater. The existing TSF decant system is designed to take these flows with the excess being directed to the currently scheduled discharge point either directly or through the mill product hydrocyclones.

4.2.2 Performance Requirements

EPN 7409/1 specifies the designated and scheduled aqueous discharge points for the premises. No new designated discharge points are required for this project.

Aqueous emissions, including diffuse surface waters and groundwater during construction must comply with the EPN and meet the requirements of the State Policy on Water Quality Management 1997. However, no new aqueous discharges are planned or envisaged.


The standard measures to control and manage surface water quality and sediment loads during mine site extraction activities are outlined in the Quarry Code of Practice 1999 and may be referenced as required.

The PEVs for the permanent surface waters and groundwater and the water quality objectives have been discussed in Section 3.2.4.

The Department of Primary Industries and Water historically undertook regular biota monitoring of the Emu River at the Upper Natone Bridge as part of the then State Government’s Monitoring River Health Initiative. The historical monitoring indicated that the Emu River supported a very healthy and diverse aquatic ecosystem.

The following threatened species are known to occur in the area:
- *Astacopsis gouldi* giant freshwater lobster (vulnerable, state and national) - occurs in the Emu River and tributaries.
• *Beddomeia protuberata* freshwater snail (rare, state) - occurs in the Emu River tributary south of Kara Road.

Monitoring of the Emu River further downstream at Fern Glade Reserve, as part of the river health initiative, found that the lower reaches of the river had little evidence of water quality and sediment contamination problems. This site had faunal assemblages indicative of reference like sites.

The mine water monitoring requirements are contained in the EPN. The project will integrate into the existing program. Groundwater monitoring may need to be included in future.

The clean tailings decant return water quality has been monitored and found to be relatively benign. The new TSF decant water quality is predicted to be the same as is currently being returned to the mill (refer to water quality summary in Table 4 of Section 3.2.7).

During construction temporary site huts/crib rooms and portable toilets may be used. The waste water from these temporary facilities will be disposed of by the construction contractor by an approved waste transporter to an approved waste facility.

There will be no permanent crib rooms, toilet or shower facilities at the new TSF.

### 4.2.3 Potential Effects

During construction the primary potential water contaminant may be sediment loss from the construction area and burn off areas. This will result from the collection of incident rainfall and potentially some groundwater ingress into the TSF footprint.

Sediment loss to Emu River has the potential to:
- Increase turbidity and reduce visibility for natural predation and sunlight for photosynthesis.
- Displace aquatic animals from river bed habitat by filling up the spaces between the rocks and gravels on the river bed.
- Affect fish gills and respiration under extreme sediment loads.

There appears to be negligible impacts from other potential contaminants that may be present, based on the existing water and groundwater quality in the area (refer to Table 3 in Section 3.2.7 and Section 3.2.9), the tailings and decant chemical properties (Section 3.2.8 and Appendix J (J2) and the lack of impact from previous TSF construction activity in the area.

The other potential effect during construction is from the loss of diesel fuel or hydraulic oil during construction equipment operations and refuelling. Loss can occur from spillage, breakage or vandalism.

Although any potential loss of fuels or oils is likely to be absorbed by the soils and vegetation in the buffer zones to the nearest surface waters, it has the potential to contaminate groundwater in the area. This will be assessed under Section 4.3.

The only potential effects from the operating phases are:
- Seepage from the tailings storages.
- TSF failure.

---

Change in decant water quality that affects the existing aqueous discharge quality and therefore jeopardises the ability to recycle the clean decant water to the mill.

The volume of the incident rainfall caught by the new TSF especially during winter is more than the mill can reuse.

There will not be any emergency spillway overflow from the new TSF to the new TSF surrounding environment. The new TSF overflow will be designed and constructed so that the overflow is directed into the existing system and clean decant water pond for reuse in the mill as required or as a managed discharge under the existing management plan.

The rainwater volumes collected in the TSFs will increase by approximately 3-fold in future (based on ultimate catchment area of 46 ha for the new TSF divided by the 14 ha for the existing TSF and clean decant water pond area).

The volume of rainfall collected will increase proportional to the area from existing 14 ha TSF to a total of 60 ha (14 ha + 46 ha new TSF). This equates to approximately 360,000 kL/year (using an annual average net rainfall of 0.6 m).

The new TSF will be designed by an appropriately qualified engineer, and the existing clean decant water pond modified if necessary, to accommodate the potential increase in rainfall collected and the associated volumes.

The water quality data for the existing clean tailings decant and receiving waters indicates that although the levels of some parameters are occasionally elevated compared to ANZECC guidelines, the impact on the downstream water quality in the Emu River is minimal.

The decant quality is currently similar to upstream and downstream water quality so any potential seeps or overflows are not expected to result in any significant impacts. The extra rainwater has the potential to improve the decant water quality to that already measured.

It is predicted that the project will not jeopardise the protected environmental values and uses of the downstream waters in accordance with the State Policy on Water Quality Management 1997.

4.2.4 Avoidance and Mitigation Measures

During the construction phase, the following avoidance measures are proposed.

- The area of disturbance and the surface water drainage from the TSF footprints during the construction phase will be controlled and managed.
- Temporary settlement basins and silt fencing will be used and final runoff will be directed to naturally vegetated gently sloping ground.
- Burn off areas will be at least 20 m from the class 4 surface water drainage line and from natural bush with silt fences.
- A reputable civil works contractor will be employed with properly trained operators and properly maintained equipment.
- Fuel will not be stored on site in any fixed location but will be transported, stored and dispensed in a mobile purpose built tanker with an expected capacity of approximately 1,000 L. The fuel tanker will be parked in a relatively secure area. The tanker will carry fuel cleanup equipment in case spills occur during refuelling.
- Any hydrocarbon contaminated soil will be removed immediately and taken to an appropriate authorised disposal or treatment facility.
- Oil absorbent mats will be located at the construction site for use on an emergency spill.

During operations, the following avoidance measures are proposed
- The tailings are currently classified as non acid forming and rather benign by nature. The tailings should be analysed every six months to identify if any changes to the geochemistry of the tailings is occurring that may jeopardise the current water management plan. 6 monthly monitoring is deemed appropriate to detect any significant geochemical changes due to the consistent nature and reliable geological knowledge of the ore mined.
- The current tailings decant water is basically non toxic. The existing TSF appear to be supporting healthy aquatic ecosystems. The tailings decant water should be analysed every six months to identify if any changes to the geochemistry of the tailings is occurring that may jeopardise the current water management plan. Six monthly is deemed appropriate given the buffer volumes of the tailings storage capacity.
- The TSF will be designed and the construction supervised by an appropriately qualified engineer to an appropriate engineering standard.
- The storage facility design will be assessed by the ACDC during the project assessment by the EPA Board. The tailings will consolidate following deposition and improve the impervious nature and integrity of the facility thus reducing the likelihood of any seeps to surface water.

4.2.5 Assessment of Effects

The outlined measures should ensure that potential aqueous emissions during construction and operations are properly controlled, monitored and managed and present a negligible risk to the environment.

Proposed Treatment Processes

No treatment processes for the water in the tailings storages are proposed. On settlement of the tailings, water will be decanted and reused in the processing plant, with any excess discharged to the existing discharge system as currently occurs.

Nature of the Discharge

Analysis of the existing tailings decant has been undertaken during June, July and August 2009. The analyses and findings are discussed in Section 3.2.7. The decant water is benign and presents a negligible risk of causing environmental nuisance or impacts to the existing situation.

Discharge Points to the Receiving Environment

There will be no new discharge points to the receiving environment. All decant discharge to the environment will be via the existing discharge points, in accordance with the requirements of the current mine site EPN 7409/1 of 19 December 2006.

Nature of Receiving Water

The results of the mine site surface water monitoring program are discussed in Section 3.2.6. The database indicates that the quality of the receiving waters is variable but primarily of good quality given the activities in the catchment.

The data analysis indicates very little difference between the upstream, discharge and downstream water qualities using pH and sulphate as key water quality indicators.
Contingency Measures

Contingency measures will be in accordance with the requirements of the current mine site EPN 7409/1 of 19 December 2006.

The following commitments extra to those already outlined will ensure that the risks to the environment are minimised.

Commitment 3: The area of disturbance will be controlled and surface water drainage diverted around the TSF footprints during the construction phases. Where possible, temporary sedimentation basins and silt fencing will be used and final runoff will be directed to the existing naturally vegetated gently sloping drainage lines.

Commitment 4: The TSF will be designed and the construction supervised by an appropriately qualified engineer to an appropriate engineering standard. A reputable civil works contractor will be commissioned with properly trained operators and properly maintained equipment.

Commitment 5: Fuel or hydrocarbons will not be stored on site in any fixed storage facility. Refuelling of equipment will be undertaken using a mobile purpose built tanker. The tanker will carry fuel cleanup equipment in case spills occur on site.

Commitment 6. Any hydrocarbon contaminated soil will be removed immediately and taken to an appropriate authorised disposal or treatment facility. The Director, Environment Protection Authority, will be notified immediately.

Commitment 7. The tailings and the clean tailings decant water will be analysed 6 monthly as prescribed in Table 8 in Section 5.

4.3 Groundwater

Groundwater exists in the project area at the headwaters of the three main drainage lines discussed in Section 3.2.4 and 3.2.7.

The groundwater appears to be uncontained for the shallower aquifers and recharge appears to be very local.

The excavations and construction for the TSF may alter the groundwater levels in the local project area but is not expected to alter the down gradient groundwater behaviour to any great extent.

The TSF construction should not interfere with any deeper contained aquifers.

4.3.1 Existing Conditions

The groundwater in the project area is basically at the ground surface during the winter monitoring period across most of the project area. There is no evidence of any karst system in the project area.

Monitoring of groundwater quality within the new TSF areas has been undertaken over a three month period from June to August 2009. The samples were taken from an excavated trench in the project area. The results of this program are discussed in Section 3.2.7.

The analytical results from this program indicate that the ANZECC guidelines trigger values for 95% protection of aquatic ecosystems are:

- Not exceeded by: EC, As, Cd, Mn, Ni.
• Exceeded by: Al, Cu, Pb, Zn, Total nitrogen.
• Marginal for: Cr and NO$_2$+NO$_3$/N.

The pH values (range 5.0 – 5.6) are less than the trigger values (range 6.5 – 7.5) but this is to be expected given the thick vegetation and organic acids from the vegetation and the low EC or buffering capacity of the natural water.

The groundwater recharge in the project is expected to be very local due to the location and topography and easily isolated from the TSF as for the existing TSF. The project will divert the unconfined near surface groundwater and will be isolated from deeper confined aquifers due to the impervious design of the facility and the impervious property of the impounded tailings.

The proposed TSF compacted clay construction materials is expected to have a permeability in the order of $10^{-8}$ m/s and the impermeable nature of the tailings (coefficient of permeability $k$ (two samples): $6.6 \times 10^{-7}$ m/s; $2.7 \times 10^{-7}$ m/s) will ensure minimal impact on the groundwater quality, in accordance with the State Policy on Water Quality Management 1997.

4.3.2 Performance Requirements
Groundwater emissions from TSF sites must comply with the following:

• *State Policy on Water Quality Management 1997.*
• *Environmental Management and Pollution Control Act 1994.*
• *Water Management Act 1999.*
• *Groundwater Act 1985.*

4.3.3 Potential Effects
The management measures used to protect surface waters from contamination will also protect groundwater.

The potential impacts on groundwater are similar to the potential impacts on surface water. If the quality of the decant water in the TSF was to alter adversely over time then seepage from the TSF to groundwater may impact on groundwater quality.

The project construction phases have the potential to alter the local groundwater levels in the area further to variations that occur over the seasons each year.

4.3.4 Avoidance and Mitigation Measures
The following mitigation measures will be utilised during construction to minimise the potential impacts on groundwater in the area extra to those already outlined for air emissions and liquid waste/surface water:

• Groundwater will be intercepted during construction. The diversion and disposal of groundwater will to be controlled and managed by the contractor using standard sedimentation ponds, silt fencing and dissipation drains into natural sloping vegetation to minimise potential impact to downstream surface waters.
• The storage facility design will be assessed by the ACDC during the project assessment by the EPA Board. The tailings will consolidate following deposition and improve the impervious nature and integrity of the facility thus reducing the likelihood of any seeps to groundwater.
- A down gradient groundwater monitoring borehole will be installed to monitor groundwater level and quality. The proposed location will be down gradient and outside the footprints of Stage 2 and Stage 3 so that the borehole can be reference for the next 20+ years. Refer to Figure 9 below for approximate location of the proposed groundwater monitoring borehole.

- The monitoring will be undertaken every 6 months and include pH, EC, REDOX, sulphate and the routine heavy metal suite of analytes.

![Figure 9. Approximate location of the down gradient groundwater borehole](image)

### 4.3.5 Assessment of Effects

Potential impacts on groundwater levels may occur mainly during the construction phases. It is expected that groundwater levels will stabilise to normal around the TSF once constructed.

If groundwater is encountered during construction, the proposed management, disposal and monitoring extra to the existing mine site water monitoring will identify any impacts for management to make appropriate changes as required.

The isolation of approximately 46 ha of recharge area for the groundwater catchment will change the local recharge volumes into the catchment class 4 drainage line. The area is located at the head of the catchment and is small compared to the estimated 400 ha class 4 drainage line catchment downstream of the proposed new TSF.

The following commitments extra to those already outlined under the potential air and surface water emissions and management will ensure that the risks to the groundwater environment are minimised.

**Commitment 8:** Groundwater encountered during construction will be disposed of similar to the surface water using sedimentation ponds, silt fencing and dissipation drains to minimise potential impact to downstream surface waters.
Commitment 9: A down gradient groundwater monitoring borehole will be installed in the approximate location shown in Figure 9 of section 4.3.4 to monitor groundwater level and quality. The groundwater monitoring will be undertaken as prescribed in Table 8 in Section 5.

4.4 **Noise Emissions**

Noise emissions will be associated with the TSF construction phases. The noise will relate to earthmoving construction equipment.

There will be no noise emissions extra to those that already exist during the operating phase following construction.

4.4.1 **Existing Conditions**

The site is subject to variable ambient noise levels associated with an operating mine and processing plant. The area is also subject to noise emissions from forestry activities and forestry and mine transport activities on Kara Road.

Background woodchip noise emissions are apparent at the site.

The existing conditions can be summarised as follows:

- Ambient noise levels will not be altered by the operations following construction of the proposed new tailings storage facility.
- Ambient noise levels will be increased during the construction phase as a result of the operation of machinery and vehicles.
- Construction of the new TSF will be undertaken during all available daylight hours to ensure the facility is built during optimum weather conditions.
- As there are no nearby residences or sensitive land users, no other specific measures are required to mitigate these temporary increases in ambient noise levels (nearest residence approximately 5 km away).
- It is not considered that these elevated ambient noise levels will have any adverse impacts on terrestrial, marine and freshwater wildlife.
- There will be no impact on livestock - there are no livestock within the vicinity of the proposed new tailings storage facility construction.

Vegetation growth is relatively thick and diverse over the project area. This will assist with any local noise mitigation.

4.4.2 **Performance Requirements**

Air emissions from TSF sites must comply with the following:

- The construction phase on the mine site may reference the Quarry Code of Practice.

4.4.3 **Potential Effects**

The construction phase has the potential to generate noise emissions from heavy earthmoving equipment. There will be no noise generating activities from the new TSF once it is commissioned.
Noise emissions have the potential to cause a nuisance to neighbouring residences. Exposure to high noise emissions can affect human health.

Using a typical engine power of up to 162 kW for the largest earthmoving equipment, a sound power level emission of approximately 105 dB(A) can be expected. A large front end loader or bulldozer of similar power will have a similar sound power level.

Other mobile equipment or a truck can be expected to have a sound pressure level at 1 m distance to be 93 dB(A), which equates to a sound power level of 101 dB(A).

The combined sound power of both emissions operating simultaneously will be the logarithmic addition of 105 and 101 dB(A), which is 106.5 dB(A).

Assuming half-spherical sound propagation from this source over flat ground, the drop in sound pressure levels with distance from the source can be calculated.

The resultant the drop off in sound pressure levels at various distances from the construction equipment source (assuming no screening effects from intervening topography or vegetation) are shown in Table 7.

<table>
<thead>
<tr>
<th>Distance from noise source (m)</th>
<th>Sound pressure level (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5</td>
<td>81.0</td>
</tr>
<tr>
<td>100</td>
<td>58.5</td>
</tr>
<tr>
<td>200</td>
<td>52.5</td>
</tr>
<tr>
<td>300</td>
<td>49.0</td>
</tr>
<tr>
<td>335</td>
<td>48.0</td>
</tr>
<tr>
<td>400</td>
<td>46.5</td>
</tr>
<tr>
<td>475</td>
<td>45.0</td>
</tr>
<tr>
<td>500</td>
<td>44.5</td>
</tr>
<tr>
<td>600</td>
<td>43.5</td>
</tr>
<tr>
<td>700</td>
<td>41.6</td>
</tr>
<tr>
<td>800</td>
<td>40.5</td>
</tr>
<tr>
<td>900</td>
<td>39.4</td>
</tr>
<tr>
<td>1000</td>
<td>38.5</td>
</tr>
</tbody>
</table>

Table 7: Sound Pressure Levels versus Distance from Source

Under schedule 2 of the Environmental Management and Pollution Control (Miscellaneous Noise) Regulations 2004, noise from equipment such as front end loaders must not exceed between 83 and 92 dB(A) (depending on engine power) 7.5 m away. As shown in Table 7, this requirement will be met even with the combined noise from the two nominal sources.

Under regulation 4 of the same Regulations, unless otherwise approved by the Director, Environment Protection Authority, noise from the equipment must not exceed 45 dB(A) at domestic premises outside the 0700-1800 hours Monday-Friday, 0800-1800 hours Saturday and 1000-1800 hours on public holidays.

Table 7 shows that construction activities within the regulation 4 requirement will be readily achievable as the construction activities are greater than 475 m from the nearest domestic premises. In fact, the necessary separation distance will be less than this due to noise screening by topography and vegetation.

The 475 m separation distance will be achieved for the construction plan, meaning that there would be no need for restrictions on construction hours due to noise emissions.
4.4.4 Avoidance and Mitigation Measures

No noise mitigation measures are considered necessary.

4.4.5 Assessment of Effects

Noise from equipment will meet the requirements of the Environmental Management and Pollution Control (Miscellaneous Noise) Regulations 2004.

Ambient noise will meet the requirements of the Quarry Code of Practice and will not cause an environmental nuisance under the Environmental Management and Pollution Control Act 1994.

4.5 Solid and Controlled Waste Management

The proposed development will not produce any solid and/or controlled wastes and no process waste will be produced.

The proposal involves the storage of a solid waste (tailings). The tailings are not classified as a controlled waste as interpreted under the Schedule A of the National Environment Protection (Movement of Controlled Waste between States and Territories) Measure as varied December 2004.

During construction of the new TSF, contractors may produce some general solid wastes such as papers, plastics, food materials and empty bottles. Fuel and oil contaminated wastes from routine minor machinery maintenance will be managed by the contractors.

4.5.1 Existing Conditions

The existing TSFs have been operating successfully in the area for approximately 12 years. No impacts to the surrounding environment have been measured or observed.

The new TSF will be constructed in 3 stages over approximately the next 10 years. Currently tailings are stored in the existing TSF and the operation does not produce any solid wastes or require any processing that may produce any other wastes.

The new TSF will have the same mode of operation as for the existing TSF. Basically, the operation involves the pumping of a tailings slurry to the TSF where the solids settle and separate from the liquid and the clear liquid overflows to the existing clean decant water reuse management system.

The new TSF construction will secure the environmentally responsible storage of tailings over the next 24 years.

The 46 ha footprint currently has a variety of vegetation types with some areas of thick wet forest. Some old access tracks exist in the area. The clearing will be undertaken with Forestry Tasmania approval and in accordance with an (uncertified).

No other wastes are currently stored on site and the facility will be used only for their sole intended tailings storage purpose.

**Tailings Solids**

Approximately 175,000 t or 120,000 m$^3$ of dry tailings are currently deposited in the existing TSF per year.

A full sieve sizing analysis of the total tailings (sludge solids) that are currently being pumped into the existing tailings storage facility at Tasmania Mines Kara Mine was undertaken by the TML contract metallurgist using a Ro-Tap Machine in June 2009.
The results of this analysis, contained in Appendix J (J1), are summarised below:

- No suspended solids were detected under the current sizing distributions.
- 6.2% by weight of the solids was less than 45 micron size.
- 88.7% was greater than 53 microns.
- The majority of the tailings solids by weight (77.8%) was in the 53 - 150 micron range.

The following laboratory analyses were undertaken by pitt&sherry: Permeability, Dry Density, Soil Particle Density and Wet Cylinder Settled Density.

Details of these determinations are summarised below and the full report included in Appendix J (J1)

- Coefficient of permeability \( k \) (two samples): \( 6.6 \times 10^{-7} \) m/s; \( 2.7 \times 10^{-7} \) m/s
- Dry Density: Minimum: 1.53 t/m\(^3\); Maximum: 2.08 t/m\(^3\)
- Soil Particle Density: 3.610 g/cm\(^3\)
- Wet Cylinder Settled Density, condition at 7 days:
  - Wet density: 1,980 kg/m\(^3\)
  - Moisture content of settled sludge: 45.8%
  - Dry density: 1360 kg/m\(^3\).

The nature and properties of the tailings are not expected to change over time.

**Acid Rock Drainage**

Analysis of the tailings has been undertaken to determine their capacity to produce acid drainage and the likely nature of any leachate from the tailings.

The analytical results, which are included in Appendix J (J2), indicate that:

- The tailings are non acid forming (AMIRA International ARD test handbook, May 2002)
- Acid rock drainage will not, therefore, be produced by the tailings stored in the new TSF
- The tailings have some acid neutralising capacity.

Any tailings leachate produced under similar conditions to the TCLP test is unlikely to represent any significant risk of causing environmental nuisance or harm.

### 4.5.2 Performance Requirements

Solid and controlled waste from TSF sites must comply with the following:

- Tasmanian *Environmental Management and Pollution Control Act 1994* - Environmental nuisance or harm provisions
- *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure as varied December 2004*
- Tasmanian *Environmental Management and Pollution Control (Waste Management) Regulations 2000*
- Tasmanian *Quarry Code of Practice 1999*. 
4.5.3 Potential Effects
Waste material can cause environmental nuisance or harm if it is not contained and disposed of appropriately.

4.5.4 Avoidance and Mitigation Measures
The following mitigation measures extra to those already identified will be utilised to minimise the risk from solid and controlled waste handling during construction:

- During construction of the new TSF, solid refuse will be stored on the project area by contractors in a lidded skip bin or similar and regularly taken to a waste transfer station for disposal.
- Portaloos used during construction of the TSF will be managed and routinely emptied by the selected civil contractor.
- Any soil contaminated by hydrocarbons during construction will be managed by the contractor and removed and taken to an appropriate disposal or treatment facility by an authorised transporter. This is already a commitment under Commitment 5 in Section 4.2.5.
- The facility will be used only for the storage of process tailings.

No solid waste measures are required during the operational phase.

4.5.5 Assessment of Effects
Only minimal amounts of waste will be produced during construction, and all this will be taken offsite for appropriate disposal. There will therefore be no residual effects.

The following commitment extra to those already outlined will ensure the risks to the environment are minimised.

Commitment 10: Refuse will be stored on site in a covered bin and periodically taken to a waste transfer station for disposal.

Commitment 11: The facility will be used only for the storage of process tailings.

4.6 Dangerous Goods
Neither fuels or oils, nor any other dangerous good, will be stored in bulk on site in any permanent facility.

Fuel and oil will be brought onto the site as required in a mobile tanker for the construction activities only. No fuel will be required in the project area once the TSF has been commissioned and is operational.

The tanker is expected to have a capacity of approximately 1,000 L and will be parked away from the class 4 drainage line in a secure area for refuelling activity.

Refuelling and minor maintenance (e.g. lubrication) of equipment will be undertaken on site in a secure area but major repairs will only occur off-site.

4.6.1 Existing Conditions
There has been no previous known use of dangerous goods on the project area.
4.6.2 Performance Requirements

- *Environmental Management and Pollution Control Act 1994* - Environmental nuisance or harm provisions
- *Environmental Management and Pollution Control (Waste Management) Regulations 2000*
- *Dangerous Substances (Safe Handling) Act 2005* - storage of fuels

4.6.3 Potential Effects

- Fuel storage can be an explosion risk
- Fuels and oils can cause environmental nuisance or harm if they are spilled and contaminate either land or water.

4.6.4 Avoidance and Mitigation Measures

- The fuel storage and transport requirements of the *Dangerous Substances (Safe Handling) Act 2005* will be met
- The fuel tanker will satisfy appropriate construction standards. The fuel tanker will have a bund with 110% capacity of the fuel tank
- The tanker will carry fuel cleanup equipment in case fuel spills occur during refuelling
- Refuelling and lubrication will be undertaken within the excavation area, and away from any freestanding water
- Oil spill absorption materials will be used immediately for cleanup if there is a spill
- If there is any residual contaminated sand evident after a spill and clean up, it will be excavated immediately and taken for disposal or treatment at an appropriately licensed facility.

4.6.5 Assessment of Effects

There is only very limited potential for a spill of fuel or oil, and it will be cleaned up immediately using dedicated equipment.

Any remaining contaminated sand will be excavated and taken offsite for appropriately authorised disposal. The residual effects are therefore negligible.

The following commitment extra to those already outlined will ensure that the risks to the environment are minimised.

**Commitment 12:** Fuel storage and transport will comply with the requirements of *Dangerous Substances (Safe Handling) Act 2005*.

4.7 Biodiversity and Nature Conservation Values

The new TSF will generally be constructed in stages on a 46 ha area as outlined in Figure 3 in Section 2.3. The vegetation is diverse with some dense wet forest.

4.7.1 Existing Conditions

There are no threatened vegetation mapping units present in the study area and a survey of the site by Forestry Tasmania has shown that there is little or no utilizable timber within the proposed new TSF site.
No environmentally relevant activities appear to have been undertaken on the area of the proposed development.

No symptoms of *Phytophthora cinnamomi* were recorded in the study area.

### 4.7.2 Performance Requirements

*Threatened Species Protection Act 1995*
*Environment Protection and Biodiversity Conservation Act 1999*
*Forest Practices Act 1985*
*Forest Practices Code 2000*
*Forest Practices Plan*
*Crown Lands Act 1976*
*Weed Management Act 1999.*

### 4.7.3 Potential Effects

The development of the new TSF will result in the clearance of the vegetation communities and permanent loss of some habitat within the 46 ha area.

However, the impact is not considered to be significant as the habitat types are common and extensive in the bioregion, with no known specialist or rare animal niches present.

There will be no impact on flora of national or state significance as no species listed by either the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* or the *Tasmanian Threatened Species Protection Act 1995* were recorded in the study area or thought likely to occur.

The areas of rainforest adjacent to the project area will be susceptible to increased myrtle wilt following disturbance caused by the TSF construction. However, the uninfected forest as a whole will not be threatened as myrtle wilt is natural and the rates of infection fall dramatically away from the source of disturbance.

Impact to threatened fauna habitat is considered minimal although there is potential for the site to contain habitat for the following threatened species: spotted tailed quoll, Tasmanian devil, grey goshawk, masked owl, hydrobiid snail and giant freshwater crayfish.

There is also potential to impact the downstream water quality for the Australian grayling, hydrobiid snail and giant freshwater crayfish in the event of a TSF failure. The potential for impact on wedge-tailed eagle nests is low due to the exposed nature of the site.

During and after the proposed works, disturbed areas will be susceptible to weed regeneration and potential future weed invasion.

### 4.7.4 Avoidance and Mitigation Measures

A botanical survey and faunal habitat assessment of the new TSF site was undertaken by North Barker Ecosystem Services in December 2008.

The findings and recommendations of this thorough survey has minimised the risk of the destruction of any valued vegetation and any valued habitat.

No specific management measures are required as no threatened species were recorded from the site.
Prior to the removal of vegetation, approval will be requested from Forestry Tasmania to clear the area in accordance with the (uncertified) Forest Practices Plan (FPP).

The FPP was developed to reflect the requirements of the *Forest Practices Act 1985*. Subsequent changes to the applicable regulations mean that the FPP no longer receives certification from the FPA.

Two declared weeds, *Cytisus scoparius* (english broom) and *Ulex europaeus* (gorse), were recorded near the new TSF project area. The following management measures will be undertaken:

- The declared weeds will be controlled and treated in accordance with the requirements of their Draft Management Plans under the *Weed Management Act 1999*.
- The project area will be monitored for weed regeneration during and after the proposed works as disturbed areas will be susceptible to future weed invasion.
- Machinery will be washed down prior to leaving the new TSF construction site if heading to another offsite premises, as per standard soil hygiene practices, in order to minimise the risk of transferring weed seed to other areas off the mine site.
- Vehicle washing will be undertaken using a pump truck in a secure area. The area will be selected to ensure wash water is contained in a secure area for easy future treatment if required.

In order to reduce any potential increase in the occurrence of myrtle wilt in the area, trees will be felled away from the vegetation that is to be retained.

This will reduce the potential for damage to trees that are to be retained and hence reduce the potential for development of myrtle wilt.

4.7.5 **Assessment of Effects**

The biodiversity and nature conservation values of the area to be disturbed have been surveyed and assessed. The risk of destroying valued vegetation and any valued habitat are negligible.

The project risk to the surrounding vegetation and habitat has also been identified and mitigation measured identified to reduce any risks to that surrounding environment.

The following commitment extra to those already outlined will ensure that the risks to the environment are minimised.

**Commitment 13:** All machinery and vehicles undertaking the TSF construction activity in the designated area will be cleaned prior to leaving the Mining Lease for work at other premises.

**Commitment 14:** Any areas that become infected with *Phytophthora cinnamomi* will be managed in accordance with DPIPIW ‘Interim Phytophthora cinnamomi Management Guidelines’.

**Commitment 15:** All trees will be felled such that the felled trees fall away from the retained trees into existing cleared areas and are removed from the site.

4.8 **Marine and Coastal**

Construction and operation of the proposed new tailings storage facility will not have any impact on marine and coastal areas.
4.9 Greenhouse Gases and Ozone Depleting Substances

Greenhouse gases will be generated during the construction of the new TSF as a result of:

- Vehicle and construction machinery emissions.
- Production of carbon dioxide from the burn off of the cleared vegetation.

Operation of the new TSF will not involve the generation of any additional greenhouse gas emissions above those that are already exist.

The tailings will be pumped by rising main to the TSF and it is planned that the clean tailings decant water will be gravity fed back to the mill (subject to TSF levels).

No ozone depleting substances will be used.

4.9.1 Existing Conditions

The tailings are currently pumped by rising main from the mill to the TSF. This will continue under the proposed new TSF project.

It is planned that the clean tailings decant from the TSF will continue to be gravity fed back to the mill subject to final TSF levels.

There will be no truck transportation or diesel powered pumping of the tailings that would increase the greenhouse gas emissions from the project area.

There will be no permanent equipment, chemicals or machinery on the TSF site during operations to produce greenhouse gas or ozone emissions.

4.9.2 Performance Requirements


4.9.3 Potential Effects

The development of the new TSF will result in the clearance and burning of uncommercial timber windrowed from the site clearance.

The construction vehicles and equipment will emit exhaust fumes.

4.9.4 Avoidance and Mitigation Measures

Excavation areas around the TSF will be actively regenerated, thereby quickly establishing a carbon sink.

The existing mine site rehabilitation plan involves the revegetation of mine site areas which will offset the project carbon emissions.

The contractor will be required to use machinery and vehicles which are well maintained so as to minimise the generation of greenhouse gases.

The existing low onsite greenhouse gas emission tailings delivery process will continue to be used. The existing gravity clean tailings decant return to the mill will continue to be used where possible.

It is planned to construct the new TSF solely from onsite clay and rock resources, minimising the need for extraction and transport of offsite material to the project area.
4.9.5 **Assessment of Effects**

The carbon sink effects of the mine will be maximised by ongoing site rehabilitation and greenhouse gas generation minimised.

The location and mode of operation of the existing tailings storage system will be used for the new TSF. The energy usage by locating the TSF close to the mill and adjacent to the existing system minimizes energy requirements.

Utilising onsite resources to the maximum extent will minimize the transport of materials from offsite and therefore greenhouse gas emissions.

No further reduction of greenhouse emissions for the project is deemed possible.

4.9.6 **Estimate of Greenhouse Gas Emissions**

The additional emissions associated with construction of the new TSF are small and will have very little net impact on state and national greenhouse emissions over the lifetime of the proposed new TSF.

4.9.7 **Implementing Greenhouse Best Practice**

The location of the new TSF will provide a greenhouse benefit as it will allow for gravity feed of decanted water back to the plant. No pumping will be required to reuse this water in the mill.

4.9.8 **Ozone Depleting Substances**

Construction and operation of the new TSF will not involve the generation or use of any ozone depleting substances.

4.10 **Heritage**

4.10.1 **General**

The potential effects of the project on Aboriginal heritage and non-Aboriginal heritage sites and areas are assessed below.

No places or sites exist in the project area that are listed on National Heritage List, Register of National Estate, Tasmanian Heritage Register and Tasmanian Historic Places Inventory.

4.10.2 **Aboriginal Cultural Heritage**

Aboriginal people are known to have lived in the region. All registered and unregistered Tasmanian Aboriginal sites are protected by the State *Aboriginal Relics Act 1975* and the Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.

**Existing Conditions**

The 46 ha project area is well vegetated with diverse vegetation. A few old tracks surround and traverse parts of the area. No environmentally relevant activities have been undertaken of the project area.

**Performance Requirements**

- *Aboriginal Relics Act 1975*.
- Commonwealth *Aboriginal and Torres Strait Islander Heritage Protection Act 1984*.
Potential Effects

The 46 ha project area will be cleared in stages over approximately 10 years. The project clearance has the potential to inadvertently destroy or damaged any Aboriginal heritage that may exist in the project area.

Avoidance and Mitigation Measures

- An Aboriginal heritage survey was undertaken by Cultural Heritage Management Australia in February 2009. Consultation was undertaken with the Aboriginal community.
- As the study area has been assessed as being of low archaeological sensitivity, no impacts on Aboriginal cultural heritage values are anticipated.
- The Aboriginal Relics Act 1975 will be adhered to, in particular Section 14 (1), which states in part:

  ‘Except as otherwise provided in this Act, no person shall, otherwise than in accordance with the terms of a permit granted by the Minister on the recommendation of the Director -

  Destroy, damage, deface, conceal, or otherwise interfere with a relic’.

- In the event that any Aboriginal artefacts are discovered during the land clearance, all work will stop immediately in that area and the Tasmanian Aboriginal Land Council and the Manager of the Aboriginal Heritage Section at the Department of Primary Industries, Parks, Water and Environment will be contacted to assess the situation.

Assessment of Effects

There are no site specific archaeological requirements or impediments to the construction of the proposed tailings storage facility.

As the study area has been assessed as being of low archaeological sensitivity, there are no further requirements for implementing a sub-surface test program within the study area.

Although no specific management measures are required, all Aboriginal sites are non-renewable and have high cultural significance for today’s Aboriginal community as they reinforce Aboriginal connections with the land.

The following commitment will ensure that the risks of damaging or destroying Aboriginal heritage are minimised.

Commitment 16: In the event that any unknown Aboriginal artefacts are discovered during the project area clearance and TSF construction, all work will stop immediately in that area and the Tasmanian Aboriginal Land Council and the Manager of the Aboriginal Heritage Section at the Department of Primary Industries, Parks, Water and Environment will be contacted to assess the situation.

4.10.3 Historic Heritage

The project must comply with the Historic Cultural Heritage Act 1995.

Construction of the proposed tailings storage facility will not have any impact on any listed heritage properties and/or values.
4.11 Land Use and Development

Land use in the area, outside the existing mine site, is currently primarily forestry activities.

The proposal will have no detrimental effects on potential land use in the area.

4.11.1 Existing Conditions

The new tailings storage facility will be located on State Forest managed by Forestry Tasmania. The land adjacent to the proposed new TSF area is owned by Associated Forest Holdings Proprietary Limited.

The property identification and ownership details are outlined in the Land Information System of Tasmania (List) map contained in Appendix E (E1).

The land capability has very low potential for viable agricultural production. Forestry Tasmania may require the reinstatement of forestry vegetation in specific areas of the Mining Lease at mine closure.

A survey by Forestry Tasmania has shown that there is little utilizable timber within the proposed tailings storage facility site.

In the longer term, rehabilitation of the new TSF following closure of the mine is expected to result in the development of water covering of the storage facility and the potential improved aquatic fauna and amenities on the site.

Some public and club bushwalking currently occurs, with the support of the mine management, from a car park adjacent to the mine site to St Valentines Peak.

The project will not interfere with the current and future bushwalking to St Valentines Peak.

4.11.2 Performance Requirements

City of Burnie Planning Scheme 1989.

4.11.3 Potential Effects

The project could conflict with other land use and developments.

4.11.4 Avoidance and Mitigation Measures

Apart from forestry and walking on St Valentines Peak, no other activities exist in the area.

No mitigation measures are necessary.

4.11.5 Assessment of Effects

The mining and mineral processing activities, forestry and walking activities already exist in the area.

No changes will result from the proposed tailings storage extensions. No actions or commitments are necessary.
4.12 Visual Effects

**Existing Conditions**

The walking tracks on the northern side of St Valentines Peak, to the south of the mine site, are the only possible areas from where the current mining activities and the proposed new TSF may be visible.

Construction of the proposed TSF will result in a slight increase in the area of visual impact from this location. However, it is expected to have little, if any, visual impact from any other areas around the mine site.

**Potential Effects**

Development of the new TSF has the potential to cause a visual impact on neighbouring residents and alternative local land use activities.

**Avoidance and Mitigation Measures**

An examination of the area around the proposed development could not identify any land use conflict or potential visual impact from public roads or land in other ownership.

It is expected that each TSF will look like a small lake containing wildlife and wildlife habitat following their individual closure when viewed from the St Valentines Peak tracks.

**Management Measures**

None are required.

4.13 Socio-Economic Issues

The project is expected to provide significant economic and social benefits at the local, regional and State levels. It is anticipated that it will secure the jobs of the existing workforce of approximately 40 people for the next 10 to 20 years.

The construction of the TSF will facilitate any potential future expansion in operations and the resultant labour and expenditure flow on benefits.

Construction of the tailings storage facility, which will cost approximately $2M, is likely to go to a local construction contractor, providing further social and economic benefits for the local community.

The location and construction of the new TSF will be consistent with the existing mine closure strategy and plan and minimise the rehabilitation footprint and maximise future potential fauna habitat and human amenity in the area.

The proposal should have no effect on land value in the area or recreational use in the surrounding region. There appear to be no economic or social downsides to the project.

4.14 Health and Safety Issues

Safety management systems consistent with the requirements of the current operations, the requirements of Workplace Standards Tasmania Environment and the Environment Protection Notice (EPN) 7409/1 of 19 December 2006 will be applied during the construction and operation of the new TSF.
The EPN also requires that all operations, maintenance and inspection health and safety issues on the mine site are compliant with the Workplace Health and Safety Act 1995 and the Workplace Health and Safety Regulations 1998.

Existing security arrangements to prevent unauthorised access to the site of the mining and processing operations will be extended to cover the new TSF.

As indicated in Section 4.2, no scheduled emissions of liquid waste are proposed from the TSF.

However should an emergency discharge of clean tailings decant occur to natural drainage lines that report to the Emu River, the discharge of this excess decant water is not expected to have any detrimental impact on downstream water quality, users or present any risk to human health.

The nearest known residential properties, which are approximately 5 km to the north west of the proposed new TSF sites, are considered extremely unlikely to be affected by any construction activity. They will not be impacted by the operation of the new TSF.

The temporary increase in traffic on Upper Natone Road (public road) and Kara Road (Forestry road) during the construction phase is not expected to increase the risk to residences above and beyond that which already exists and which already exists from other construction activities at the site. Refer to Section 2.4.

4.15 Hazard Analysis and Risk Assessment

4.15.1 Hazard Analysis

The only major hazard event identified is a major failure of a new TSF wall. The ACDC risk rating is expected to be ‘low’.

4.15.2 Risk Assessment

The likelihood of a major failure of a new TSF wall is considered to be extremely low because:

- Geotechnical investigation of the site has demonstrated that the site is geologically and geo-technically sound.
- Construction of the proposed TSF will be compliant with ANCOLD design and management guidelines.
- The constructed TSF will be inspected regularly, consistent with ANCOLD requirements.
- The site will be removed from all high risk site locations and facilities, including the mining operations.
- The storage facility design will be assessed by the ACDC and is expected to be assessed as low risk rating.
- There are no historic or current underground workings in the area.

The hazard assessment and the low hazard rating information are contained in the K Moore and Associates report contained in Appendix C.
4.16 Fire Risk

The potential fire risk associated with this proposal is considered to be very low for the following reasons:

- All combustible material will be cleared from the site in order to establish the new TSF.
- There is no likelihood of fire generation within the new TSF because of the slurry nature of the materials being stored.
- Wildfire originating outside the new TSF sites is unlikely to have any impact on the new TSF because of the earthen nature of the TSF walls.
- As the site is surrounded by plantations (Associated Forest Holdings) and forest (Forestry Tasmania) it is subject to the scrutiny of their fire watch service during fire danger periods.
- The availability of water and earthmoving equipment on site, and volunteer fire brigades at Ridgley and Natone, 20 and 25 km to the north respectively will enable a rapid and effective response in the event of fire.

4.17 Infrastructure and Off-Site Ancillary Facilities

Construction and operation of the new TSF will not result in any potential effects on off-site infrastructure or facilities.

All construction activity and operation of the new tailings storage facility will be carried out within the Mining Lease and will not involve any utilisation of external infrastructure such as roads.

4.18 Environmental Management Systems

Operation of the new tailings facility will be part of the existing mine environmental management systems, which have been developed and operated in accordance with the requirements of the current mine site EPN 7409/1 of 19 December 2006.

4.19 Cumulative and Interactive Effects

The proposal does not appear to have any significant cumulative or interactive effects.

4.20 Traffic Impacts

The temporary increase in traffic on Upper Natone Road (public road) and Kara Road (Forestry road) during the construction phase is not expected to increase the risk to residences and other road users above and beyond that which already exists and which already exists for other construction activities at the mine site. Refer to section 2.4.
5. Monitoring and Review

The current program of surface water monitoring will be continued, in accordance with the requirements of the current mine site EPN 7409/1 of 19 December 2006, issued for the current operations.

A monitoring regime will be implemented for the new TSF as outline in Table 8 below, extra to the EPN requirements.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Tailings</th>
<th>Decant water</th>
<th>Groundwater</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td></td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>pH</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>EC</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>Dissolved solids</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>Y</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulphate</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>Heavy metals</td>
<td>Y</td>
<td></td>
<td>Y</td>
<td>6 monthly</td>
</tr>
<tr>
<td>APP</td>
<td></td>
<td></td>
<td></td>
<td>6 monthly</td>
</tr>
<tr>
<td>NAPP</td>
<td>Y</td>
<td></td>
<td></td>
<td>6 monthly</td>
</tr>
<tr>
<td>NAG</td>
<td>Y</td>
<td></td>
<td></td>
<td>6 monthly</td>
</tr>
<tr>
<td>ANC</td>
<td>Y</td>
<td></td>
<td></td>
<td>6 monthly</td>
</tr>
<tr>
<td>T/Sulphur</td>
<td></td>
<td></td>
<td></td>
<td>6 monthly</td>
</tr>
</tbody>
</table>

Table 8. New TSF Monitoring Regime

Y = to be analysed.

6. Decommissioning and Rehabilitation

Site decommissioning and rehabilitation will be undertaken in accordance with the existing Kara Mine Closure Plan (2008) that has been submitted to DPIPWE.
### 7. Commitments

<table>
<thead>
<tr>
<th>No.</th>
<th>Commitment</th>
<th>When</th>
<th>Responsible</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dust impacts will be minimised by road tanker watering as required in the first instance and by the suspension of construction activities in extreme weather conditions</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.1</td>
</tr>
<tr>
<td>2</td>
<td>Vegetation burn off smoke impacts will be minimised by qualified people undertaking the burn offs at appropriate times and in consultation with Forestry Tasmania</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.1</td>
</tr>
<tr>
<td></td>
<td><strong>Liquid waste/surface water</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Surface water on and around the TSF footprints during the construction phases will be controlled and where possible; temporary sedimentation basins and silt fencing will be used before discharge to the existing naturally vegetated drainage lines</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.2</td>
</tr>
<tr>
<td>4</td>
<td>TSF will be designed and the construction supervised by an appropriately qualified engineer to an appropriate engineering standard. A reputable civil works contractor will be commissioned with properly trained operators and properly maintained equipment</td>
<td>During construction</td>
<td>Mine manager</td>
<td>4.2</td>
</tr>
<tr>
<td>5</td>
<td>Fuel or hydrocarbons will not be stored on site in any fixed storage facility. Refuelling of equipment will be undertaken using a mobile purpose built tanker. The tanker will carry fuel cleanup equipment in case spills occur on site</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.2</td>
</tr>
<tr>
<td>6</td>
<td>Any hydrocarbon contaminated soil will be removed immediately and taken to an appropriate authorised disposal or treatment facility. The Director, Environment Protection Authority, will be notified immediately</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.2</td>
</tr>
<tr>
<td>7</td>
<td>The tailings and the clean tailings decant water will be analysed 6 monthly as prescribed in Table 8 in Section 5</td>
<td>Ongoing</td>
<td>Mine manager</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td><strong>Groundwater</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Groundwater encountered during construction will be disposed of similarly to the surface water, using sedimentation ponds and dissipation drains to minimise potential impact on downstream surface waters</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.3</td>
</tr>
<tr>
<td>9</td>
<td>A down gradient groundwater monitoring borehole will be installed in the approximate location shown in Figure 9 of section 4.3.4 to monitor groundwater level and quality. Groundwater monitoring will be undertaken every 6 months as prescribed in Table 8 in Section 5</td>
<td>Ongoing</td>
<td>Mine manager</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td><strong>Solid and controlled waste management</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Refuse will be stored on site in a covered bin and periodically taken to a waste transfer station for disposal</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.5</td>
</tr>
<tr>
<td>No.</td>
<td>Commitment</td>
<td>When</td>
<td>Responsible</td>
<td>Section</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------</td>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>11</td>
<td>The new tailings storage facility will be used only for the storage of process tailings</td>
<td>Ongoing</td>
<td>Mine manager</td>
<td>4.5</td>
</tr>
<tr>
<td>12</td>
<td>Fuel storage and transport will comply with the requirements of the Dangerous Substances (Safe Handling) Act 2005</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.6</td>
</tr>
<tr>
<td>13</td>
<td>All machinery undertaking the TSF construction activity in the designated area will be cleaned prior to leaving the Mining Lease for work at other premises.</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.7</td>
</tr>
<tr>
<td>14</td>
<td>Any areas that become infected with Phytophthora cinnamomi will be managed in accordance with DPIPWE ‘Interim Phytophthora cinnamomi Management Guidelines’</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.7</td>
</tr>
<tr>
<td>15</td>
<td>All trees will be felled such that the felled trees fall away from the retained trees into existing cleared areas and are removed from the site</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.7</td>
</tr>
<tr>
<td>16</td>
<td>In the event that any unknown Aboriginal artefacts are discovered during the project area clearance and TSF construction, all work will stop immediately in that area and the Tasmanian Aboriginal Land Council and the Manager of the Aboriginal Heritage Section at the Department of Primary Industries, Parks, Water and Environment will be contacted to assess the situation</td>
<td>During construction</td>
<td>Relevant contractor</td>
<td>4.10</td>
</tr>
</tbody>
</table>
8. Conclusion

8.1 Positive Environmental Effects

- Ongoing control of tailings management
- Ongoing mitigation of an environmental risk
- Maintain recycle to mill
- Minimise water usage
- Permanent aquatic habitat and water fowl habitat.

8.2 Negative Environmental Effects

- Clearing of vegetation
- Permanent loss of vegetation.

8.3 Summary

- The Development Proposal and Environmental Management Plan (DPEMP) has been developed in accordance with the EPA Division’s generic DPEMP guidelines and the site specific guidelines from the Board of the Tasmanian Environment Protection Authority issued on 6 February 2009, entitled Development Proposal and Environmental Management Plan Project Specific Guidelines for Tasmania Mines Ltd, Tailings Storage Facility (TSF), Kara Mine.

- The Development Proposal and Environmental Management Plan has identified and assessed the potential impacts associated with the proposed project.

- The specific commitments contained in the Development Proposal and Environmental Management Plan demonstrate that appropriate operational and management measures will be in place to minimise any potential impacts and to minimise any risks to the environment and human health.

- The Development Proposal and Environmental Management Plan demonstrates that the proposal will be compliant with Tasmanian Policies, legislation and Regulations.

- The community will benefit from the socioeconomic advantages associated with the project.
APPENDIX A

(Uncertified) Forest Practices Plan
APPENDIX B

Mining Leases
APPENDIX C

K Moore and Associates Report
APPENDIX D

Indicative Project Layout and Areas
APPENDIX E

Land Information System Tasmania Maps
APPENDIX G

Environment Protection Notice #7409/1
APPENDIX H

Rainfall and Water Quality Data
APPENDIX I

Analytical Reports
APPENDIX J

Tailings Data
APPENDIX K

Botanical Survey and Fauna Habitat Assessment
APPENDIX L

Aboriginal Heritage Survey
A. GENERAL

- Forest practices shall be carried out in accordance with the principles and approaches specified in the Forest Practices Code. As this operation is considered a salvage operation under the Code some conditions of the code are exempt i.e. stream side reserves. The specific requirements set out below are also mandatory. This FPP governs the clearing of vegetation required to allow access to the site to finish the collection of geotechnical data to allow the completion of the Development Proposal and Environmental Management Plan (DPEMP) and the permanent clearance of vegetation prior to the construction of the tailings dam. Stage 1 dam construction is planned for 2009/2010 summer; stage 2 in about 2013; and stage 3 in about 2017. Although the dam is to be constructed in three phases it should be noted that clearance of the entire area will be required as clay from all sites will be required in the construction of the earlier phases.

- There are no provisions required under the Forest Practices Code for the construction of the tri-staged tailings dam – this will be administered under the Development Proposal and Environmental Management Plan (DPEMP) that is still in preparation for the tailings dam for Tasmania Mines Ltd. The Chief Forest Practices Officer, Graham Wilkinson has determined that DPEMP’s have precedence over the requirements of the Forest Practices Code for the construction of the dam.

- A copy of this Forest Practices Plan should be present on site whenever operations are occurring. The Forest Practices Plan includes a map.

- The operational plan boundary will be marked a maximum of 30 metres from the expected footprints of the combined three stages of the dams and remain within the Tasmania Mine Ltd. Mining Lease Areas.

- Dam construction activities may occur within the area covered by this Plan while the Plan remains current.

- All operations are to be carried out in a safe manner in accordance with the requirements of the Workplace Health and Safety Act 1995.

- Machinery washdown procedures will comply with the standard soil hygiene prescriptions as per Tasmanian Washdown Guidelines for Weed and Disease Control.

B. ACCESS TO THE OPERATION SITE (ROADING)

(See also section D. Conservation of Natural and Cultural Values and section F. Management of Fuels, Oils, Rubbish and Emissions.)

Person or organisation assuming primary responsibility for management of forest practices under this section of the plan  Alwyn Neubaucher, Manager of Operations, Tasmania Mine Ltd.

General

- Existing tracks and roads will provide the access to the tailing dam sites.

Clearing and Formation

Not applicable

Initials of parties to the Plan:  Landowner ……… Applicant ……… FPO ………
Date ……… Date ……… Date ………
FPP No… KIZ0046 ………
Operations agreement (FPP equivalent) for tailings dams at Kara Rd, Tasmania Mines – PAS043

Drainage
- It is the responsibility of the contractor to cease operations when water run off exceeds the minimum standards of the FPC.
- Drainage systems including table drains, culverts and trafficable spoon drains will be kept functional at all times during the operation and will be left clear and functioning at the completion of the operation or when leaving the construction for an extended period.

Surfacing
Not applicable

C. CLEARING OF THE VEGETATION
(See also section D. Conservation of Natural and Cultural Values and section F. Management of Fuels, Oils, Rubbish and Emissions.)

Person or organisation assuming primary responsibility for management of forest practices under this section of the plan  Alwyn Neubaucher, Manager of Operations, Tasmania Mine Ltd.

General
- The operation and FPP boundary will be defined by **blue** flagging tape. Due to the long term life of this plan it will be necessary to retape the FPP boundary prior to each dam stage being constructed.
- The clearing of vegetation will be salvage with some commercial timber being salvaged as instructed by Forestry Tasmania.

Landings
Not applicable

Snig tracks
Not applicable

Felling prescriptions
- The clearing prescription for this FPP will be clearfall with the objective of preparing the site for tailings dam construction.
- All standing trees live or dead will be cleared.
- The operation boundary is shown on attached FPP map and will be marked with **blue** flagging tape.
- Trees will not be felled over the clearing boundaries. Where a tree accidentally falls over the boundary a decision will be made by a supervisor as to whether the tree will be pulled out or left in place. Machinery will not cross the **blue** taped line without the permission of a supervisor responsible for the operation.
- The equipment to be used on this operation is Class C1.
Windrowing and Burning

- The windrowing of vegetation is to be done in consultation with Forestry Tasmania. Forestry Tasmania will burn the windrows and charge costs to Tasmania Mines. Burning of the windrows will occur after 15th March to November on the year that the each stage has been cleared.

Streamside management and special water quality protection measures

Exemption from the standard Forest Practices Code streamside reserve prescriptions is given for the area within the inundation area. Standard streamside reserves cannot be applied due to the proposed operation being for vegetation clearing for tailings dam construction. Soil and water management will be managed according to DPEMP during the construction of dams.

However, during the period of geotechnical assessment drill rig will only cross the stream at corded points. Cording is to be removed after geotechnical assessment has been completed.

- Management of water quality during and after dam construction will be to the standards determined in the DPEMP.
- Sites for equipment refuelling will be located at least 40 metres from any watercourse to minimise the adverse effects on water quality in the event of spillage.
- Bulk fuel and oil will be stored outside the dam inundation area and no closer than 40 metres to the high water level in a bunded area and where leaks cannot enter streams, directly or indirectly, through table drains.
- Salvage logging within the operation area and dam construction will only occur during dry periods to reduce the risk of sediment entering the Emu River catchment. Work will cease during periods of heavy rain.

The potential for contamination of runoff during the operation will be minimised by:
- Construction machinery will be washed down prior to entry to operation site.
- All machinery will be free of oil leaks and properly maintained.
- Any oil drips or spills will be excavated and placed in a sealed container for removal from site.
- Oil absorbent materials will be available at all times to control and clean up any spills on impermeable surfaces.

Harvesting restoration

Landings
No applicable.

Snig tracks
Not applicable.

Roads
Drainage systems on the Kara Road including table drains and culverts will be kept functional at all times during the operation and will be left clear and functioning at the completion of the operation.
D. CONSERVATION OF NATURAL AND CULTURAL VALUES

Prescriptions to manage, flora, fauna, geomorphic, cultural heritage, landscape, and soil and water values.

Flora

Myrtle wilt and weed management plan

- Machinery will be washed down following operations and prior to moving to another site as a standard soil hygiene practice to reduce the possibility of transmitting weed and soil pathogens in soil on machinery.

- The spread of myrtle wilt can be mitigated by minimising damage to adjacent trees when felling myrtle. Felling should be carried out so that trees fall away from the retained trees. If trees fall in retained vegetation outside the FPP area inadvertently, the supervisor is to determine whether the tree should be docked and left there or removed with an aim to cause the less possible disturbance.

- Monitoring of the presence of weeds should be undertaken biannually and treated as necessary.

Fauna

Standard threatened species coupe level prescriptions cannot be applied because the operation is salvage prior to the construction of a tailings dam. Disturbance is to be minimized by restricting clearing of each stage to just prior to the construction of that stage.

Wedge-tailed and Sea Eagles

It is unlikely that a nest occurs within or adjacent to the harvest boundary, however:

The contractor will notify the Forest Practices Authority Senior Zoologist via the Forest Practices Officer in charge of the operation if any nests are found during the operation:

- If a nest is discovered during the breeding season (August – January inclusive) immediately cease all forestry activity within 500 m of the nest or within 1 km if in line of sight of the nest. The nest site will be inspected by the FPA Senior Zoologist and or DPIW specialist and advice on appropriate further action will be provided as soon as possible.

- If a nest is discovered outside the breeding season (February – July inclusive) cease all forestry activities within 500 m of the nest. The nest site will be inspected by the FPA Senior Zoologist and or DPIW specialist and advice on appropriate further action will be provided as soon as possible.

Geoscience

There are no specific geoscience concerns with this plan. Due to Ordovician limestone being present it is assumed that the geotechnical survey will identify whether there is any subsurface drainage issues on the site prior to the development of the tailings dam and that these issue will be addressed in the DPEMP.

No special prescriptions apply under the Forest Practices Code.

Cultural heritage

Initials of parties to the Plan: Landowner……….. Applicant ………….. FPO………..
Date……….. Date……….. Date………..
FPP No…KIZ0046…………..
Aboriginal
The dam site has been surveyed for Aboriginal artefacts. No sites or high sensitivity indicators were located. However, in the event that additional artefacts are found during works:
- The contractor will notify the person responsible for supervision, in the event that any additional site/s is/are located during the course of the operation.
- Any site found during the operation will be excluded from the operation until the advice is obtained from the Forest Practices Authority, Senior Archaeologist.

Historical
An unrecorded sawmill site is located in the SE corner of the FPP area as mapped on the FPP map. Detailed site recording has been done by the FPO and has been forwarded to the Senior Forest Practices Archaeologist which has been assessed as being a good example of a local sawmill.
- The sawmill site will be marked as a machinery exclusion zone with a 10 metre buffer using yellow and white flagging tape.
- Any further historical site found during the operation will be excluded from the operation until the advice is obtained from the Forest Practices Authority, Senior Archaeologist.

Person or organisation responsible for organising Aboriginal archaeological survey: Not Applicable – a pre-operational survey has been undertaken

Landscape
- No prescriptions under the FPC.

Soil and Water
Exemption from the standard Forest Practices Code streamside reserve prescriptions is given for the area within the inundation area. Standard streamside reserves cannot be applied due to the proposed operation being clearing for dam construction. Soil and water management will be managed according to DPEMP

However, during the period of geotechnical assessment drill rig will only cross the stream at corded points. Cording is to be removed after geotechnical assessment has been completed.

- In the inundation area all vegetation should be cleared, windrowed and burnt. Windrows will be at least 20m from the class four streams.
- Sites for equipment refuelling will be located at least 40 metres from any watercourse to minimise the adverse effects on water quality in the event of spillage.
- Bulk fuel and oil will be stored outside the inundation area and no closer than 40 metres to the high water level in a bunded area and where leaks cannot enter streams, directly or indirectly, through table drains.
- Vegetation clearing within the operational area for dam construction will only occur during dry periods to reduce the risk of sediment entering the Emu River catchment. Work will cease during periods of heavy rain.

The potential for contamination of runoff during the operation will be minimised by:
- Construction machinery will be washed down prior to entry to operation site.
- All machinery will be free of oil leaks and properly maintained.
• Any oil drips or spills will be excavated and placed in a sealed container for removal from site.
• Oil absorbent materials will be available at all times to control and clean up any spills on impermeable surfaces.

E. ESTABLISHING AND MAINTAINING FORESTS

(See also section D. Conservation of Natural and Cultural Values and section F. Management of Fuels, Oils, Rubbish and Emissions.)

| Person or organisation responsible for reforestation and having primary responsibility for management of forest practices under this section of the plan | Alwyn Neubaucher, Manager of Operations, Tasmania Mine Ltd. |

Site preparation procedures (eg. clearing, windrowing, ripping, cultivation, mounding, catch drains, areas to be treated differently etc)
All vegetation will be cleared within each stage and windrowed and burnt prior to dam construction. This is to be carried out in consultation with Forestry Tasmania for all three stages of the tailings dam.

Burning (eg. planned intensity and timing)
The area to be inundated will be cleared, timber windrowed and burnt according to the instructions of Forestry Tasmania and burned within the area to be inundated. Burning of heaps will occur after the 15th of March to November, depending on suitable weather conditions and under permit, if required.
• Ground based ignition techniques may be used.

Sowing or planting treatments (artificial sowing, seed zone, natural regeneration, retained growing stock, planting etc)
No sowing or planting treatments are required within the inundation area
• Rehabilitate disturbed areas -dam walls and cleared land around infrastructure- with appropriate plants. These include local native species that are suitable for dam wall coverage to promote stability but do not “puncture” the wall and provide for the amenity of the site. Suitable species are Gahnia grandis, Dianella tasmanica, Baloskion tetraphyllum and Blechnum species.

Weed control (describe method(s) to be used)
Gorse & Broom occur within the FPP area. Biannual monitoring will occur. Weeds will be controlled during the period of the FPP using an appropriate method.

Fertiliser application (describe method(s) to be used)
Not applicable.
Restoration (e.g. drainage of fire breaks and access tracks)
No restoration will occur within the dam inundation area. Restoration of areas outside the dam wall and within the FPP area will be in consultation with Forestry Tasmania.

Fire protection (e.g. fire breaks and fire management on adjoining land)
- All equipment and machinery must have regular maintenance of mufflers, spark arresters, running gear and removal of debris from manifolds and base plates.
- Fire prevention for Forest Operations is as per procedures developed by the Tasmanian Forest Industry Fire Management Committee (FFMIC).
- The current prescriptions are listed in Murchison District Contractor Advice No. 5.
- Fuels created by harvesting will be managed in accordance with the prescriptions in “Section E. Establishing Forest) above.
- Any wildfire which occurs on the property during the period of this plan will be dealt with as directed by Tasmania Fire Service and Forestry Tasmania.

Browsing (eg monitoring and control treatments)
Not Applicable.

Is there a fire management plan for this area? YES / NO – Loongana Fire Management Plan

E2. ASSESSMENT OF REFORESTATION

Stocking standards (specify survey method and stocking standard to be achieved)
- No stocking standard assessment will take place within the dam inundation area.

Survey to be organised by: .... Not Applicable................................ by (date): Not Applicable ..........
F. MANAGEMENT OF FUELS, OILS, RUBBISH AND EMISSIONS

Use of fuels, oils etc
• ALL fuel or oil spills will be contained as soon as possible and clean up procedures will be promptly implemented where necessary.
• Fuel or oil spills that cause or threaten to cause environmental harm will be reported to Department of Primary Industries, Water (DPIW) by phoning 1800 005 171, as soon as practicable but within 24 hours of the event.

Placement of fuel tankers and lubricants will be bunded and will be as far as practical from stream reserves and outside the dam inundation area and take into consideration natural ground features that may assist in containing any spillage.

Rubbish
All rubbish onsite will be stored in appropriate water-tight containers, and is to be removed on a regular basis to an approved refuse disposal site.

Forest Practices Officer (Planning)
Certified by (signature):...................................... .....................  Date: ..............................................
Name: Karen Ingrid Ziegler .................................................................
Pursuant to a delegation from the Forest Practices Authority under section 43 of the Forest Practices Act 1985.

Also refer to Map 1 for FPP KIZ0046.
Map 1 for FPP KIZ0046

KIZ0046 Tailings Dam
Kara Road Tasmania Mines

FPP/ Operational Boundary
Storage Dam Extent
Existing Roads
Stream Class

Machinery Exclusion Zone (for Historical Sawmill)
10m Buffer of historical sawmill site

Declared Weeds

d+ English broom

g+ gorse

Initials of parties to the Plan:  Landowner……..  Applicant……..  FPO……..
Date……..  Date……..  Date……..

FPP No…KIZ0046………..
CONSORTIATED MINERAL LEASE UNDER THE MINING ACT 1929

THIS INDENTURE, made the 7th day of May 1995,

BETWEEN the Minister administering the Mining Act 1929 (hereinafter called 'the Minister') of the one part, and

TASMANIA MINES LIMITED
(A.C.N. 009 491 990)

of P.O. Box 815, Burnie, Tasmania, 7320 (hereinafter called 'the lessee') of the other part, being the holder of 7 contiguous mineral leases numbered 105M/77, 1267P/M, 1268P/M, 1269P/M, 1270P/M, 71M/86 and 72M/86, and has surrendered the said leases conditionally upon the issue of a consolidated lease to the lessee and WHEREAS the lessee has applied to the MINISTER to grant in lieu thereof a consolidated lease of the land contained in the said surrendered leases of a total area of 722 hectares of land AND WHEREAS it having been made to appear to the satisfaction of the MINISTER that greater facilities for the working of such total area as aforesaid would be ensured by the issue of a consolidated lease thereof the MINISTER hath agreed with the consent of the Governor in Council to grant such application WITNESSETH that in pursuance of the said total area and in consideration of such surrender as aforesaid and WITNESSETH that, in consideration of the rents, reservations, covenants, provisos, and agreements hereinafter contained, and on the part of the lessee to be paid, observed, and performed, the Minister by these presents, with the consent of the Governor in Council, LEASES unto the lessee, subject to the provisions of the Mining Act 1929, ALL THAT piece or parcel of land delineated in the map or plan hereon endorsed and surrounded by a red boundary-line.

EXCEPT and reserving unto Her Majesty the Queen, Her heirs and successors, all such parts and so much of the land hereby leased as may be required for making public ways in, over, and through the same, to be set out by the Minister or some person by him authorised in that respect.

AND ALSO except and reserving unto Her Said Majesty all stone, gravel, indigenous timber, and other materials, the natural produce of the said leased land, which may be required at any time or times hereafter for the construction or repair of any public ways, bridges, fences, embankments, dams, sewers, or drains necessary for the same, together with the right of taking and removing all such materials, and full and free ingress, egress, and regress into, out of, and upon the said leased premises for the several purposes aforesaid.

TO HAVE AND TO HOLD the said leased premises (except and subject as aforesaid) unto the lessee from the first day of May 1989, for and during the term of 21 years, to the intent that the same shall be used for mining and for all purposes necessary for effectually carrying on mining operations therein and thereon for all minerals, as provided by section 31 of the said Act.
YIELDING AND PAYING therefore yearly unto Her Majesty, Her heirs and successors, in advance, on the first day of July in each and every year during the said term, the annual rent prescribed in accordance with Section 29(1) of the Mining Act 1929.

AND THE LESSEE COVENANTS:-

(I) To pay the rent and royalty (if any) hereby reserved, at the times and in the manner prescribed;

(II) To use the leased land exclusively for the purposes for which the same is leased, and in accordance with the regulations;

(III) To employ continuously in relation to the land leased one man for each 4 hectares, or part of 4 hectares for 40 hours per week in each period of 12 months in the said term;

Provided that:

(a) subject to the regulations, any work done by the lessee or by a tributer, as provided by section 46 of the said Act, shall be deemed to be an employment of labour as provided by that section; and

(b) where the lessee uses steam power, water power, electric power, or other power or horses for driving or propelling machinery, each 8 kilowatts or each horse so used shall be deemed to be equivalent to the employment of one man.

(IV) To observe, perform, fulfil, and keep all the covenants, conditions, and provisos, if any, set forth in the Schedule to this lease to the intent that the same shall continue throughout the term hereby created: and

(V) At the termination of this lease, to deliver up possession of the leased land to the Minister,

in accordance with the provisions of the said Act.

PROVIDED ALWAYS, and it is hereby expressly agreed and declared by and between the said parties hereto:

(a) that the Minister shall have the right of entry and inspection upon and in respect of the leased land;

(b) that the Minister may distrain for rent in arrear;

(c) that this lease may be declared forfeited

(i) by the Governor in Council for breach of the covenant hereinbefore numbered I, or

(ii) by the Court of Mines for breach of either of the covenants hereinbefore numbered II and III respectively, or, alternatively, that the said court may impose a fine not exceeding 10 penalty units in lieu of forfeiture;

as provided by the said Act;

(d) that the area granted by this lease shall be exclusive of all public reserves not subject to the said Act, roads, railways, tracks, water and easement licences in and upon the land leased and which may later be defined by survey;
(e) that there is excepted and reserved unto Her Majesty, Her heirs and successors so much of the land hereby leased as may be required for the construction of a water race or easement to be set out by the Minister or some other person by him authorised in that respect; and

(f) that, if the lessee at any time fails or neglects to observe, perform, or comply with a term or condition contained in the Schedule to this lease, the Minister or a person authorised by him may carry out work to remedy any damage arising from such failure or neglect and the lessee shall then be liable to pay the cost incurred in carrying out that work and the lease shall be terminated without prejudice to any other right of action or remedy of the Minister.

IN WITNESS whereof the Minister has hereunto set his hand and seal and the company has caused its common seal to be hereunto affixed, the day and year first hereinbefore written.

Signed, sealed, and delivered by the

MINISTER FOR MINES

in the presence of:

The common seal of

TASMANIA MINES LIMITED
(A.C.N. 009 491 990)

the lessee, was affixed hereto in the presence of:
DESCRIPTION

SUBJECT TO SURVEY THE AREA DEMISED MAY BE DESCRIBED AS FOLLOWS:-

Commencing at a north western corner of the area applied for and being the north west corner of 178.2.14 H.T. & A.C. Ellis Pur. and bounded on the north by 1220 metres or thereabouts easterly on the east by 1590 metres or thereabouts grid south to a point on the northern boundary of 99.33.34 C.M. Darcey Pur. on the south by 100 metres or thereabouts westerly along 99.3.34 aforesaid again on the east by 637.7 metres southerly again along 99.3.34 again on the north by 20 metres or thereabouts easterly again along 99.3.34 again on the east by 850 metres or thereabouts southerly to a point on the northern boundary of 99.1.39 S.P. Lohrey Pur. again on the east by 1030 metres or thereabouts grid south to grid co-ordinate 5 424 000 metres N. again on the south by 1460 metres or thereabouts grid west on the west by 605 metres or thereabouts grid north again on the south by 540 metres or thereabouts grid west again on the west by 970 metres or thereabouts grid north again on the west by 1000 metres or thereabouts northerly again on the west by 900 metres or thereabouts grid north again on the north by 780 metres or thereabouts northerly to the point of commencement.
PLAN — SUBJECT TO SURVEY

LAND DISTRICT: DEVON
VICINITY: CITY OF BURNIE
HAMPshire

MUNICIPALITY: CITY OF BURNIE
APPLICATION NO.: 1371 P/M
APPLICANT: TASMANIA MINES LTD

MAP: PARRAWE 1:25,000
AREA: 722 ha

SCALE: 1:30,000

DRAWN: D.J.F. DATE 13-04-92
APPROVED: DEPUTY SECRETARY DATE 23-04-1992

RESOURCE PLANNING & POLICY DEVELOPMENT BRANCH — RESOURCES DRAFTING OFFICE

VOL. 62 FOLIO 6
SCHEDULE 1

1. It is hereby declared and agreed that the rent reserved by this lease shall not be payable by the lessee in respect of any period during which the lessee is the owner of the freehold of the demised land but upon any transfer or devolution of the lessee's interest herein to any other person, not being such owner as aforesaid, such rent shall become payable by the lessee for the time being as from the date of such transfer or devolution.

2. Where the lessee is not the owner of the freehold of the demised land a compensation agreement in accordance with Sections 73 and 74 of the Mining Act, 1929 shall be supplied to the Director of Mines and maintained in force during the term or subsequent renewal of the lease. The lessee shall ensure that all operations fall within the terms and conditions of that agreement and shall advise the Director of Mines of any variations to the compensation agreement.

SCHEDULE 2

1. To extract as much of the economic minerals or stone in the leased land as is practical consistent with safety. Should the question arise as to whether a greater or lesser amount of minerals or stone has been left unworked than is necessary, the matter shall be decided by the Director of Mines whose decision shall be final.


3. Within 60 days of the receipt of a request from the Director of Environmental Control, or within such further period as he may approve, and at three yearly intervals thereafter to submit to him an Environmental Management Plan for approval. The plan is to be prepared by the lessee in accordance with guidelines established by the Director of Environmental Control, and is to be a three year program for the protection, management and rehabilitation of the environment. It must include arrangements for monitoring and studying sample areas to ascertain the effectiveness of the program. The Director of Environmental Control may require the amendment of the approved Plan to correct any error or to make any modification which he reasonably considers to be desirable because of the existence of more accurate or complete data, technological developments or other matters not contemplated at the time when the Plan was approved.

To:

(a) provide the Director of Environmental Control with all relevant data in relation to the Plan submitted or amended;

(b) at yearly intervals, commencing from the date on which the Plan is approved, submit an interim progress report to the Director of Environmental Control concerning the Plan; and

(c) after three years from the date on which the Plan is approved, submit a detailed report to the Director of Environmental Control concerning the implementation of the Plan during the previous three years.
In the event of a material detriment to the environment occurring as a result of the lessee's operations, to take immediate action to mitigate the effect of the material detriment and to submit to the Director of Environmental Control a report on the action taken as soon as is reasonably practicable.

To at all times conduct operations on the leased land in accordance with the provisions of the Environmental Management Plan as approved or varied by the Director of Environmental Control and in accordance with the provisions of the Environment Protection Act 1973, and in particular with the Licence to Operate a Scheduled Premises.

4. To provide, when requested by the Director of Mines, all relevant information as may be required to determine whether the lessee is observing, performing or complying with the terms and conditions contained in this Schedule.

5. The lessee shall forward quarterly production and employment returns and royalty returns to the Director of Mines as prescribed by the Mining Act 1929, the Mining Regulations 1930, the Mines Inspection Act 1968 and the Mines Inspection Regulations 1991.

6. To provide within 60 days of the issue of the lease and thereafter by 30 September of each year a Mining Plan in a form approved by the Director. The Mining Plan must contain such relevant information as the Director may request including, without limitation, details of:

- production and grades of ore for the year ending 30 June.
- production and grades of product for the year ending 30 June.
- forecast production and grades of ore and product for the ensuing 5 year period.
- ore reserves and the method of calculation of reserves and recoverable reserves including, without limitation, cut-off parameters and assumptions as to mining recovery, dilution and metallurgical recovery.
- exploration conducted on the lease for the year ending 30 June.
- location, capacity, construction details and use of ore and waste dumps and tailings disposal.
- measures taken to prevent damage to the environment from run-off, or discharge water.
- measures taken to rehabilitate dumps, stockpiles, tailings dams and other disturbed areas.

Information provided by the lessee pursuant to this clause shall be confidential between the lessee and the officers of the Department of Mines for the term of the lease.
7. To observe, perform and comply with all of the terms, conditions and covenants contained in this Schedule, provided always that if the lessee fails to comply, the Minister for Mines or any person appointed by him may enter upon the leased land and carry out work necessary to secure observance, performance and compliance with all of the terms, conditions and covenants contained in this Schedule and to remedy damage arising from breach of any of the terms, conditions and covenants without prejudice to any other remedy he may have.

8. Within 28 days of a request to do so by the Director, to provide a surety in a form approved by the Director for the sum of $150,000.00 to meet any costs that the Minister may incur through carrying out work to secure observance, performance and compliance with all of the terms, conditions and covenants contained in this Schedule and to remedy damage arising from the breach of any terms, conditions or covenants. The surety will be reviewed periodically and an additional surety may be required:

(a) at five year intervals from the date of grant of the lease to take account of any changed value of the surety with the passage of time;

(b) When there is a change of lessee, a change in the scale of operations or a change in the scale or nature of environmental impact.

9. To pay the cost of work carried out by the Minister to secure compliance and remedy damage so far as the cost exceeds the surety referred to in Clause 8.

10. On the termination of this lease, except where the lease is forfeited for breach of the terms, conditions and covenants contained in this Schedule, and provided the terms, conditions and covenants have been complied with to the satisfaction of the Director of Mines, the lessee shall be entitled to the return of the surety less any amount then due to the Minister under the lease.

11. The lessee will take such steps as directed by the Inspector of Mines to avoid or protect mining features or artefacts deemed to be of cultural heritage significance.

12. The lessee is required to liaise with the District Forester in relation to the salvage or clearing of any timber within Crown Land on the lease.

13. Any material burnt shall only be done so in accordance with provisions of the Fire Service Act 1979.

14. The site shall be maintained so as to be free of fire hazard.

15. No fires are to be lit on or adjacent to the lease area without the written approval of the State Fire Commission and then only in accordance with the provisions of the Fire Service Act 1979 as amended from time to time.

16. Precautions are to be taken with fuel storage to minimise the risk of fire.

17. The lessee, agent and/or employees during mining activities shall be responsible for the immediate suppression of non-permit fires arising from those activities.
18. Upon conclusion of mining operations:-

(a) The lessee shall give written notice of intention to cease mining operations to the Director of Mines prior to so doing.

(b) The lessee shall rehabilitate worked out areas of the demised land including revegetation of the land surface to the satisfaction of the Director of Mines.

(c) To dispose of all tailings within the leased area and to rehabilitate tailings areas to the satisfaction of the Director of Mines.

19. To rehabilitate worked-out areas concurrently with mining operations to the reasonable satisfaction of the director of mines.

20. No dwelling may be erected for residential purposes in terms of Section 31 (1) (d) of the Mining Act 1929 upon the lease unless prior approval has been obtained from the municipal council for the area in which the proposed dwelling is located.

21. Obtain a permit under the Land Use Planning and Approvals Act 1993 in respect of the proposed use or development affecting the leased land, unless planning approval has been previously obtained under Part XVIII of the Local Government Act 1962 or is not otherwise required.

22. To pay the cost of all rates and charges levied on the leased land unless otherwise agreed with the landowner.

23. To obtain the written consent of the Director of Mines prior to carrying out any mining operations within 100 metres of the Emu and Old Park Rivers

24. The lease excludes the roads shown coloured brown on the plan herein.

25. The lease may be declared forfeit by Governor in Council for breach of any of the terms and conditions contained herein. Prior to forfeiture, the Minister shall give the lessee notice in writing stating the breach and giving the lessee 14 days in which to show cause why the lease should not be forfeited.
MINING LEASE NO. 1M/97
UNDER THE
MINERAL RESOURCES DEVELOPMENT ACT, 1995

THIS INDENTURE made the ............ 28th day of September ............ 20 ............,

BETWEEN the Minister administering the Mineral Resources Development Act, 1995, 
(hereinafter called 'the Minister') of the one part, and

TASMANIA MINES LIMITED

of P O Box 815, Burnie, Tasmania, 7320 (hereinafter called 'the lessee') of the other 
part, WITNESSETH that, in consideration of the rents, reservations, covenants, 
provisos, and agreements hereinafter contained, and on the part of the lessee to be paid, 
observed, and performed, the Minister by these presents, LEASES unto the lessee, 
subject to the provisions of the Mineral Resources Development Act, 1995, ALL THAT 
piece or parcel of land delineated in the map or plan hereon endorsed and surrounded by 
a red boundary-line,

EXCEPT and reserving unto Her Majesty the Queen, Her heirs and successors, all such 
parts and so much of the land hereby leased as may be required for making public ways 
in, over, and through the same, to be set out by the Minister or some person by him 
authorised in that respect:

AND ALSO except and reserving unto Her Said Majesty all stone, gravel, indigenous 
timber, and other materials, the natural produce of the said leased land, which may be 
required at any time or times hereafter for the construction or repair of any public ways, 
bridges, fences, embankments, dams, sewers, or drains necessary for the same, together 
with the right of taking and removing all such materials, and full and free ingress, egress, 
and regress into, out of, and upon the said leased premises for the several purposes 
aforesaid.

TO HAVE AND TO HOLD the said leased premises (except and subject as 
aforesaid) unto the lessee until 1 May 2011, to the intent that the same shall be used for 
mining and for all purposes necessary for effectually carrying on mining operations 
therein and thereon for Category 1 minerals, as provided under Section 3 of the said Act.

YIELDDLING AND PAYING therefore yearly unto Her Majesty, Her heirs and 
successors, in advance, on the first day of July in each and every year during the said 
term, the annual rent prescribed in accordance with Section 101 of the Mineral Resources 

AND THE LESSEE COVENANTS:-

1. To pay the rent and royalty (if any) hereby reserved, at the times and in the 
manner prescribed;

2. To use the leased land exclusively for the purposes for which the same is leased;
in accordance with the provisions of the said Act.
PROVIDED ALWAYS, and it is hereby expressly agreed and declared by and between the said parties hereto:

a. that the Minister shall have the right of entry and inspection upon and in respect of the leased land;

b. that the Minister may distrain for rent in arrear;

c. that this lease may be revoked;

- by the Minister for breach of the covenants hereinbefore referred to,
as provided by the said Act;

d. that the area granted by this lease shall be exclusive of all public reserves not subject to the said Act, roads, railways, tracks in and upon the land leased and which may later be defined by survey; and,

e. that, if the lessee at any time fails or neglects to observe, perform, or comply with a term or condition contained in the Schedule to this lease, the Minister or a person authorised by him may carry out work to remedy any damage arising from such failure or neglect and the lessee shall then be liable to pay the cost incurred in carrying out that work and the lease shall be terminated without prejudice to any other right of action or remedy of the Minister.

IN WITNESS whereof the Minister has hereunto set his hand and seal and the company has caused its common seal to be hereunto affixed, the day and year first hereinbefore written.

Signed, sealed, and delivered by

the Minister in the presence of:

[Signature]

The common seal of the lessee,

TASMANIA MINES LIMITED
(A.C.N. 009 491 990)

was affixed hereto in the presence of

[Signature]

Director

[Signature]  

Minister

Common Seal

Mining Lease No. 1M/97  Page 2 of 8
**DESCRIPTION**

SUBJECT TO SURVEY THE AREA DEMISED MAY BE DESCRIBED AS FOLLOWS:

Commencing at the posted notice at the southeast corner of the area applied for at approximate grid coordinates 398 530 mE 5 425 050 mN and bounded on the south by 135 metres or thereabouts grid west to the eastern boundary of Mining Lease 1371P/M Tasmania Mines Ltd. thence on the west along that boundary by 500 metres or thereabouts northerly on the north by 150 metres or thereabouts grid east on the east by 500 metres or thereabouts grid south to the point of commencement. SK
SCHEDULE 1

1. To extract as much of the economic mineral or minerals in the leased land as is practical and consistent with safety. Should the question arise as to whether a greater or lesser amount of any mineral has been left unworked than is necessary, the matter shall be decided by the Director of Mines whose decision shall be final.

2. Prior to beginning work on the leased land to obtain lawful authority under the Land Use Planning and Approvals Act 1993 and Environmental Management and Pollution Control Act 1994, in respect of the proposed use or development affecting the leased land.

3. To observe, perform and comply with all of the terms and conditions contained in this Schedule provided always that if the lessee fails to comply, the Minister or any person appointed by him may enter upon the leased land and carry out work necessary to secure observance, performance and compliance with all of the terms and conditions contained in this Schedule and to remedy damage arising from the breach of any law, regulation or lease condition without prejudice to any other remedy he may have.

4. The lessee shall forward quarterly production, employment and royalty returns to the Director of Mines.

5. The lessee will take such steps as directed by an inspector to avoid or protect mining features or artefacts deemed to be of cultural heritage significance, and prior to mine closure the lessee may be required to undertake an audit of the heritage values of the site in accordance with directions issued by the Director of Mines.

6. Prior to beginning work on the leased land to provide a surety in a form approved by the Minister for the sum of $18,000.00 for the purpose of meeting any costs to the Minister through carrying out work as provided by Clause 3.

7. To pay the cost of work carried out by the Minister to secure compliance and remedy damage so far as the cost exceeds the surety of Clause 6.

8. Subject to Section 197 of the Mineral Resources Development Act, 1995 on termination of this lease the lessee shall be entitled to the return of the surety less any amount due or expended by the Minister to cover the cost of any work as provided by Clause 3.

9. The surety approved and deposited prior to work commencing will be reviewed as follows:-
   a. At the time of renewal of the lease; or,
   b. At five yearly intervals from the granting of the lease to take account of any diminishing value of the original surety; or
   c. When there is a change of lessee, a change in the scale of operations or a change in the scale or nature of environmental impact.

10. To maintain a vegetation screen of operations to the satisfaction of the Director of Mines. This screening may be accomplished by:-

   SK
a. the use of existing trees and other vegetation which shall not be removed without the written consent of the Director of Mines;

b. planting and maintaining trees and other vegetation for this purpose.

11. Non-merchantable timber cleared from the site and other cleared vegetation shall be stacked within a cleared area.

12. The lessee shall not cut, remove or use any timber on the lease for mining or domestic purposes without the prior approval of an inspector.

13. The lessee shall provide drainage work and settling ponds to prevent erosion, escape of silt from the site in order and to ensure successful protection of the environment. Work to be to the satisfaction of the Director of Mines.

14. No damage to be caused by the lessee to existing roads and drainage systems. Any damage so caused shall be repaired at the lessee's own expense to the satisfaction of an inspector.

15. Any material burnt shall only be done so in accordance with provisions of the 
_Fire Service Act 1979_, as amended from time to time.

16. The site shall be maintained so as to be free of fire hazard.

17. No fires are to be lit on or adjacent to the lease area without the written approval of the State Fire Commission and then only in accordance with the provisions of the 
_Fire Service Act 1979_, as amended from time to time.

18. The lessee, agent and /or employees during mining activities shall be responsible for the immediate suppression of non-permit fires arising from those activities.

19. The lessee shall ensure that the storage and use of dangerous goods within the lease area is in accordance with the requirements of the 
_Dangerous Goods Act 1976_ and the 
_Dangerous Goods Regulations 1994_, as amended from time to time.

20. To remove and stockpile surface soil separately from other overburden before mining.

21. To spread surface soil over mined-out areas to the satisfaction of the Director of Mines.

22. Upon conclusion of mining operations:-

a. The lessee shall give written notice of intention to cease mining operations to the Director of Mines prior to so doing, and;

b. Where a shaft, adit, excavation, stockpile, wastes, dam, other workings or their access is likely to present a hazard the lessee shall, subject to Clause 5 of this Schedule, cap, fill, grade or rehabilitate the workings to remove or otherwise secure the hazard to the satisfaction of the Director of Mines, and;

c. The lessee shall rehabilitate worked out areas of the demised land including revegetation of the land surface to the satisfaction of the Director of Mines, and;
d. To retain all tailings within leased areas and to rehabilitate tailings areas to the satisfaction of the Director of Mines, and;

e. The lessee shall remove all structures, equipment, hazardous substances and debris from the lease area, subject to Clause 5 of this Schedule.

23. To rehabilitate worked-out areas concurrently with mining operations.

24. The lessee shall not undertake any clearing of vegetation or earthworks outside of the proposed area/s of disturbance, shown on the mining plan, without the written approval of the Director of Mines.

25. To keep the leased area in a tidy condition to the satisfaction of the Director of Mines.

26. To pay the cost of all rates and charges levied on the leased land.

27. The lease may be revoked by the Minister for breach of any of the terms and conditions contained herein. Prior to revocation, the Minister shall give the lessee notice in writing stating the breach and giving the lessee 14 days in which to show cause why the lease should not be revoked.

28. The lessee shall provide to the Director of Mines if demanded, copies of records kept under Section 188 of the *Mineral Resources Development Act, 1995.*

Such records are to contain the following:

a. the quantities and values of products sold or held in stock;

b. the quantities of ore and waste mined and ore treated;

c. the sources of ore and waste mined and details of waste disposed of;

d. details of any mine development undertaken;

e. details of any process development;

f. a breakdown of any capital expenditure;

g. the operating costs of any mining and exploration carried out;

h. details of the workforce;

i. details of on-lease exploration as the Director requires and to the standard set out in the brochure Mineral Tenements Guidelines for Reporting as published by Mineral Resources Tasmania from time to time, and;

j. details of ore reserves and resources in accordance with the standards as published in the Australasian Code for Reporting of Identified Mineral Resources and Ore Reserves by the Australian Institute of Mining and Metallurgy.

30. The lessee shall not damage or interference in any way with roads, tracks, water licences or easements within the demised land and which may later be defined by survey.

31. The lease area excludes:

- 5 metres either side of Kara Road

**SK**
SCHEDULE 2

The lessee shall liaise with the District Forester, Murchison, prior to commencement of any mining works likely to affect State Forest or Forestry operations on the lease area, and for such works the following clauses shall apply.

1. The lessee shall not cut, remove or use any timber on the lease for mining or domestic purposes without the prior approval of the District Forester, Murchison, and:
   a. Shall pay compensation to Forestry Tasmania for each tree removed, such value to be the value at the time of removal as may be assessed by the District Forester, and;
   b. Shall not clear any other natural vegetation without first obtaining the written approval of the District Forester, Murchison.

2. No fires are to be lit on or adjacent to the lease area without the written approval of the District Forester, Murchison and then only in accordance with the provisions of the Fire Service Act 1979, as amended from time to time.

3. The lessee shall be responsible for the immediate suppression of any fires which may occur due to mining operations on the lease area to the satisfaction of the District Forester, Murchison.

4. Forest officers and their agents shall have free access to the lease area including the use of roads and tracks for forestry purposes.

5. The Lessee will allow Forestry Tasmania (including contractors and agents operating on it’s behalf) at all reasonable times after having given five (5) business days written notice to the Lessee to have access to the Quarry to enable Forestry Tasmania to take such material as Forestry Tasmania shall reasonably require PROVIDED THAT the taking of such material shall not adversely affect the Lessee’s business or make it financially unviable.

6. All material taken by Forestry Tasmania pursuant to the provisions of Schedule 2, clause 1 shall be paid for at the wholesale price for such material which shall be determined as the reasonable cost incurred by the Lessee of obtaining the material plus any costs associated with environmental rehabilitation of the site which will be required to be paid by the Lessee to rehabilitate the site upon its closure or as required by all relevant authorities.

7. In the event of a dispute arising as to what constitutes the wholesale price of material then the parties shall use all reasonable endeavours to settle the matter in dispute within seven (7) business days of both parties becoming aware of the dispute. For the purpose of this clause to assist in resolving any dispute at first instance the matter in dispute will be discussed at management level and failing satisfactory resolution a committee consisting of a representative of Forestry Tasmania and a representative of the Lessee with an independent third person appointed by the Director/Registrar of Mines or his nominee to act as mediator shall be established to try and resolve the dispute.

8. Should the parties fail to resolve any dispute pursuant to the terms hereof then the matter in dispute shall be referred to the Mining Tribunal established pursuant to the provisions of the Mineral Resources Development Act 1995.
Mining Lease 8M/2008

Dated 29th September 2008

The Honourable, David Llewellyn MP ("Minister")

and

Tasmania Mines Limited ("Lessee")

The Crown Solicitor of Tasmania
GPO Box 825
Hobart 7001
Phone: (03) 6233 3409
Fax: (03) 6233 2874
Email: crown.solicitor@justice.tas.gov.au
MINING LEASE 8M/2008

Contents

1 Definitions and interpretation ................................................. 2
  1.1 Definitions .................................................................. 2
  1.2 Interpretation ................................................................. 4

2 Grant of Lease ....................................................................... 5
  2.1 Grant .............................................................................. 5
  2.2 Term .............................................................................. 5

3 Rent and Royalty .................................................................... 5

4 Conditions of Lease ............................................................... 6

5 Lessee's failure to comply with a condition ......................... 6
  5.1 Minister may remedy default ............................................ 6
  5.2 Lessee must reimburse Minister ..................................... 6
  5.3 Minister may distrain ...................................................... 6

6 Lessee's covenants ................................................................. 7
  6.1 Covenants ..................................................................... 7
  6.2 Unworked mineral ......................................................... 9
  6.3 Conflict with Quarry Code of Practice ............................ 9

7 Increased security deposit ..................................................... 9

8 Lessee's indemnities and waiver ........................................ 10
  8.1 Lessee indemnifies Minister for third party risk .............. 10
  8.2 Lessee indemnifies Minister against loss and damage ...... 10
  8.3 Waiver of rights of recovery from the Minister ............... 10
  8.4 Nature of indemnities and waiver .................................. 10

9 Insurance ............................................................................... 11
  9.1 Lessee to insure ............................................................. 11
  9.2 Crown to be named as principal ..................................... 11
  9.3 Lessee to notify Director ................................................. 11
  9.4 Evidence of insurance .................................................... 12
  9.5 Minister may insure ....................................................... 12
  9.6 Lessee not to prejudice insurance ................................... 12

10 Licence to use Reports .......................................................... 12
  10.1 Grant of licence ............................................................. 12
  10.2 Lessee does not warrant ownership ............................... 12
  10.3 Confidentiality of Reports ............................................. 13
10.4 Moral Rights consent from Lessee ........................................... 13
10.5 Moral Rights consent from third party authors ...................... 13
10.6 Supply of documentary evidence ........................................... 13

11 Goods and Services Tax ......................................................... 13
11.1 GST exclusive .................................................................. 13
11.2 Tax invoice ...................................................................... 14
11.3 Entitlement to input tax credit ............................................. 14
11.4 Defined terms in GST Act apply .......................................... 14

12 Notices ............................................................................. 14
12.1 Giving a notice .................................................................. 14
12.2 Serving a notice .................................................................. 14
12.3 Sufficiency of notice etc. .................................................... 15
12.4 Signatures ........................................................................ 15

13 Exercise of powers ............................................................... 15
13.1 Minister may delegate ........................................................ 15
13.2 Minister’s consent ............................................................... 15

14 Governing law and jurisdiction ............................................. 15
14.1 Law of Tasmania ................................................................. 15
14.2 Proceedings issued under or about this Lease ...................... 15

15 Confidentiality .................................................................... 15

Schedule 1 ............................................................................. 18
The Lease Area ........................................................................ 18
Addresses for service of notices ............................................. 20

Schedule 2 ............................................................................. 21
Item 1 (Refer clause 1.1, “Authorised Purpose”) ......................... 21
Item 2 (Refer clause 1.1, “Deposit”) .......................................... 21
Item 3 (Refer clause 1.1, “Term”) ............................................. 21
Item 4 (Refer clause 6.1(n)) ....................................................... 21
Item 5 (Refer clause 9.1(a)) ....................................................... 21

Schedule 3 ............................................................................. 22
Special Provisions .................................................................... 22

Schedule 4 ............................................................................. 23
State Forest ............................................................................. 23
### Parties

<table>
<thead>
<tr>
<th>Minister</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>The Honourable David Llewellyn MP, (&quot;the Minister&quot; which expression, where the context admits or requires, includes the Minister’s successors in office and a person acting as such Minister for the time being).</td>
</tr>
<tr>
<td>Address</td>
<td>The Director of Mines</td>
</tr>
<tr>
<td></td>
<td>Mineral Resources Tasmania</td>
</tr>
<tr>
<td></td>
<td>P O Box 56</td>
</tr>
<tr>
<td></td>
<td>Rosny Park</td>
</tr>
<tr>
<td></td>
<td>Tasmania 7018</td>
</tr>
<tr>
<td>Telephone</td>
<td>03 6233 8341</td>
</tr>
<tr>
<td>Fax</td>
<td>03 6233 8338</td>
</tr>
<tr>
<td>Attention</td>
<td>Registrar of Mines</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lessee</th>
<th>Name</th>
<th>Tasmania Mines Limited (&quot;Lessee&quot;).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incorporated in</td>
<td>New South Wales</td>
<td></td>
</tr>
<tr>
<td>Regn Number</td>
<td>009 491 990</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td>Level 33, 88 Phillip Street, Sydney, NSW, 2000</td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td>(02) 9251 4244</td>
<td></td>
</tr>
<tr>
<td>Fax</td>
<td>(02) 9247 2322</td>
<td></td>
</tr>
<tr>
<td>Attention</td>
<td>Ken Broadfoot</td>
<td></td>
</tr>
</tbody>
</table>

### Recitals

<table>
<thead>
<tr>
<th>Recitals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The Minister has decided to grant the Lessee's application under the Act for a mining lease over the Lease Area, subject to the terms and conditions in this Lease and the provisions of the Act.</td>
</tr>
<tr>
<td>B</td>
<td>The Minister is satisfied that the Lessee has satisfied the conditions, and done the things, required to be satisfied and done for the grant of a mining lease under the Act.</td>
</tr>
</tbody>
</table>

### Date of Lease

| Date of Lease | See Signing page |
1 Definitions and interpretation

1.1 Definitions

In this Lease unless the contrary intention appears, or the context requires otherwise:

"Act" means the Mineral Resources Development Act 1995;

"Authorised Purpose" means:

(a) to carry out Mining Operations in the Lease Area, for minerals of the Category (as defined in the Act) shown in Item 1 of Schedule 2; and

(b) (only to gain access to the Lease Area), to enter on, and pass over Crown land adjoining the Lease Area;

"Business Day" means a day on which authorised deposit-taking institutions (as defined in the Banking Act 1959 (Cwlth)) in Hobart are open for general banking business excluding, Saturdays, Sundays and public holidays;

"Deposit" means the sum shown in Item 2 of Schedule 2, determined by the Minister as the security deposit under the Act for this Lease, as varied under clause 7;

"Director" means the Director of Mines appointed under section 8 of the Act;

"Insolvent" means, for a natural person:

(a) having committed an act of bankruptcy;

(b) being made bankrupt; or

(c) being subject to an arrangement under part IV of the Bankruptcy Act 1966 (Cwlth);

and for a corporation:

(d) being wound up (other than for the purpose of restructure);

(e) having a controller appointed;

(f) coming under administration under the Corporations Act 2001 (Cwlth);

(g) being subject to an order for winding up or reconstruction; or
(h) having a receiver, a receiver and manager, an agent in possession, a trustee or guardian appointed to the property of the corporation;

"Inspector" has the same meaning as in the Act;

"Intellectual Property" means all copyright, patents, registered and unregistered trademarks, registered designs, trade secrets and know-how and all other intellectual property rights resulting from intellectual activity;

"Interest Rate" means the aggregate of two per cent (2%) per annum and the same rate as the rate prescribed for the purposes of section 36(a)(ii) of the Crown Lands Act 1976;

"Lease" means this mining lease granted under the Act;

"Lease Area" means the land described in Schedule 1;

"Legislative Requirements" means Acts, Ordinances, regulations, by-laws, orders, awards and proclamations of the Commonwealth, the State or a local government body exercising lawful jurisdiction;

"Lessee's Obligations" means the terms in Schedules 3 and 4;

"Mining Operations" has the same meaning as in the Act;

"Moral Rights" means:

(a) a right of attribution of authorship;

(b) a right not to have authorship falsely attributed; or

(c) a right of integrity of authorship;

granted to creators under the Copyright Act 1968 (Cwlth);

"Rent" means the annual rent prescribed under the Act;

"Reports" means the reports that the Lessee submits to the Director under the Act;

"Royalty" means the royalty prescribed under the Act;

"Special Provisions" means the terms in Schedule 3;

"Term" means the period from the date of this Lease until the date shown in Item 3 of Schedule 2.
1.2 Interpretation

In this Lease, unless the contrary intention is expressed:

(a) a reference to this Lease includes its schedules, appendices, annexures and attachments, and any variation or replacement of any of it;

(b) a reference to a statute, ordinance, code, or other legislative instrument includes regulations and other instruments under it and consolidations, amendments, re-enactments or replacements of any of them;

(c) the singular includes plural and conversely;

(d) a reference to a gender includes reference to each other gender;

(e) a reference to a person includes:

(i) an individual, a firm, a body corporate, an unincorporated association or a statutory or responsible authority or other authority, as constituted from time to time; and

(ii) the person’s executors, administrators, successors and permitted assigns;

(f) an agreement, representation or warranty by, or for, two or more persons binds, or is for their benefit, together and separately;

(g) a covenant forbidding a person from doing something, also forbids that person from authorising or allowing another person to do it;

(h) a reference to any thing (including an amount) is a reference to the whole or any part of it and a reference to a group of persons is a reference to any one or more of them;

(i) a reference to a clause, paragraph, schedule, annexure or appendix, is a reference to a clause, paragraph, schedule, annexure or appendix in or to this Lease;

(j) a reference to a day is to be interpreted as the period of time starting at midnight and ending twenty-four (24) hours later;

(k) a reference to a month or a year means a calendar month or a calendar year respectively;

(l) words or phrases derived from a defined word have a corresponding meaning to the defined word;

(m) a term of inclusion is not to be interpreted as a term of limitation;
(n) all payments referred to in, or to be made under, this Lease must be in Australian dollars;

(o) a reference to the payment of money within a specified time, means the full clearance of any cheque into the payee's account within that time;

(p) it operates under Tasmanian time;

(q) headings are included for convenience only and do not form part of it and are not be used in its interpretation;

(r) if a party consists of more than one person then this Lease binds all or any two or more of them jointly and each of them severally;

(s) an uncertainty or ambiguity in the meaning of a provision is not to be interpreted against a party only because that party prepared the provision;

(t) if a day appointed for the payment of money or the performance of an act, falls on a day that is not a Business Day, then the day for the payment of that money or the performance of that act will instead be the Business Day immediately following the appointed day; and

(u) "writing" includes typing, lithography, photography and other modes of representing or reproducing words, figures, diagrams and symbols in a tangible and visible form.

2 Grant of Lease

2.1 Grant

In consideration of the Lessee paying the Rent, the Minister, acting under section 81(1) of the Act, leases the Lease Area to the Lessee exclusively for the Authorised Purpose, subject to:

(a) the terms and conditions in this Lease; and

(b) the provisions of the Act.

2.2 Term

This Lease is in force for the Term, unless revoked earlier.

3 Rent and Royalty

The Lessee must pay the Rent and the Royalty as required under the Act.
4 Conditions of Lease

In addition to the conditions imposed under the Act, this Lease is issued subject to the following conditions:

(a) the Lessee must not use the Lease Area for any purpose other than the Authorised Purpose;

(b) the Lessee must observe and perform the Lessee’s Obligations strictly and punctually;

(c) the Lessee must comply with all applicable Legislative Requirements;

(d) the Lessee must insure as provided in clause 9;

(e) the Lessee must not become Insolvent;

(f) the Lessee must comply strictly with:
   (i) the Lessee’s covenants in clause 6; and
   (ii) the requirements of clause 7(b).

5 Lessee’s failure to comply with a condition

5.1 Minister may remedy default

The Minister, or a person appointed by the Minister, may:

(a) enter the Lease Area and carry out work necessary to secure observance, performance and compliance with all of the terms and conditions contained in this Lease; and

(b) take whatever action is necessary to remedy a breach of a Legislative Requirement or Lease condition, without prejudice to any other available remedy.

5.2 Lessee must reimburse Minister

The Lessee must reimburse to the Minister all costs incurred under clause 5.1 within seven days of demand, together with interest at the Interest Rate, calculated from the date of expenditure by the Minister to the date of payment by the Lessee.

5.3 Minister may distrain

In addition to any other available right or remedy, the Minister may distrain for unpaid Rent or Royalty.
6 Lessee’s covenants

6.1 Covenants

The Lessee covenants with the Minister as follows:

(a) not to start any work for the Authorised Purpose until all Legislative Requirements have been satisfied;

(b) to extract as much of the economic mineral or minerals in the Lease Area as is consistent with the Authorised Purpose, safety and good mining practice;

(c) to take such steps as an Inspector directs, to avoid or protect mining features or artefacts in the Lease Area considered to be of cultural heritage significance;

(d) to undertake an audit of the heritage values of the Lease Area, if directed to do so by the Director, and to deliver the audit report to the Director;

(e) to notify the Inspector if mining features or artefacts, thought to be of significance, are uncovered by Mining Operations;

(f) to carry out all Mining Operations consistently with the mining plan most recently approved by the Director for the Lease Area;

(g) whenever the Director requires, to submit to the Director, an updated mining plan that takes into account:

(i) changes to relevant Legislative Requirements and codes of practice;

(ii) changes to the environmental effects of the Mining Operation;

(iii) changes to permit or Lease conditions;

(iv) unforeseen environmental effects of the Mining Operation; or

(v) changes in the scale or nature of the Mining Operation;

(h) to stack non-merchantable timber and other vegetation cleared from the Lease Area, within a cleared area;

(i) not to cut, remove or use any timber on the Lease Area for mining or domestic purposes without the prior written approval of an Inspector, or in the case of State Forest, of the District Forester;
(j) to provide drains and settling ponds to the Director’s satisfaction, designed and maintained to meet or exceed the following requirements:

(i) to mitigate reasonably foreseeable sediment loss that would result from a one in 10 year storm event;

(ii) discharge from ponds must occur via a stable spillway that is not subject to erosion;

(iii) all dam walls must be stable, treated with topsoil and vegetated or otherwise treated so as to prevent erosion;

(iv) ponds must be cleaned out regularly so that, at any time, no more than two-thirds of the depth of the pond contains sediment; and

(v) sediment removed during cleaning must be securely deposited so that it will not be transported off the Lease Area by surface run-off;

(k) not to damage or interfere in any way with existing or future roads, tracks, water licences or easements, or drainage systems on the Lease Area;

(l) to repair any damage to existing or future roads, tracks, water licences or easements, or drainage systems on the Lease Area at the Lessee’s cost, to the satisfaction of an Inspector;

(m) to remove and stockpile surface soil separately from other overburden;

(n) to rehabilitate worked-out areas concurrently with Mining Operations, so that, except with the Director’s prior written approval, the un-rehabilitated area does not exceed the area shown in Item 4 of Schedule 2, at any time;

(o) not to clear any vegetation or undertake any earthworks, outside the proposed area of disturbance shown on the mining plan, without the Director’s prior written approval;

(p) to take immediate action to suppress any fire for which there is no permit, that commences on the Lease Area during Mining Operations;

(q) to retain all tailings, waste rock and overburden within the Leased Area and to rehabilitate disturbed areas to the Director’s satisfaction;

(r) to ensure that all equipment entering or leaving the Lease Area is clean and free from earth, mud or vegetation, to minimise the risk of weeds or plant diseases being spread to and from the site;
(s) to establish within the Lease Area and maintain throughout the Term, an adequate, stable buffer zone at least 10 metres wide, and parallel to, the Lease Area common boundary with all adjoining land occupied or used by another;

(t) not to conduct Mining Operations or ancillary activities on the buffer zone without the prior written approval of an Inspector and the occupier of the adjoining land;

(u) when Mining Operations are coming to an end:

(i) to give the Director at least four weeks prior written notice of the date on which the Lessee expects to cease Mining Operations; and

(ii) subject to paragraphs (d) and (e) of this clause, if a shaft, an adit, an excavation, a stockpile, wastes, a dam, or other workings, or the access to them, is likely to constitute a hazard, to cap, fill, grade or rehabilitate the workings to remove or otherwise secure the hazard to the Director’s satisfaction; and

(iii) to rehabilitate worked out areas of the Lease Area, including revegetating the Lease Area surface, to the Director’s satisfaction; and

(iv) subject to paragraphs (d) and (e) of this clause, to remove all structures, equipment, hazardous substances and debris from the Lease Area unless the Director directs otherwise.

6.2 Unworked mineral

The Director (whose decision on the matter is final), will determine whether the Lessee has satisfied clause 6.1(b).

6.3 Conflict with Quarry Code of Practice

If a permit condition under the Land Use Planning and Approvals Act 1993, or a Lease condition under this Mining Lease, conflicts with the Quarry Code of Practice approved under section 204 of the Act, then the permit or Lease condition takes precedence.

7 Increased security deposit

(a) The Minister may require the Lessee to increase the value of the Deposit whenever, and as often as, the Minister sees fit.

(b) The Lessee must provide any increased Deposit within 20 Business Days after being required to do so.
8 Lessee's indemnities and waiver

8.1 Lessee indemnifies Minister for third party risk

The Lessee indemnifies the Minister against all present and future legal liability, claims, or proceedings for:

(a) personal injury to, or death of a third party;
(b) either or both loss of, or damage to, property of a third party; and
(c) financial loss of a third party;

arising from, or attributable to, the Lessee's occupation or use of the Lease Area.

8.2 Lessee indemnifies Minister against loss and damage

The Lessee indemnifies the Minister against all loss and damage to the Lease Area and all property on it arising from, or attributable to, the Lessee's occupation or use of the Lease Area.

8.3 Waiver of rights of recovery from the Minister

The Lessee waives all present and future rights to claim against the Minister for:

(a) personal injury to, or death of, the Lessee;
(b) either or both loss of, or damage to, any of the Lessee's property; and
(c) financial loss to the Lessee;

arising from, or attributable to, the Lessee's occupation or use of the Lease Area.

8.4 Nature of indemnities and waiver

The indemnities and waiver in this clause 8:

(a) do not extend to liability caused by the Minister's wrongful (including negligent) act or omission;
(b) are continuing obligations of the Lessee, separate and independent from any other obligations; and
(c) survive the termination of this Lease.
9 Insurance

9.1 Lessee to insure

The Lessee must hold and keep current throughout the Term and for as long as the Lessee occupies the Lease Area, contracts of insurance with a reputable insurer lawfully carrying on insurance business in Australia, indemnifying:

(a) the Minister’s and the Lessee’s respective liability for:

(i) personal injury to, or death of, a third party; and

(ii) either or both loss of, or damage to, the property of a third party;

for at least the sum shown in Item 5 of Schedule 2, for each individual claim or series of claims arising out of a single occurrence, or for such other amount as the Minister reasonably determines from time to time;

(b) the Lessee’s liability for workers' compensation; and

(c) any other risks that the Minister reasonably requires the Lessee to insure against, for the amount stipulated by the Minister, to the extent that the claim for indemnity is not caused by the Minister’s wrongful (including negligent) act or omission.

The liability to be insured against under paragraph (a) is liability arising from, or attributable to, the Lessee’s occupation or use of the Lease Area, to the extent that the injury, death, damage or loss is caused by a wrongful (including negligent) act or omission of the Lessee or the Lessee’s employees, agents, sub-contractors or invitees.

9.2 Crown to be named as principal

Insurance under clause 9.1(a) must cover "the Crown in Right of Tasmania" as principal under the insurance contract.

9.3 Lessee to notify Director

The Lessee must notify the Director in writing as soon as practicable:

(a) if an insurance contract taken out under clause 9.1 lapses, is cancelled or is materially altered; or

(b) if an insurance contract taken out under clause 9.1 is materially altered; or

(c) if the Lessee claims, or becomes entitled to claim under such an insurance contract for something related to this Lease.
9.4 Evidence of insurance

The Lessee must give the Director evidence of:

(a) the terms of; and
(b) payment of the premium for;

each insurance contract taken out under clause 9.1,
(c) before the Lessee exercises rights under the Lease; and
(d) before each due date for renewal of each such insurance contract.

9.5 Minister may insure

If the Lessee fails to hold or renew each insurance contract required under clause 9.1, then without being obliged to do so, the Minister may:

(a) take out or renew an insurance contract that the Lessee does not hold or has not renewed; and

(b) pay any unpaid premium.

The Lessee must pay to the Director, on demand, all costs that the Minister or the Director incurs to do that, and interest on those costs, at the Interest Rate, from the date of outlay to the date of payment.

9.6 Lessee not to prejudice insurance

The Lessee must not do anything that may result in an insurance contract taken out under clause 9.1, or any part of it, becoming invalid or unenforceable.

10 Licence to use Reports

10.1 Grant of licence

Subject to clauses 10.2 and 10.3, the Lessee grants to the Minister a permanent, irrevocable, free, world-wide, non-exclusive licence (including a right of sub-licence) to use, reproduce, publish, adapt and exploit the Intellectual Property in all Reports, for any Crown purpose.

10.2 Lessee does not warrant ownership

(a) The Lessee does not warrant ownership of all Intellectual Property in the Reports.

(b) The Lessee must use best endeavours to identify to the Director, those parts of each Report in which another person holds Intellectual Property rights.
10.3 Confidentiality of Reports

(a) The Minister will keep confidential, for the Term and any renewal of the Term, all Reports about activities lawfully conducted under the Lease, unless:

(i) the Lessee waives entitlement to confidentiality for a Report; or

(ii) a Report deals exclusively with areas that are no longer part of the Lease Area.

(b) The Lessee’s right to confidentiality of the Reports:

(i) continues under a new consolidated mining lease or other tenement issued on condition of surrender of the original tenement, to enable the granting of the new consolidated mining lease or other tenement; but

(ii) ceases if the Lessee fails to lodge a Report as required under the Act.

10.4 Moral Rights consent from Lessee

The Lessee unconditionally consents to any infringement of the Lessee’s Moral Rights resulting from any use of the Reports by or on behalf of the Crown, for any Crown purpose.

10.5 Moral Rights consent from third party authors

To the extent that a third party has Moral Rights in the Reports, the Lessee warrants that it has obtained the third party’s unconditional consent to any use of those materials by or on behalf of the Crown, for any Crown purpose.

10.6 Supply of documentary evidence

If the Director so requests, the Lessee must promptly provide to the Director, all Moral Rights consents required by clauses 10.4 and 10.5.

11 Goods and Services Tax

11.1 GST exclusive

Subject to any other provision of this Lease expressing a contrary intention, if GST is imposed on a supply made under it, then the party paying for the supply must pay the amount of the GST to the party making the supply, at the same time as, and in addition to, the amount payable for the supply.
11.2 **Tax invoice**

A party making a taxable supply under this Lease must give the recipient a tax invoice for the taxable supply when that supply is made.

11.3 **Entitlement to input tax credit**

If, under this Lease, a party is required to indemnify another party, or to make a reimbursement or contribution to another party, and that other party can obtain an Input Tax Credit on an acquisition associated with that indemnity, reimbursement or contribution, then the amount the party is required to pay is:

(a) reduced by the amount of that Input Tax Credit; but

(b) increased by any GST payable by that other party in respect of the indemnity, reimbursement or contribution.

11.4 **Defined terms in GST Act apply**

In this clause “GST” refers to goods and services tax under *A New Tax System (Goods and Services) Act 1999* (“GST Act”) and the terms used have the meanings as defined in the GST Act.

12 **Notices**

12.1 **Giving a notice**

(a) A notice or other communication to be given or made under this Lease must be in writing and addressed, as the case may be, to the receiving party at their address in Schedule 1.

(b) A party may from time to time change its address or number for service by giving written notice to the other party.

12.2 **Serving a notice**

A notice or other communication is taken to have been duly served:

(a) in the case of hand delivery - when delivered;

(b) if sent by prepaid post - on the third Business Day after the date of posting;

(c) if sent by facsimile transmission (if the sending facsimile machine produces a print out of the time, date and uninterrupted transmission record of the sending of the notice) - upon completion of sending if completion is within ordinary business hours in the place where the recipient’s facsimile machine is located, but if not, then at 9.00 a.m. on the next Business Day.
12.3 **Sufficiency of notice etc**

A notice or other communication to be given or made under this Lease, is sufficient if:

(a) in the case of the Minister, it is signed by the Minister, or a duly authorised officer of the Minister’s Department, or the Minister’s solicitors;

(b) in the case of the Lessee, it is signed by the Lessee or the Lessee’s agent or solicitors.

12.4 **Signatures**

A printed or copied signature is sufficient when sending a demand, written consent or other communication by facsimile transmission.

13 **Exercise of powers**

13.1 **Minister may delegate**

The Minister may exercise any powers, authorities and discretions through permanent officers or any other person or corporation appointed in writing for that purpose.

13.2 **Minister’s consent**

If the Minister’s consent is required to be obtained under the provisions of this Lease, the Minister may give or withhold the consent at the Minister’s absolute discretion and on the conditions that the Minister imposes.

14 **Governing law and jurisdiction**

14.1 **Law of Tasmania**

This Lease is governed by the law of Tasmania, and the parties submit to the jurisdiction of the Courts of Tasmania.

14.2 **Proceedings issued under or about this Lease**

Any proceedings issued against the Minister or the Director under or about this Lease, must be instituted either:

(a) in a Tasmanian court; or

(b) in the Federal Court, from the Tasmanian Registry of that court.

15 **Confidentiality**

(a) Despite any confidentiality or intellectual property right subsisting in this Lease or a schedule, appendix, annexure or attachment to it,
either party may publish all or any part of it without reference to the other.

(b) Nothing in this clause derogates from a party’s obligations under the *Personal Information Protection Act 2004* (Tas) or the *Privacy Act 1988* (Cwlth).

*Executed* as a deed.
Signing page

Dated: 29th September 2008

Signed Sealed and Delivered for The Crown in Right of Tasmania by The Honourable, David Llewellyn MP, being and as the Minister for Energy and Resources in the presence of:

[Signature]

Signature of witness

Nick Watson
Name of witness (block letters)

[Address]

Address of witness

[Occupation]

Occupation

The Common Seal of TASMANIA MINES LIMITED (ACN 009 491 990) fixed in the presence of:

[Signature]

Director

[Signature]

Director/Secretary

Mining Lease BM/2008
Schedule 1

The Lease Area
PLAN-SUBJECT TO SURVEY

STATE
1371P/M 722 ha
5 426 000mN

Tasmania Mines Ltd
M.L. 62/6ss

F.R. 128367 / 3
Associated Forest Holdings Pty Ltd
Owner

8M/2008
44 ha
Land
Demised

1M/1997
7 ha

POSTED NOTICE
398 668mE
5 425 233mN

Associate Forest Holdings Pty Ltd
Owner

Coordinate Datum - GDA94 MGA Zone 55

LAND DISTRICT DEIVON VICINITY HAMPISHIRE (5.5 KM S OF)
MUNICIPALITY BURNIE MAP PARRAWE 1:25000
APPLICATION NO. 8M/2008 AREA 44 ha SCALE 1:10000
APPLICANT TASMANIA MINES PTY LTD

DRAWN J. Meares EXAMINED Atkinson Date 26/8/08 VOL. 79
DIRECTOR OF MINES Date 26/8/08 FOLIO 37
Addresses for service of notices

1. The Minister: As in the Details

2. The Lessee: As in the Details
Schedule 2

Item 1 (Refer clause 1.1, “Authorised Purpose”)

Mineral Category; Category 3 - Construction Minerals.

Item 2 (Refer clause 1.1, “Deposit”)

Deposit: $15,000.00.
The deposit will be reviewed following the approval of your planning and environmental permit and before construction commences.

Item 3 (Refer clause 1.1, “Term”)

Term end date: 1 May 2011.

Item 4 (Refer clause 6.1(n))

Un-rehabilitated area: one hectare

Item 5 (Refer clause 9.1(a))

Public risk insurance cover: $20 Million.
Schedule 3

Special Provisions

- The Minister may review the tenure of the lease if the dam does not proceed prior to the expiry date of 1 May 2011.
Schedule 4

State Forest

This Schedule applies to all parts of the Lease Area that are State Forest.

(a) The Lessee must liaise with the District Forester responsible for the Lease Area before starting Mining Operations likely to affect State Forest or forestry operations on the Lease Area.

(b) The Lessee must compensate Forestry Tasmania for each tree removed, at its market value at the time of removal.

(c) The Lessee must give Forest officers and their agents free access to the Lease Area, including the use of roads and tracks for forestry purposes, throughout the Term.

(d) The Lessee must sell to Forestry Tasmania, its contractors and agents, forest products:

   (i) occurring naturally on the Lease Area; and

   (ii) to which the Lessee is entitled;

that Forestry Tasmania reasonably requires, if Forestry Tasmania agrees to pay market value for winning or producing that material.

(e) If the Lessee and Forestry Tasmania fail to agree about what constitutes market value under this Schedule, the Director may finally determine the issue.