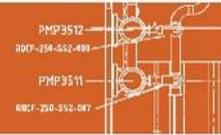


# Coordinator-General's Report

## Tarong Northern Land Ash Emplacement - Stage 1 Project

Report evaluating the Environmental Impact  
Statement, pursuant to Section 35 of the *State  
Development and Public Works Organisation Act  
1971* (Qld)

November 2007



# Tarong Northern Land Ash Emplacement - Stage 1 Project

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# Coordinator-General's Report - Synopsis

The Proponent for the Project is Tarong Energy Corporation Limited (TEC). TEC is a Queensland Government Owned Corporation and a public company established under the *Commonwealth Corporations Act 2001*.

TEC is proposing to develop a new ash storage facility to service the future requirements of both the Tarong and Tarong North Power Stations. The proposed facility is to be constructed in two stages. Stage 2 will only proceed if there is an identified need for additional ash storage after completion of Stage 1. On this basis, TEC proposed to undertake the environmental assessment for each stage in separate Environmental Impact Statements (EISs) under the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act).

Ash is produced as a by-product of the coal combustion process used in thermal power stations. It is formed from the non-combustible mineral fraction of the coal. The continuous collection and disposal of ash is an integral part of the power generation process.

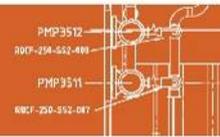
At present this ash is disposed of in an existing ash dam. At normal operating levels, the ash dam was expected to reach capacity in mid-2008. At current reduced operating levels, brought about by the current water shortage crisis, the existing dam will reach capacity by December 2008. It is vital to the Queensland community and economy that the Tarong power stations have adequate long-term ash disposal facilities available in order to remain operational.

Stage 1 of the new ash storage facility is located approximately 3.5 km north of the existing Tarong ash dam, will cover an area of 2 km<sup>2</sup>, have a storage capacity of 45 million m<sup>3</sup> and a predicted storage life of 20 years at the anticipated rate of ash production.

The majority of the ash from the power stations will be pumped to the proposed facility as a dense phase slurry via a dedicated pipeline. Furnace ash from the Tarong North Power Station will be transported to the proposed facility by truck. Ash will be stacked as a dense phase material to create an above ground stable landform. The landform will be progressively developed over-time from the western side of the site until such time as it reaches a flat top at a level approximately 60 m in height.

TEC lodged an Initial Advice Statement with the Coordinator-General on 20 October 2005 and the Tarong Northern Land Ash Emplacement Project (Stages 1 and 2) was declared to be a "significant project for which an EIS is required", pursuant to s.26 of the SDPWO Act on 29 November 2005.

Draft Terms of Reference (ToR) for an EIS for the Tarong Northern Land Ash Emplacement Stage 1 Project (the Project) were prepared and advertised for public comment. The final ToR were issued to TEC following consideration of public and Advisory Agency comments.



The EIS was subsequently advertised for public comment. All submissions were forwarded to TEC for its consideration and, following discussions with the TEC and its technical consultants, it was determined that the preparation of a Supplementary EIS (SEIS) was necessary to address substantive issues that were raised.

TEC prepared the SEIS, which provided additional information or clarification of specific matters raised in the EIS and it was forwarded to Advisory Agencies requesting their specific comments or advice for consideration in preparing this report.

Key environmental issues raised in submissions included landform stability; erosional stability; leachate monitoring; revegetation; rehabilitation and final land use of site; air quality; noise; and property devaluation. I have provided comments on these matters and, where necessary, recommended requirements to mitigate adverse impacts.

This Report has been prepared pursuant to s.35 of the SDPWO Act to evaluate the environmental effects of the Project and provides an evaluation of the EIS process for the Project.

In evaluating the environmental effects, I have considered: the EIS, SEIS and detailed Environmental Management Plans (EMPs) prepared by TEC; public submissions received on the EIS; comments on the EIS and other advice provided by State and local government authorities (Advisory Agencies); and other relevant information.

Having regard to the above, I consider that the EIS for the Project has adequately addressed the environmental and other impacts of the project and generally meets the requirements of the Queensland Government for impact assessment in accordance with the provisions of Part 4 of the SDPWO Act.

I consider that on balance there is an overriding need for the Project to ensure the availability of reliable electricity supply for Queensland. Therefore, I recommend that the Project, as described in detail in the EIS and SEIS and summarised in Section 2 of this report, can proceed, subject to specific requirements.

TEC propose to seek a designation of land for the project for Community Infrastructure in accordance with the process detailed in Chapter 2, Part 6 of the *Integrated Planning Act 1997* (Qld). As such, my report recommends specific requirements, contained in *Appendix 1 –Recommended Requirements pursuant to Section 43 of the SDPWO Act 1971 & Appendix 2 – Other Recommendations* that the relevant Minister may have regard to in making the designation under section 2.6.4(a) of the *Integrated Planning Act 1997*.

.....  
**Colin Jensen**  
**Coordinator-General**  
**Date: November 2007**

# 1.0 Introduction

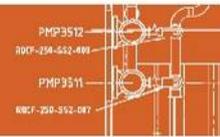
This Report has been prepared pursuant to s.35 of the *State Development and Public Works Organisation Act 1971* (Qld) (SDPWO Act) and provides an evaluation of the Environmental Impact Statement (EIS) process for the Tarong Northern Land Ash Emplacement Stage 1 Project (the Project). The EIS was undertaken by Tarong Energy Corporation Limited and prepared on its behalf by Parsons Brinkerhoff Australia Pty Limited.

On 29 November 2005, the Tarong Northern Land Ash Emplacement project (Stages 1 and 2) was declared to be a “significant project for which an EIS is required”, pursuant to s.26 of the SDPWO Act.

The Project was referred to the Federal Minister for the Environment and Heritage under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) on 7 March 2006 (reference number EPBC 2006/2641). On 3 April 2006, the Minister determined that the Stage 1 proposal does not constitute a controlled action pursuant to s.75 of the EPBC Act. Consequently, the Project does not require assessment and approval under the EPBC Act.

The objective of this Report is to summarise the key issues associated with the potential impacts of the Project on the physical, social and economic environments at the local, regional, state and national levels. It is not intended to record all the matters that were identified and subsequently settled. Instead, it concentrates on the substantive issues identified during the EIS process.

TEC propose to seek a Community Infrastructure Designation (CID) for the Project, under Part 6 of the *Integrated Planning Act 1997* (IPA).



## 2.0 Project description

### 2.1 The Proponent

The Proponent for the Project is Tarong Energy Corporation Limited (TEC). TEC is a Queensland Government Owned Corporation and a public company established under the *Commonwealth Corporations Act 2001*. TEC participates in the National Energy Market. Shares in TEC are held by Ministers of the Queensland State Government on behalf of the State of Queensland.

### 2.2 The Project

TEC is proposing to develop a new ash storage facility to service the future requirements of both the Tarong and Tarong North Power Stations. The proposed facility is to be constructed in two stages. Stage 2 will only proceed if there is an identified need for additional ash storage after completion of Stage 1. On this basis, TEC proposed to undertake the environmental assessment for each stage in separate EISs under the SDPWO Act.

The Stage Project 1 is located approximately 3.5 km north of the existing Tarong ash dam (see Figure 1), will cover an area of 2 km<sup>2</sup>, have a storage capacity of 45 million m<sup>3</sup> and a predicted storage life of 20 years at the anticipated rate of ash production. Stage 2 would be on land immediately to the north of Stage1. Land for both stages of the proposed ash storage facility is owned by TEC.

The majority of the ash from the power stations will be pumped to the proposed facility as a dense phase slurry via a dedicated pipeline. Furnace ash from the Tarong North Power Station will be transported to the proposed facility by truck.

Ash will be stacked as a dense phase material to create an above ground stable landform. The landform will be progressively developed over-time from the western side of the site until such time as it reaches a flat top at a level approximately 60 m in height, which is an elevation about the same as the Nanango-Neumgna Road. The front face of the landform will be built up using a series of 3 m high bunds in a stepped fashion. These bunds will act as the capping layer for the front face of the landform and will slope at 12.5%. The top flat section of the landform will slope at 1.5% and will be covered by topsoil 1 m thick.

The dense phase ash placement method will allow a greater storage density to be achieved than in the existing dam and placement will be managed to allow progressive rehabilitation. Any excess run off water from the proposed facility will be collected for reuse in the power stations or other uses as required.

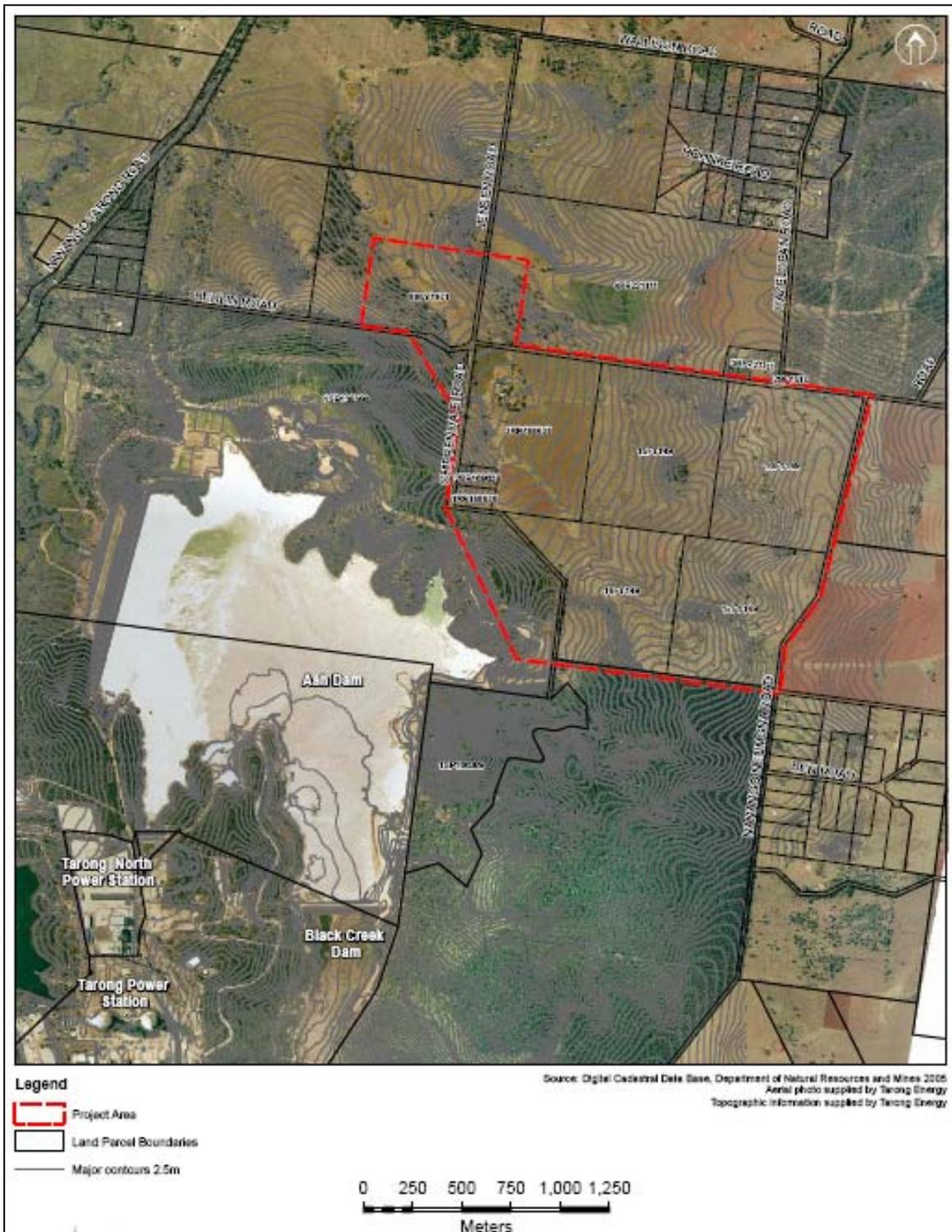
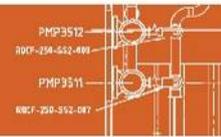


Figure 1: Project Location - Stage 1



## 2.3 Project rationale

The Tarong Power Stations supply low-cost reliable electricity to the National Electricity Market. The Tarong site currently has a generating capacity of 1,845 MW and is the largest thermal electricity power station complex in Queensland. The size and location of the Tarong power stations dictates that they play an integral role in the supply of electricity to southern Queensland.

Ash is produced as a by-product of the coal combustion process used in thermal power stations. It is formed from the non-combustible mineral fraction of the coal. The continuous collection and disposal of ash is an integral part of the power generation process. At normal generation levels, approximately 1.6 million tonnes of ash per year needs to be disposed of on-site.

At present this ash is disposed of in the existing ash dam. At normal operating levels, the ash dam was expected to reach capacity in mid-2008. At current operating levels the existing dam will reach capacity by December 2008. It is vital to the Queensland community and economy that the Tarong power stations have adequate long-term ash disposal facilities available in order to remain operational.

## 3.0 Impact Assessment Process

### 3.1 Declaration of a Significant Project

TEC lodged an Initial Advice Statement (IAS) with the Coordinator-General on 20 October 2005 requesting that the Tarong Northern Land Ash Emplacement Project be considered for declaration as a significant project under part 4 of the SDPWO Act. After consideration of the matters under s.27 of the Act, the Tarong Northern Land Ash Emplacement Project (Stages 1 and 2) was declared to be a 'significant project for which an EIS is required' on 29 November 2005, pursuant to s.26 (1)(a) of the SDPWO Act.

The declaration was publicly notified in the Queensland Government Gazette and is available on the Coordinator-General's website, at: <http://www.coordinatorgeneral.qld.gov.au/eis>

### 3.2 Review and refinement of the EIS Terms of Reference

Draft Terms of Reference (ToR) for an EIS for the Project were prepared and advertised for public comment on 21 & 22 April 2006 in the South Burnett Times and Courier Mail newspapers respectively. Comments were accepted until close of business (cob) on 22 May 2006. The final ToR were issued to TEC on 24 July 2006, following consideration of public and Advisory Agency comments.

A total of six submissions on the draft ToR were received from Advisory Agencies and one from a private individual, as follows:

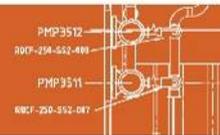
- Department of Aboriginal and Torres Strait Islander Policy;
- Department of Main Roads;
- Department of Emergency Services;
- Department of Natural Resources, Mines and Water;
- Environmental Protection Agency;
- Nanango Shire Council; and
- Ms W Buttsworth.

### 3.3 Public review of the EIS

Once TEC had prepared an EIS to the satisfaction of the Coordinator-General, it was approved for public release. The EIS was advertised on 17 & 18 November 2006, in the South Burnett Times and Courier Mail newspapers respectively, inviting submissions until cob on Monday 18 December 2006. A CD-ROM copy of the EIS was available free of charge from TEC.

The EIS was displayed at:

- Nanango Municipal Library;
- Yarraman Public Library;
- T.J. O'Neill Memorial (Kingaroy) Library; and
- State Library of Queensland, Info Zone, South Bank, Brisbane.



Information on the Project was available via the Coordinator-General's web site and public information sessions were held at:

- Nanango Cultural Centre;
- Kingaroy Town Hall; and
- Yarraman Community Hall.

The following Advisory Agencies were approached formally to conduct an evaluation of the EIS:

- Nanango Shire Council;
- Department of Aboriginal and Torres Strait Islander Policy;
- Department of Communities;
- Department of Emergency Services;
- Department of Local Government, Planning, Sport and Recreation;
- Department of Main Roads;
- Department of Mines and Energy;
- Department of Natural Resources and Water;
- Department of Primary Industries and Fisheries;
- Environmental Protection Agency;
- Department of State Development;
- Queensland Health;
- Queensland Transport; and
- Queensland Treasury.

Following a six-week public review of the EIS a total of eleven submissions were received, eight from Advisory Agencies and three from members of the public as follows:

- Nanango Shire Council;
- Department of Emergency Services;
- Department of Main Roads;
- Department of Natural Resources and Water;
- Department of Primary Industries and Fisheries;
- Department of State Development;
- Environmental Protection Agency;
- Queensland Health;
- Ms J Tesch;
- Mrs J Manwaring; and
- Mr T Sullivan.

The substantive issues raised in submissions were as follows:

- Landform stability;
- Erosional stability;
- Leachate monitoring;
- Revegetation;
- Rehabilitation and final land use of site;
- Air quality;
- Noise; and
- Property devaluation.

All submissions were forwarded to TEC for its consideration. Following discussions with the TEC and its technical consultants, it was determined that

the preparation of a Supplementary Report to the EIS (SEIS) was necessary to address substantive issues that were raised.

### 3.4 Review of Supplementary EIS

TEC prepared the SEIS, which provided additional information or clarification of specific matters raised in the EIS. On 8 May 2007, the SEIS was forwarded to Advisory Agencies requesting their specific comments or advice for consideration in preparing this report. The SEIS was also forwarded to other respondents to the EIS for their information and made available on the Coordinator-General's and TEC's websites.

The following Agencies advised that they were satisfied that their interests had been adequately addressed:

- Department of Emergency Services; and
- Office of Aboriginal and Torres Strait Islander Policy (Department of Communities).

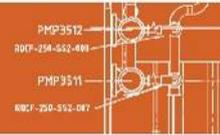
The following Agencies either provided advice and/or recommended conditions for consideration by the Coordinator-General:

- Environmental Protection Agency;
- Department of Main Roads;
- Department of Natural Resources and Water;
- Department of Primary Industries and Fisheries; and
- Queensland Health.

No comments on the SEIS were received from the following agencies:

- Department of Mines and Energy;
- Queensland Transport;
- Department of Local Government, Planning, Sport and Recreation;
- Treasury Department;
- Nanango Shire Council; and
- Department of State Development.

Substantive issues raised in submissions are discussed individually in the following section.



## 4.0 Evaluation of Environmental Effects

### 4.1 Introduction

The SDPWO Act defines 'environment' to include:

- a) ecosystems and their constituent parts, including people and communities;
- b) all natural and physical resources; and
- c) the qualities and characteristics of locations, places and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony and sense of community; and
- d) the social, economic, aesthetic and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).

'Environmental effects' means "the effects of development on the environment, whether beneficial or detrimental". These effects can be direct or indirect, of short, medium or long-term duration and cause local or regional impacts.

TEC propose to seek a designation of land for the Project for Community Infrastructure under Chapter 2, Part 6 of the *Integrated Planning Act 1997* (IPA). In evaluating the environmental effects of the Project, pursuant to s.35 of SDPWO Act, I have made findings on the major environmental effects identified during the EIS process. In order to be satisfied that unavoidable adverse environmental effects can be adequately managed, I have recommended requirements, pursuant to s.43 of SDPWO Act, that the relevant Minister may consider in making the designation under s.2.6.4(a) of IPA.

I also recommend that TEC implements other specific actions (collated in Appendix 2 – Other Recommendations), in accord with best practice environmental management, to mitigate particular impacts of the Project. These recommendations, which cannot be attached as a condition to any statutory approval, reflect the objectives stated in the EIS documentation.

In making my evaluation, I have considered the following materials:

- a) Tarong Energy's Northern Land Ash Emplacement Project Environmental Impact Statement Volumes 1 to 3 – Parsons Brinckerhoff Australia, November 2006;
- b) Tarong Energy's Northern Land Ash Emplacement Project Supplementary Environmental Impact Statement – Parsons Brinckerhoff Australia, May 2007;
- c) Properly made submissions on the EIS and Supplementary EIS received from persons and Advisory Agencies;
- d) Tarong Northern Land Ash Emplacement Project Landform failure risk assessment – preliminary report October 2007; and
- e) Relevant Queensland legislation.

The following section outlines the major environmental effects identified during the EIS process, including those raised in the EIS, SEIS, in submissions on the EIS and in consultation with Advisory Agencies and other key stakeholders.

## 4.2 Substantive Issues

### 4.2.1 Landform stability – liquefaction

#### EIS Findings and/or Key Points

Initial assessments of the ash material indicated that the ash is potentially liquefiable in that it may become unstable during extreme storm or seismic events.

EPA, in its comments on the EIS, recommended that details be provided regarding the use of under-drains to keep the tailings water table down in the ash heaps and as to how the risk of liquefaction will be minimised.

TEC has incorporated a floor drainage system, in the form of finger drains, into the design of the landform to reduce the phreatic surface present in the stored ash (refer to Drawing S014 of Appendix B, SEIS). Reducing the phreatic surface within the landform aids in stability by reducing the risk of liquefaction occurring in the event of a seismic disturbance.

Seepage and liquefaction modelling have been undertaken. Modelling results indicate that a low phreatic surface level will be present in the medium to long-term, but given the expected negative pore pressures in the ash, it is not expected that this zone will be fully saturated.

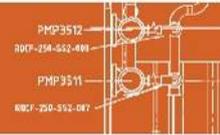
During the operational phase of the project, a series of monitoring stations (refer to Drawing S016 of Appendix B, SEIS) will be set up in order to monitor the phreatic surface level within the ash and also the level of saturation. In the interim, whilst field monitoring is being used to validate the desktop modelling, a containment bund will be progressively constructed in the north-west corner of the site (refer to Drawing S018 of Appendix B, SEIS) in order to provide an additional level of safety against the spread of material off site in the event of liquefaction.

The design height of the bund includes allowances for the following:

- containment of slumped ash;
- allowance for a WSA0.01 storm event (a water storage allowance that ensures that the risk of a spill in any given year is equal to 1%);
- allowance for splashing of ash due to its velocity;
- a freeboard to spillway of 0.5 m; and
- a freeboard from spillway to bund crest of 1.0 m.

The bund will double as a water management dam during the operational life of the project.

TEC has prepared a Landform Failure Risk Assessment Report (October 2007) in order to provide a preliminary assessment on the likelihood of failure of the proposed ash landform, the likely consequences of failure and the



remedial works required. The preliminary stability analysis work to date has indicated that:

- the ash landform has an acceptable factor of safety under static conditions for all shear strength ratios within the likely range; and
- the ash landform has an acceptable factor of safety during a 1 in 500 year earthquake for all shear strength ratios within the likely range.

During the first three years of ash deposition, on site data will be collected to confirm the assumptions used in the stability analysis.

The risk assessment report also states that:

“Using FLDWAV (one-dimensional unsteady mud/debris flow model) modelling, the distance that the ash slumps down the hill following a failure was determined for a range of ash densities and yield shear strengths. The results showed that for a year 5 and year 20 landform failure, the slumped profile will remain on site for all cases analysed. It is noted that this type of modelling is considered conservative, as it assumes that the entire landform liquefies, whereas this will not be the case, as the combination of multiple drainage systems and confining pressures will prevent the lower part of the landform from liquefying. This part of the ash stack, which grows in size as the ash disposal progresses, will in fact act as a supporting berm. The stability of the ash landform will improve as drying and drainage occur.

Given that failure of the ash landform during a severe earthquake event will be contained within the site boundaries, the required rehabilitation works would involve replacement of the capping plus reinstatement of drainage works. There would be no need to transport and re-dispose of large volumes of ash or reconstruct the ash stack.

Based on the ANCOLD (Australian National Committee on Large Dams) Guidelines on Tailings Dam Design, Construction and Operation (1999), we consider the ash storage facility to be of “Low Risk” hazard category. This is based upon the following:

1. Contamination of water supplies for either human or animal consumption is not expected, as there will be no planned off site discharge of surface water and leaching into the groundwater system will be mitigated by installation of a clay liner.
2. No loss of life is expected in the event of landform failure as modelling indicates that the deformed landform will remain on site – i.e. no downstream populations are at risk.
3. There will be no significant economic loss resulting from damage to agricultural land, minor roads or mine infrastructure as the deformed landform would remain on site.
4. There will be no ongoing economic loss to the region resulting from the failure of the facility as modelling indicates that the deformed landform will remain on site. Similarly, there will be no ongoing economic loss to the power stations, as an allowance has been made for temporary storage of

ash in the ash dam whilst building a new embankment at the toe of the deformed landform.

Given that the ash storage facility is considered to be a Low Risk hazard, we consider it appropriate to design the facility for a Maximum Design Earthquake (MDE) of 1 in 1,000 year ARI, in accordance with accepted industry practices as tabulated within the ANCOLD Guidelines for the Design of Dams for Earthquake.

EPA, in its advice to me, recommends that TEC provides a financial assurance against the risk of liquefaction of the ash landform. I propose that this financial assurance does not apply for the first three years of ash deposition and then, is to be levied in proportion to that portion of the landform that may be found to be at risk of liquefaction, based on the results of a comprehensive landform safety review which TEC will be required to undertake within the three year period.

### **Conclusions**

In considering the above, I am satisfied that in the event of an incident, implementation of the mitigation measures and commitments contained in the EIS documents, implementation of the Rehabilitation Plan contained in the draft Environmental Management Plan (EMP) and the recommended requirements contained in Schedules A, C, F and H, Appendix 1 of this Report, will be adequate to ensure that the potential for environmental harm can be minimised.

### **4.2.2 Erosional stability**

#### **EIS Findings and/or Key Points**

The landform will be progressively developed over-time from the western side of the site until such time as it reaches a flat top at a level approximately 60 m in height.

The front face of the landform will be built up using a series of 3 m high bunds in a stepped fashion. These bunds will act as the capping layer for the front face of the landform. Earthworks will trim the tops of the bunds and infill the stepped sections to create a uniform 12.5% slope for the front face of the final landform. The top flat section of the landform will slope at 1.5% and will be covered by topsoil 1 m thick.

EPA, in its comments on the EIS, recommended that TEC demonstrate that a 12.5% embankment slope will be erosionally stable in the long-term. This included the provision of information that:

- demonstrates that levels of erosion of this type of material are acceptable at slopes of 12.5%;
- the type of contour drains proposed have adequate capacity on a 12.5% slope and an explanation as to how the required capacity will be maintained in the long term;
- justifies in more detail the design of the banks, including capacity to collect run-off from inter-bank areas, vertical interval (horizontal

- spacing), bank grade, bank length, and design of rock chutes or other structures used to channel water from the contour banks; and
- justifies from the perspective of erosion control and stability the critical design parameters of the deposited ash, particularly the final maximum slope.

The EIS finds that the University of Queensland and others conducted several years of investigation into predictive modelling of soil loss on long steep slopes. This project known as “Post Mining Landscape Parameters for Erosion and Water Quality Control” aimed principally to develop appropriate methodologies to determine the critical range of degree of slope – length of slope – vegetative cover combinations for acceptable control of erosion and salt generation, as an aid towards the design of stable and sustainable post mining landforms.

The research commenced in 1992 and continued until 1998 and the data collected during the investigation has been used to provide soil, climate performance characteristics for the development of an erosion predictive modelling package, MINEROSION. This modelling program includes a capability to predict erosive losses under various slopes and pasture covers in the Nanango region. Actual local Nanango/Kingaroy soils characteristics and regional climatic data are imbedded into the model database, including the Tarong Red Krasnozem which is similar to the principal soil in the area of the proposed ash emplacement facility (Red Kandosol's). This is the principal soil to be used in the rehabilitation program of the ash emplacement areas.

The MINEROSION modelling indicates that a 50 -70% pasture cover can provide excellent erosion protection when slope length and slope is limited. Soil losses on a 12.5% grade as has been proposed for the ash disposal site using up to 60 m drainage intervals to limit drainage slope length are quite tolerable at around 2 tonnes/ha. In this situation, very low soil loss can be achieved. These results are also supported by work undertaken at the nearby Meandu Mine in which Department of Primary Industry and Fisheries (DPI&F) investigations suggested that a vegetative cover level of approximately 50% could be adopted as a simple indicator of stable rehabilitation on topsoiled areas with up to 15% gradient and 70 m slope length with no incised gullies or rills. (Loch and Bourke 1995). However, it should be noted that high level protection from erosion is only possible with a dense pasture cover.

Providing that at least 50% vegetative cover is maintained on the capped ash landform, the following estimates of the longevity of this landform are made subject to the following assumptions:

- climate remains much the same as is now – global warming may impact on projection due to lower annual rainfall possibility;
- drainage system remains functional – assuming that drains may need limited maintenance into the future; and
- that 200 – 250 mm topsoil is applied and this is equivalent to approximately 2, 500 m<sup>3</sup>/ha or approximately 4,700 tonnes/ha.

If the slopes of the rehabilitation remained bare (no vegetation cover protection), then all of the applied topsoil would be eroded in about 30 years with a soil loss at 115 tonnes/ha/annum. However, under a good pasture

cover (50-70% or so) which is quite likely in the Nanango area on fertile soil, the MINEROSION model estimate of soil loss at 2.5 tonnes/ha indicates that the longevity of the soil cover may extend well beyond 1,000 years.

In Queensland, the 'best practice' guidelines issued by the Department of Mines and Energy suggests that up to 40 tonnes/ha is acceptable for rehabilitated landforms. Much lower rates are proposed for the Tarong ash emplacement area as is indicated by the results of the MINEROSION modelling.

Also the DME guidelines – Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland (DME 1995) recommends maximum inter-bank slope lengths of at least two times what Tarong Energy is proposing for the northern land ash emplacement area.

In summary, in the Nanango area, provided a dense pasture cover is established on outer batters of the ash emplacement area, erosion at intolerable levels can be prevented.

### **Conclusions**

I am satisfied that in the event of an erosion-related incident, implementation of the commitments contained in the EIS documents, the Rehabilitation Plan contained in the draft EMP and the recommended requirements contained in Schedules A, C, F and H, Appendix 1 of this Report, will be adequate to ensure that the potential for environmental harm can be minimised.

### **4.2.3 Leachate monitoring**

#### **EIS Findings and/or Key Points**

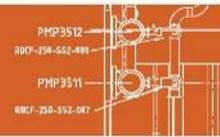
Details of the proposed groundwater monitoring system for the facility are provided in Drawing S018 of Appendix B, SEIS. All stages of the project include as a minimum the following:

- an upstream monitoring location;
- a downstream monitoring location; and
- a monitoring location within the landform.

In the early years, existing monitoring bores will form the majority of the system. Additional monitoring locations will be added progressively as the landform develops.

The EPA, in its comments on the EIS, recommended that monitoring of the dewatering system be carried out as part of the operational monitoring, and proposed monitoring details included in the Detailed Operational Plan (DOP) and draft EMP. Further, EPA recommended that TEC should monitor the unsaturated zone under the ash to assess the migration of contaminants at an early stage. The EPA guideline "Waste disposal systems (ERA 75) – Monitoring systems" provides some suggestions as to how this can be achieved. A description of the proposed monitoring should be provided in the DOP and in the draft EMP.

The SEIS states it that is not considered feasible to install monitoring equipment in the region below the landform liner due to the logistics of accessing the equipment at a later date. Monitoring locations directly in front of the toe of the landform will detect any impacts on the groundwater at an



early stage and allow for prompt mitigation measures to be implemented. Monitoring of the phreatic surface level in the landform will also be undertaken at locations along the front face.

Both the surface and subsurface dewatering systems within the landform outflow through the front face of the landform via a series of pipelines. From this point, the water will be directed to the ash dam via one of the following methods:

- continuing the pipelines; or
- using a drainage channel.

The detailed design process will confirm the practicality of the pipeline option. If this option is used, the risk of contamination of the surrounding environment and therefore ground water will be minimal. The pipelines would be inspected regularly, as an addition to the slurry pipeline inspection process, to ensure that there are no leakages.

If the drainage channel option is used, the drain will be lined with material of permeability no greater than  $1 \times 10^{-9}$  m/s to prevent leaching of contaminants into the regions below the drain. Monitoring stations will be installed at intervals along the drain to ensure early detection in the event of a breach of the liner.

The EPA is seeking earlier detection of and movement of leachate to groundwater before it gets into monitoring bores downstream and has requested that TEC develops and implements a water balance monitoring program, the purpose of which is to demonstrate with substantial confidence that leachate is not leaking through the ash emplacement lining.

TEC has argued that it was not possible to take measurements to the level of accuracy required, particularly for evaporation. Whilst the level of accuracy may be an issue, I understand that implementation of a water balance monitoring program would at the very least highlight the sensitivities involved in leachate monitoring and early detection of leachate movement.

## **Conclusions**

I am satisfied that implementation of the recommended requirement for TEC to develop and implement a monitoring program capable of early detection of leakage through the ash emplacement lining, contained in Schedules A, C and H of Appendix 1 of this Report, will be adequate to ensure that the potential for environmental harm can be minimised.

### **4.2.4 Revegetation**

#### **EIS Findings and/or Key Points**

The EIS states that a large scale revegetation trial was planned to commence on the existing ash dam by the end of 2006 with the aim of identifying the most effective method of rehabilitating the existing ash dam and the proposed ash storage facility.

EPA, in its comments on the EIS, stated that the proposed revegetation trial provides no details of what will be tested. Trials carried out to date on relatively fresh ash would be appropriate.

The trial actually began in January 2007 using spoil from adjacent road works. The site covers approximately 3.5 ha of ash surface at the southern end of the ash dam. Some 30 species of wattle, eucalypt, casuarina, callistemon, native herbs and grasses have been direct seeded together with short lived cover crop species including lucerne, millet and oats. The area has been capped with spoil to approximately 500 mm average depth. No topsoil has been applied as it is in short supply. The trial is focussing on native species rather than introduced pasture species. The capping has been applied to eliminate dust generation even though the site and DPI&F trials demonstrate that it is not necessary to cap ash to establish some forms of vegetation – for example pasture species.

Native species sown into the capped surface and in the bare area include acacia, callistemon, eucalypts and melaleuca.

Little rainfall has occurred since sowing the seed on 19 January 2007. Nonetheless some germination has already been reported.

Relevant data from existing trials has been presented in the SEIS (section 4.3.17) and analysed to determine realistic options.

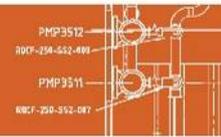
Tarong's ash characterisation together with a variety of vegetation investigation work provides a reasonable expectation that the ash media can be satisfactorily rehabilitated under a pasture cover. However, if a robust native vegetation community is preferred, then capping with "subsoil" preferably under a topsoil cover is warranted. Aside from dust generation and erosion risks, furnace ash could be used as the growth media.

In terms of using knowledge gained from the work directly on ash, the trials undertaken by DPI&F and Tarong Energy provide some basic understandings of vegetation establishment in ash. Overall, the ash media can grow plants, particularly pasture species and quite dense growths have been achieved on bare fly ash at the existing ash dam.

However, the strategy proposed for the northern land ash emplacement area includes capping with a considerable depth of subsoil and topsoil to isolate ash from the environment to provide high level protection aimed at eliminating windblown ash, providing substantial erosion protection, and reducing moisture ingress. Given this situation, the presence of the ash is unlikely to impact on the vegetation established on the isolating blanket of subsoil and soil.

## **Conclusions**

I am satisfied that TEC has provided sufficient information to demonstrate that all areas disturbed by ash placement activities can be adequately revegetated through the mitigation measures and commitments contained in the EIS documents, implementation of the Rehabilitation Plan contained in the draft EMP and the recommended requirements contained in Schedules A and F, Appendix 1 of this Report.



## 4.2.5 Rehabilitation and final land use of site

### EIS Findings and/or Key Points

EPA, in its comments on the EIS, recommended that rehabilitation be addressed in more detail and that critical parameters such as soil depth and success criteria for vegetation should be stated and justified to provide assurance that the rehabilitation will be established and succeed with limited inputs.

By way of response, TEC in preparing the SEIS states that topsoil will be applied uniformly over the landform to a depth ranging between 200 and 250 mm. Topsoil will be directly placed for most of the rehabilitation effort. Standard land reclamation techniques will be utilised including contour deep ripping and seeding. Application of fertiliser will be made to ensure nutrient levels are optimised and use of irrigation (only if required) to make up soil moisture deficit. Performance criteria for rehabilitated land is presented in Section 4.4.2 of the SEIS.

Importantly, progressive rehabilitation of the lower slope can commence as soon as the third bund has been completed. Thus, areas of bare ash will be minimised throughout the operational life of the ash placement facility. Progressive rehabilitation will ensure that there is sufficient pasture cover on slopes below the working bunded areas, hence minimising erosion potential as the landform progressively develops.

On the conventional top-soiled 12.5% slope that has been proposed, erosion control will be heavily dependent on the development of a dense pasture cover. This can be achieved in the region as is evidenced in the locality where rhodes and kikuyu pastures form thick swords on similar slopes, particularly those slopes underlain by fertile soil.

The overriding objective of the rehabilitation must be to minimize risk of long term instability of the landform. The rehabilitation program is aligned to this outcome and any future use of the land must be fully compatible with the objectives of preventing any adverse impact on environmental, health and social values.

The range of possible uses for the final landform includes: native bushland to the project buffer area, crest area and selected areas on sloping faces; managed grazing; and fauna habitat.

Refined scenarios will be investigated in the years leading up to the development of the final landform i.e. as the final lift of the landform is developing. Involvement of community interest groups such as Bush Care and Society for Growing Native Plants will be encouraged.

Reference sites will be established to enable comparison with “undisturbed environments” and ultimately, when the sites demonstrate similar characteristics, the reference sites will be used to provide supporting evidence for the attainment of satisfactory rehabilitation.

As part of the validation process prior to relinquishment of the Environmental Authority/Development permit, a standard land suitability survey will be undertaken and a report prepared by a suitably experienced land suitability

surveyor. The survey will follow Queensland DPI&F guidelines as may be at the time of the survey.

The report will take the form of a final rehabilitation report as is required for the relinquishment of mining leases and will be submitted to the regulator at the time as demonstration that Tarong Energy has fulfilled its rehabilitation conditions and relevant parts of the land are suitable for an ongoing managed productive grazing use in which the rehabilitation maintenance activities do not prevent commercial utilisation of the land for a viable grazing use.

TEC proposed that during operations, a security deposit be provided to Government. This security deposit would be based on third party costing of all work necessary to rehabilitate the landform and any associated affected areas based on the maximum area of disturbance and cost that is calculated. The security deposit could be reviewed annually and submitted to government with an annual return which declared the extent and nature of the disturbance as well as the unit rates which are applied to determine the deposit.

This proposal has been incorporated into a requirement for a financial assurance from TEC to cover both rehabilitation of the landform and remediation of any downstream or off-site impacts in the event of mass movement of the landform (refer to Recommended Requirements, Schedules A12 – A16, Appendix 1 of this Report).

In the long-term, if the land is not used for grazing or other income producing activities, there would be a need to provide a means of funding the periodic maintenance of the drainage channels, particularly the cross drains on the 12.5% slope. It is proposed that if this situation arose, a sum of money would be set aside in trust. The sum would be of sufficient size to produce an annual return that would cover the annual costs of maintenance.

## **Conclusions**

I acknowledge TEC's proposal above in relation to long-term periodic maintenance of the drainage channels and accept its commitment for funding this maintenance should the situation arise. I am satisfied that all areas disturbed by the ash placement activities during construction and operation can be rehabilitated through the mitigation measures and commitments contained in the EIS documents, implementation of the Rehabilitation Plan contained in the draft EMP and the recommended requirements contained in Schedules A and F, Appendix 1 of this Report.

### **4.2.6 Air Quality**

#### **EIS Findings and/or Key Points**

##### *a) Dust Control & PM<sub>10</sub>*

The main sources of dust emissions from the ash emplacement area are expected to be wind erosion of the working area and vehicle movements on haul roads.

EPA, in its comments on the EIS, recommended that TEC should demonstrate that effective dust control can be achieved on the ash to ensure that unacceptable impacts do not occur on or off site.

TEC state that the project has been designed to provide an ash emplacement area that has a lower potential (than for an ash dam) for off-site dust impacts with improved capacity for dust control that more efficiently uses the available land to dispose of ash and that can reach a stable landform quickly so that rehabilitation can be undertaken.

Dust emissions from the ash emplacement area will be controlled by: progressive rehabilitation of the completed surface;

- use of vegetative screens and bunds;
- management of haul roads by watering; and
- application of surface treatments to the ash when high dust conditions are expected.

Haul roads are the second largest dust source for the project. Watering the roads can reduce the emission of dust by 50% if watering is applied at a rate of 2 L\m<sup>2</sup>\hour. Emissions can be reduced by 75% if more than 2 L\m<sup>2</sup>\hour is applied. Watering at 2 L\m<sup>2</sup>\hour was assumed in the modelling to predict water usage. Water requirements for dust suppression can be reduced by up to 90% by the use of surface treatments (dust suppressants).

As well as the above dust control measures which are aimed to minimise the amount of dust arising from the project, Tarong Energy will be conducting continuous monitoring of dust levels (as per monitoring program outlined in Appendix C – Air Quality Assessment, SEIS). Should dust nuisance occur, Tarong Energy will rely on the draft EMP to address any dust issues in a timely and efficient manner. Any complaints will be managed through Tarong Energy’s existing complaints management system.

Queensland Health commented that the EIS indicates that the maximum 24 hour PM<sub>10</sub> concentrations at the nearest residences will comply with the EPP (air). Even though, as stated in the EIS, the National Environment Protection (Ambient Air Quality) Measure (NEPM (Air)) were developed for urban environments, the PM<sub>10</sub> standard was based on health effects and is appropriate for assessing PM<sub>10</sub> exposures of nearby residents.

At various times during the life of the project, PM<sub>10</sub> exposure of nearby residents is predicted to exceed the NEPM (air) standard of 50 µg/m<sup>3</sup>. It is important that the mitigation strategies outlined in the EIS are implemented and their effectiveness monitored. One critical element of any mitigation strategy is a good complaint handling process with clearly defined responsibilities for investigating and responding to any complaints within reasonable timeframes.

It is TEC’s view that the NEPM standard for PM<sub>10</sub> is not an appropriate assessment criterion for this project because material emitted from the ash emplacement area is crustal matter. The NEPM Standard was developed from epidemiological studies in urban areas where particulate matter from petrol and diesel engines is the dominant form of particulate matter.

The Draft EMP (refer to Appendix E, SEIS) outlines air quality management for the project and assesses the performance of the dust minimisation techniques through the number of incidences of dust nuisance and

complaints. In the event of an incident or complaint, Tarong Energy has in place Corporate Business Procedures for:

- incident reporting and management (CORP\_HSE\_03); and
- customer complaints/Feedback/Enquiries (CORP\_MAN\_04).

These procedures are in place to ensure all complaints are handled efficiently and in a timely manner, providing feedback/progress updates to the complainants at all times. These procedures have been incorporated into the draft EMP.

As part of the approval process for the proposed project, Tarong Energy will develop with the EPA a suitable monitoring program. The preliminary monitoring program is detailed in Appendix C – Air Quality Assessment, SEIS. It is anticipated that through the monitoring program, Tarong Energy will be able to quantify the effectiveness of the mitigation strategies implemented to minimise dust from the emplacement area. This will be incorporated into the EMP.

Queensland Health does not agree with the above statement that the NEPM standard for PM<sub>10</sub> is not an appropriate assessment criterion for this project as road and crustal dust is a significant component of PM<sub>10</sub> in urban and rural environments. Even though the epidemiological studies were based on urban environments, the toxicity of PM<sub>10</sub> appears to be linked to the physical size of the dust rather than its chemical composition. Therefore it is considered that the results of the epidemiological studies can be applied to situations where people are exposed to crustal dust and not just particulate matter originating from the combustion processes in petrol and diesel engines.

Queensland Health is satisfied, however, that the implementation of the dust mitigation strategies outlined in the EIS will minimise health impacts to local residents.

#### *b) Heavy Metals*

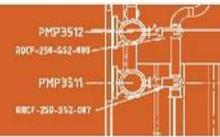
EPA, in its comments on the EIS, recommended that TEC provides an analysis of the potential impacts of mercury and other heavy metals in ash on human health via all potential vectors.

An analysis of heavy metals (mercury, arsenic, cadmium and lead) as well as respirable crystalline silica has been undertaken to assess the likely impacts on human-health due to operation of the project area.

The modelling results show that it is unlikely that health impacts due to heavy metals or respirable crystalline silica will occur. Detailed results are presented in Table 4-14 to 4-19, SEIS.

### **Conclusions**

I am satisfied that the potential for the Project to impact on air quality during construction and operation can be adequately managed through the mitigation measures and commitments contained in the EIS documents, implementation of the Air Quality Management Plan contained in the draft EMP and the recommended requirements contained in Schedules A, B and G, Appendix 1 of this Report.



## 4.2.7 Noise

### EIS Findings and/or Key Points

#### a) Construction

There are currently no criteria for construction noise impact in Queensland legislation. In the absence of specific noise level limits for construction, estimated construction noise levels can be compared against industry-standard best practice guidelines and indicators.

The EIS found that if operational noise criteria are used as a guide for setting construction noise criteria, noise emissions from ongoing construction activities are expected to marginally exceed the criteria at a number of receiver locations during some part of the ongoing construction phase. However, the use of operational criteria as a means of assessing construction noise is considered to be conservative, given the intermittent nature of the construction activity locations and durations.

It is also noted that the predicted levels will not exceed the sleep disturbance criteria. Given this, noise levels from ongoing construction are not expected to cause significant impact on sensitive receptors. It should also be noted that construction noise associated with the bunds will be temporary and it is common practice that temporary noise sources are given more relaxed noise limits than long-term noise sources.

It is likely that construction equipment such as dump trucks, dozers, rollers and excavators will be used at the site. Equipment will be selected such that low frequency noise risks are minimised. Regular monitoring will be conducted during construction and operation of the facility. The noise will be assessed against the criteria detailed in the EIS and any issues will be addressed with mitigation strategies to ensure that the criteria are met.

#### b) Operation

The operational phase of the project will involve the pumping of ash slurry and the placement of furnace ash via truck haulage onto the project site. The pumping of slurry is not expected to create any noise impact on the surrounding environment, however, truck movements will introduce a noise impact.

Noise levels from typical operational activities for the project have been predicted at the potentially affected noise-sensitive receptors. The applicable criteria are the night-time limiting criterion and the sleep disturbance criterion since truck haulage occurs intermittently during the day, evening and night.

The EIS finds that noise levels will comply with the sleep disturbance criteria of 52dB(A)  $L_{max}$  under adverse weather conditions at all receiver locations. Haulage truck noise levels will be monitored during the operational phase of the project. If noise levels exceed the guidelines, then it may be necessary to reduce the sound power of the haulage truck or restrict the location which those trucks can haul to during the night.

EPA comment on the EIS noted that the noise report indicated that the EPA Planning Guideline had been followed but it appeared that absolute maximum

levels had been used to determine noise criteria. Proposing criteria at or near maximum levels is not a precautionary approach. All reasonable measures should be taken to reduce noise particularly at night. Measures may include temporarily storing ash rather than running trucks at night.

The noise modeling indicates that noise levels at all receptors during both day-time and night-time activities are below the relevant World Health Organisation (WHO) guidelines.

An ongoing noise monitoring program will be undertaken throughout the life of the project. In addition to the regular noise monitoring program, additional noise and/or vibration monitoring will be incorporated as part of ongoing communication and consultation with the near neighbours, since the noise emissions from construction of the ash storage facility and other operations may occasionally be audible at some sensitive receptors under adverse meteorological conditions.

Any complaints will be managed through Tarong Energy's complaints management system. In the event that the ongoing noise monitoring and consultation process indicates that night-time trucking operations are causing nuisance, an emergency bottom ash storage area (as shown on Drawings S002 to S005 of Appendix B, SEIS) will be utilised.

## **Conclusions**

I am satisfied that the potential for the Project to have a noise impact on sensitive receptors during construction and operation can be adequately managed through the mitigation measures and commitments contained in the EIS documents, implementation of the Noise Management Plan contained in the draft EMP and the recommended requirements contained in Schedules A, D and G, Appendix 1 of this Report.

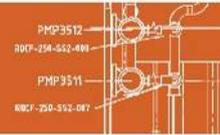
## **4.2.8 Property Devaluation**

### **EIS Findings and/or Key Points**

Three property owners in proximity to the proposed ash emplacement facility raised the issue of property devaluation as a concern. The proposed development moves the potential impacts closer to these properties, although one of the properties is closer to the proposed Stage 2 development which will be the subject of a separate EIS process should it proceed.

TEC is to establish a buffer zone that will help alleviate any visual impacts. TEC also believes that, given the properties are already adjacent to the existing ash dam and power station infrastructure, it would be difficult to distinguish any individual effects on land values from the various operations of Tarong Energy.

Tarong Energy has committed to individual meetings with these property owners to discuss this issue further.



## Conclusions

I am satisfied that the potential for the Project to have an impact on property valuations can be adequately managed through implementation of the Visual Impact Management Plan contained in the draft EMP.

### 4.2.9 Project Alternatives - Ash Disposal to Mine Voids

#### EIS Findings and/or Key Points

Mine void disposal of power station ash is discussed in the EIS as an alternative disposal option. The mine voids that could be used are on the nearby Meandu Mining Lease, the current source of coal fuel for the power stations.

A four phase process to determine the technical viability of such disposal was initiated by TEC in 2002. Phase 2 was completed in 2003 with none of the laboratory tests indicating that leaching of placed ash, or infiltration of water placed with the slurry, would exceed environmental guideline values so as to adversely impact the beneficial use of ground or surface waters, based on the results of a groundwater study. Phase 3 was to involve an ash disposal trial with collection of information needed to obtain EPA licences and Phase 4 was to be detailed design of the final ash disposal system, including finalisation of the licensing process.

The process did not continue beyond Phase 2 as Tarong Energy decided that the mine void disposal option was not feasible in the available time frame because:

- Rio Tinto Australia (then owner and operator of the Meandu Mine) advised that suitable mine voids might not be available until 2011 or later; and
- This option required Rio Tinto's full support, which could not be assured prior to finalisation of commercial negotiations between the two parties in relation to future coal supply options beyond 2010.

The EPA has stated that ash disposal to mine voids is its preferred disposal option.

The Queensland Government announced on 10 September 2007 that it had accepted Tarong Energy's recommendation to purchase the Meandu Mine from Rio Tinto and construct a new fuel source at Kunioon to supply the power stations in the future. Under the agreement, Tarong Energy will acquire ownership of Meandu Mine on 1 February 2008, which will continue to supply fuel to the Tarong power stations for some time under a revised mining plan of operations.

## Conclusions

While both Tarong Energy and EPA recognise the potential environmental benefits of using mine voids for ash disposal, there is serious concern about the time constraints to obtain the necessary approvals for such disposal before capacity at the existing ash dam is exhausted.

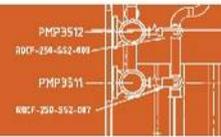
Before committing to mine void disposal of power station ash, Tarong Energy will need to investigate the technical and associated environmental issues of



all aspects of disposal to mine voids, which will take some time to complete and gain regulatory approval.

At normal rates of electricity production it was expected that the existing ash dam would reach its maximum capacity by mid-2008. However, production of electricity at Tarong has been recently reduced by about 70% due to the current water shortage crisis and the capacity of the ash dam is now expected to be reached in December 2008. I understand that the Tarong power stations could be returned to full production at short notice.

Tarong Energy has stated its commitment to investigate the option of ash disposal to mine voids. I am satisfied that through this commitment and the recommended requirement contained in Schedule A, section (A16), Appendix 1 of this Report, the feasibility of ash disposal to mine voids will be adequately investigated.



## 5.0 Environmental Management Plan

A draft EMP has been prepared by TEC and is contained in the Supplementary EIS.

The draft EMP addresses the key elements of construction and operation of the proposed new ash storage facility. The draft EMP has been prepared based on information developed during the EIS process and follows the EPA environmental impact assessment guideline: *“Preparing Environmental Management Plans”*.

TEC has committed to refine the draft EMP, in conjunction with the EPA, to incorporate final design details leading to a final EMP. Monitoring programs will be reviewed every three years and amended if required in consultation with the EPA.

### Objective of the EMP

The objective of the EMP is to minimise and manage adverse impacts and manage residual risks of the Tarong northern land ash emplacement facility on the environment. Implementation of this EMP is necessary to achieve this objective.

The EMP provides measures to mitigate the environmental risks associated with each environmental aspect. It outlines environmental management procedures and controls to be implemented by all employees and contractors involved in Tarong northern land ash emplacement construction, operations and maintenance.

### Project Risk

This EMP provides the environmental controls for the new ash storage facility, as determined from the EIS, based on an assessment of key environmental risks relating to:

- air quality (dust);
- visual impact (amenity); and
- stability of final landform (especially under extreme storm or seismic events).

These environmental risks have been assessed using the Tarong Energy risk management matrix. The EMP has been developed to manage these risks and also to ensure that other commitments from the EIS are implemented.

### Management Plans

The following table summarises the elements for each phase of the Project for which Environmental Management Strategies or Plans have been prepared.

PROJECT ELEMENT	CONSTRUCTION	OPERATION
Air Quality	X	X
Visual Impact	X	X
Landform Stability	X	X
Rehabilitation	X	X
Surface Water and Erosion	X	X
Noise	X	X
Groundwater	X	X
Road Use	X	X
Contaminated Land	X	X
Flora and Fauna	X	X
Weeds and Feral Animals	X	X
Waste	X	X
Chemical and Dangerous Goods	X	X
Cultural Heritage	X	
Health and Safety	X	X

In summary, implementation of the EMP will ensure the effective management of environmental impacts of the Tarong Northern Land Ash Emplacement Project. Furthermore, the monitoring measures proposed within the document will gauge the success of that effectiveness. Therefore I make the following recommendation:

**Recommendation 1**

**TEC should finalise the Environmental Management Plan for construction and operation of the Tarong Northern Land Ash Emplacement facility to the satisfaction of EPA at least one month before commencement of construction of the Project.**

## 6.0 Conclusion

The disposal of ash from coal-fired power generation is fundamental to operation of the Tarong and Tarong North power stations, which provide approximately 25% of Queensland's electricity generation capacity. As such, the availability of a new ash disposal facility is essential for the continued operation of the power stations after the current ash dam reaches capacity later in 2008.

Having regard to the documentation provided during the EIS process for the Tarong Northern Land Ash Emplacement facility, I am satisfied that the requirements of the Queensland Government for impact assessment in accordance with the SDPWO Act have been met. The EIS process has provided sufficient information to government and to the community to allow an informed evaluation of potential environmental impacts which could be attributed to the Project. Careful management of the key construction and operational activities should ensure that any potential environmental impacts will be minimised or avoided.

TEC presented a schedule of Project Commitments in Appendix O of the Supplementary EIS. These commitments include actions beyond those required to meet statutory approvals and their implementation will enhance the mitigation of potential adverse environmental impacts of the Project. Further, TEC has developed detailed EMPs to address specific environmental issues identified during the EIS process associated with each element of the Project.

In reaching a conclusion on the acceptability or otherwise of the management of potential impacts of the Project I have considered these Project Commitments and EMPs. Where necessary, I have made specific recommendations that TEC should implement in accordance with best practice environmental management.

Thus, on the basis of the information provided, including advice from Advisory Agencies, I am satisfied that the adverse environmental impacts associated with the Project are able to be addressed through:

- Implementation of the commitments in the EIS;
- Implementation of the construction EMPs; and
- Implementation of specific recommendations set down in Appendix 2 of this Report.

I consider that on balance there is an overriding need for the Project to ensure the availability of reliable electricity for Queensland. Therefore, I recommend that the Project, as described in detail in the EIS and SEIS and summarised in Section 2 of this report, can proceed, subject to qualifications above.

TEC propose to seek a designation of land for the project for Community Infrastructure in accordance with the process detailed in Chapter 2, Part 6 of the *Integrated Planning Act 1997* (Qld). As such, my report recommends:

- specific requirements, contained in *Appendix 1 – Recommended Requirements pursuant to Section 43 of the SDPWO Act 1971*; and

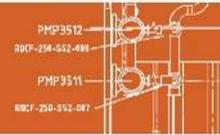
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- *Appendix 2 – Other Recommendations* that the relevant Minister may have regard to in making the designation under section 2.6.4(a) of the *Integrated Planning Act 1997*.

In the event of any inconsistencies between the EIS documents and the recommended requirements in this Report, the recommended requirements in this Report prevail.

Copies of this Report will be issued to:

- TEC, pursuant to section 35(5)(a) of *the State Development and Public Works Organisation Act 1971* (Qld); and
- The relevant Minister for Community Infrastructure designation, under section 2.6.4(a) of the *Integrated Planning Act 1997*.

A copy of this Report will also be made available on the Department of Infrastructure and Planning web site at:  
<http://www.infrastructure.qld.gov.au/eis>



# Appendix 1

## RECOMMENDED REQUIREMENTS PURSUANT TO SECTION 43 OF THE STATE DEVELOPMENT AND PUBLIC WORKS ORGANISATION ACT 1971 FOR LAND FOR WHICH A DESIGNATION AS COMMUNITY INFRASTRUCTURE MAY BE MADE UNDER SECTION 2.6.4(a) OF THE INTEGRATED PLANNING ACT 1997

### Construction and operation of Tarong Northern Land Ash Emplacement facility

#### Development Description

Property	Lot/Plan	Aspect of Development
Tarong Power Station, NANANGO QLD 4615	Lots 15 - 18 on FY149, Lot 88 on FY1971, Lots 1- 3 on RP168638, and Lot 4 on RP221111.	ERA 75(b)(iv) Waste disposal - disposing of regulated waste (other than limited regulated waste) whether alone or in combination with any waste mentioned in paragraph (a), if the facility is designed to receive waste at the rate of 200 000 t or more a year.

#### Schedule of Conditions

##### Schedule A – General Conditions

###### Prevent and/or minimise likelihood of environmental harm

- (A1) In carrying out an environmentally relevant activity (ERA) to which this approval relates, all reasonable and practicable measures must be taken to prevent and / or to minimise the likelihood of environmental harm being caused.

###### Maintenance Of Measures, Plant and Equipment

- (A2) The registered operator must:
- (a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this approval;
  - (b) maintain such measures, plant and equipment in a proper and efficient condition; and
  - (c) operate such measures, plant and equipment in a proper and efficient manner.

###### Site Based Management Plan

- (A3) From commencement of an ERA to which this approval relates, a site based management plan (SBMP) must be implemented. The SBMP must identify all sources of environmental harm, including but not limited to the actual and potential release of all contaminants, the potential impact of these sources and what actions will be taken to prevent the likelihood of environmental harm being caused. The SBMP must also provide for the review and 'continual improvement' in the overall environmental performance of all ERAs that are carried out.

The SBMP must address the following matters:

- (a) Environmental commitments - a commitment by senior management to achieve specified and relevant environmental goals;

- (b) Identification of environmental issues and potential impacts (including from noise and dust);
  - (c) Control measures for routine operations to minimise likelihood of environmental harm;
  - (d) Contingency plans and emergency procedures for non-routine situations.
  - (e) Organisational structure and responsibility;
  - (f) Effective communication;
  - (g) Monitoring of contaminant releases;
  - (h) Conducting environmental impact assessments;
  - (i) Staff training;
  - (j) Record keeping; and
  - (k) Periodic review of environmental performance and continual improvement.
- (A4) The site based management plan must not be implemented or amended in a way that contravenes any condition of this approval.

#### **Records**

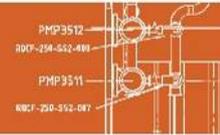
- (A5) Record, compile and keep all monitoring results required by this approval and present this information to the administering authority when requested.
- (A6) All records required by this approval must be kept for 5 years.

#### **Notification**

- (A7) As soon as practicable after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with the conditions of this development approval, the registered operator must notify the administering authority of the release by telephone and facsimile. After hours calls should be directed to 1300 130 372, or any replacement after hours contact number available for the administering authority.
- (A8) The notification of emergencies or incidents as required by condition number (A7) must include but not be limited to the following:
- (a) The name of the registered operator;
  - (b) the location of the emergency or incident;
  - (c) the number of the development approval and of the relevant registration certificate;
  - (d) the name and telephone number of the designated contact person;
  - (e) the time of the release;
  - (f) the time the registered operator became aware of the release;
  - (g) the suspected cause of the release;
  - (h) the environmental harm and or environmental nuisance caused, threatened, or to be caused by the release; and
  - (i) actions taken to prevent further any release and mitigate any environmental harm and or environmental nuisance caused by the release.
- (A9) Not more than 14 days following the initial notification of an emergency or incident, the registered operator must provide written advice of the information supplied in accordance with condition number (A8) in addition to:
- (a) proposed actions to prevent a recurrence of the emergency or incident; and
  - (b) outcomes of actions taken at the time to prevent or minimise environmental harm and or environmental nuisance.

#### **Monitoring**

- (A10) A competent person(s) must conduct any monitoring required by this approval.



### **Equipment Calibration**

- (A11) All instruments, equipment and measuring devices used for measuring or monitoring in accordance with any condition of this approval must be calibrated, and appropriately operated and maintained.

### **Financial Assurance**

- (A12) Provide a financial assurance in the amount and form required by the administering authority.
- (A13) Submit to the administering authority, within three years of the commencement of the deposition of ash in the emplacement facility allowed under this development approval and every two (2) years thereafter: (1) a calculation of financial assurance; and (2) an accompanying audit statement signed by a competent and experienced person.
- (A14) The calculation of financial assurance for conditions (A12) and (A13) must be the sum of: (1) the highest Total Rehabilitation Cost calculated for any year of the "Ash Emplacement Management Plan"; plus (2) the highest total cost of remediation of the site and off site land and waters in the event of a failure of the Ash Disposal Facility and Containment Bund. In calculating (2), the cost should be based on the proportion of the emplacement determined by condition (H5-3) to be unstable. All calculations must be based on third party costs for services and materials, and must allow for annual inflation.
- (A15) The financial assurance is to remain in force until the administering authority is satisfied that no claim on the assurance is likely.

### **Review of Alternatives**

- (A16) Within three (3) years after the commencement of the environmentally relevant activity, the registered operator must submit a report to the administering authority detailing the outcomes of its continued investigation into alternative options (including reuse options) for disposal of ash. This must include investigation into the feasibility of disposal into mine voids, and demonstrate consideration of the waste management hierarchy as provided in the *Environmental Protection (Waste Management) Policy 2000*.

### **Closure And Post-Closure Care**

- (A17) A site management plan pursuant to Chapter 7, Part 8, Division 5 of the *Environmental Protection Act 1994* must be developed and provided to the administering authority at least 12 months before the expected final receipt of ash in the facility. The site management plan must include, but is not to be limited to, the future land use and actions you intend to take for compliance with the closure and post-closure care requirements of this approval.

### **Security**

- (A18) Measures must be taken to prevent unauthorised access to the site to which this approval relates.

### **Schedule B - Air**

#### **Nuisance**

- (B1) The release of noxious or offensive odours or any other noxious or offensive airborne contaminants resulting from the activity must not cause an environmental nuisance at any nuisance sensitive place.

## Dust Nuisance

- (B2) The release of dust and/or particulate matter resulting from the ERA must not cause an environmental nuisance at any nuisance sensitive place.
- (B3) When requested by the administering authority, dust and particulate monitoring must be undertaken to investigate any complaint of environmental nuisance caused by dust and/or particulate matter, and the results notified within 14 days to the administering authority following completion of monitoring. Monitoring must be carried out at a place(s) relevant to the potentially affected nuisance sensitive place and at upwind control sites and must include:
- for a complaint alleging dust nuisance, dust deposition; and
  - for a complaint alleging adverse health effects caused by dust, the concentration per cubic metre of particulate matter with an aerodynamic diameter of less than 10 micrometre ( $\mu\text{m}$ ) (PM10) suspended in the atmosphere over a 24hr averaging time.

## Dust Management

- (B4) The Site Based Management Plan (SBMP) for this ERA must ensure that all activities associated with the ERA to which this approval relates are carried out by such reasonable and practicable means necessary to prevent the emission of dust that constitutes an environmental nuisance.

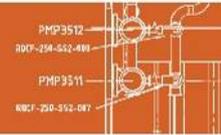
The SBMP must address, but not be limited to, the following matters:

- community liaison and consultation;
- recording, investigating and resolving dust complaints;
- training staff in dust management practices;
- identifying dust sources and activities at the site which may impact on nuisance sensitive or commercial places; and
- the reasonable and practicable control or abatement measures that can be undertaken to reduce identified dust sources.

Reasonable and practicable control or abatement measures may include but not be limited to:

- limiting the size of working areas;
- progressive rehabilitation of the completed surface;
- use of vegetative screens and bunds;
- management of haul roads; and
- applying dust suppressing surface treatments to the ash.

- (B5) From the commencement of the ERA, dust levels must be monitored at a minimum of two locations at the boundary of the site (or within 150 metres of the boundary of the site), between active ash emplacement areas and the nearest nuisance sensitive places. If this monitoring indicates exceedence of the following levels due to emissions from the ERA, the registered operator must immediately review the effectiveness of dust control measures implemented under the Site Based Management Plan required by Condition (B4) with a view to further minimising dust emissions from the site. The applicable levels are:
- Dust deposition of 120 milligrams per square metre per day when monitored in accordance with AS 3580.10.1:2003 Methods for sampling and analysis of ambient air - Method 10.1: Determination of particulate matter – Deposited matter – Gravimetric method; or
  - A concentration of particulate matter with an aerodynamic diameter of less than 10 Micrometer ( $\mu\text{m}$ ) (PM10) suspended in the atmosphere of 150 micrograms per cubic meter over a 24 hour averaging time, at a dust sensitive place downwind of the site, when monitored in accordance with:



- Australian Standard AS 3580.9.6 “Ambient air - Particulate matter- Determination of suspended particulate PM10 high-volume sampler with size selective inlet – Gravimetric method”; or
- Australian Standard AS 3580.9.9:2006 Methods for sampling and analysis of ambient air – Method 9.9 Determination of suspended particulate matter – PM 10 low volume sampler – Gravimetric method; or
- Any alternative method of sampling PM10 which may be permitted by the ‘Air Quality Sampling Manual’ as published from time to time by the administering authority.

## Schedule C - Water

### Water Management

- (C1-1) There must be no release of contaminants (including but not limited to, ash, leachate or stormwater runoff that has been in contact with any contaminants at the site) to any waters, except for releases of stormwater and ash process water and leachate from the ash emplacement to the ash dam on the Tarong Power Station site.
- (C1-2) Water released over the spillway of the containment bund in 0.01 AEP (or larger) rainfall event must not contain any contaminants in sufficient concentration to cause environmental harm.

### Containment Bund Monitoring

- (C2) When the containment bund is filled with water to more than 30% of its design capacity, monitoring must be undertaken and records kept for the quality characteristics and not less frequently than specified in Schedule C Table 1 – Containment Bund Water Monitoring. All determinations of the quality of contaminants must be:
- made in accordance with methods prescribed in the latest edition of the Environment Protection Agency Water Quality Sampling Manual; and
  - carried out on samples that are representative of the water held in the containment bund.

**Schedule C Table 1 – Containment Bund Water Monitoring**

Quality characteristic	Units	Monitoring frequency
Boron (total)	mg/L	Quarterly
Molybdenum (total)	mg/L	Quarterly
Vanadium (total)	mg/L	Quarterly
Selenium (total)	mg/L	Quarterly
Chloride	mg/L	Quarterly
Fluorine	mg/L	Quarterly
Sulphate(SO <sub>4</sub> )	mg/L	Quarterly
Electrical Conductivity	µS/cm	Quarterly
Total Dissolved Salts (calculated)	mg/L	Quarterly
Total Suspended Solids	Mg/L	Quarterly
pH	unit	Quarterly

## **Stormwater Management**

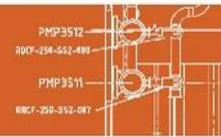
- (C3) Suitable banks and/or diversion drains must be installed and maintained to prevent stormwater runoff from entering ash placement areas or other structures used for the storage or treatment of contaminants or wastes.

## **Erosion Protection Measures and Sediment Controls**

- (C4) Erosion protection measures and sediment control structures must be installed and maintained to effectively minimise any likelihood of erosion and release of sediments from the site and be maintained during any operational activities, any site clearing, any construction and any rehabilitation. Such measures must include temporary sedimentation traps and diversion drainage works and/or embankments constructed and maintained to divert surface waters away from any area of the site where contact with waste or contaminants may occur.
- (C5) Diversion drains, appropriate grades (to minimise surface water flow velocities) or equivalent measures must be installed and maintained to ensure surface waters from disturbed areas, including operational or trafficable areas, are diverted to a containment system.
- (C6) Sedimentation pond(s) or control structure(s) must be installed and maintained to collect and treat stormwater from those parts of the site (other than ash emplacement areas) from which stormwater runoff is likely to be contaminated by sediment, for example, disturbed areas and areas in which any earthen material is stored.

## **Groundwater Monitoring**

- (C7) Routine groundwater monitoring must be conducted for the parameters described in Schedule C - Table 2 below and at locations as determined in (C8).
- (C8) A groundwater monitoring network and program must be implemented. The network and program must:
- (a) Be designed by a person possessing appropriate qualifications and experience in groundwater hydrology, groundwater monitoring program design and able to competently analyse monitoring data and make recommendations about these matters; and
  - (b) Include a sufficient number of "bore(s) of compliance" that are located an appropriate distance from potential sources of impact from ash placement activities and provides the following:
    - i. Representative groundwater samples from the uppermost aquifer;
    - ii. Background water quality in hydraulically up-gradient or background bore(s) that have not been affected by any release of contaminants from ash placement activities to groundwaters; and
    - iii. The quality of groundwater down gradient of any potential or actual release of contaminants to groundwaters from ash placement.
- (C9) The holder of the development approval must conduct monitoring and keep records of groundwater quality for the relevant bores of compliance and maintain the groundwater monitoring program using persons of suitable experience. All determinations of groundwater quality must be:
- (a) conducted for the water quality characteristics and at the minimum frequency stated in Schedule C – Table 2;
  - (b) taken from sufficient monitoring points and/or wells to obtain representative samples of groundwater both up-gradient and down-gradient of potential influence;



- (c) carried out with sufficient regularity and spatial and temporal replication to make valid conclusions about the presence or absence of contamination or other impact;
  - (d) carried out with a sufficient number of sampling events to determine the ambient groundwater quality and level prior to any development of the site occurring;
  - (e) followed by an annual assessment of whether there has been any change compared to background values at locations hydraulically down gradient of the potential sources of contamination for each quality characteristic in Schedule C- Table 2, and the source, cause and extent of these changes; and
  - (f) made in accordance with methods prescribed in the latest edition of the Environmental Protection Agency Water Quality Sampling Manual.
- (C10) On any occasion that samples are obtained in accordance with condition (C9) the standing water levels must be measured and recorded to an accuracy of 0.01 metres relative to Australian Height Datum (AHD).
- (C11) If an annual assessment of groundwater quality carried out in accordance with condition (C9) indicates significant changes in the contaminant levels listed in Schedule C – Table 2 because of the authorised activity, the registered operator must:
- (a) complete an investigation in accordance with the ANZECC (2000) methodology, into the potential for environmental harm caused by change in contaminant levels;
  - (b) provide a written report to the administering authority within 6 weeks of the date of the annual assessment, outlining:
    - (i) details of the investigations carried out; and
    - (ii) actions taken to prevent environmental harm.

**Schedule C – Table 2 Groundwater Quality Characteristics to be monitored and monitoring frequency**

Quality characteristic	Units	Monitoring frequency
Boron (total)	mg/L	Quarterly
Molybdenum (total)	mg/L	Quarterly
Vanadium (total)	mg/L	Quarterly
Selenium (total)	mg/L	Quarterly
Chloride	mg/L	Quarterly
Fluorine	mg/L	Quarterly
Sulphate	mg/L	Quarterly
Total Dissolved Salts (calculated)	mg/L	Quarterly
Electrical Conductivity	µS/cm	Quarterly
pH	unit	Quarterly

## Management of Surface Water from Rehabilitated Ash Emplacement Areas

- (C12) To confirm that the rehabilitated ash emplacement areas are not adversely affecting surface water quality, contaminants in surface water runoff collected from these areas must be monitored at the frequency specified in Schedule C Table 3.

**Schedule C - Table 3 Rehabilitated Ash Emplacement Area – Surface Water Performance Criteria**

Contaminants	Units	Monitoring Frequency
Indicator Metals: Boron (total) Molybdenum (total) Vanadium (total) Selenium (total) Chloride Fluoride Sulphate	mg/L	During or immediately following at least two rainfall events per year*
Electrical Conductivity	$\mu\text{S/cm}$	During or immediately following at least two rainfall events per year*
pH	unit	During or immediately following at least two rainfall events per year*

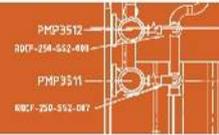
\*For the purposes of this condition, a 'rainfall event' includes only those rainfall events of sufficient duration or intensity to cause surface water runoff from the rehabilitated ash emplacement areas.

- (C13-1) The holder of this approval must develop and implement a monitoring program capable of the early detection of leakage through the ash emplacement lining.
- (C13-2) The holder must submit the monitoring program to the administering authority at least 28 days prior to the commencement of the ERA. If the administering authority gives to the holder of this approval any comment on the monitoring program within 21 days of receiving the document, the holder of this approval must have due regard to those comments when implementing the monitoring program.

## Schedule D - Noise

### Noise Nuisance.

- (D1) Noise from the ERA must not cause an environmental nuisance at any nuisance sensitive place.



- (D2) When requested by the Administering Authority, noise monitoring must be undertaken within two weeks to investigate any complaint (which in the opinion of an authorised officer is neither frivolous nor vexatious nor based on mistaken belief) of environmental nuisance at any nuisance sensitive place, and the results must be notified within 14 days to the Administering Authority following completion of monitoring.
- (D3) Noise Monitoring must include:
- (a) background noise level;
  - (b)  $L_{Amax, adj, 15 mins}$  or where they can be justified as appropriate,  $L_{A 10, adj, 15 mins}$  and  $L_{A 1, adj, 15 mins}$ ;
  - (c)  $L_{Ar, 1 hour}$ ;
  - (d) the level and frequency of occurrence of impulsive or tonal noise;
  - (e) atmospheric conditions including wind speed and direction;
  - (f) effects due to extraneous factors such as traffic noise; and
  - (g) location, date and time of recording.

### Noise Environmental Nuisance Management Plan

- (D4) In the event of a complaint about noise environmental nuisance that the administering authority considers is not frivolous or vexatious nor based on mistaken belief, the registered operator to which this development approval relates is to develop a noise management plan within two (2) weeks of being advised in writing of the complaint. The noise management plan must address at least, but not be limited to, the following matters:
- (a) the identification of component noise sources and activities carried out at the site which were the cause of the complaint(s);
  - (b) the measured level of these noise sources and activities at the nuisance sensitive place(s);
  - (c) the reasonable and practicable control or abatement measures that can be undertaken to reduce identified intrusive noise sources;
  - (d) the level of noise at the noise sensitive place(s) achieved from implementing these measures.
  - (e) the handling of noise complaints;
  - (f) ongoing liaison and consultation with affected persons in relation to noise; and
  - (g) training of staff in noise management practices.
- (D5) Upon completion of the Noise Management Plan it must be submitted to the administering authority for its review and comment.
- (D6) After the Administering Authority has provided comment on the noise management plan, the registered operator must implement the plan.
- (D7) Within one month of commencement of the ERA, noise assessments must be carried out at all nuisance sensitive places potentially affected by the activities approved under this Development Approval. These assessments must:
- (a) be carried out by a suitably qualified independent acoustic professional;
  - (b) Include noise assessments carried out during daytime (7am to 6pm), evening (6pm to 10pm), and night time (10pm to 7am); and
  - (c) identify component noise sources which may impact on the nuisance sensitive place.
- (D8) The method of measurement and reporting of noise levels must comply with the latest edition of the Environmental Protection Agency's Noise Measurement Manual.

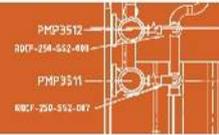
## Noise Control Measures

- (D9) The ERA to which this approval relates must be carried out by such reasonable and practicable means necessary to prevent the emission of noise that constitutes an environmental nuisance. The reasonable and practicable measures adopted may include but not necessarily be limited to the following noise abatement measures:
- (a) ensure that any equipment to be used is assessed for potential noise nuisance impacts and appropriately attenuated;
  - (b) ensure that all plant and equipment is operated and maintained in a proper and efficient manner;
  - (c) ensure that engine cowlings and high efficiency silencers are fitted to all the engines of all plant and equipment identified as impacting on noise sensitive receivers;
  - (d) ensure that noise generating activities are not undertaken in close proximity to noise sensitive places or commercial places;
  - (e) ensure that, where required, noise abatement barriers are sited such that they effectively intercept the sound transmission path between the sources of noise and nuisance sensitive places;
  - (f) ensure that if plant or equipment is identified as causing sleep disturbance it is not operated between 7 pm and 7 am or alternative means of preventing sleep disturbance are implemented;
  - (g) locate haul and access routes within the premises as far away from sensitive places as is practical having regard to operational convenience; and
  - (h) where operation of reversing beepers is likely to cause environmental nuisance, taking measures to ensure mitigation of the nuisance, for example by de-tuning the reversing beepers, replacing the reversing beepers with other warning devices and/or replacing reversing beepers with alternative reversing beepers which adjust their noise level output in accordance with the prevailing background noise level.

## Schedule E - Waste

### Waste Records

- (E1) The only waste materials permitted to be accepted for disposal in the ash placement facility are:
- Tarong Power Station dense phase ash;
  - Tarong North furnace ash (trucked);
  - Tarong North dense phase ash;
  - Coal rejects;
  - Screen rejects;
  - Ash blockage;
  - Material from de-silting of site dams; and
  - Material from existing ash dam.
- Note:** 'Dense phase ash' means a mixture of ash and liquids with an average solids content not less than 50%.
- (E2) Notwithstanding condition (E1), other ash and effluents from Tarong North and Tarong Energy Power Stations may be received at the ash placement facility, provided that the activity complies with condition (E3).
- (E3) In relation to any liquids or other effluents received by the ash placement facility, that facility must not store any significant volume of liquids or other effluents at any time, and the quantities or concentrations received must not be such as to affect the stability of the ash placement facility or cause environmental harm off site.



- (E4) Records of the source, volumes and composition of all waste materials accepted at the ash placement facility must be kept and maintained and provided to the administering authority upon request.

#### **Site Control**

- (E5) At all times while the ERA is operating, at least one person must oversee the control and operation of the facility and whose duties must include but not be limited to:
- (a) controlling the receipt and storage of waste;
  - (b) maintaining the facility to achieve compliance with the development approval conditions;
  - (c) controlling all employees and contractors working in the facility; and
  - (d) supervising all persons entering the facility.

#### **Regulated Waste Handling**

- (E6) Movement of regulated wastes is only authorised to be carried out within the boundary of the site to which this development approval relates, and the Tarong and Tarong North power station sites, or via pipelines constructed within these boundaries.

### **Schedule F - Land**

#### **Preventing Contaminant Release to Land**

- (F1) Spillage of all chemicals and fuels must be contained within an on-site containment system and controlled in a manner that prevents environmental harm.
- (F2) All petroleum product storages must be designed, constructed and maintained in accordance with AS 1940 - Storage and Handling of Flammable and Combustible Liquids.
- (F3) The base and walls of all bunded areas must be maintained free from gaps or cracks that may result in the loss of containment.

#### **Rehabilitation Criteria**

- (F4) All areas disturbed by the ash placement activities must be rehabilitated to the final land description and to the criteria and performance criteria as defined in Schedule F Table 1.
- (F5) The registered operator must develop and implement a Final Land Use and Rehabilitation Plan to ensure that all areas disturbed by ash placement activities will be suitably rehabilitated in accordance with Schedule F – Table 1. The Plan, which may form part of other plans required for this development approval, must include, but is not limited to the following:
- (a) Disturbance type;
  - (b) Disturbance area;
  - (c) Pre and post ash placement land descriptions;
  - (d) Reference site identification and monitoring;
  - (e) A description of rehabilitation management techniques incorporating works and monitoring programs and timetables;
  - (f) Performance criteria – as per Development Approval conditions and other indicators of success; and
  - (g) Keeping of appropriate records or rehabilitation measures and reporting in accordance with Condition (F11).

- (F6) On or before 26 November 2010, the registered operator must submit a copy of the Final Land Use and Rehabilitation Plan, as required by condition (F5), to the administering authority, and in finalising the plan must have due regard to comments made by the administering authority.

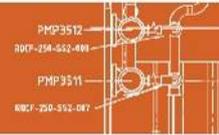
**Schedule F Table 1 - Ash Emplacement Area Final Land Use Vegetation Establishment Performance Criteria**

Land Use	Performance Criteria
Native bushland – crest areas and plateaus	Overall Stem density >1,000/ha. Eucalypt >3 species /ha. Acacia Spp >5 species/ha. Shrubs and others >6 species/ha. Grass cover >20%. All indices averaged over landform element area.
Wooded Pasture – Batters and External slopes	Pasture Cover >50% Native tree and shrub stem density >10/ha
All Other Areas ( i.e. roads, tracks, hardstands, misc. disturbance) excluding dams and waterways.	Mosaic of native vegetation and pasture species.

- (F7) Disturbed areas must be returned to a stable landform capable of sustaining vegetative cover and providing surface stability against erosion.

**General Rehabilitation**

- (F8) Progressive rehabilitation must commence as soon as practicable when areas become available within the ash placement area.
- (F9) Reference sites must be selected within two years of commencement of the deposition of ash to provide comparative performance of the two main final land use types (i.e. wooded pasture (batters) and native bushland (crest areas)) with respect to undisturbed areas. These sites must be monitored at least annually.
- (F10) A cover material utilisation assessment must be submitted to the administering authority as part of the operational plan (condition H3-2). This assessment must identify the source of cover materials (including clay capping and topsoil) and demonstrate that sufficient quantities will be available for proposed closure and maintenance.
- (F11) Twelve months after rehabilitation commences and annually thereafter, a rehabilitation and monitoring report must be prepared by the registered operator detailing what rehabilitation activities have occurred and the results of the monitoring program including:
- (a) trend and statistical analysis where appropriate (including taking of photographs demonstrative of rehabilitation achieved);
  - (b) proposed improvements or upgrades to the rehabilitation program; and
  - (c) an action plan formulated to improve rehabilitation outcomes and monitoring as well as remedy areas of failed or poorly performing rehabilitation.



## Final Cover

- (F12) Materials used in the construction of the clay capping layer must achieve an *in situ* permeability which is sufficiently low and be of sufficient thickness so as to minimise infiltration of water into the landform.
- (F13) The final capping system must include an upper layer of earthen material that is capable of sustaining plant growth, together with sufficient drainage to ensure that erosion is minimised and the landform is stable for the foreseeable future, and be designed and maintained to minimise erosion occurring to either the final capping system or the placed ash..
- (F14) Sufficient monitoring of parameters affecting the sustainability of the final capping system (e.g. soil loss) must be undertaken by a suitably qualified person to enable the registered operator to demonstrate that the landform is stable for the foreseeable future.

## Schedule G - Social

### Complaint Response

- (G1) The registered operator must record the following details for all complaints received and provide this information to the administering authority on request:
  - (a) Time, date, name and contact details of the complainant;
  - (b) reasons for the complaint;
  - (c) any investigations undertaken;
  - (d) conclusions formed; and
  - (e) any actions taken.
- (G2) In consultation with the administering authority, cooperate with and participate in any community environmental liaison committee established in respect of the premises to which this development approval relates.

## Schedule H - Dams

### Dams – General Conditions

- (H1-1) The holder of this development approval must ensure that dams are designed, constructed, operated and maintained in accordance with accepted engineering standards.
- (H1-2) Except for dams affected by condition H1-3, the hazard category of dams, must be assessed by a suitably qualified and experienced person prior to their construction, and then not less frequently than on an annual basis.
- (H1-3) The hazard category of dams constructed prior to the grant of this development approval must be assessed by a suitably qualified and experienced person within six months of this development approval taking effect, and not less frequently than on an annual basis.
- (H1-4) The condition of dams must be monitored for early signs of loss of structural or hydraulic integrity by a suitably qualified and experienced person.
- (H1-5) In the event of early signs of loss of structural or hydraulic integrity, the holder of this development approval must take action to prevent or minimize any actual or potential environmental harm, and report any findings and actions taken to the administering authority.
- (H1-6) The holder of this development approval must not abandon any dam, but must decommission each dam to a situation where ongoing environmental harm is prevented.
- (H1-7) As a minimum, the holder must demonstrate that they have decommissioned the dams so that they:
  - (a) have become stable landforms;

- (b) no longer contain flowable substances; and
- (c) comply with the rehabilitation requirements of this development approval.

(H1-8) The registered operator must ensure that activities conducted in accordance with this development approval do not compromise the integrity of a dam, whether or not that dam is under the control of the operator.

**Regulated Dams (Dams in the Significant or High Hazard Category)**

**Location and Limits**

(H2-1) The following regulated dams are to be located within the control points defined in Schedule H - Table 1, below.

**Schedule H — Table 1 (Location of Regulated dams)**

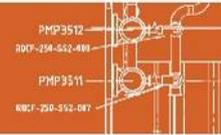
Name of Regulated Dam	Latitude (GDA 94)	Longitude (GDA 94)
Ash Disposal Facility	<XXX>	<XXX>
	<XXX>	<XXX>
	<XXX>	<XXX>
	<XXX>	<XXX>
Containment Bund	<XXX>	<XXX>
	<XXX>	<XXX>
	<XXX>	<XXX>
	<XXX>	<XXX>

(H2-2) The following regulated dams are to be constructed and used in accordance with Schedule H - Table 2, below.

**Schedule H — Table 2 (Specification of Regulated Dams)**

Name of Regulated dam	Maximum surface area of dam (ha)	Maximum volume of dam (m <sup>3</sup> )	Maximum depth of dam (m)	Use of dam
Ash Disposal Facility	<XXX>	<XXX>	<XXX>	Disposal of ash and other wastes from Tarong and Tarong North Power Stations
Containment bund	<XXX>	<XXX>	<XXX>	Site water management and sediment control

(H2-3) The following regulated dams are to be designed, constructed and operated in accordance with Schedule H - Table 3, below.



**Schedule H — Table 3 (Hydraulic Performance of Regulated Dams)**

<b>Name of Regulated dam</b>	<b>Spillway Capacity Diversion Capacity (Levees) AEP</b>	<b>Design Storage Allowance (N/A for levees) AEP</b>	<b>Mandatory Reporting Level (N/A for levees) AEP</b>
Ash Disposal Facility	1 in 1000 AEP	N/A	N/A
Containment Bund	1 in 1000 AEP	1 in 100 AEP*	1 in 100 AEP*

**Regulated Dams (Dams in the Significant or High Hazard Category)**

**Certification and Operation**

- (H3-1) The holder of this development approval must not commence construction of a regulated dam unless:
  - (a) the holder has submitted to the administering authority two copies of a design plan, together with the certification of a suitably qualified and experienced person that the design of the regulated dam is fit for purpose, compliant in all respects with this development approval and in accordance with accepted engineering practice; and
  - (b) at least 28 days has passed since the submission of the design plan.

The design plan shall include consideration of adequate drainage to be installed and maintained within and beneath ash emplacement areas to ensure that dewatering of leachate from the ash is adequate to achieve stability of the ash emplacement facility.

- (H3-2) When construction or modification of any regulated dam is complete, or within 12 months of a dam becoming a regulated dam by virtue of H1-2 or H1-3, the holder of this development approval must submit to the administering authority two copies of:
  - (a) a set of 'as constructed' drawings, together with the certification by a suitably qualified and experienced person that the dam 'as constructed' is fit for purpose, compliant in all respects with this development approval, and in accordance with accepted engineering practice; and
  - (b) an operational plan for the dam, which may form part of other plans required by this development approval, that specifies the time of application of that plan.

- (H3-3) The holder of this development approval must ensure that there is always a current operational plan for each regulated dam, which may form part of other plans required by legislation.
- (H3-4) The holder of this development approval must ensure that, where a current operational plan covers decommissioning and rehabilitation, those operations are consistent with the objectives in any design plan for the dam.
- (H3-5) The holder of this development approval or approval must notify the administering authority when the level in any regulated dam reaches the mandatory reporting level.

**Regulated Dams (Dams in the Significant or High Hazard Category)**

**Annual Inspection and Report**

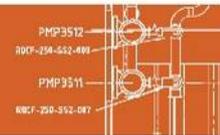
- (H4-1) The holder of this development approval must arrange for each regulated dam to be inspected annually by a suitably qualified and experienced person, in accordance with conditions H4-2 to H4-5 below.

- (H4-2) The annual inspection may be conducted as early as 1<sup>st</sup> September each year, but not later than 1<sup>st</sup> November each year, except that the assessment of adequacy of available storage in a dam must be based on dam levels observed within the month of October in the year that the inspection is conducted.
- (H4-3) At each annual inspection, a suitably qualified and experienced person must assess the condition of each regulated dam, determine the structural, geotechnical and hydraulic adequacy of the dam, and assess the adequacy of the works with respect to dam safety.
- (H4-4) At each annual inspection, the suitably qualified and experienced person must assess the adequacy of the available storage against the design storage allowance, and determine a mandatory reporting level to be marked on each regulated dam as applicable in Schedule H Table 2.
- (H4-5) For each inspection, two copies of a report certified by the suitably qualified and experienced person, including any recommendations to ensure the integrity of each regulated dam, must be provided to the administering authority within 28 days of the inspection.

#### **Comprehensive Dam Safety Review**

- (H5-1) From the date of commencement of deposition in the ash storage facility, the holder of this development approval must submit a monitoring program that would determine moisture profiles in the beached ash.
- (H5-2) All monitoring to determine moisture profiles of the beached ash must be consistent with the program from s.H5-1.
- (H5-3) Within three years of the commencement of deposition of ash in the emplacement, the holder of this development approval must have a comprehensive dam safety review of the ash storage facility undertaken by suitably qualified and experienced persons. The review is to be carried out in accordance with practice described in Guidelines on Dam Safety Management – Australian National Committee on Large Dams 2003. The review must consider all the monitoring data collected and include a determination of:
  - (a) Areas within the ash storage facility that have become unsaturated to the extent that liquefaction by any cause is not possible;
  - (b) Areas within the ash storage facility that can liquefy given the occurrence of appropriate conditions;
  - (c) Areas that could be impacted should liquefaction occur and containment fail; and
  - (d) The expected life of the capping systems before exposure of ash occurs as a result erosion (caused by wind and/or water) or other land degradation mechanism.

The findings of the review are to be reported to the administering authority.



## Definitions

Where a definition for a term used in this document is sought and the term is not defined within this document the definitions provided in the relevant legislation shall be used.

**“acceptance criteria”** means the measures by which actions implemented are deemed to be complete. The acceptance criteria indicate the success of the decommissioning and rehabilitation outcomes or remediation of areas which have been significantly disturbed by the environmentally relevant activities. Acceptance criteria may include information regarding:

- stability of final land forms in terms of settlement, erosion, weathering, pondage and drainage;
- control of geochemical and contaminant transport processes;
- quality of runoff waters and potential impact on receiving environment;
- vegetation establishment, survival and succession;
- vegetation productivity, sustained growth and structure development;
- fauna colonisation and habitat development;
- ecosystem processes such as soil development and nutrient cycling, and the re-colonisation of specific fauna groups such as collembola, mites and termites which are involved in these processes;
- microbiological studies including re-colonisation by mycorrhizal fungi, microbial biomass and respiration;
- effects of various establishment treatments such as deep ripping, topsoil handling, seeding and fertiliser application on vegetation growth and development;
- resilience of vegetation to disease, insect attack, drought and fire;
- vegetation water use and effects on ground water levels and catchment yields.

**"administering authority"** means the Environmental Protection Agency or its successor.

**“AEP”** means the Annual Exceedence Probability, which is the probability that at least one event in excess of a particular magnitude will occur in any given year. In the current context, this refers to rainfall events. An AEP together with a contributing catchment (area) and duration will determine a rainfall depth.

**"annual return"** means the return required by the annual notice (under section 316 of the *Environment Protection Act 1994*) for the section 73F registration certificate that applies to the development approval.

**"approval"** means 'notice of development application decision' or 'notice of concurrence agency response' under the *Integrated Planning Act 1997*.

**‘assessed’ or ‘assess’** by a suitably qualified and experienced person means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what has been assessed and the precise nature of that assessment;
- the relevant legislative, regulatory and technical criteria on which the assessment has been based;
- the relevant data and facts on which the assessment has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the assessment has been based using the relevant data and facts, and the relevant criteria.

**"authorised place"** means the place authorised under this development approval for the carrying out of the specified environmentally relevant activities.

**‘certification’ or ‘certified’** by a suitably qualified and experienced person means that a statutory declaration has been made by that person and, when taken together with any attached or appended documents referenced in that declaration, all of the following aspects are addressed and are sufficient to allow an independent audit at any time:

- exactly what is being certified and the precise nature of that certification.
- the relevant legislative, regulatory and technical criteria on which the certification has been based;
- the relevant data and facts on which the certification has been based, the source of that material, and the efforts made to obtain all relevant data and facts; and
- the reasoning on which the certification has been based using the relevant data and facts, and the relevant criteria.

**“clay capping layer”** means the layer of low permeability clay used to cover ash when ash deposition ceases in an area, prior to the placement of topsoil and the commencement of rehabilitation.

**“coefficient of runoff”** means the ratio obtained by dividing the resulting surface runoff of water for a given contributing catchment, by the average depth of rainfall over the contributing catchment that caused the runoff.

**"commercial place"** means a place used as an office or for business or commercial purposes.

**“construction”** includes building a new dam and modifying or lifting an existing dam.

**“dam”** means a land-based structure or a void that is designed to contain, divert or control flowable substances - including any substances that are thereby contained, diverted or controlled by that land-based structure or void; but does *not* mean a fabricated or manufactured tank or container designed to a recognised standard. In case there is any doubt, a levee dyke or bund is a dam.

**“design plan”** is the documentation required to describe the physical dimensions of the dam, the materials and standards to be used for construction of the dam, and the criteria to be used for operating the dam. The documents must include design and investigation reports, specifications and certifications, together with the planned decommissioning and rehabilitation works and outcomes. A design plan may include ‘as constructed’ drawings.

**“design storage allowance”** or **“DSA”** means the minimum storage required in a dam at the first of November each year in order to meet the hydraulic performance requirements.

**"dwelling"** means any of the following structures or vehicles that is principally used as a residence –

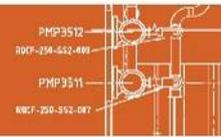
- a house, unit, motel, nursing home or other building or part of a building;
- a caravan, mobile home or other vehicle or structure on land;
- a water craft in a marina.

**"Environmental Protection Agency"** means the department or agency (whatever called) administering the *Environmental Protection Act 1994*.

**“final capping”** is a term used in this document to collectively describe the clay capping layer and any subsequent layers of cover (including topsoil) used to cover ash on completion of ash emplacement as part of rehabilitation works.

**“flowable substance”** means matter or a mixture of materials which can flow under any conditions potentially affecting that substance. Constituents of a flowable substance can include water, other liquids fluids or solids, or a mixture that includes water and any other liquids fluids or solids either in solution or suspension.

**“foreseeable future”** is the period used for assessing the total risk of an event occurring. Permanent structures and ecological sustainability should be expected to still exist at the end of a 150 year foreseeable future with an acceptable risk of failure before that time.



“**hazard**” in relation to a dam as defined in this authority, means the potential for environmental harm resulting from the collapse or failure of the dam to perform its primary purpose of containing, diverting or controlling flowable substances.

“**hazard category**” means a category, either low significant or high, into which a dam might be assessed as a result of the application of tables and other criteria in the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995).

“**hydraulic performance**” means the capacity of a regulated dam to contain or safely pass flowable substances based on a probability (AEP) of performance failure specified for the relevant hazard category in the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995).

“**intrusive noise**” means noise that, because of its frequency, duration, level, tonal characteristics, impulsiveness or vibration –

- is clearly audible to, or can be felt by, an individual; and
- annoys the individual.

In determining whether a noise annoys an individual and is unreasonably intrusive, regard must be given to Australian Standard 1055.2 – 1997 Acoustics – Description and Measurement of Environmental Noise Part 2 – Application to Specific Situations.

“**L<sub>A 10, adj, 10 mins</sub>**” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 10% of any 10 minute measurement period, using Fast response.

“**L<sub>A 1, adj, 10 mins</sub>**” means the A-weighted sound pressure level, (adjusted for tonal character and impulsiveness of the sound) exceeded for 1% of any 10 minute measurement period, using Fast response.

“**L<sub>A, max adj, T</sub>**” means the average maximum A-weighted sound pressure level, adjusted for noise character and measured over any 10 minute period, using Fast response.

“**land**” in the “land schedule” of this document means land excluding waters and the atmosphere.

“**mandatory reporting level**” or “**MRL**” means a warning and reporting level determined in accordance with the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995).

“**mg/L**” means milligrams per litre.

“**noxious**” means harmful or injurious to health or physical well being.

“**NTU**” means nephelometric turbidity units.

“**nuisance sensitive place**” includes –

- a dwelling, residential allotment, mobile home or caravan park, residential marina or other residential premises; or
- a motel, hotel or hostel; or
- a kindergarten, school, university or other educational institution; or
- a medical centre or hospital; or
- a protected area under the *Nature Conservation Act 1992*, the *Marine Parks Act 1992* or a World Heritage Area; or
- a public thoroughfare, park or gardens; or
- a place used as a workplace, an office or for business or commercial purposes and includes a place within the curtilage of such a place reasonably used by persons at that place, but does not include the Tarong Power Station.

“**offensive**” means causing offence or displeasure; is disagreeable to the sense; disgusting, nauseous or repulsive.

“**operational plan**” means a document that amongst other things sets out procedures and criteria to be used for operating a dam during a particular time period.

“**protected area**” means –

- a protected area under the *Nature Conservation Act 1992*; or
- a marine park under the *Marine Parks Act 1992*; or
- a World Heritage Area.

**"registered operator"** means the holder of a registration certificate for the activity to which this Development Approval relates, issued under Section 73F of the *Environmental Protection Act 1994* and in force.

**"regulated dam"** means any dam in the significant or high hazard category as assessed using the Site Water Management Technical Guideline for Environmental Management of Exploration and Mining in Queensland (DME 1995).

**"regulated waste"** means non-domestic waste mentioned in Schedule 7 of the *Environmental Protection Regulation 1998* (whether or not it has been treated or immobilised), and includes -

- for an element - any chemical compound containing the element; and
- anything that has contained the waste.

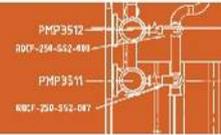
**"site"** means land or tidal waters on or in which it is proposed to carry out the development approved under this development approval.

**"spillway"** means a weir, channel, conduit, tunnel, gate or other structure designed to permit discharges from the dam, normally under flood conditions or in anticipation of flood conditions.

**"stable"** in relation to land, means land form dimensions are or will be stable within tolerable limits now and in the foreseeable future. Stability includes consideration of geotechnical stability, settlement and consolidation allowances, bearing capacity (trafficability), earthquake loadings, potential liquefaction, erosion resistance and geochemical stability with respect to seepage, leachate and related contaminant generation.

**"suitably qualified and experienced person"** means one who is a Registered Professional Engineer of Queensland (RPEQ) under the provisions of the Professional Engineers Act 1988, OR registered as a National Professional Engineer (NPER) with the Institution of Engineers Australia, OR holds equivalent professional qualifications to the satisfaction of the administering authority for the Act, in these 'relevant fields':

- a) knowledge of engineering principles related to the structures, geomechanics, hydrology, hydraulics, chemistry and environmental impact of dams; and
- b) at least a total of five years of suitable experience and demonstrated expertise in at least four of the following areas:
  - investigation, design or construction of dams;
  - operation and maintenance of dams;
  - geomechanics with particular emphasis stability, geology and geochemistry;
  - hydrology with particular reference to flooding, estimation of extreme storms, water management or meteorology;
  - hydraulics with particular reference to sediment transport and deposition, erosion control, beach processes;
  - hydrogeology with particular reference to seepage, groundwater;
  - solute transport processes and monitoring thereof; and
  - dam safety.



**“tolerable limits”** means a range of values used as acceptance criteria and regarded as being sufficient to meet the objective of protecting relevant environmental values. For example, a range of settlement for a tailing capping, rather than a single value, could still meet the objective of draining the cap quickly, preventing pondage and limiting infiltration and percolation.

**“void”** means any man-made, open excavation in the ground.

**"watercourse"** means a river, creek or stream in which water flows permanently or intermittently-

- in a natural channel, whether artificially improved or not; or
- in an artificial channel that has changed the course of the watercourse.

**"waters"** includes river, stream, lake, lagoon, pond, swamp, wetland, unconfined surface water, unconfined water natural or artificial watercourse, bed and bank of any waters, dams, non-tidal or tidal waters (including the sea), stormwater channel, stormwater drain, roadside gutter, stormwater run-off, and groundwater and any part thereof.

**"works" or "operation"** means the development approved under this development approval.

**"you"** means the holder of this development approval or owner / occupier of the land which is the subject of this development approval.

**"50th percentile"** means not more than three (3) of the measured values of the quality characteristic are to exceed the stated release limit for any six (6) consecutive samples for a release/monitoring point at any time during the environmental activity(ies) works.

**"80th percentile"** means not more than one (1) of the measured values of the quality characteristic is to exceed the stated release limit for any five (5) consecutive samples for a sampling point at any time during the environmental activity(ies) works.

# Appendix 2

## **OTHER RECOMMENDATIONS**

These recommendations, which cannot be attached as a condition to any statutory approval, reflect the objectives stated in the EIS documentation.

### **Recommendation 1**

TEC should finalise the Environmental Management Plan for construction and operation of the Tarong Northern Land Ash Emplacement facility to the satisfaction of EPA at least one month before commencement of construction of the Project.