Tarong Power Station

Tarong Northern Land Ash Emplacement Project

Initial advice statement

October 2005

Tarong Energy Corporation Limited

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List of Abbreviations

EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ERA	Environmentally Relevant Activity
IAS	Initial Advice Statement
IPA	*Integrated Planning Act 1997*
MW	Mega Watts
NEM	National Electricity Market
PB	Parsons Brinckerhoff
SDPWO Act	*State Development and Public Works Organisation Act 1971*
the Project	Tarong Power Station – Tarong Northern Land Emplacement Ash Project Stage 1 & Stage 2. Significant Project Declaration to be sought for both Stages. EIS to assess Stage 1 only.
the Power Stations	Tarong and Tarong North Power Stations
Tarong Energy	Tarong Energy Corporation Limited
Tarong Site	Tarong and Tarong North Power Stations combined
ToR	Terms of Reference
VMA	*Vegetation Management Act 1999*

1. Purpose of this document

This Initial Advice Statement (IAS) has been prepared by Parsons Brinckerhoff (PB) for Tarong Energy Corporation Limited (Tarong Energy) for the Tarong Power Station — Northern Land Ash Emplacement Project (the Project). The Project is to be assessed in two stages:

- *Project Stage 1*. Stage 1 is located approximately 3.5 km north of the existing ash storage facility and covers an area of 2 km^2. The preliminary design of Stage 1 is predicted to have a storage life of approximately 20 years at the current rate of ash production at the Power Stations.
- *Future Stage 2*. The land anticipated to be required for this future stage is located directly north of Stage 1. The design and approval of future Stage 2 will only proceed if there is an identified need for additional ash storage within the Northern Land after completion of Stage 1. Sufficient land has been acquired for both stages.

This IAS is to provide information to Government to:

- assist the Coordinator-General to make a decision on a declaration of the Project as a 'significant project' under Section 26 of the *State Development and Public Works Organisation Act 1971* (SDPWO Act), which would initiate the statutory impact evaluation procedures of Part 4 of the SDPWO Act;
- assist the Coordinator-General to prepare draft Terms of Reference (ToR) for an Environmental Impact Statement (EIS) for Stage 1 of the Project; and
- enable stakeholders to determine the nature and level of their interest in the Project.

The IAS is intended to scope the potential impacts that will be investigated in detail prior to the Project being granted appropriate approvals. A ToR for the EIS will be developed based on the outcomes of this IAS and the requirements of relevant government agencies and other stakeholders through a public consultation process. An EIS and Environmental Management Plan (EMP) will be prepared as part of the environmental assessment process.

1.1 Project description

The Project involves the construction of an additional ash storage facility to service both the Tarong and Tarong North Power Stations (the Power Stations).

Tarong Power Station is one of Queensland's largest power stations with a total generating capacity of 1,400 MW. The adjacent Tarong North Power Station has a total generating capacity of 445 MW. The Power Stations are located on a 1,500 ha site adjacent to the Nanango-Tarong Road approximately 12.5 km south-east of Nanango in the south-Burnett region of Queensland (Figure 1.1).

The Tarong Site (Tarong and Tarong North Power Stations combined) currently has a generating capacity of 1,845 MW and is the largest electricity generation complex in Queensland. Most electricity generated by the Tarong Site is consumed in south-east Queensland. Coal is principally sourced from the neighbouring Meandu Mine owned by Pacific Coal Pty Ltd.

1.1.1 Tarong Power Station

Tarong Power Station comprises 4 x 350 MW coal-fired electricity generating units. The first of Tarong Power Station's four generating unit became operational in May 1984 and the station was completed in 1986 at a cost of $1.2 billion. The power station also has ancillary facilities such as coal conveyor and storage systems, cooling water dams, a 15 MW emergency gas turbine and an ash storage dam.

1.1.2 Relationship with Tarong North Power Station

Tarong North is a single unit 445 MW coal-fired station that was completed in August 2003. Tarong North is owned by a 50/50 unincorporated joint venture between Tarong Energy (via a special purpose subsidiary, TN Power Pty Ltd) and TM Energy (Aust) Pty Ltd which is owned by Tokyo Electric Power Company and Mitsui & Co. Ltd.

Tarong North Power Station is situated on discrete land (separate certificates of title) adjacent to the Tarong Power Station pursuant to a long-term lease from Tarong Energy. The Tarong North Joint Venture has no interest in any of Tarong Energy's other land.

The operation of Tarong North Power Station is dependant on the continued operation of the Tarong Power Station in several practical ways. Tarong Energy provides a number of services to Tarong North Power Station including fuel supply (coal) under a Fuel Supply Agreement and various site services such as cooling water, hydrogen, fuel oil and ash disposal under a Site Services Agreement. Under the Site Services Agreement Tarong Energy is obliged to receive ash from Tarong North Power Station into its 'ash facility' which is defined to mean the existing ash dam (or such other replacement facility nominated by Tarong Energy).

Importantly, the site leased to the joint venturers could not accommodate the construction of alternate ash disposal facilities for the Tarong North Power Station.

Tarong Energy is wholly responsible for maintaining and operating the ash dam and other ancillary infrastructure at Tarong Power Station, including coal handling equipment and cool water dams and pipelines. Tarong Energy is also responsible for all legal requirements in relation to these facilities including all development and environmental approvals.

1.1.3 The Project

Currently the Power Stations are burning coal with an average ash content of 28%. At the normal rates of electricity generation, in excess of 1.9 million tonnes of ash is produced annually. It is expected that the existing ash dam will reach its maximum capacity by mid-2008. It is therefore critical that the additional ash storage facility is operating prior to this date.

After assessing a range of options for the long-term storage of ash, the Project has been identified as the preferred option for ash storage. It is proposed that Project Stage 1 be operational by mid-2007. This will provide for one year contingency storage in the existing facility.

Tarong Energy has recently purchased enough additional freehold land adjacent to the Tarong Site (the Northern Land) to allow for the long-term future strategic planning of power station needs and to ensure there is no encroachment of incompatible land uses that could limit the future operation of the Power Stations. The preferred location for the Project is on the northern land as outlined in Figure 1.2.

The Project has been divided into two stages based on need and timing for future long-term ash disposal at the Tarong Site:

- *Project Stage 1*. Stage 1 is located approximately 3.5 km north of the existing ash storage facility and covers an area of 2 km^2. The preliminary design of Stage 1 is predicted to have a storage life of approximately 20 years at the current rate of ash production at the Power Stations.
- *Future Stage 2*. The land anticipated to be required for this future stage is located directly north of Stage 1. The design and approval of future Stage 2 will proceed if there is an identified need for additional ash storage within the Northern Land after completion of Stage 1. Sufficient land has been acquired for both stages.

Tarong Energy is seeking to have the Project (both Stages 1 and 2) declared a 'significant project' under the SDPWO Act. For the present, it is proposed to prepare an EIS for Stage 1 only of the Project and receive an evaluation report from the Coordinator-General for Stage 1. It is proposed to carry out an EIS and receive an evaluation report for Stage 2 when the requirement for additional storage is confirmed.

This IAS aims to present sufficient information to the Coordinator-General and relevant stakeholders to gain approval under SDPWO Act that the Project is of State Significance, and that the EIS for Stage 1 only of the Project, will proceed under the SDPWO Act.

Key features of the Project are:

- the proposed ash facility will accept ash from Tarong and Tarong North Power Stations
- 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. The furnace ash from Tarong North Power Station (approximately 60,000 tonnes per year) will be transported to the proposed facility by truck

- Project Stage 1 is expected to provide an additional 20 years of storage capacity (approximate ash storage volume of 45 mm^3)
- ash will be stacked as a dense phase material to create a stable landform with a support embankment at the lead face
- the dense phase ash placement method will allow a greater storage density to be achieved than in the existing ash dam
- the dense phase ash 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
- the final landform will be developed using a phased construction approach and will involve raising the support embankment as the ash level rises. Development of the landform design will investigate sequencing the ash emplacement in discrete areas over the Northern Land to distribute construction works over the life of the Project.

Figure 1.1: Location of the study area

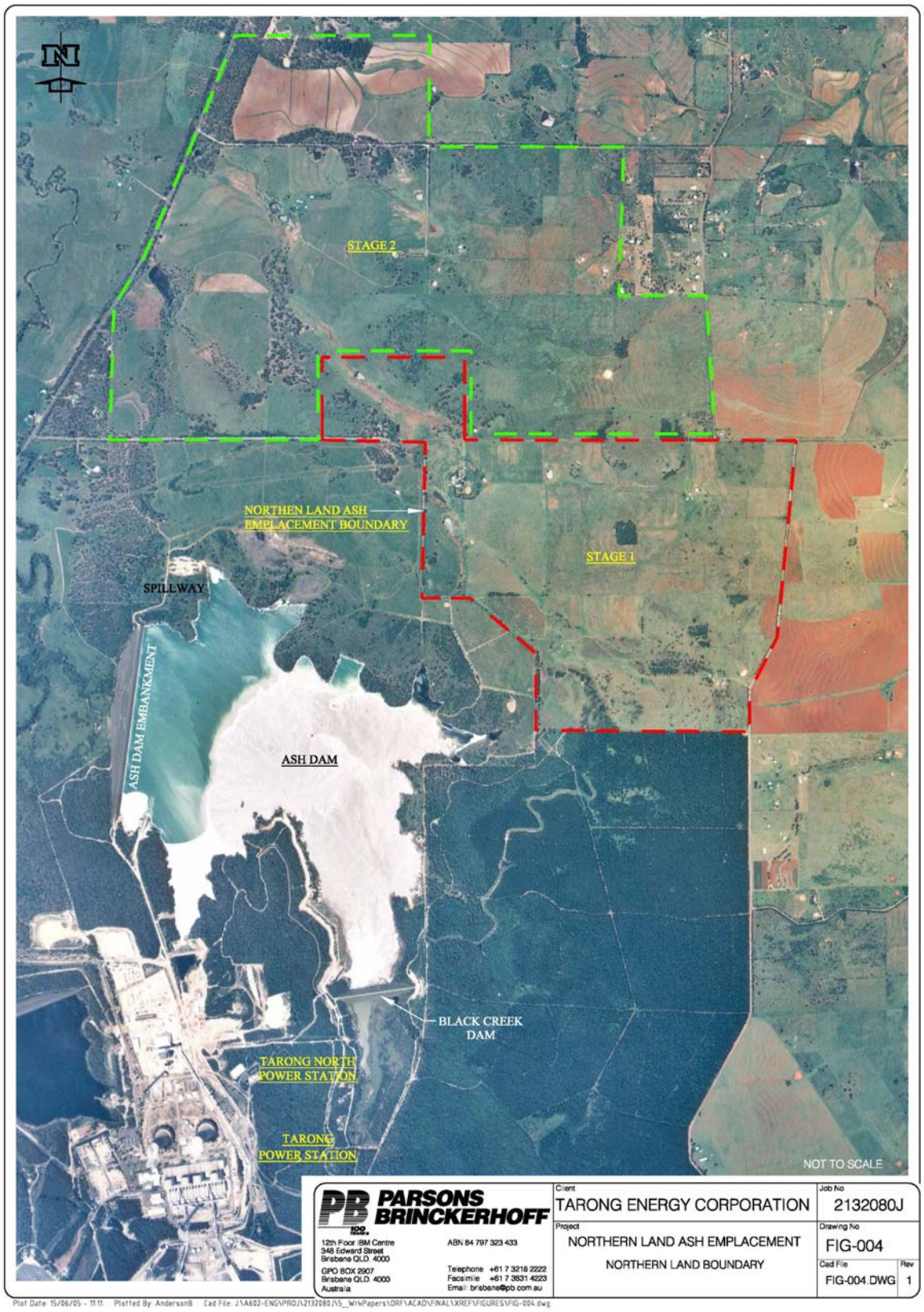

Figure 1.2: Northern Land Project location plan

1.2 The proponent

Tarong Energy is the proponent for the Project. Tarong Energy is a Queensland Government Owned Corporation and a public company established under the Commonwealth *Corporations Act 2001*, employing approximately 350 people and generating about one quarter of Queensland's electricity supply. Tarong Energy participates in the National Electricity Market (NEM). The shares in Tarong Energy are held by Ministers of the Queensland State Government on behalf of the State of Queensland.

Tarong Energy was established on 1 July 1997 following the disaggregation of AUSTA Electric. In the 2003/04 financial year, Tarong Energy earned $423.9 million in revenue through the NEM as a result of the sale of electricity and ancillary services. In the same period, Tarong Energy had an after tax operating profit of $85.9 million, $5.3 million more than the previous year. Tarong Energy's total assets were worth $1,598.5 million and its liabilities totalled $741.9 million.

Tarong Energy's 100% owned and operated assets include the Tarong and Wivenhoe power stations in Queensland and South Australia's first wind farm at Starfish Hill. Tarong Energy also owns 50% of the Tarong North Power Station in a joint venture with the Tokyo Electric Power Company and Mitsui and Co Ltd.

Tarong Energy is well experienced in the successful completion of major construction projects. In 2003 Tarong Energy developed two significant projects. There were:

- the 445 MW Tarong North Power Station
- the 34.5 MW Starfish Hill Wind Farm

Both projects were carried out by experienced contractors, under the direction of Tarong Energy's core project management team.

Contact details for the project proponent are:

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1.3 Cost and financing

The Project Stage 1 is expected to cost up to $10 million for construction and establishment of the initial infrastructure (Stage 1), excluding on-going operating costs. These costs are budgeted and have been approved by the Tarong Energy Board of Directors. The Project Stage 1 will be funded from the Tarong Energy balance sheet. No external funds are being sought.

1.4 Project need

Tarong Power Station supplies low-cost reliable electricity to the NEM. Tarong Energy produces approximately one quarter of the electricity generated in Queensland. The Tarong Site (Tarong and Tarong North Power Stations combined) 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 Tarong Power Station dictates that the power station plays an integral role in the supply of electricity to Southern Queensland. At present the ongoing provision of power to the Southern Queensland market is reliant on the continued operation of Tarong Power Station.

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.

The Power Stations currently burn a total of about 7 million tonnes of coal per year, which results in approximately 1.9 million tonnes of ash remaining from the combusted coal. Approximately 300,000 tonnes of fly ash per year is sold for use offsite in the manufacture of concrete and cement products. The magnitude of these sales is limited by the capacity of the market. This leaves approximately 1.6 million tonnes of ash per year to be disposed of on site each year.

If on site ash disposal was not possible due to the existing storage facility becoming full, the Tarong and Tarong North Power Stations would have to curtail operation. If this was to occur, there is a likelihood of power outages and interruptions, particularly in Southern Queensland, as other existing power stations would be unable to meet the demand.

It is therefore vital to the Queensland community and economy that the Tarong Power Stations have adequate long term ash disposal available in order to continue to be operational. The Project, as described in this IAS, will provide the secure long term ash disposal required to ensure electricity generation at the Tarong Site is not constrained through a lack of available ash disposal.

1.4.1 Existing ash storage facility

The ash dam is an integral part of the Tarong Power Station. Furnace and fly ash is collected from various parts of the Tarong Power Station and deposited in the ash dam. Low Coal quality and the inclusion of ash generated by Tarong North Power Station have lead to total ash production being significantly higher than originally provided for in the initial design of the ash dam.

The existing ash storage facility, constructed in 1981, is formed by a dam located on Black Creek approximately 2 km north of the Tarong Power Station. The original design storage capacity was 42,000 ML. In December 2004, the spillway was raised 1.6 m, increasing the allowable ash storage capacity to 46,000 ML and providing a short-term solution to the shortfall in capacity of the ash dam.

Based on current projected inflow rates from the Tarong and Tarong North Power Stations it is expected that the existing ash dam would reach its capacity by mid-2008. It is therefore critical that an alternative disposal site is finalised and operational prior to this date.

1.4.2 Local, regional and state significance

The first of the Tarong Power Station's four generators, Unit 1 became operational in May 1984. The station was completed with the commissioning of Unit 4 in 1986. In all, the construction of the Tarong Power Station employed more than 2,000 people and cost more than $1.2 billion to complete. The Tarong Power Station employs about 250 people, 90% of whom reside in the neighbouring shires of Kingaroy, Nanango and Rosalie. As well, Tarong Power Station households contribute 415 workers to Kingaroy Shire, 181 to Nanango Shire and 38 to Rosalie Shire. Eight–five percent of the total employment created is due to flow-on effects of the Tarong Power Station's operations.

Construction on the Tarong North Power Station commenced in January 2000. Commercial operation commenced in July 2003. The power station cost approximately $650 million to construct and employed 2,235 people (directly and indirectly) during construction. Over its expected life, Tarong North Power Station will create 170 permanent jobs and the estimated net economic benefit to the Queensland economy is expected to be $1,546 million.

Based on the report, *The Economic Impact of Tarong Energy on the Wide Bay—Burnett Region* by the Centre for Australian Financial Institutions for the financial year of 2000/01 (the CAFI Report), Tarong Power Station's direct annual economic contribution to the Wide Bay - Burnett Region includes spending $4.5 million on purchasing goods and services locally (excluding coal purchases, salaries and wages) as well as contributing $1.95 million in water delivery to farmers downstream of the facility along Meandu Creek. In addition to this, Tarong Energy helped to establish the Tarong Learning Program and other community activities and facilities aimed at developing the skills of local residents, particularly the unemployed youth.

The benefits to the local communities extend beyond direct contributions and include the multiplier effects created by the employment and finances provided by the Tarong Power Station. The CAFI Report found that for the financial year of 2000/01, Tarong Power Station households contributed $14.5 million in goods and services expenditure to the economy of the Wide Bay - Burnett Region. Contracts to local service providers also contributed to the region's economy with the associated Coal Combustion Products contractors spending $1.6 million in the region annually.

The CAFI Report found that Tarong Power Station's total annual economic contribution to the Wide Bay - Burnett Region plus the flow-on effects of the expenditure in the Region were estimated as follows:

- change in total output: $518 million
- change in value added: $285.9 million
- change in total household income: $88.9 million
- change in total employment: 1,618 fulltime equivalent jobs.

These estimates provide an indication of the substantial contribution of the Tarong Power Station to the maintenance of a higher level of sustainable social and economic activity in the region. The dominant beneficial impacts of the contributions above are the increase in the living standards of local communities and the widely observed increase in regional economic certainty and stability. This certainty has raised the level of business confidence in the region, an issue which is vitally important for future regional economic development and the follow-on benefits of halting the drain of young and qualified people from regional areas.

1.4.2.1 Demand for electricity

According to the Annual Planning Report of Powerlink for 2005 (the 'Powerlink Report'), electricity usage in Queensland has grown strongly during the past 10 years and this trend is expected to continue. The Powerlink Report estimates that summer maximum demand is expected to increase at an average annual rate of 4% from 7,424 MW in 2004/05 to 10,959 MW in 2014/15. However, this ten year average masks the accelerated summer demand increase forecast for the near future. This accelerated demand growth is attributable to the expected continuation of rapid increase in penetration and usage of domestic air conditioners and strong population growth, which have been evidenced in recent years, particularly in South-East Queensland. Here the forecast summer weather corrected demand for the three year period up to 2007/08 will have an average growth rate of 6% per annum.

The South East Queensland Infrastructure Plan and Program for 2005-2026 states that 'over the past ten years Queensland has experienced a 53% increase in electricity consumption and an 8% per annum increase in peak load growth' and that 'this growth in demand is expected to continue over the coming two decades' (p29, Ref 17).

Annual energy to be delivered by the Queensland transmission grid is forecast to increase at an average rate of 3.2% p.a. over the next ten years for the medium growth scenario. Similarly, an average energy growth of 4.2% p.a. is expected in South-East Queensland (Powerlink Queensland 2005).

The bulk of Queensland's electrical energy is generated by coal-fired power stations located in central and southern Queensland.

The unavailability of Tarong and Tarong North Power Stations would cause a significant reduction in the Queensland electricity generating capacity. The ability to have South-East Queensland's electricity needs supplied from sources other than Tarong Power Station is limited by the capability of the high voltage transmission network. The Central Queensland – Southern Queensland grid limit is around 2,000 MW, which together with 1,000 MW through the Braemar transformer (Queensland-New South Wales Interconnection + Millmerran) gives a maximum of 3,000 MW of external supply to Southern Queensland.

The Powerlink Report indicates 2005/06 maximum demand for Southern Queensland of around 4,421 MW, or around 1,400 MW greater than what can be supplied from sources outside of Southern Queensland. Without Tarong Power Station this 1,400 MW of load could not be supplied from the remaining Southern Queensland power stations (Swanbank E (385 MW), Swanbank B (480 MW) and Wivenhoe Power Station (160 MW during summer due to energy limits)).

Unplanned outages at generating plant (typically around 2%–5%) would further compromise the ability of other Southern Queensland power stations to reliably meet consumers' electricity demands should Tarong Power Station be forced to reduce its availability.

Therefore, a reliable electricity supply will not be able to be maintained to Southern Queensland without continued availability from Tarong Power Station.

The above illustrates that Tarong Power Station plays a vital role in meeting the future demand for electricity of Southern Queensland. In particular, the transmission network system has been designed on the presumption that Tarong Power Station will continue to be available. The inherent limits of the transmission network design mean that Tarong Power Station must remain operationally available for there to be a continued supply of electricity to Southern Queensland.

It is essential to ensure the continued operation of both power stations to maintain the continued high level security of electricity supply that the Queensland community expects and to fully utilise the capital investment already made at the Tarong Site.

1.5 Project alternatives

For the past five years Tarong Energy has been developing a strategy for the long-term storage of ash. The conversion to dense phase ash production has been completed and studies carried out to identify long term ash storage options.

The options considered for the long-term storage of ash are summarised in Table 1.1.

Based on the conclusions provided in Table 1.1, Option 1 provides the lowest risk disposal alternative and hence is the preferred storage option for long-term certainty of ash disposal.

In addition to current assessment of disposal alternatives, Tarong Energy continues to seek commercial opportunities for separation and sale of ash materials to reduce the annual ash disposal tonnage.

Additional sales and new markets for ash products have also been encouraged by Tarong Energy. However the distance from the major markets of Brisbane and the Gold Coast together with the readily available materials at these locations tends to limit the opportunities.

Table 1.1: Summary of future ash storage options evaluated

Option No.	Timeframe	Description of option and evaluation
1	Long-term	Use dense phase ash placement to establish a new storage facility outside the existing ash dam catchment. This method is similar to ash stacking used at Stanwell Power Station. The use of dense phase material has now become the preferred method of tailings disposal in a wide range of minerals processing activities. The method offers significant economic and environmental advantages over wet storage systems.
2	Long-term	Dispose of dense phase ash into the adjacent Meandu Mine final voids. Tarong Coal advises that suitable mine voids may not be available until 2010 or later. As the ash dam is predicted to be at maximum capacity in mid-2008, this option leaves a two year shortfall in ash disposal at best and at worst it may be impossible due to incompatibility with the mine plan or inability to reach a commercial agreement. Despite these problems, this option has some perceived environmental advantages and will continue to be pursued; however it is not possible to rely solely on this option for future long-term ash disposal.
3	Long-term	Build new wet storage facility. The topography of the Tarong site does not offer any suitable additional dam sites.
4	Long-term	Significantly increase the capacity of the existing storage facility by raising the Ash Dam crest to approximately RL 452. The cost of these modifications makes this option significantly more expensive than options 1 and 2. In addition, the increased inundation area would include a large area of remnant 'of concern' regional ecosystem in the adjacent State Forest. This would also require government approvals to excise the required land from the State Forest.
5	Mid-term	Deposit additional dense phase material within the existing ash dam area to create an elevated land form. This has implication for the stability of the existing ash emplacement and for possible liquefaction risks in the placed ash during potential seismic events. To date, it has not been possible to prove that this option is feasible using current engineering knowledge and available simulation tools. The viability of this option will be investigated further over the next 12 months as more experience is gained with the dense phase ash stacking.

1.6 Assessment and approval process

1.6.1 Proposed State development approval assessment process

Tarong Energy is seeking to have Stage 1 and Stage 2 of the Project declared a 'significant project' under the SDPWO Act. If it is declared as a 'significant project' the Coordinator-General would manage the EIS process on behalf of the Coordinator-General in accordance with the SDPWO Act. Following the Coordinator-General's evaluation report for the EIS for Stage 1 of the Project, Tarong Energy intends to seek a Community Infrastructure Designation (CID) of Stage 1 of the Project under the *Integrated Planning Act 1997*.

In addition to the process mentioned above, it is expected that the Project Stage 1 will be an Environmentally Relevant Activity (ERA) under the *Environmental Protection Act 1994*, requiring a Development Approval and Registration Certificate for ERA75(b)(iv) (Waste disposal - operating a facility for disposing of regulated waste). The Project Stage 1 will require a development application under the *Integrated Planning Act 1997* (Qld) (IPA) for the ERA, which will be a code assessable application and a registration certificate issued under the *Environmental Protection Act 1994* (Qld). Additional approvals for other ERAs may be required due to construction requirements.

The EIS process carried out under the SDPWO Act will substitute the information and referral stage and public notification stage under IPA. The Coordinator-Generals evaluation report will be applied to seek a community infrastructure designation for the Project Stage 1.

Approvals under the *Nature Conservation Act 1992* (Qld), may be required for the Project Stage 1 if protected species are identified on the site. In addition, a cultural heritage management plan under the Queensland *Aboriginal Cultural Heritage Act 2003* will be required. Approval of the Minister for Natural Resources and Mines would also be required under the Queensland *Land Act 1994* for the closure of Chippendale Road.

The *Vegetation Management Act 1999* (VMA) regulates the clearing of native vegetation in Queensland. One of the primary objectives of this Act is the preservation of remnant native vegetation.

The land has previously been used for farming, mainly grazing and cropping and is currently cleared. Searches of the regional ecosystem maps indicate that none of the project site is currently mapped as having remnant vegetation. There are some small pockets of vegetation that will be assessed for conformance with regional ecosystem criteria as part of the preliminary site investigations.

1.6.2 Commonwealth approval requirements

The Project may require assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) if the Project is likely to have a significant impact on a matter of national environmental significance. From information already known about the study area, Tarong Energy considers it unlikely that the Project will have a significant impact on a matter of national environmental significance, however this will be reviewed after relevant detailed field studies are completed.

2. Details of the proposed Project Stage 1

2.1 Ash emplacement design considerations

The search for a suitable ash emplacement location was influenced by a number of design targets. These were:

- minimum use of construction materials other than ash
- maximisation of the ash storage volume
- minimal dust generation during placement of the ash
- provision of safe access to the ash emplacement area for earthmoving equipment
- minimising water infiltration into the ash emplacement area
- minimising stormwater runoff from the ash disposal area to reduce the quantity of water to be recycled
- provision of a visual screen from roads and adjacent farming and rural residential areas as much as practical during the ash disposal phase
- ensuring the ash storage is a stable landform with minimum erosion potential
- minimising the need for ash rehandling once placed by the transport system
- ability to rehabilitate the site to achieve a well grassed surface with the aim of minimising erosion
- ability to control stormwater runoff to minimise sediment load and achieve compliance with accepted standards for water quality to allow to drain freely offsite.

An area of land to the north of the existing ash dam is the proposed ash emplacement site. This was the only available freehold land available for extension of the Power station site. The area has been subject to intensive agriculture and has been heavily modified, consisting mostly of open grassed paddocks.

The emplacement location covers an approximate area of 2 km^2. By filling the existing valley with ash to a maximum depth of 50 m and creating a peak at the centre of the valley, a volume of 45 Mm^3 can be achieved giving an approximate storage life of 20 years at the current rate of production. Drainage can be directed either into the existing ash dam and a proposed northern stormwater dam located in a natural gully to the north of Berlin Road, or just the northern stormwater dam.

2.2 Dense phase ash transport

There are two methods of transporting ash to the emplacement area:

- trucking the output from the dense phase ash plants from the Power Station
- piping the ash as a dense phase slurry.

Concept designs and cost estimates were developed to determine the most economically and environmentally viable form of ash transportation. Trucked haulage, although providing flexibility and minimal initial capital costs, was found to have the following main disadvantages:

- a significantly higher long-term cost than for an ash pipeline due to high operational costs
- increased environmental and social concerns due to increased dust, noise emissions etc.

Transporting the dense phase ash via a slurry pipeline is the preferred option. Due to the configuration of the Tarong North Power Station ash plant it will be necessary to truck the furnace ash to the Northern Land. The Tarong North furnace ash is a small fraction of the total ash produced (60,000 tonnes per annum out of approximately 1.9 million tonnes per annum). Future modifications to the Tarong North Ash plant may allow the furnace ash to be blended into the dense phase slurry and therefore pumped to the northern ash facility.

2.3 Emplacement methodology

Construction of the Project Stage 1 will occur in phases. To prepare the area for construction, topsoil will be stripped and stockpiled on site for future use in the rehabilitation process. Topsoil stripping will occur on a progressive basis to minimise the duration that topsoil is stockpiled and reduce the working footprint.

In general it is expected that the emplacement procedure will require the initial construction of a bund followed by emplacement of ash slurry upslope of the bund. Following the initial construction a series of lifts will be required to raise the bund in horizontal layers progressively. Once a reasonably high bund has been constructed ash slurry can be placed upslope. A number of materials are being considered for construction of the bund. A series of bunds may be used to form up the ash during the initial stages of development.

Under the bund and ash slurry a series of subsurface drains will be constructed to prevent a water table being established in the ash emplacement. This has a two fold effect:

1. it maintains the stability of the ash
2. it prevents water being in long-term contact with the ash.

In addition, it will also collect any groundwater seepage and drain it to the northern stormwater dam.

The slurry will be placed upslope of the bund. The water that separates from the slurry will be channelled to a low point and pumped over the ridge line to the south into the existing ash dam or pumped directly to the Tarong Power Station. Clean stormwater will be diverted around the ash emplacement facility and will flow to Meandu Creek. Stormwater from within the ash emplacement facility will be pumped into the existing ash dam once collected in the northern stormwater dam or reused on site for dust control and rehabilitation purposes.

The behaviour of the ash slurry will be taken into account in the design of the ash emplacement and will require a particular sequential construction technique. Further investigation is to be undertaken to assess the stability of the ash landform and construction sequencing of the ash emplacement. The further investigation will take into consideration the ash slurry properties, availability of materials, environmental issues, long-term planning for the area and the need for progressive rehabilitation of exposed surfaces.

2.4 Water management

The water management system for the ash emplacement is greatly simplified by the topography because very little diversion of stormwater is required. The proposed water management design is expected to include a clean water diversion drain to keep local stormwater away from the ash working area. A separate drainage system will be constructed to contain runoff from within ash work areas.

The drainage concept has been designed such that all runoff from the proposed ash emplacement will be contained in either of two locations. These locations are the existing ash dam and the new northern stormwater dam. Runoff from the ash placement areas behind the bund will flow to a low point behind the ash placement process and be pumped to the existing ash dam or to the Power Stations. Once the height of the placed ash has exceeded the existing ridge line this water can gravitate to the existing ash dam. Runoff and seepage from the downstream face of the ash emplacement will report to the new northern stormwater dam. Water reporting to the stormwater dam may be utilised on site for dust control.

The following design criteria are proposed for the surface water management system:

- open channels to be designed for the Q100 rainfall events and maximum runoff velocity of 1.5 m/s for grassed drains
- the supporting stormwater control systems are to be designed to contain the 0.01 AEP, 72 hour duration rainfall event with an extra 20% allowance for operating water storage and sediment build-up.

2.5 Groundwater

The ash emplacement design will incorporate the following features, to provide protection of the existing groundwater environment:

- the ash will be placed as dry as possible and any bleed water from the deposited ash is to be drained to a holding dam and pumped to the existing ash dam as quickly as possible
- seepage collection subsoil drains will be installed under the ash emplacement to reduce the degree of infiltration during construction of the emplacement
- the final landform is to be designed to drain freely, minimising the degree of infiltration
- the cleared site will be measured and logged for soil permeability and areas of high permeability will be treated prior to construction of the emplacement
- a suitable groundwater monitoring system will be implemented as part of the emplacement project works.

3. Description of the existing environment

3.1 Regional setting

The Tarong and Tarong North Power Stations are located within the rolling uplands of the Great Dividing Range, approximately 2 km to the north-west of the subsidiary Cooyar Range. The Power Stations and their surrounds consist of gently to moderately sloping alluvial valleys, which are dominated by transects of medium to densely vegetated eucalypt forests and cleared land that is being used for agriculture.

The major creek in the vicinity of the study area is Meandu Creek. This watercourse begins its journey approximately 14 km to the south, meandering in a north-easterly direction before merging with Barker's Creek, approximately 4 km north-west of Nanango. Other tributaries in the area include Black Creek, located approximately 2 km to the east of Meandu Creek. Black Creek is intercepted by the two Tarong Power Station dams: the Black Creek dam and the ash dam. Black Creek upstream from its confluence with Meandu Creek has recently been degazetted as a watercourse under the *Water Act 2000*.

3.1.1 Existing regional land use

Land use in the region is predominantly rural. The region includes various transects of State Forest and the Meandu Coal Mine to the south of the study area.

The Tarong Power Station site occupies an area of approximately 1,500 ha and includes such infrastructure as the Power Stations, coal stockpile area, switchyard and related infrastructure and numerous dams associated with the coal-fired power generation process. Smaller areas within the site are intermittently used for grazing and a small hoop pine plantation. The remaining areas of the site comprise both native and exotic vegetation and regrowth.

Under the current Nanango Shire Council Town Planning Scheme, the Tarong site is zoned 'Special Use — State Government Purposes'. Under the draft Nanango Shire Council IPA Planning Scheme, that has been publicly advertised, the Tarong Site is shown as a major utility – power station.

The Tarong Power Station is surrounded by transects of State Forest comprising the Tarong State Forest to the west, consisting of eucalypt woodland and vine forest and the Yarraman State Forest to the east, consisting of hoop pine plantations with fringing remnant vine forest.

There are two pockets of rural-residential properties located nearby the project site, a small pocket to the north, along Hazeldean Road, and a second pocket to the west located at the corner of Berlin Road and the Nanango-Tarong Road. The properties to the west have recently been acquired by Tarong Energy.

These areas of small-lot rural holdings are currently zoned 'Rural B'. The land is used for homesteading, minor grazing, horticulture and small crops. Large-lot mixed cropping and grazing properties (currently zoned 'Rural A') are located to the north and north-east of the power station site.

3.1.2 Regional geology and soils

Regionally, the area lies within the structural high known as the Yarraman Block. This block consists of a series of igneous bodies intruding an undifferentiated metamorphic complex. The study area is founded on a unit of these Palaeozoic metamorphics known as the Maronghi Creek Beds. The rocks of this unit comprise steeply dipping meta-sediments that display well developed bedding (Smith & Allen 1983) and can be observed in outcrops to the north of the study area.

The extensive granitic intrusions are thought to be Permo-Triassic in age. These intrusives are not locally significant, as they are located to the east and west of the study area (Taromeo Tonalite and the Boondooma Igneous Complex).

Following this period of igneous activity, localised subsidence formed the Tarong Basin, now host to the sediments of the Tarong Beds. These beds occur regionally as an elongated, north-south trending deposit. They are located within the central and southern extents of the study area and unconformably overlie the Maronghi Creek Beds.

After these depositional events, a major period of erosion then carved the landscape before the final major deposit event occurred, that of the widespread Tertiary volcanic extrusives of the Main Range Volcanics. This unit occurs across the region, forming upland areas such as the Stuart and Cooyar Ranges. This unit consists dominantly of a series of basalt flows with minor dolerite (essentially coarser-grained basalts) and interbedded lacustrine sediments.

During the Tertiary and Quaternary periods, extensive weathering and erosion occurred, being responsible for the lateritisation of surficial lithologies and the formation of pediment and other detritus widely deposited over the gentle slopes of the region.

Accumulations of Quaternary alluvium have since been deposited and they irregularly dot the geological landscape, being found along the meanders of the larger alluvial channels such as Meandu Creek.

With reference to the published Geological Survey of Queensland, 1:100 000 series Kingaroy sheet, the units described throughout this report have been summarised and presented in Table 3.1.

Table 3.1: Stratigraphic sequence of the Tarong area

Period	Formation	Symbol	Description
Quaternary	Alluvium	Qa	Alluvial sand, gravel, silt, and clay
	Unnamed pediment	TQr/r	Red soil, pediment slope wash eroded from Tertiary duricrusts with red soil development
Tertiary	Unnamed deposits	Td/rv	Red soil development on Main Range Volcanics
	Main Range Volcanics	Tm	Basalt, dolerite, minor shale, siltstone and diatomite
(Upper) Triassic	Tarong Beds	Trut	Sandstone, shale, coal, and conglomerate
Permo-Triassic	Taromeo Tonalite	Pt	Hornblende-biotite tonalite, hornblende diorite, adamellite
	Boondooma Igneous Complex	P-Trb	Granodiorite, granite, diorite, adamellite, gabbro
Undifferentiated Palaeozoic	Maronghi Creek Beds	Pzm	Quartzite, mudstone, shale, siltstone, greywacke

Previous pedological studies (Halliburton KBR 2002) have investigated soils in the area and have indicated that the local soils are generally of very-low to low fertility and only suited to low rates of grazing or for use as native forest.

A summary of the soil types identified across the study area and their potential agricultural problems are summarised below in Table 3.2:

Table 3.2: Summary of soil types identified across the study area

Australian Soil Classification	Characteristics	Problems
Siliceous Arenic Rudosol	Sandy, loose	Very low fertility Very well drained
Grey Chromosol	Variable, can be sandy	Low to moderate fertility Locally poorly drained and subject to flooding
Leptic Rudosol	Firm, generally hard setting with gravels	Low fertility Abundant stone and cobble
Sodosol	Generally hard setting	Very low to low fertility High erosion potential

Under the draft Nanango Shire Council IPA Planning Scheme the northern ash emplacement site has been designated as Class B good quality agricultural land (GQAL) as per the State Planning Policy 1/92. Other areas of the Shire may be designated as GQAL. The implication for GQAL retention with regard to this proposed development will be investigated further as part of the EIS for this Project Stage 1.

3.1.3 Regional surface water

Locally, surface water occurs in two types of reservoirs, natural watercourses and numerous dams. These dams have mostly been constructed for water storage for various purposes related to the coal-fired power generation process for the Tarong Power Station. However, several much smaller structures exist that are managed by local property owners for agricultural use.

Meandu Creek has a total catchment area of approximately 51 km^2, with the Black Creek catchment area being significantly smaller, covering an area of only 17 km^2. Originally, both the Meandu and Black Creeks were ephemeral and subject to natural seasonal influences. However, with the developments associated with the Tarong Power Station, both these creeks have undergone significant changes to their flow regime.

The local hydraulic storage facilities associated with the Power Stations include the Meandu Creek Dam, Black Creek Dam, the Tarong Power Station ash dam, the cooling water dam and the Black Creek stormwater diversion dam.

The Meandu Creek Dam releases a constant water flow from via either a spillway or discharge valve. This water continues north along Meandu Creek, flowing into Barker's Creek approximately 4 km northwest of Nanango, before entering the storage of the Bjelke Peterson Dam, a further 30 km north.

Black Creek originally flowed to Meandu Creek, but is now host to a diversion dam and the much larger ash dam. The upper parts of Black Creek catchment have been significantly modified by the Meandu mine which supplies coal to the power stations. Black Creek upstream from its confluence with Meandu Creek has recently been degazetted as a watercourse under the *Water Act 2000*. No discharge is released from the ash dam, excluding the small volume emanating from the toe-drain, which is related to infiltration of precipitation along the ash dam wall.

3.1.4 Regional groundwater

Two groundwater regimes exist surrounding the study area:

- a shallow aquifer system associated with alluvial sediments of local watercourses
- a deeper aquifer associated with the bedrock geology.

The shallow alluvial aquifer system is highly variable in its nature, being intermittently interconnected, with large ranges in primary porosity and its extent and depth. Within Meandu Creek, these aquifers are usually of thicknesses varying up to 5 m. Groundwater levels have generally been recorded between 2 m and 5 m (Halliburton KBR 2002). Aquifer recharge would be dominated by means of direct infiltration of precipitation and stream flow with the catchment area.

The deeper aquifer supported with the basement geology is expected to be less variable, with its properties depending largely on primary and secondary porosities. Primary porosity would be present in sand-based sedimentary units, while secondary porosity, related to features such as jointing, faults and bedding planes is expected to occur throughout the aquifer. Recharge of such aquifers occurs where associated lithologies outcrop or subcrop.

These groundwater resources are not within a declared groundwater area, however they are used for extensive irrigation by local landowners and also by the Nanango Shire Council for their potable water supply occurs.

Current groundwater work by Tarong Energy has concentrated on the existing ash dam and the impact of blowdown release water into Meandu Creek from the Power Stations. Two recent investigations were reviewed for this report:

- Tarong Energy: Tarong North Power Station and Tarong Power Station joint Meandu Creek groundwater monitoring protocol
- Halliburton KBR 2002: Surat Basin to Tarong Rail Project – Alternative unloading location report.

Review of the Halliburton KBR (2002) report has shown that previous studies into the hydrogeology of the area have concentrated on the region downslope of the existing ash dam and the local Meandu Creek environment have been conducted by Woodward Clyde (1997, 1999).

A number of bores have been developed downslope of the existing ash dam embankment as part of the studies undertaken by Woodward Clyde (1997). These bores are located adjacent to the former channel of Black Creek, the relic stream empounded by the existing ash dam. The majority of bores intersected groundwater between 5–7 m, with one intersecting groundwater at 1.5 m (KBR 2002). Investigations indicated that the ash dam construction had not caused groundwater levels to rise significantly downstream of the dam (KBR 2002).

3.2 The Project Stage 1 bio-physical environment

3.2.1 Existing land use

Current land use on the Project Stage 1 site is predominantly cattle grazing, however opportunistic cropping with species such as corn or maize is carried out occasionally when conditions are suitable. The topography of the area limits the area available for cropping.

The Project Stage 1 site is currently zoned Rural in the Nanango Town Planning Scheme.

3.2.2 Project site geology and soils

The Project Stage 1 site dominantly overlies extensive areas of red soil (TQr\r), being gently sloping wash eroded from the developed red soils of Tertiary duricrust (Td\r). Further red soil (Td\rv) occurs to the east, development from the extensive weathering of the Main Range Volcanics (Table 3.2).

Table 3.3: Stratigraphic table of local geological units[1]

Geological age	Geological symbol	Unit name	Lithologies represented
Quaternary	Qa		Alluvium
Tertiary	Tm	Main Range Volcanics	Basalt, dolerite, minor shale, siltstone, diatomite
Triassic	Rut	Tarong Beds	Sandstone, shale, coal, conglomerate
Palaeozoic (undifferentiated)	Pzm	Maronghi Creek Beds	Quartzite, mudstone, shale, siltstone, greywacke

1. Department of Mines, 1975. Gympie, SG 56-10, geological map. Geological Survey of Queensland, Brisbane.

The occasional crop cultivation carried out on this site indicates at least some of the project site may contain soils of moderate fertility.

No soil testing in the proposed ash emplacement areas has been undertaken at this time. Soil testing is proposed as part of the geotechnical investigations for the EIS.

3.2.3 Project site surface water

Small, nameless drainage lines and gullies exist over the Project Stage 1 site and surrounding areas. These drainage lines contribute to the larger natural watercourses that occur within or nearby the study area such as Meandu and Black Creeks.

3.2.4 Project site groundwater

Specific groundwater studies related to the Project Stage 1 site and impacts have not been carried out to date but will be done during the EIS process. It should be noted that an established groundwater monitoring network exists for the adjacent Tarong site, existing ash dam area and in downstream Meandu Creek area.

3.2.5 Project site flora and fauna

The Project Stage 1 site is located on land that has previously been cleared for grazing and cropping purposes. Very little native vegetation remains on this site particularly in the areas used for cultivation. No Regional Ecosystems as per the Queensland EPA Regional Ecosystem mapping have been mapped for the Project Stage 1. A detailed flora and fauna survey of the site has not been conducted as this will be done during the EIS process. However a preliminary desktop review of the site and surrounds has been carried out and a summary of findings is presented in this section.

It should be noted that the Yarraman State Forest is adjacent to both the Project Stage 1 site and the Tarong Power Station site. This State forest contains both pine plantation and native forest, with some of the native forested areas mapped as Regional Ecosystems under Queensland EPA Regional Ecosystem mapping.

The detailed field studies carried out during the EIS will confirm the presence or likely presence of endangered species on the Project Stage 1 site.

3.2.5.1 Background review

As part of this IAS for the Project, a desktop review of the ecological values of the site has been undertaken in terms of the:

- potential for rare and threatened flora and fauna to occur in the proposed emplacement site and their status under the Queensland Nature Conservation (Wildlife) Regulation 1994 and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- presence of Regional Ecosystems (REs) mapped by the Environmental Protection Agency (EPA) (2001) and the status of these REs under the Queensland *Vegetation Management Regulation 2000* and the EPBC Act
- potential impacts of the Project on the identified flora and fauna values of the site
- current legislative requirements under the Queensland *Integrated Planning Act 1997*, *Vegetation Management Act 1999* and the EPBC Act regarding vegetation clearing for the proposed ash emplacement site.

3.2.5.2 Database searches

Four database searches were undertaken to determine the potential flora and fauna, which may exist in the site. Each database was searched with the following grid coordinates: Latitude –26° 48’ 51’ to –26° 52’ 13’ and Longitude: 151° 50’ 46’ to 151° 53’ 27’. Below is a description of the database search results.

Queensland Herbarium database search

The Queensland Herbarium database results included 205 species, 28 of which are introduced to Queensland. Queensland Herbarium results include five threatened species (Table 3.4), which have been recorded in the vicinity of the proposed ash emplacement site. Two of these species are listed under the EPBC Act.

Table 3.4: Rare and threatened flora species recorded by the Queensland Herbarium within the grid search area

Scientific Name	Common Name	Conservation Status (NCW Regulation 1994)	Conservation Status (EPBC Act)
Trymalium minutiflorum	No common name	Vulnerable	Vulnerable
Eucalyptus curtisii	Plunkett mallee	Rare	
Sarcochilus weinthalii	An orchid	Endangered	Vulnerable
Callitris baileyi	A cypress	Rare	
Symplocos harroldii	Hairy hazelwood	Rare	

Queensland Herbarium records represent only the flora specimens held in the Queensland Herbarium for the nominated grid area. The absence of particular species from the available data does not imply that the species does not occur within the specified area.

Queensland Museum database search

The Queensland Museum database results included three fauna species; a skink (*Eulamprus tenuis*), red-legged pademelon (*Thylogale stigmatica*) and pale field rat (*Rattus tunneyi*). None of these species are listed as rare or threatened under the Queensland *Nature Conservation (Wildlife) Regulation 1994* or the EPBC Act.

Queensland Museum records represent only the fauna specimens held in the Queensland Museum for the nominated grid area. The absence of particular species from the available data does not imply that the species does not occur within the specified area.

Queensland Parks and Wildlife (Wildnet) database search

The Environmental Protection Agency Wildnet databases were investigated for fauna records in the vicinity of the proposed ash emplacement site. The searches revealed 124 species from the Wildnet database search that could potentially exist in the area. Of the species recorded, three have conservation significance under the *Nature Conservation (Wildlife) Regulation 1994* and one under the EPBC Act. The species of conservation significance that may be present in the area are listed in Table 3.5.

Table 3.5: Significant fauna species recorded from the EPA Wildnet database within the grid search area

Scientific Name	Common Name	Conservation Status (NCW Regulation 1994)	Conservation Status (EPBC Act 1999)
Accipiter novaehollandiae	Grey goshawk	Rare	
Turnix melanogaster	Black-breasted button-quail	Vulnerable	Vulnerable
Kerivoula papuensis	Golden-tipped bat	Rare	

Wildnet fauna records are identified and taken in the field by trained volunteers of the Queensland Parks and Wildlife Service.

DEH online database search

A search of the Commonwealth Department of Environment and Heritage online database revealed 11 flora and 14 fauna species that may potentially occur in the study area. These species are listed in Tables 3.6 and 3.7 respectively. An additional 23 migratory bird species may also potentially occur in the study area. These species are listed in Appendix A.

Table 3.6: Flora species recorded from the DEH Online database within the grid search area

Scientific name	Common name	Conservation status (EPBC Act 1999)	Type of presence
Cadellia pentastylis	ooline	V	Species or species habitat likely to occur within area
Clematis fawcettii *	stream clematis	V	Species or species habitat likely to occur within area
Dichanthium queenslandicum	king blue-grass	V	Species or species habitat likely to occur within area
Digitaria porrecta	finger panic grass	E	Species or species habitat likely to occur within area
Diuris sheaffiana	tricolour diuris	V	Species or species habitat may occur within area
Haloragis exalata subsp. velutina		V	Species or species habitat likely to occur within area
Sarcochilus weinthalii	blotched sarcochilus, Weinthals sarcanth	V	Species or species habitat likely to occur within area
Sophora fraseri		V	Species or species habitat likely to occur within area
Stemmacantha australis	austral cornflower, native thistle	V	Species or species habitat likely to occur within area
Thesium australe	austral toadflax, toadflax	V	Species or species habitat likely to occur within area
Trymalium minutiflorum		V	Species or species habitat likely to occur within area

Table 3.7: Fauna species recorded from the DEH Online database within the grid search area

Scientific name	Common name	Conservation status (EPBC Act 1999)	Type of presence
Birds			
Cyclopsitta diophthalma coxeni	Coxen's fig-parrot	E	Species or species habitat likely to occur within area
Erythrotriorchis radiatus	red goshawk	V	Species or species habitat likely to occur within area
Geophaps scripta scripta	squatter pigeon (southern)	V	Species or species habitat likely to occur within area
Lathamus discolor	swift parrot	E	Species or species habitat may occur within area
Neochmia ruficauda ruficauda	star finch (eastern), star finch (southern)	E	Species or species habitat likely to occur within area
Rostratula australis	Australian painted snipe	V	Species or species habitat may occur within area
Turnix melanogaster	black-breasted button-quail	V	Species or species habitat likely to occur within area

Scientific name	Common name	Conservation status (EPBC Act 1999)	Type of presence
Mammals			
Chalinolobus dwyeri	large-eared pied bat, large pied bat	V	Species or species habitat may occur within area
Dasyurus maculatus maculatus (SE mainland population)	spot-tailed quoll, spotted-tail quoll, tiger quoll (south-eastern mainland population)	E	Species or species habitat likely to occur within area
Nyctophilus timoriensis (South-eastern form)	eastern long-eared bat	V	Species or species habitat may occur within area
Potorous tridactylus tridactylus	long-nosed potoroo (SE mainland)	V	Species or species habitat may occur within area
Pteropus poliocephalus	grey-headed flying-fox	V	Species or species habitat likely to occur within area
Reptiles			
Delma torquata *	collared delma	V	Species or species habitat may occur within area
Furina dunmalli *	Dunmall's snake	V	Species or species habitat may occur within area

3.2.5.3 Conservation areas

There are no conservation areas within the proposed northern ash emplacement site. The Yarraman State Forest is south of the proposed Project Stage 1 site.

The proposed Project Stage 1 site is located within the Brigalow Belt Bioregion, Province 31, Eastern Darling Downs. Environmental Protection Agency (2001) mapping for the Tarong Site indicates that the following Regional Ecosystem may occur adjacent to the southern boundary of the proposed ash emplacement site footprint area. The current conservation status of this Regional Ecosystem under the Queensland Vegetation Management Regulation 2000 is provided in Table 3.8.

Table 3.8: Regional Ecosystems in adjacent areas

RE Code	RE Description	Conservation Status (VMR)
12.9/10.7	*Eucalyptus crebra* woodland on sedimentary rocks	'of concern'

3.2.6 Noise

A background noise survey on the Project Stage 1 site and nearest sensitive receptors has not been carried out as this will be done during the EIS process. Noise survey assessments have been carried previously in areas adjacent to the Project Stage 1 site. Some of these background noise survey results are presented in this section. It should be noted that the property residences mentioned below have since been purchased by Tarong Energy and will be vacant or removed before the Project proceeds.

As part of the KBR 2002 study, collection of background noise data was carried out at two locations. Location 1 was at residence on the Berlin property and immediately north of the Project Stage 1 site. Location 2 was located approximately 100 m from Nanango-Tarong Road and approximately 400 m south of the Hickman property. While the purpose of monitoring was for the proposed railway line unloading facility, based on the locations of the monitoring sites, both sites are relevant as a general indication of background noise levels in the area.

The background levels are shown in Table 3.9.

Table 3.9: Background noise levels in dB(A) at two locations close to Tarong Power Station*

Time of day	Location 1	Location 2
Day 6:00 to 18:00	31.5	35.6
Evening 18:00 to 20:00	37.3	35.4
Night 20:00 to 6:00	30.6	33.5

* Source: Ask Consulting Engineers: Tarong Railway Unloading Facility – Noise & Dust Assessment, June 2002, Table 3.1, page 2.

The noise levels are similar at both sites. The noise levels are slightly higher in the evening due to insect and other similar noises (Ask 2002).

3.2.7 Air quality

An air quality assessment for the Project and impact predictions for sensitive local receptors has not been carried out as this will be done during the EIS process. The main air quality impact of the Project will be dust from earthworks and dry ash surfaces after placement.

Tarong Energy is currently monitoring local air quality using real-time monitoring equipment located in a purpose built container to the west of the Tarong site. This monitoring is required by the Tarong North environmental licence to evaluate the modelling predictions reported in the impact assessment report for the power station. Results are regularly reported to the Queensland EPA and background levels of both TSP and PM_{10} are well within the EPA guidelines.

3.3 Cultural heritage

3.3.1 European heritage

There are no known European heritage sites on the Project Stage 1 site.

3.3.2 Indigenous heritage

A cultural heritage assessment of the Project Stage 1 site has not been carried out as this will be done during the EIS process. As part of this process, a Cultural Heritage Management Plan will be prepared for the Project Stage 1 as required under the *Aboriginal Cultural Heritage Act 2003*. The most recent work assessed as part of the desk-top review was from Godwin (2000). While the survey did not cover the proposed Project Stage 1 site, the findings from this report are relevant in relation to the indigenous groups involved and findings from the area.

Key relevant cultural heritage studies undertaken to date are as follows.

- Hill, I.W. 1978 An archaeological report on the proposed Tarong Power Station site. Report to Queensland Electricity Generating Board, Brisbane.
- Lilley, I 1982; 1984 studied open sites in the D'Aguilar and Beachmont Ranges to the south east of the study area. Lilley's work concentrated on the distribution of open sites and seasonal resource use.
- Morwood, M. 1986 excavated at a rock shelter at the Maidenwell to the west of the study area. Morwood's work provided evidence of an antiquity for Aboriginal occupation in the region. Base deposits in the rock shelter dated around 4000 with an upper date of 1200 BP.
- Godwin L. 2000 Tarong Ash Dam. Godwin surveyed 46 ha of land designated to form part of the ash disposal system. The study area included a buffer zone between the Ash Dam and adjacent state forest. Godwin found that the areas was significant to the Wakka Wakka people and was probably exploited for its resources. No cultural heritage sites were identified and the expectation of any occurring was considered low.
- Cultural heritage assessment and Cultural Heritage Management Plan for the extension to Tarong Power Station (subsequently named Tarong North Power Station) by Wakka Wakka Traditional Owners and Sophie Thompson 1998).

3.4 Native title

Native Title is extinguished over the Project site as the land is held under freehold title and does not contain any named watercourses.

3.5 Socio-economic

The Nanango Shire represents 0.1% (1,735 km2) of the State's area. Nanango Shire's three principal settlements are Nanango township, Blackbutt-Benarkin and Maidenwell.

The Shire's principal primary industries are the production of avocados, beef, beans, pigs, dairying, grain crops, macadamias, peanuts, forestry, small crops and fruit and grapes. Major industries in the Shire include the Tarong Power Station, Tarong North Power Station, and Meandu Coal Mine. Secondary industries include timber milling, avocado oil, silica cenospheres, diatomite, cheese making and wine production.

As at 31 December 2001, the estimated resident population of the Nanango Shire was 8,546 persons, representing 0.2% of the State's population. The annual average rate of change in population in the Nanango Shire between 31 December 1996 and 31 December 2001 was 1.1%, compared with 1.7% for the State (Office of Economic and Statistical Research 2004).

At the time of the 2001 Census 87.7% of the labour force were employed. Of these 63.9% were working full-time and 32.1% were working part-time. This compares with 79.2% who were employed in the 1996 Census and 77.0% who were employed in the 1991 Census.

In the 2001 Census 12.3% of the labour force was unemployed. Of these 83.3% were looking for full-time work and 16.7% were looking for part-time work. This compares with 20.8% who were unemployed in the 1996 Census and 23.0% who were unemployed in the 1991 Census.

Construction of the proposed Project Stage 1 is expected to provide full-time employment for around15 people during the construction phase and two people during the operation phase.

4. Potential environmental effects

A preliminary assessment by Tarong Energy has identified the likely key environmental effects of the Project Stage 1. These will be addressed in full as part of the EIS process.

4.1 Land use, rehabilitation and visual amenity

The construction and operation of the Project Stage 1 will lead to some permanent impacts on the local topography. The existing valley will be filled to a maximum depth with ash, creating a peak at the centre of the valley.

The dense phase ash deposition proposed for the Project Stage 1 site can be managed to produce a landform, which is more stable than lean phase deposited ash and more readily rehabilitated.

Tarong Energy will select feasible options for post-rehabilitation land use after consideration of factors such as final slope angle, long-term settlement and stability of the landform, final surface water drainage, ash soil cover options, potential for plant uptake of trace elements and potential for impacts on surface water runoff quality.

The final decision on the final land use will be based on technical evaluations that will include field trials of different treatments.

4.2 Surface water

The drainage for the proposed Project Stage 1 area has been designed such that all runoff from the proposed ash emplacement will be discharged via two locations. The first location discharges into a sag point and is then pumped to the existing ash dam. The second location discharges into a dirty water channel which diverts the runoff into the new stormwater dam. Runoff from Berlin Road and adjacent land is collected via a clean water channel approximately 10 m wide. The runoff is turned out and redistributed as sheet flow downstream.

The EIS assessment will address potential impact due to runoff from the proposed area, however the design ensures that all surface water is captured by directing all discharge to either the existing ash dam or the new northern stormwater dam.

4.3 Groundwater

The EIS assessment for the proposed Project Stage 1 area will address local groundwater quality and quantity and potential flow paths in relation to vertical infiltration from the proposed ash emplacement site. The engineering design of ash emplacement site will ensure minimal impact on the groundwater environment and installation of monitoring bores will need to be established as part of the environmental management of the project. The hydraulic connection between the underlying Tertiary basalts to the Quaternary alluvial will also be assessed.

4.4 Flora and fauna

The database searches indicated that 14 flora and 16 fauna species of conservation significance and 23 migratory bird species may occur within the vicinity of the Project Stage 1 site. The potential for all of the listed species to occur on the site depends on the presence of suitable habitat.

Species diversity, abundance and the presence of rare and threatened species within the Project Stage 1 site is broadly dependent on habitat availability, level of disturbance to the site, presence and abundance of predators and introduced competitors and ecological integrity of native vegetation.

Habitat loss is expected as part of the Project Stage 1 although the majority of the site has previously been recorded as open grazing land with potential significant habitat limited to a few vegetation remnants at best.

Detailed field investigations will be undertaken throughout the proposed disturbance areas prior to construction to identify rare and threatened species and habitat and identify sensitive areas.

There are no designated natural or conservation areas shown in the land tenure records on the subject site.

4.5 Air quality

No assessment on air quality has been undertaken for this IAS. As the Project Stage 1 area is a potential source of dust emissions, the impact on air quality from dust during operation will need to be established as part of the EIS.

Possible dust suppression methods that will be considered during the EIS are as follows:

- irrigation of exposed ash surfaces (has the added benefit of increasing evaporation from the water in the northern stormwater dam)
- compaction
- spray application of a binder such as a clay or a proprietary tree sap based product

- spray application of hydra mulch (paper or straw)
- spray application of bitumen
- spray application of a cementicous layer (weak mix of Portland cement)
- rehabilitation
- topsoiling
- direct seeding with suitable grass species to provide temporary rehabilitation
- careful planning of the placement process to minimise the exposed work area
- careful planning of the deposition process to shield the work area from prevailing winds
- use of wind shields around work areas.

4.6 Noise

No predictive noise modelling has been undertaken as part of this IAS, however will be addressed in the EIS stage of the Project Stage 1. It would be anticipated that increase in noise levels would result during construction and machinery during operation and will need to be assessed as part of further studies.

5. Community and stakeholder consultation

As part of the EIS process community and stakeholder consultation will be undertaken. This will be done to ensure that all relevant bodies are aware of the Project and have the opportunity to comment on issues of relevance to them. A Key Stakeholder list and Community Consultation Plan for the Project will be developed during the EIS.

While directly affected properties within the proposed footprint have been acquired by Tarong Energy, the major issue in terms of social impacts, is the impact to property owners surrounding the footprint who could experience a variety of perceived or actual impacts.

Whether perceived or actual impacts develop as a result of the ash emplacement, the surrounding community will be kept informed of the Project and what it could mean for their local area. Tarong Energy will establish an open line of communication with the surrounding community, to address the issues raised, ensure a strong relationship into the future and reduce the potential for disruption to the Project.

IPA and the SDPWO Act highlight that property owners should be notified of potential issues relating to the ash emplacement site development. In particular Tarong Energy's consultation will focus on neighbouring property owner awareness on issues such as:

- health and safety
- noise during construction and operation
- visual impact
- loss of agricultural land
- groundwater impact
- contamination management
- air quality (primarily dust)
- impacts on local flora and fauna
- construction and operation timing
- contact points for community concerns in the future
- long-term management of the ash emplacement site and related infrastructure.

Consultation would take the form of individual meetings with surrounding property owners and the distribution of a public information brochure. This will be in addition to the public notification of the EIS required by the SDPWO Act process.

6. References

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7. Legislation

Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

Queensland

Aboriginal Cultural Heritage Act 2003

Environmental Protection Act 1994

Integrated Planning Act 1997

Land Act 1994

Nature Conservation Act 1992

Nature Conservation (Wildlife) Regulation 1994

State Development and Public Works Organisation Act 1971

Vegetation Management Act 1999

Vegetation Management Regulation 2000

Water Act 2000

Appendix A

Migratory bird species listed from the DEH online search

Table A1: Migratory bird species listed from the DEH online search as potentially occurring on the proposed ash emplacement site

Species	Common name	EPBC (1999) status	Type of presence
Cyclopsitta diophthalma coxeni	Coxen's fig-parrot	Migratory	
Haliaeetus leucogaster	white-bellied sea-eagle	Migratory	
Hirundapus caudacutus	white-throated needletail	Migratory	
Monarcha melanopsis	black-faced monarch	Migratory	
Monarcha trivirgatus	spectacled monarch	Migratory	
Myiagra cyanoleuca	satin flycatcher	Migratory	
Rhipidura rufifrons	rufous fantail	Migratory	
Migratory Wetland Species			
Gallinago hardwickii	Latham's snipe, Japanese snipe	Migratory	
Rostratula benghalensis s. lat.	painted snipe	Migratory	
Other Matters Protected by the EPBC Act			
Anseranas semipalmata	magpie goose	Listed - overfly marine area	Species or species habitat may occur within area
Apus pacificus	fork-tailed swift	Listed - overfly marine area	Species or species habitat may occur within area
Ardea alba	great egret, white egret	Listed - overfly marine area	Species or species habitat may occur within area
Ardea ibis	cattle egret	Listed - overfly marine area	Species or species habitat may occur within area
Gallinago hardwickii	Latham's snipe, Japanese snipe	Listed - overfly marine area	Species or species habitat may occur within area
Haliaeetus leucogaster	white-bellied sea-eagle	Listed	Species or species habitat likely to occur within area
Hirundapus caudacutus	white-throated needletail	Listed - overfly marine area	Species or species habitat may occur within area
Lathamus discolor	swift parrot	Listed - overfly marine area	Species or species habitat may occur within area
Merops ornatus	rainbow bee-eater	Listed - overfly marine area	Species or species habitat may occur within area
Monarcha melanopsis	black-faced monarch	Listed - overfly marine area	Breeding may occur within area
Monarcha trivirgatus	spectacled monarch	Listed - overfly marine area	Breeding likely to occur within area
Myiagra cyanoleuca	satin flycatcher	Listed - overfly marine area	Breeding likely to occur within area
Rhipidura rufifrons	rufous fantail	Listed - overfly marine area	Breeding may occur within area
Rostratula benghalensis s. lat.	painted snipe	Listed - overfly marine area	Species or species habitat may occur within area