Preliminary Project Application

Environmental Assessment Scoping Report - Eraring Energy
Eraring Power Station 750 MW Upgrade
Rocky Point Road
Eraring NSW 2264

22 August 2006

Prepared for:
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1 INTRODUCTION

1.1 Background

Eraring Energy (EE) is one of three State-Owned Corporations that manages a diverse set of electricity-generating assets located throughout NSW. Over the last five years, EE has maintained a relatively consistent share of the NSW electricity market averaging just over 20%.

EE's portfolio includes seven hydro stations, two wind farms and a coal-fired power station (at Eraring), known as Eraring Power Station (EPS). EPS comprises four, 660 megawatt (MW) units with a total capacity of 2,640 MW. The first of these generating units came into service in 1982, followed by the second and third units in 1983 and the fourth in 1984.

EE is proposing to undertake an upgrade to the existing Eraring Power Station (EPS) to increase the capacity of each of the four 660 MW generating units (which are already capable of generating at 700 MW) to enable the units to operate up to a maximum continuous rating (MCR) of 750 MW.

1.2 Project Context

EE is one of 10 companies which have electricity generation plants in NSW and NSW is part of the National Electricity Market (NEM) which is essentially a common set of trading and access agreements that allows generators and retailers to buy and sell electricity from the most competitive sources (NSW Govt. 2004). The National Electricity Market Management Company (NEMMCO) facilitates the purchase of electricity by retailers by providing a wholesale market. The electricity is then sold to the consumer and transported by high voltage transmission lines and distribution networks.

Construction of EPS started in 1977. The first generating unit went into service in 1982, the second and third units in 1983, and the fourth unit was commissioned in 1984. EPS is an 'intermediate' participant in the NEM. Therefore depending on demand and the availability of other generators, EPS's output may vary from mid-load to high-load during the peak demand periods and operate at low load during the off peak periods. The current average load is 450 to 500 MW per unit.

An *Energy Directions Green Paper* (December 2004) was released by the NSW Government as a precursor to a White Paper that will set out the energy policy for NSW. The White Paper has not yet been released. The Green Paper identified that whilst there is currently sufficient electricity generation capacity in NSW to meet demand, the level of maximum demand is increasing by approximately 4% per annum. In the event this trend continues, additional generation capacity or demand management would be required by 2010.

The Green Paper outlined two types of electricity demand as follows:

- Average demand: Average demand is essentially a measure of the demand that occurs most of the time. Average demand in New South Wales is currently around 8,500MW; and
- Peak demand: Typically, periods of peak demand occur when customers use air conditioning or heating at times of very high or very low temperatures respectively. Peak demand reached its highest level to date of 12,838 MW on 19 July 2004.

Traditionally, the primary electricity supply to meet peak demand was the Snowy Mountains Hydro-electricity Scheme (SMHS) due to its ability to be brought on line and shut down quickly.

However, due to a number of factors such as the increasing rate of peak demand, the reduction in New South Wales' share of the SMHS's capacity (from 71% to 50%) and the fact that summer peak demand can last for up to 8 hours, the ability of the SMHS to meet this peak demand is increasingly limited.

Based on forecasts, the Green Paper indicates that new generation capacity or demand side management capability is likely to be initially needed to meet demand at peak times only. But new base load generation capacity may be required from around 2012/13. Over the longer term, the forecasts imply that up to 6,000 MW of new supply, or demand reduction will be required by 2020.

In order to provide future baseload capacity the Green Paper specifically identifies the potential to upgrade the capacity of existing 660 MW power stations to 750 MW, in order to add around 900 MW to New South Wales' capacity. EPS, if upgraded, would provide over one third of this additional capacity. Upgrading existing plants is considered to be a cost effective way to provide new generation capacity, and meet growing demand for a limited period of time without developing a new power plant. Actual trends since the Green Paper was written indicate that the local growth is occurring close to the predicted trends.

Therefore the proposal to upgrade the EPS is in accordance with consumer demand and the government's intent to increase generation capacity where possible and practical.

1.3 Location

The EPS site comprises approximately 1,200 hectares of land and is located in a natural dip on the western shore of Lake Macquarie, near the township of Dora Creek, within the Morisset Planning District. The power station and associated infrastructure covers a footprint of approximately 150 hectares, with the remaining area including the ash dam, natural ecosystems and water canals.

1.4 Approval Regime

The proposed works to the power station fall within the definition of major development (formerly state significant development) under Schedule 1, clause 24 of *State Environmental Planning Policy 2005* (SEPP 2005), being works for the purpose of an electricity generation facility with a capital investment of more than $30 million. The proposal is therefore a candidate for assessment under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) with the Minister for Planning being the decision making authority.

A project approval under section 75J of the EP&A Act is being sought for the proposed upgrade to allow for further details and environmental assessment to be undertaken once greater certainty of the project is assured. An outline of the proposed upgrade is provided in this scoping report.

1.5 Purpose of this EASR

The purpose of this report is to provide the Minister with outline information and background environmental data on the site and the proposed development, sufficient to establish the key environmental issues of importance to the project and the level of environmental assessment required for the application. The report will form the basis for discussion at a Planning Focus Meeting (PFM) to be convened by the Department of Planning (DOP).

1.6 Sources of Information

A variety of sources of information were used to produce this EASR including:

- Biodiversity Study Eraring Energy – Winter, Eraring Power Station, Lake Macquarie, HLA-Envirosciences, 2004
- Lake Macquarie 2004 State of the Environment Report
- Lake Macquarie 2003 Community Profile
- Eraring Energy Community and Environment Report 2005
- ABS Data available at www.abs.gov.au
- Lake Macquarie Local Environmental Plan 2004

1.7 Structure of Report

To inform relevant government agencies and local councils of the level and detail of environmental assessment required, this EASR has been structured to provide information on broad areas as follows:

- Section 1 – provides a background to the project, including information about the proponent;
- Section 2 – outlines a description of the project and other alternatives that were considered;
- Section 3 – describes the planning context, including the approvals required;
- Sections 4 and 5 – report on the environmental implications in terms of physical and biological effects, including the baseline situation and anticipated impacts;
- Section 6 – examines the likely impacts of the project on resources (community, natural and transport);
- Section 7 – outlines the potential community effects, including the social, heritage and cultural, land use and economic implications;
- Section 8 – prioritises the potential environmental issues associated with the project; and
- Section 9 – presents a summary of the findings and recommendations.

1.8 The Proponent

EE is a State Owned Corporation that manages a diverse set of electricity-generating assets located throughout NSW. EE operates under the *Energy Services Corporations Act* (1995) and the *State Owned Corporations Act* (1989). EE was formed in August 2000, to administer the electricity generation activities of the corporation formerly known as Pacific Power (http://www.dlwc.nsw.gov.au/care/water/wr/clu_ee.html). EE's facilities include:

- coal fired/thermal power stations (Eraring Power Station);
- wind farms (Blayney Wind Farm, Crookwell Wind Farm);
- hydro sites (Hume, Warragamba, Burrinjuck, Keepit and Brown Mountain Power Stations); and,
- pumped storage schemes (Shoalhaven Scheme – Kangaroo Valley and Bendeela Power Stations).

In total, EE has a combined generating capacity of approximately 3,050 MW.

2 DESCRIPTION OF PROJECT

2.1 Overview of Project Objectives

The key objective of the project is to upgrade the infrastructure at EPS to allow the four existing 660 MW generating units to operate at 750 MW. This additional capacity would be used to meet the increasing demands for electricity, particularly during peak periods. A secondary objective of the project is to replace existing components of plant and equipment within the EPS operating units to maintain operational capability as some components are now aging. This replacement/renewal program also aims to improve the efficiency of operations and the environmental and safety performance of EPS. In order to achieve these objectives the key project components will be:

- to replace or upgrade selected plant components to increase the generating capacity of each of the four operating units from 660 MW to 750 MW;
- to renew aged components of plant;
- to replace or upgrade plant components with the latest technology to improve technical, environmental and safety performance; and
- to increase cooling water effectiveness.

2.2 Current Operations

Figure 1 provides a flow chart which demonstrates the current operational process undertaken at EPS.

2.2.1 Generating Infrastructure

The four generating units contain steam driven, tandem turbines. Four associated boilers are single-furnace, twin-drum and use natural circulation.

Each generator is connected to a pair of generator transformers which raise the generated voltage of 23 kV to the transmission voltage of 330 kV on Units 1 and 2 and to 500 kV on units 3 and 4. Electricity is transmitted overhead to the 330 and 500 kV switchyards which form part of the interconnected transmission system.

2.2.2 Coal Supply

Coal for the EPS is sourced from five different mines. The plant currently burns an average of up to 6.5 million tonnes per year based on an average annual generation of some 15,000 GWh.

Coal is presently transported to EPS by conveyor, truck and rail in approximately equal proportions.

2.2.3 Ash Disposal

Currently, ash material is stored in an ash disposal area north of the existing power station. The present rate of disposal will result in the current ash storage facility being full by 2011-2012.

EE is in the process of seeking a separate approval for extension of the existing ash dam and associated infrastructure and is focusing on a conceptual design change in the ash storage facility to allow for high concentration, "dense phase" ash disposal. This method of disposal would allow more efficient ash storage and, in combination with the extension of the existing ash dam, would secure ash disposal capacity at EPS up to around 2032..

2.2.4 Cooling Water

EPS uses salt water from Lake Macquarie for cooling water (CW). The CW system is a once-through system where water drawn from Bonnells Bay is directed to the station by the inlet canal. There are currently six pumps used to pump cold water into the high level canal, one for each generating unit and two spare for attemperating purposes. Their nominal capacity is 20 m^3/sec each. The Power Station's environment protection licence (EPL) sets a limit on the volumetric flow rate in the outlet canal of 11,000 ML/day. Flow in the outlet canal is not routinely measured, but the limit set in the EPL is based on the calculated maximum of the current pump capacity.

Most of the water flows through the power station condensers, with the remainder used for attemperating the water before it flows back into Lake Macquarie at Myuna Bay. Attemperation is a process to control water temperature by combining the cooler inlet canal water with warmer water exiting the condensers. This is done to maintain the outlet canal temperature below the EPL limit. The EPL sets an absolute limit of 37.5°C but allows water to be discharged for up to 131 hours per annum when it is over 35°C. The EPL allows a further 69 hours per annum above 35°C providing there is a pending shortfall of electricity. This latter condition expires in September 2007.

The water discharged into Lake Macquarie rapidly cools to ambient temperature as the water moves away from the outlet canal. Eraring Energy routinely monitors the temperature of water in the outlet zone, and the results show that the temperature increases are localised to the upper water surface layers, and are confined primarily to the Myuna Bay area.

In addition to continuously monitoring the temperature of water discharged from the outlet canal, EE also monitors water discharged for copper, iron, and selenium levels in accordance with the EPL.

Attemperating Weir
The high level canal wall in the vicinity of the power station has an attemperating weir or spillway where hot water and cold water are mixed. Under normal conditions four cooling water pumps supply the four operating units and discharge water into the outlet canal via the condensers. The two spare pumps discharge water into the outlet canal directly over the attemperating weir.

Outlet Canal Weir
There is another weir also known as the "glory hole" located in the outlet canal. The water spills through the hole and then travels in a pipe underground for several kilometres before resurfacing into a canal before being released into Myuna Bay.

2.2.5 Site Layout

EPS is located on Rocky Point Road in the suburb of Dora Creek, some 40 kilometres south-west of Newcastle. The EPS site comprises approximately 1,200 hectares of land on the western shore of Lake Macquarie of which 150 hectares is taken up by the power station itself. The remainder of the land contains ancillary power station infrastructure (canals, ash dam,

conveyors, switchyard and coal stack) but is largely undeveloped consisting of open grassland and bushland. **Figure 2** shows the current site layout.

The power station is separated from surrounding land uses by extensive tracts of land which provide a buffer that minimises adverse visual and acoustic impacts.

2.3 Proposed Project Overview

The proposed project consists of two main components:

- modifications to the existing infrastructure to allow for capacity and performance improvements; and
- construction of a new cooling water storage reservoir and associated infrastructure.

Details of these components are provided below.

Capacity and Performance Improvement Modifications
Aged components of the Boiler and Turbine Generating Plant would be refurbished, including:

- "Steam Path Upgrade" of high pressure, intermediate pressure and low pressure stages of the turbine;
- Upgrade of generator;
- Upgrade of generator transformer cooling system;
- Additional tubing inside boiler;
- Replacement of 28 boiler burners;
- Upgrade of fabric filter bags; and
- Other miscellaneous work.

All of these modifications and improvements would be internal and would occur within the existing building housing the boiler and turbine generating plant. The work undertaken would be similar to a major maintenance which occurs every six years on each generating unit. The external appearance of the station would be unchanged.

Cooling Water Attemperating Reservoir
A reservoir would be constructed to temporarily store lake water for the purpose of providing additional attemperating cooling water in order to reduce the temperature of the water returned to Lake Macquarie. Six new transfer pumps (3,000 litre/sec pumps at 3.5 MW total power consumption) would be required to transfer water from the high level canal to the reservoir.

The reservoir would be filled from the existing high level canal via the new transfer pumps and pipes. Filling would occur at night during the off peak period. The reservoir would discharge via the same pipes back into the canal when required. The pipes would be designed such that stored water could be discharged at a rate to suit the requirements for that day. The water would be stored and released as required to maintain the temperature of the returned cooling water to Lake Macquarie within licence conditions.

The proposed water storage would provide for maximum capacity operation whenever demand requires it.

2.4 Location of Project Components

2.4.1 Capacity and Performance Improvement Modifications

These components involve internal modifications which would all be located within the existing power station building on the site.

2.4.2 Cooling Water Attemperating Reservoir

The proposed cooling water attemperating reservoir and associated infrastructure would be located within the EPS site as shown in **Figure 3**. Computer generated images of what the reservoir may look like are found in **Figures 5 - 7**.

2.5 Construction

The new cooling water reservoir would be the main feature to be constructed as part of the proposal. The reservoir would have a nominal capacity of approximately 1,200 ML and would be approximately 500 m by 125 m in size with a nominal depth of around 12 m. The reservoir will require a construction footprint of some 18 hectares. Surplus topsoil may be relocated to other parts of the EPS site for use in rehabilitation activities, such as the ash dam.

New transfer pumps and pipes would be installed to transfer water from the high level canal into the cooling water attemperating reservoir.

It is not anticipated that modifications will need to be made to the outlet canal and low level canal to contain the higher level water flows resulting from the upgrade.

Construction activities required for the project are likely to include the following:

- clearing of vegetation;
- earthmoving;
- construction activities;
- installation and diversion of services and infrastructure; and
- construction vehicle movements.

2.5.1 Operations

The main change to the operations as a result of the upgrade would be the manner in which cooling water is handled. The provision of additional cooling water to attemperate water being discharged into the lake would potentially reduce the impact on the lake compared with current operations.

During peak periods there would be an increase in the water level in the high level canal of approximately 0.3 m. The top of the canal embankment is approximately 2.2 m above the existing maximum water level, therefore the new water level would not require any significant work to the canal.

The attemperating weir was designed such that it can discharge water supplied by an additional two cooling water pumps, therefore there is no requirement for an alteration to the existing discharge system. The expected increase in the volume of cooling water (up to some

40 m^3/second at full load would increase the water level at the spillway but would not require changes to the existing infrastructure.

The water level at the outlet canal weir is expected to rise with the increase in the volume of cooling water of some 40 m^3/second but this is not expected to place any restrictions on either the outlet canal or the outlet canal weir and both would be capable of operating effectively under the potential maximum increase in water levels. The volumetric flow rate in the outlet canal would increase while the reservoir is discharging, but would decrease by the same amount while it is filling. The licence limit of 11,000 ML/day will therefore not be exceeded.

A mini hydro system may also be implemented in the future using the discharge head between the cooling water reservoir and the outlet canal.

The increased generating capacity of the power station would also result in additional generating flexibility as the generating load would be able to be varied between 230 MW and 750 MW per unit. The actual generation at any time is determined by supply and demand but, because Eraring is an intermediate/peaking generator, it is often generating below its maximum capacity. This means that at very short notice EE can boost its output up to its maximum capacity, a concept called “spinning reserve” which is extremely important to the NEM in the case of breakdowns in the system.

2.5.2 Environmental Controls

The capacity and performance improvement modifications would provide environmental improvements, such as savings in NO_x both in mass emission and concentrations, and CO_2 emission concentrations due to improvements in overall cycle efficiency. NOx concentrations are estimated to reduce by around 30% which is anticipated to result in a reduction in total mass emission even at higher generating rates. CO_2 concentrations are also anticipated to reduce with only a marginal increase estimated for total annual mass emissions at the higher generating capacity.

EE operates an Environmental Management System (EMS) at EPS which is certified to ISO 14001. Changes in operation as a result of the proposal would be updated in the EMS and regular environmental audits and environmental risk assessments are undertaken as part of the EMS in order that EPS continually improves in its environmental performance.

2.5.3 Program of Works

Construction of the cooling water attemperating reservoir is planned to commence by 2007 and the upgraded power station is expected to be fully operational by the beginning of 2012.

2.5.4 Interfaces

The cooling water attemperating reservoir and new pumps would require servicing infrastructure such as electricity and vehicle access. These services would be connected from the existing infrastructure.

2.5.5 Ownership

EE owns and operates the EPS site which comprises the following parcels of land:

- Lot 11 DP 1050120;
- Lots 301 & 302 DP 806475;

- Lot 3/8 Section L DP 6747;
- Lots 13/16 Section O & Part Lot 13/16 Section U DP 6747;
- Lot 7/16 DP 262501;
- Lot 19 DP 262501;
- Lot 1 DP 817425
- Lots 100 & 101 DP 828283;
- Lot 211 DP 840670;
- Lots 50 & 51 DP 840671;
- Lots 1, 2 & 3 DP 621697;
- Lot 1 DP 816174; and
- Lots 20 and 21 DP 734860.

2.6 Options Considered

Different options were considered for the provisions of cooling water for the upgrade and for the location of the cooling water attemperating reservoir. However the proposal as detailed above was considered to be the best option based on a number of factors that were considered in the development of the proposal.

2.6.1 Alternative Options for Cooling Water

Several options were considered in order to provide the additional cooling water that would be required as a result of the upgrade. These options are discussed briefly below.

Improved Recirculation in Lake Via Installation of a Discharge Tunnel or Training Walls
Computer models were trialled for a few scenarios for this option which were:

- dredging of the discharge channel to 4 m depth;
- 400 m training walls for the discharge channel; and
- installation of a 1 km long discharge tunnel.

The modelling of these scenarios did not result in a significant enough reduction in water temperatures to warrant pursuing this as a viable option for cooling water.

Two Additional Main Cooling Water Pumps to Lake Macquarie Inlet
Consideration was given to the installation of an additional two pumps at the inlet from Lake Macquarie in order to extract more water to use for attemperation purposes. There are currently six pumps at the intake pumping station (four to supply the four units and two additional pumps for attemperation purposes).

However, this option was not considered further as it would not be practically possible since EE would be unable to purchase the large motors required for these pumps. This option would also not be technically possible because of restrictions in the size of the intake canal which would result in the pumps causing excessive drawdown in the canal.

Attemperating Pumps at Rocky Point on Lake Macquarie Foreshore
This option would require the construction of ten pumps on the foreshore at Rocky Point which would draw water from the southern side of the point and would pump water via ten pipelines

laid under the road between the foreshore and outlet canal. This option would require that power supplies be installed to this area and for dredging of Lake Macquarie.

This option was not preferred as EE does not own the land on the lake foreshore and the installation of attemperating pumps on Lake Macquarie Foreshore would involve dredging of the Lake and impact upon seagrass populations.

Discharge Cooling Towers
Consideration was given to the construction and use of fan draft, salt water cooling towers which would be constructed adjacent to the lower outfall canal near Rocky Point Road. This option would require a pumping station and would involve up to four banks of cooling towers, similar to the existing cooling towers at EPS.

This option was not preferred because of the potential impacts of noise from fans and salt water drift in the form of plumes from the cooling towers potentially affecting surrounding vegetation. This option would also have high maintenance costs associated with the infrastructure required.

2.6.2 Alternative Locations for Cooling Water Attemperating Reservoir

Six alternative locations were initially considered for the location of the proposed cooling water attemperating reservoir. Four locations were considered on the low side of the high level canal and two locations were considered on the high side of the high level canal. A selection process resulted in two alternatives being available for further consideration. These two alternatives are shown in **Figure 7** and are discussed below.

Option A – Eastern side of canal (high side)
The option shown as Option A is located to the south and east of the high level canal. Option A is located in a more elevated position at approximately 30 metres above sea level (masl). The selection of this location for the reservoir is preferred as there would not be issues related to spillway operation, as it is in a more elevated position. In the case of spillway operation the reservoir water would be spilled back into the high level canal. The location of the reservoir in this location would also result in the consumption of less energy as the water from the high level canal could be pumped into the reservoir at night and then would be gravity fed into the low level canal during the day to provide for attemperation.

Option B – Western side of canal (low side)
This option shown as Option B is located to the north and west of the high level canal. This option is located in a lower position at an elevation of approximately 20 masl. This location was not preferred as a spillway may impact upon surrounding land because of the lower elevation. This option would also require the consumption of more energy as water would need to be pumped back up to the high level canal in the daytime at the same time when there is a peak demand for electricity.

2.6.3 Do Nothing

The do nothing option would result in the power station being restricted to operation at the current generating capacity (4 x 660 MW) during peak demand periods and would not provide for any additional capacity to enable EPS to meet the growing demand for electricity, particularly during these peak periods.

In addition, the do nothing option would result in aged components of plant being increasingly susceptible to failure leading to the potential for losses in generating capacity with flow on effects to the ability to meet electricity demand.

The do nothing option would also result in a lost opportunity to improve the technical, environmental and safety performance of EPS and reduced ability to effectively attemperate cooling water.

3 STATUTORY PLANNING

3.1 Local Matters

The site is located within the Lake Macquarie City Council area where the relevant environmental planning instrument is *Lake Macquarie Local Environmental Plan 2004* (LEP 2004).

The objective of LEP 2004 is:

> *'to achieve development of land to which this plan applies that is in accordance with the principles of ecologically sustainable development by:*
> *(a) promoting balanced development of that land, and*
> *(b) implementing the Lifestyle 2020 Strategy adopted by the Council on 27 March 2000'.*

3.1.1 Definition of the Development

The proposed development comprises a *utility installation* under LEP 2004, defined as:

> *'a building or work used for a public utility undertaking, but does not include a building designed wholly or principally as administrative or business premises or as a showroom'.*

A *public utility undertaking* is defined under LEP 2004 as:

> *'any of the following undertakings carried on or permitted or suffered to be carried on by or by authority of any government department or under the authority of or in pursuance of any Commonwealth or State Act:*
> *(a) railway, road transport, water transport, air transport, wharf or river undertakings,*
> *(b) undertakings for the supply of water, hydraulic power, electricity or gas or the provision of sewerage or drainage services,*
>
> *and a reference to a person carrying on a public utility undertaking includes a reference to a council, electricity supply authority, Government department, corporation, firm or authority carrying on the undertaking'.*

EE is an electricity supply authority authorised under the *Energy Services Corporations Act 1995* (ESC Act) with the following principal functions:

> *(a) to establish, maintain and operate facilities for the generation of electricity and other forms of energy, and*
> *(b) to supply electricity and other forms of energy to other persons and bodies*

As an electricity generator, under the ESC Act, EE may also:

> *(a) provide facilities or services that are ancillary or incidental to its principal functions, and*
> *(b) conduct any business (whether or not related to its principal functions) that it considers will further its objectives.*

The proposed EPS upgrade project involving capacity and performance improvement modifications and construction of a cooling water attemperating reservoir and associated infrastructure expansion falls within the definition of facilities and infrastructure which are either part of, or ancillary to, the principal functions of EE and are therefore adequately defined as a *utility installation*.

3.1.2 Permissibility of the Development

Under the provisions of LEP 2004, the areas of the EPS site are zoned part 4(1) Industrial (Core), part 7(2) Conservation (Secondary) and part 5(1) Infrastructure.

The objectives of the Industrial (Core) zone are to:

(a) provide land for a wide range of employment-generating industries, including manufacturing, processing, assembly, storage and distribution uses, and

(b) provide land for a range of industrial uses that, because of their nature, require large areas of land or separation from more intensive forms of employment generating industries, and

(c) ensure that industries are designed and located so as not to cause unacceptable environmental harm or adversely affect the amenity of the environment, including residential neighbourhoods, and

(d) provide for sustainable water cycle management.

The objectives of the Conservation (Secondary) zone are to:

(a) protect, conserve and enhance land that is environmentally important, and

(b) protect, manage and enhance corridors to facilitate species movement, dispersal and interchange of genetic material, and

(c) enable development where it can be demonstrated that the development will not compromise the ecological, hydrological, scenic or scientific attributes of the land or adjacent land in Zone 7 (1), and

(d) ensure that development proposals result in rehabilitation and conservation of environmentally important land, and

(e) provide for sustainable water cycle management.

The objectives of the Infrastructure zone are to:

(a) provide land for future infrastructure needs such as roads, drainage and other utilities, and

(b) provide land required for the expansion of existing community facilities or the development of new community facilities, and

(c) provide for limited development within the zone where it can be demonstrated that the development will not prejudice or have the potential to prejudice the intended future infrastructure development of that land, and

(d) ensure that development on adjacent or adjoining land zoned infrastructure does not prejudice future infrastructure development within that zone, and

(e) provide for sustainable water cycle management.

Within the Industrial (Core) zone, Conservation (Secondary) zone and the Infrastructure zone, utility installations are permissible with Council consent.

The footprint of the proposed cooling water attemperation reservoir is within the 4(1) Industrial (Core) zone and the 7(2) Conservation (Secondary) zone.

Clause 10 of LEP 2004 relates to development by public authorities and states that:

> *Despite other provisions of this plan, the following are allowed on land to which this plan applies without consent:*
>
> *(a) the use of existing buildings of the Crown by the Crown, and*
>
> *(b) activities specified in Schedule 10.*

Schedule 10 to the LEP includes development for the purpose of public utility undertakings, being water, sewerage, drainage, and electricity or gas undertakings, including:

> *(a) development of any description at or below the surface of the ground,*
>
> *(b) the installation of any plant inside a building or the installation or erection within the premises of a generating station or substation established before the appointed day of any plant or other structures or erections required in connection with the station or substation,*
>
> *(c) the installation or erection of any plant or other structures or erections by way of addition to, or replacement or extension of, plant or structures or erections already installed or erected, including the installation in an electrical transmission line of substations, feeder-pillars or transformer housing, but not including the erection of overhead lines for the supply of electricity or pipes above the surface of the ground for the supply of water, or the installation of substations, feeder-pillars or transformer housing of stone, concrete or brickworks,*
>
> *(d) the provision of overhead service lines in pursuance of any statutory power to provide a supply of electricity,*
>
> *(e) the erection of service reservoirs on land acquired or in the process of being acquired for the purpose before the appointed day, provided reasonable notice of the proposed erection is given to the Council,*
>
> *(f) routine maintenance and emergency works,*
>
> *(g) any other development, except:*
>
> *(i) the erection of buildings, the installation or erection of plant or other structures or erections and the reconstruction or alteration of buildings, so as materially to affect their design or external appearance, or*
>
> *(ii) the formation or alteration of any means of access to a road.*

The proposal falls within the definition of development under Schedule 10 and is therefore permissible without Council consent.

3.2 Regional Matters

The Regional Environmental Plan (REP) applying to the subject site is Hunter REP 1989.

The aims of Hunter REP 1989 are:

> *(a) to promote the balanced development of the region, the improvement of its urban and rural environments and the orderly and economic development and*

optimum use of its land and other resources, consistent with conservation of natural and man made features and so as to meet the needs and aspirations of the community,

(b) to co-ordinate activities related to development in the region so there is optimum social and economic benefit to the community, and

(c) to continue a regional planning process that will serve as a framework for identifying priorities for further investigations to be carried out by the Department and other agencies.

The Minister is required to give consideration to the content of the background report and the objectives, policies and principles contained in REP 1989 in the assessment of the proposed upgrade works. Whilst many of these are not directly relevant to the specific development proposed, the proposal is considered to be in line with the provisions of the plan as they relate to economic development and environmental protection in the region.

3.3 State Matters

3.3.1 Environmental Planning and Assessment Act, 1979

The EP&A Act and the EP&A Regulation provide the framework for environmental planning in NSW and include provisions to ensure that proposals which have the potential to impact the environment are subject to detailed assessment, and provide opportunity for public involvement.

As outlined in **Section 1.4**, the proposed project is a candidate for assessment and approval under Part 3A of the EP&A Act, with the Minister for Planning being the decision making authority for the proposed upgrade works.

Under Part 3A, a proponent can seek a project approval or a concept approval. Concept approvals allow the project to be considered on the basis of a concept plan with the assessment focussing on the strategic issues. The proponent is then able to obtain concept approval of the concept prior to undertaking detailed studies of some components of the project. Further details can be finalised at a later stage as part of a project approval which may follow the concept approval.

In accordance with the provisions of Part 3A of the EP&A Act, EE is seeking project approval for the proposed cooling water attemperation reservoir and the capacity and performance improvement modifications.

3.3.2 Eraring Power Station Act, 1981

The *Eraring Power Station Act, 1981* was established to enable the then Electricity Commission of NSW to enter into certain agreements and understandings relating to the EPS and to exercise and perform certain functions in relation to the power station. Section 21 of this Act provided for the authorisation and approval of the development of the power station, Section 21 states:

(1) In this section: "approved purposes" means:

(a) the purposes of electricity generating works, public utility undertakings, the transmission or supply of electricity, the storage of water and coal, coal conveyors, coal loading facilities, the storage and use of hazardous

substances, the construction of dams, the storage and disposal of spoiled water, ash and waste, bulk stores, offices, recreation facilities and parking or any of those purposes,

(b) purposes connected with facilities associated with the generation, transmission or supply of electricity, or

(c) purposes ancillary to or associated with any of the foregoing purposes.

"development" means:

(a) buildings, structures and improvements erected or constructed or to be erected or constructed on, in or over land comprising the whole or any part of the site,

(b) works carried out or to be carried out on, in or over any such land, and

(c) subdivision effected or to be effected of any such land,

whether erected, constructed, carried out or effected before, on or after the day appointed and notified under section 2 (2).

(2) All development on the site for approved purposes is hereby authorised and approved, and shall be deemed always to have been authorised and approved, for the purposes of any other Act or instrument under any other Act.

(3) The site and any development on the site may be used, and shall be deemed always to have been able to be used, for approved purposes, notwithstanding any other Act or instrument under any other Act to the contrary.

Notwithstanding any rights derived from Section 21 of this Act, EE recognises the objects of the EP&A Act to provide for the orderly and economic development of land and to ensure proposals are properly assessed for environmental effect, and, therefore intends to obtain approval under the provisions of the EP&A Act.

3.3.3 SEPP 2005 (Major Projects)

State Environmental Planning Policy (Major Projects) 2005 (SEPP 2005) was gazetted on 25 May 2005 and amended on 1 August 2005. It replaces all existing provisions related to former 'state significant development' in planning instruments, directions and declarations.

The primary aim of SEPP 2005 is:

to identify development of economic, social or environmental significance to the State or regions of the State so as to provide a consistent and comprehensive assessment and decision making process for that development.

Schedule 1 of the SEPP identifies classes of development which are classified as major development. This includes development for the purpose of an electricity generation facility that:

(a) has a capital investment value of more than $30 million for gas or coal-fired generation, or co-generation, or bioenergy, bio-fuels, waste gas, bio-digestion or waste to energy generation, or hydro or wave power generation, or solar power generation, or wind generation

The proposed EPS upgrade project constitutes a major project under clause 24 of Schedule 1 to SEPP 2005 as it involves:

- a capital investment of more than $30 million. The proposed project has a capital investment of in excess of $30 million; and,
- is for the purposes of coal-fired and gas electricity generation.

Therefore, under the provisions of clause 24 in Schedule 1 to SEPP 2005, the proposed development meets the classification of major development, with the Minister for Planning being the approval authority.

3.3.4 SEPP 14 – Coastal Wetlands

SEPP 14 has the primary aim of protecting coastal wetlands in the environmental and economic interests of the State. A heritage study undertaken by HLA in May 2004 indicates that a wetland listed under SEPP 14 is located on the EPS site, being Eraring Wetland, otherwise known as 'Muddy Lake'.

In relation to listed wetlands, SEPP 14 requires that development for the purposes of clearing, levees, draining or filling is only permitted with the consent of the local Council and the concurrence of the Director. The SEPP also requires that the Director of the National Parks and Wildlife Service be consulted in relation to an application for these forms of development on affected land.

Eraring Wetland is located in the far west of the site and the proposed new cooling water attemperating reservoir or associated infrastructure would not impact on this SEPP 14 wetland.

3.4 Commonwealth Matters

The *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* came into effect in July 2000 and requires the approval of the Commonwealth Minister for the Environment and Heritage for actions that may have a significant impact on matters of National Environmental Significance (NES). Approval from the Commonwealth is in addition to any approvals under NSW legislation. The matters of NES are:

- World Heritage Properties;
- National Heritage Places;
- Wetlands of International Significance (Ramsar Sites);
- Commonwealth Marine Areas;
- Threatened Ecological Communities;
- Threatened Species; and
- Migratory Species.

Approval under the EPBC Act is triggered by a proposal which has the potential to have a significant impact on a matter of NES or by a proposal which has the potential to have a significant impact on the environment which involves the Commonwealth. The EPBC Act lists eight matters of NES which must be addressed when assessing the impact of a proposal.

Based upon preliminary assessment, the proposal is not expected to impact on a matter of NES, and as a consequence the EPBC Act is not triggered and referral to, and approval from, the Commonwealth Minister for Environment and Heritage is not required.

3.5 Other Authorisations Required

The subject site benefits from an existing EPL issued under the *Protection of the Environment Operations Act 1997* (POEO Act) (Ref. No. 1429) for electricity generation and all other activities carried out at the premises.

4 PHYSICAL AND POLLUTION EFFECTS

4.1 Introduction

This section identifies the likely physical and pollution impacts of the proposed project. Air emissions from EPS are continuously monitored, and cooling water discharged from the plant is monitored continuously and as required by the EPL. This information has been used to identify baseline conditions.

4.2 Air Quality

Discharges to air are monitored continually at the EPS and EE monitors and reports gaseous emissions to the Department of Environment and Conservation (DEC) on a yearly basis. Monitoring results show the EPS operates well below the emission guidelines set by the DEC. The total energy generated at the power station determines the total quantity (tonnes) of emissions discharged. However the spot rate of emission (concentration) is dependent on the load at any one time.

Under the EPL, EE undertakes monitoring at four sites within the EPS for air emissions and discharges to air, and three sites located within the vicinity of the site for ambient air quality monitoring. Limits are imposed so that for each monitoring point, the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified.

4.2.1 Impacts to Air Quality

It is expected that the proposed project would provide absolute reductions in NO_x post upgrade. Reductions would be made by the replacement of components of the boiler as these directly impact the NO_x emission concentrations. The replacement of Boiler Burners to an improved low NO_x type would deliver a reduction in combustion NO_x concentrations.

Post upgrade, at a generating load of less than 660 MW the CO_2 per MWh emission coefficient is expected to improve or maintain the current coefficient. The average weighted annual emission coefficient is expected to improve following the upgrade, as the plant will operate at a full load of 750 MW in the order of only 10-20% of the time unless there is an emergency in the NEM, in which case full load operation may increase to around 35% of the time for the year that the emergency occurs.

To control the emission of particles produced by the burning of coal, EE has installed a state-of-the-art fabric filter plant, which removes 99.89% of particles (or ash), collecting up to 2,500 tonnes of ash/day. An increase in the generating load is expected to increase the dust generated and collected by the fabric filter plant. However, due to the effectiveness of this plant, the current dust emission limits are not expected to be exceeded.

Temporary air quality impacts are expected during the construction period. These impacts would predominantly come from construction equipment emissions and dust associated with earthworks and some increased construction traffic. Proven mitigation measures, such as dust suppression activities would be instigated to minimise emissions during the construction phase.

4.3 Water Use

Separate water systems are used in the operation of EPS. Fresh water is used to supply the boilers where it is converted into steam to drive the turbines. Most of this water is sourced from nearby Dora Creek sewage treatment plant and further purified at EPS, and is used to meet about 80% of the power station's water needs. The remaining 20% (approximately 400 ML pa) is sourced from Hunter Water. A 5% increase in energy generated will result in approximately a 5% increase in water sourced from Hunter Water.

Waste water including sewage is treated on site and recycled to the Water Reclamation Plant for further treatment and reuse. In emergencies this water may be used for irrigation.

Salt cooling water is drawn directly from Lake Macquarie and passes through the power station cooling system. Changes to the cooling water system are discussed as this is the only component of the water system that is likely to be significantly affected by the proposal.

4.3.1 Cooling Water

EPS operates a once-through cooling water system where water is drawn directly from Bonnells Bay in Lake Macquarie and is heated as it passes through the power station. This water is discharged to Myuna Bay, Lake Macquarie via the outlet canal. Heated water is mixed with ambient lake water, if required, to ensure temperatures at the discharge point remain within licence limits, a process called attemperation.

The temperature at the cooling water discharge is continually monitored and equipped with alarms that sound when the temperature exceeds the 35°C trigger identified in the EPL. The cooling water discharge creates a plume of water of elevated temperature into the mixing zone in southern Lake Macquarie which cools as it mixes and moves away from the discharge point. Ambient water temperature in southern Lake Macquarie has been monitored on a monthly basis since 1981, and surface temperatures fluctuate between 13°C and 30°C.

The volume of water extracted from Lake Macquarie for cooling water purposes varies depending on the ambient water temperature and the generating load and hence can vary diurnally and seasonally. Currently, the total capacity of the intake pumps is nominally 120 m^3/s (43.2 ML/hr) with an additional 40 m^3/s (14.4 ML/hr) pump capacity planned after works associated with the upgrade.

The proposed cooling water attemperation reservoir is an environmental performance improvement initiative by EE for EPS, to enable it to more effectively manage cooling water discharge temperatures.

4.3.2 Monitoring

As part of the EPL for EPS operations including discharge of waste waters and runoff from the ash reservoir, water monitoring is required at five discharge points and monitoring limits have been set for:

- Copper;
- Iron;
- Selenium;
- Cadmium;

- Lead;
- Manganese;
- Nitrate + nitrite (oxidised nitrogen);
- Zinc;
- Phosphorus (total) + Reactive Phosphorus; and
- Total suspended solids.

The licence also specifies environmental monitoring of ambient waters at four sites within Lake Macquarie at least 10 times per year. Parameters measured include:

- Dissolved Oxygen;
- Temperature;
- Salinity
- Water clarity; and
- Zooplankton.

Long term monitoring results demonstrate the ability of EPS to operate within the limits identified in the EPL.

4.3.3 Impacts on Cooling Water Use

As a result of the proposed increase in the use of attemperating water the concentrations of additives in the cooling water would be reduced in the water being discharged although mass emissions of additives would be unlikely to change. It is also anticipated that with the use of additional attemperation water, the temperature of discharge water to Lake Macquarie would be able to be better and more effectively managed.

Additional volumes of water from Lake Macquarie would be temporarily stored in the reservoir before being released back into the lake through the outlet canal.

Due to the open tidal nature of the lake and the diversionary nature of the attemperating system, no changes are anticipated to the level of the lake as a result of the proposed project.

The quality of the water discharged from the proposed reservoir would be maintained by appropriate management of the reservoir.

The discharge of additional volumes of cooling water has the potential to change discharge velocities when additional attemperation water is required. Increased discharge velocities may cause impacts such as scouring to the discharge outlet. The likelihood of such impacts would be investigated as part of the Environmental Assessment and would need to be appropriately managed.

4.4 Groundwater and Surface Water

A search of the State Groundwater Database undertaken as part of study by HLA in May 2006 identified three groundwater bores within a 2 km radius of the Ash Dam on the Eraring site. All bores are located west of the site and are used for a combination of purposes.

Based on recent groundwater sampling, groundwater occurs at the EPS site at a depth of between 1.1 and 1.8 m bgl. The quality (salinity measured by Total Dissolved Solids) of the groundwater at the site is expected to be relatively fresh.

Impacts to the current groundwater regime may be caused by the construction of the cooling water attemperation reservoir.

During the construction phase of the reservoir, the potential exists for temporary impacts to surface water quality as a result of run off from earthworks and some increased construction traffic.

4.5 Noise and Vibration

Existing background noise levels at the site vary in nature and degree; however there is no requirement under the EPL to monitor noise emissions from the site. A vegetative buffer is located around the perimeter of the site.

There is some potential for noise levels within the power station building to increase at times of increased maximum generating load, but this is unlikely to significantly impact upon receivers outside the site boundaries of EPS and would be anticipated to be of short duration only during peak demand periods.

Localised noise impacts may result during construction activities; however this is anticipated to occur over relatively short periods of activity. Due to the vegetative buffer and distance of the site from the nearest residential receivers, it is anticipated that these disturbances could be managed so that they would not have a significant impact.

4.6 Soils and Landforms

The 1:100,000 soil landscape sheet 9131-9231 for Gosford – Lake Macquarie shows the soils of the site as predominantly comprising the Doyalson erosional landscape. Parts of the site as well as the area of the ash dam are classified as disturbed terrain.

The Doyalson landscape comprises gently undulating rises on Munmorah Conglomerate, and is characterised by high erosion hazard and very low fertility. Slope gradients are less than 10%, with local relief to 30m. Characteristic landscapes include broad crests and ridges and long gently inclined slopes. Areas are predominately cleared eucalypt open forest.

Soils in this landscape include:

- moderately deep Yellow Earths, Yellow Podzolics and Soloths on sandstones and conglomerates;
- moderately deep Yellow Podzolics, Soloths, and some Deep Red Podzolic soils on fine-grained siltstones and claystones; and
- moderately deep to deep Yellow Leached Earths, Grey Earths, Soloths and Gleyed Podzolic Soils along drainage lines.

Limitations to the soils include high erosion hazard, localised foundation hazard, high run-on mine subsidence, seasonal water logging, hardsetting, stoniness and strongly acid soils of low fertility.

According to the 1:250,000 Sydney Geological Map Sheet (S1 56-5) the geology of the area consists of Quaternary alluvium including grave, sand, silt and clay in the vicinity of Lake Macquarie overlying Triassic Narrabeen Group claystone, sandstone and shale (Groundwater Monitoring Review MR, 2006).

The construction of the cooling water attemperation reservoir would result in changes to the landform in this area to accommodate the new reservoir. Excess topsoil material from the construction of this reservoir may be used on other parts of the site, such as in the rehabilitation of the ash dam.

4.7 Recommended Studies

It is considered that the following studies should be undertaken as part of the environmental assessment of the proposal:

- Air Quality Impact Assessment (AQIA) to determine the nature of impacts and would include modelling of expected CO_2 and NO_x emissions from the upgraded plant.
- Assessment of thermal cooling water effluent dynamics under the proposed operating regime;
- Soil sampling to determine suitability of material at proposed cooling water reservoir site for other purposes, such as on-site rehabilitation works.
- Noise Impact Assessment to determine the nature and extent of construction and operation impacts.

5 BIOLOGICAL EFFECTS

5.1 Introduction

In 2004 HLA was commissioned by EE to undertake a biodiversity survey of the operational lands of the EPS. Previous surveys had taken place in 1999 by Biosis Research and in 1994 by Kevin Mills and Associates. The 2004 survey aimed to increase the knowledge of the distribution of significant species to allow for the effective management of the natural environment. Results of this survey have been used in the discussions below.

A targeted *Tetratheca juncea* survey was also conducted on the operational lands of the EPS in October and November 2003.

A Land Management Plan for the site covers issues such as biodiversity, bushfire control, weed control, and pest management.

5.2 Fauna

5.2.1 Terrestrial Fauna

The results of the terrestrial fauna survey of the EPS site detected 71 vertebrate species, which included 42 bird, 22 mammal, four frog and two reptile species. This was considered to be a low recording of diversity, compared to Biosis (1999), and was explained as a result of the survey taking place in winter, when frog and reptile activity is low and many migratory bird species are absent.

5.2.2 Plankton and Fish Larvae

Existing intake screens at EPS have a large enough mesh to minimise the entrainment of organisms such as plankton and fish larvae. While subject to stresses as they pass through the cooling water system, any effect on these organisms per cubic metre of cooling water is not anticipated to significantly change.

5.3 Flora

5.3.1 Terrestrial Flora

A total of 214 species of vascular plant species were identified during the survey in 2004, of which 62 species had not been previously recorded within the study area. Of the 62 additional species recorded, 55 are native species. The total number of species recorded within the study area, including those listed in Biosis (1999), was 299. This excludes species identified to genus level only, however it includes exotic species and species utilised in site rehabilitation works.

5.3.2 Seagrass

Seagrass beds occur in Myuna Bay in the path of the cooling water discharge. Annual lake wide seagrass surveys have been funded jointly by Eraring Energy and Delta Electricity since 1981. The results of these surveys indicate that the species composition in the lake has

changed over time, and the community has changed from a *Zostera* (ribbon weed) dominated community to a *Halophila* (paddle weed) dominated community.

5.4 Biodiversity

The clearing of Lake Macquarie's vegetation began during the 1860s. Since that time, the rate of clearing has averaged approximately 182 hectares per year. Just over 60% (or 39,253 hectares) of land within the Lake Macquarie LGA has native vegetation coverage. The EPS is located adjacent to Myuna Bay, which includes land protected by the National Parks Estate.

Thirty six wetlands within the Lake Macquarie LGA are covered by *State Environmental Planning Policy No. 14 - Coastal Wetlands* (SEPP 14), occupying approximately 775 hectares. The EPS is situated on a small section of the foreshore of Lake Macquarie. Eraring Wetland forms part of the EPS site and is gazetted under SEPP 14. Eraring Wetland is located in the far west of the site and the proposed new cooling water attemperating reservoir or associated infrastructure is not expected to impact on this SEPP 14 wetland.

A comprehensive survey of the EPS was undertaken in June 2005 to gather information on the location and extent of various weed species at the site. Weed species identified at the EPS include severe infestation of Lantana, Bitou Bush, Blackberry, Wild Tobacco, Balloon Vine, Crofton Weed, Pampas Grass, Dodder, Morning Glory, Small leaved privet, Castor Oil Tree, and Wild Watsonia.

In September 2004, a comprehensive survey of the EPS was undertaken to gather information on the location of dens, warrens, and sightings of animals. Vertebrate pest animal species identified at the EPS include Wild Dogs, European Red Foxes, Feral Cats, Feral European Rabbits and Hares, Indian Myna Birds, and potentially, Feral Pigs. Feral animal management and control on EPS operational lands is necessary to mitigate the impacts species are having on the environment and site functionality.

Pest control activities are undertaken at the EPS in accordance with EE's Land Management Plan and NSW guidelines.

5.5 Threatened Species, Communities and Habitat

Threatened fauna species recorded in the study undertaken in 2004 are listed in **Table 1**. No threatened bird species were recorded, however, the Powerful Owl has previously been detected within the study area.

Table 1: Threatened Vertebrate species recorded on EPS Land.

Scientific Name	Common Name	Status TSC
Mormopterus norfolkensis	Eastern Little Mastiff-bat	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable
Miniopterus australis	Little Bent-wing Bat	Vulnerable
Miniopterus schreibersii	Common Bent-wing Bat	Vulnerable
Myotis macropus	Large-footed Mouse-eared Bat	Vulnerable
Petaurus norfolcensis	Squirrel Glider	Vulnerable

Plant species recorded in terms of significance, with respect to threatened species status or recognition as a ROTAP (Briggs and Leigh 1996) species, are listed in **Table 2**.

Table 2: Significant plant species recorded on EPS Land.

Scientific Name	Common	NSW Status	EPBC Status	ROTAP code
Genoplesium despectans	Sharp Midge Orchid	U		2K
Family: Fabaceae (Mimosoideae)				
Acacia bynoeana	Tiny Wattle	E1	V	3VC-
Family: Myrtaceae				
Callistemon linearifolius		V		2RCi
Family: Proteaceae				
Hakea bakeriana		U		
Family: Thymelaeaceae				
Tetratheca juncea	Black-eyed Susan	V	V	3VCa

Two of the species, *Acacia byoneana* and *Callistemon linearifolius*, were recorded for the first time during the 2004 survey and are protected by the provisions of the TSC Act, with *A. byoneana* also protected by the provisions of the EPBC Act. Species recorded close to their distributional limits included *Bossiaea stephensonii* (at the northern limit of the species' southern population distributional limit) and *Pultenaea tuberculata* (said to occur between Lake Macquarie and Bermagui).

5.6 Potential Impacts

The main impacts of the proposal to the biology of the area would be as a result of the clearing of the area for the proposed cooling water attemperation reservoir. This would impact upon flora and fauna in this area and their habitats and communities in this area. An area of approximately 18 hectares would be required for the construction footprint of the reservoir.

The construction of the attemperation reservoir may reduce the habitat for weed and pest species. The management and eradication of pest and weed species would continue as part of the requirements outlined in the Land Management Policy.

5.7 Recommended Studies

It is considered that the following studies should be undertaken as part of the environmental assessment to assess the biological impacts of the proposal:

- Detailed flora and fauna survey of the area to be impacted by the construction of the cooling water attemperation reservoir.

6 RESOURCE IMPLICATIONS

6.1 Introduction

This section identifies the likely resources required and impacts to resources as a result of the proposed works.

6.2 Community

The proposed upgrade and the construction of the cooling water attemperation reservoir would require some use of public roads for the delivery of equipment and removal of waste, however this would be temporary and would be at a level that would not have a significant impact upon the local road network.

Potential social and aesthetic impacts would be limited to the site and the immediate surrounds.

The proposed works would not result in a significant use of community resources in environmentally sensitive areas.

6.3 Natural

The proposed upgrade and the construction of the cooling water attemperation reservoir would require an increase in the amount of water from Lake Macquarie which is extracted and discharged for cooling water purposes at the power station, this is further discussed in Section 4.3.3.

Annual levels of coal consumption at EPS are directly related to the annual average generation rate of around 15,000 GW/h. An increase in the annual average generation rate of up to some 20 % is anticipated as a result of the proposed upgrade enabling higher electricity generation during periods of peak demand. It is therefore anticipated that annual coal consumption would increase proportionally to the likely increase in the annual average generation rate.

6.4 Plant Efficiency

The efficiency of the plant varies with unit load, and operation at higher loads is generally more efficient in terms of the ratio 'energy in/energy out' than operation at lower output for the existing plant design of 660 MW. Upgrade to the turbine plant is expected to increase the average 'cycle efficiency' by the proposal which involves the retrofitting of more modern and advanced design.

7 COMMUNITY EFFECTS

7.1 Introduction

Extensive tracts of land separate the power station from the local community, reducing visual impact and also keeping noise levels low at the buffer zone boundaries.

7.2 Socio-Economic

Lake Macquarie LGA had an estimated resident population of 187,803 in 2001, with a median age of 38.2 years (www.abs.gov.au, Lake Macquarie Community Profile 2003). The population density was 291.8 persons/km^2. **Tables 3** – **7** provide a comparison of the key indicators of socio-economic factors affecting population characteristics of the Dora Creek/Eraring, Morisset Planning District and Lake Macquarie LGA.

Table 3: Comparison of Resident Population for Dora Creek/Eraring, Morisset and the Lake Macquarie LGA, 2001

Population	Dora Creek - Eraring	% of Pop'n	Morisset Planning District	% of Pop'n	Lake Macquarie	% of Pop'n
Total - all persons	1,271		19,160		177,619	
Aged 65 years and over	202	15.9	3,379	17.6	26,900	15.1
Children 0-4 yrs	85	6.7	1,199	6.3	11,494	6.5
Children 5-11 yrs	136	10.7	1,957	10.2	18,337	10.3
Youth 12-17 yrs	102	8.0	1,654	8.6	15,890	8.9
Youth 18-24 yrs	91	7.2	1,454	7.6	14,394	8.1
Adults 25-64		51.5		49.7		51.1

Table 4: Comparison of Employment Details for Dora Creek/Eraring, Morisset and the Lake Macquarie LGA, 2001

Employment Details	Dora Creek - Eraring	Morisset Planning District	Lake Macquarie
No. Persons Employed	434	6,787	70,111
% of Total Population Employed	3.4	3.5	3.9
Worked at home	24 (5.5%)	400 (5.9%)	2,618 (3.7%)
Unemployment Rate	10.7%	9.6%	9.5%
Unemployment Rate (15-24 yrs)	14.0%	17.3%	18.7%

Table 5: Comparison of Birthplace/ Background Details for Dora Creek/Eraring, Morisset and the Lake Macquarie LGA, 2001

Birthplace/ Background	Dora Creek - Eraring	% of Pop'n	Morisset Planning District	% of Pop'n	Lake Macquarie	% of Pop'n
Indigenous	33	2.6	386	1.9	3,409	1.9
Born Overseas – including at sea, not stated or classified	149	11.7	2,572	13.4	16,829	9.5
Born in Culturally and Linguistically Diverse Country	57	4.5	914	4.8	7,243	4.1

Table 6: Weekly individual income which is less than the average weekly earnings ($700) for all NSW employees, (2001)

Location	No of Persons	% of Population
Dora Creek – Eraring	838	65.9
Morisset	11,517	60.1
Lake Macquarie	104,357	58.5

Table 7: Comparison of Education Details for Dora Creek/Eraring, Morisset and the Lake Macquarie LGA, 2001

Attending Education	Dora Creek - Eraring	% of Pop'n	Morisset Planning District	% of Pop'n	Lake Macquarie	% of Pop'n
Pre-school	20	1.6	285	1.5	3084	1.7
Infants/ Primary/ Secondary School	216	17.0	3176	16.6	30,616	17.2
Uni/ TAFE/ other Tertiary	49	3.9	1060	5.5	10,138	5.7
Holds Tertiary Qualification (includes Certificate, Diploma, Post Grad Degree etc)	342	26.9	5305	27.7	49,294	27.8

The above tables show that the Dora Creek-Eraring area and Morisset Planning District have population characteristics and a social profile which are comparable to the Lake Macquarie LGA in terms of education, employment, and population statistics. Accordingly, there are no exceptional socio-economic circumstances applying to the local community.

The direct socio-economic impacts of the EPS upgrade relate to direct or indirect employment impacts and benefits. The upgrade would be undertaken in phases and is expected to take 4-5 years to complete. Construction of the cooling water attemperation reservoir is predicted to take up to around nine months, and EE encourages the use of local contractors, where possible, for construction.

Once operational the upgrades power station would not require additional permanent employees at the site. Maintenance visits may be required.

Indirect socio-economic impacts of the EPS upgrade relate primarily to the securing of a reliable electricity supply for the NSW network during peak demand periods.

7.3 Heritage and Cultural

7.3.1 Regional Context

The Koompahtoo Local Aboriginal Land Council LALC is the statutory body which represents Indigenous people in the area. Wonnarua Nation Aboriginal Corporation (WNAC) and Yarrawalk Enterprises Pty Limited (Yarrawalk) are also known to be interested in the Eraring area.

There are 381 registered Aboriginal heritage sites in Lake Macquarie LGA, these include:

- shell middens;
- open sites (former camp sites whose archaeological material consists mainly of stone artefacts);
- rock shelters (containing art and midden);
- engravings;
- stone arrangements;
- ceremonial sites;
- carved and scarred trees;
- burials;
- quarry sites;
- axe-grinding grooves, and
- mythological sites.

There are 246 Non-Aboriginal heritage sites registered in the Lake Macquarie LGA. The National Trust register of sites contains 33 sites and areas of heritage significance in Lake Macquarie.

7.3.2 EPS Site

As the EPS site is located adjacent to Lake Macquarie, there is the potential for items or places of Indigenous significance to be located in the area to be disturbed by the proposed cooling water attenuating reservoir.

An Aboriginal Heritage Information Management System search was undertaken on 5 December 2005 by HLA for an assessment undertaken for the Ash Dam extension proposal over an area encompassing EPS. This revealed 97 Aboriginal sites in the general area, comprising 61 (63%) shell middens, 23 (24%) artefact scatters or isolated finds, 3 (3%) scarred trees, 3 (3%) PADs, 1 (1%) axe grinding groove, 1 (1%) mythological site, and 5 (5%) unidentified sites.

The distribution of known sites reveals that the majority of sites are located along the edge of Lake Macquarie and its major tributaries (such as Dora Creek and Pourmalong Creek). The most common site type in this region, shell middens, reveal Aboriginal people's one-time reliance on the marine resources of Lake Macquarie and its surrounding watercourses.

The construction of the proposed cooling water attemperation reservoir has the potential to disturb Aboriginal sites that may be located within the footprint of the proposed works. Accordingly an Indigenous Heritage Assessment of the area to be affected by the construction of the reservoir would be required.

EPS has been listed as a heritage item by Lake Macquarie Council in the LEP 2004. An internet search of the State Heritage Inventory and the Register of the National Estate conducted on 5 May 2006 indicated that there were no other known items of heritage significance on the EPS site listed by local government, state agencies or on the Register.

The proposed works would not impact on the character or structure of EPS since, apart from the reservoir, they are largely related to the replacement and upgrade of internal plant.

The NSW Heritage Office State Heritage Inventory forms, has information on Eraring Wetland as a Heritage site. This site is also known locally as Muddy Lake. Eraring Wetland is gazetted under SEPP 14 (No 879 & 880); however there is no listing for Eraring Wetland either as a cultural heritage item or a natural heritage item under the EPBC Act.

The location of the proposed works is such that they are not anticipated to impact on the heritage values of Eraring Wetland.

7.4 Land Use

7.4.1 Regional Context

There are a variety of land use types in Lake Macquarie including residential, recreational, commercial and industrial areas. The lake geographically divides the City. The eastern side of the lake consists of more densely populated older urban areas while the less densely populated western side consists of scattered communities some of which are rural and isolated. The Northlakes area is a mix of densely populated suburbs and small townships. Both the Westlakes and Northlakes areas have been subject to increasing development in recent years because they have large tracts of undeveloped land. The EPS is located within the area known as Westlakes.

Lake Macquarie has a population growth rate of 0.9%, with the population predicted to increase to 203,810 by 2021 (ABS 2001). To accommodate this growth, new development areas are being established, resulting in changes to land use and character. The major changes are:

- 'greenfield' bushland to residential, industrial and commercial uses;
- creation of smaller pockets of remnant vegetation areas;
- loss of bushland remnants to rural and agricultural uses;
- loss of natural drainage lines;
- encroachment of development on bushland and riparian zones; and
- stormwater discharge to bushland remnants.

The residential value of building activity in Lake Macquarie was $123 million during 2003 and the commercial/industrial value was $10 million. Residential development is a key pressure on land use within the City.

Lake Macquarie Council has been developing strategies to manage population and growth within the City such as Lifestyle 2020, Social Plan 2005 and Economic Development Strategy (2004-05), etc. These strategies detail the connections between planning, environmental management and social and economic development so that they are not viewed as separate elements but matters given equal weighting in Council decision-making.

7.4.2 EPS Site

Land use at the EPS includes the infrastructure associated with electricity generation and ash disposal as well as ancillary works such as transport and service infrastructure and buffer zones.

Construction activities would have a temporary impact on the land use of the EPS. Construction of the cooling water attemperation reservoir would result in a direct impact on the existing land use of the area, and will require the clearing of vegetation for the reservoir, pipes and access road.

EE has prepared a Land Management Plan for the EPS site that aims to ensure that the principles of ecologically sustainable development (ESD) are integrated at the site. EE recognises that the environmental issues of importance to the sustainable use of the land for energy production are as follows:

- conservation of biodiversity;
- fire management;
- pest management;
- health of aquatic and marine environments;
- soil conservation; and
- Indigenous and non-indigenous heritage management.

The proposed upgrade works would not change the existing use of the EPS site for electricity generation purposes, and due to the location of the project elements would not change existing land use in the locality.

7.5 Transport and Traffic

Access to the EPS would remain unchanged; however an additional internal access route would be constructed to the proposed cooling water attemperation reservoir.

The main traffic increases will occur during the construction phase and would include:

- delivery of materials;
- vehicles associated with construction activities such as excavation; and
- construction employee vehicles, etc.

Minimal changes are expected to the existing operational traffic movement since additional permanent employees are not required and changes to consumables are anticipated to be marginal.

The site access is not located on a main road and is not considered to be in a sensitive location in relation to traffic and transport. Transport impacts would be minimal and limited to the site, with a temporary increase in traffic to the site during construction.

7.6 Landscape and Visual

The proposal would result in a change in the visual presentation of the area proposed for the construction of the cooling water attemperation reservoir. This area is currently partly vegetated, and would therefore be cleared in order to construct the reservoir. Proposed schematics showing the likely future landscape are provided in **Figures 4-6**. This area may be visible from properties to the west and north-west of this part of the site, but is well screened by vegetation to the south and east.

7.7 Recommended Studies

It is considered that the following studies should be undertaken as part of the environmental assessment to assess the affect of the proposal on the community:

- Indigenous Heritage Assessment of the area to be affected by the construction of the cooling water attemperation reservoir.

8 PRIORITISATION OF POTENTIAL ENVIRONMENTAL ISSUES

8.1 Issues Identification

As identified in **Sections 4-7** of this report, the list of issues associated with the project include:

- air quality;
- water use;
- groundwater and surface water;
- noise and vibration;
- soils and landforms;
- flora and fauna;
- resource use;
- social and economic;
- heritage and cultural;
- land use;
- transport and traffic; and
- landscape and visual.

8.2 Prioritisation of Issues

8.2.1 Approach

The prioritisation of issues for the proposed project is based on the need to recognise that the higher the potential severity of adverse environmental effects and the greater the consequence of those unmanaged effects, the higher the degree of environmental assessment required.

Where a high potential effect was identified, the attribute or issue was allocated a higher priority for assessment.

Table 8 provides the Issues Prioritisation Matrix upon which the identification of priorities for issues has been based. This method assesses priority on the basis of the potential severity of environmental effects and the likely consequences of those potential effects if unmanaged. The potential severity and consequence of the environmental effect are each given a numerical value between 1 and 3. The numbers are added together to provide a result which is then ranked and shaded in the matrix by the priority level being High, Medium or Low.

Table 8: Issues Prioritisation Matrix

Severity Of Effects	Perceived Consequence of Unmanaged Effects		
	3 High	2 Medium	1 Low
1 Low	4 (Medium)	3 (Low)	2 (Low)
2 Medium	5 (High)	4 (Medium)	3 (Low)
3 High	6 (High)	5 (High)	4 (Medium)

8.2.2 Assessment

The prioritisation of environmental issues related to the proposed project is shown in **Table 9**. This assessment aims to allow the prioritisation of issues for assessment and does not consider the application of mitigation measures to manage environmental effects.

Table 9: Prioritisation Analysis

Issue	Severity	Consequence	Priority
Aspect: Air Quality			
Construction related impacts on air quality	1	2	3 (Low)
Emissions to the atmosphere with the potential to result in degradation of air quality in the local area	2	2	4 (Medium)
Community concern regarding degradation of air quality and contribution to greenhouse effect	2	2	4 (Medium)
Regional and inter-regional impacts upon air quality	1	2	3 (Low)
Aspect: Cooling Water Use			
Temporary impacts to water quality during construction	1	1	2 (Low)
Quality of water in reservoir and impacts on aquatic biota	2	2	4 (Medium)
Degradation of water quality in Myuna Bay	2	3	5 (High)
Aspect: Groundwater and Surface Water			
Changes to water table and groundwater flow	1	1	2 (Low)
Changes to salinity level in groundwater	1	1	2 (Low)
Stormwater runoff from disturbed areas during construction	1	2	3 (Low)
Aspect: Noise and Vibration			
Temporary noise nuisance to local residents during construction	1	2	3 (Low)
Aspect: Soils and Landforms			

Issue	Severity	Consequence	Priority
Erosion and sedimentation during construction	2	1	3 (Low)
Sterilisation of land for future uses	1	2	3 (Low)
Aspect: Flora and Fauna			
Loss of habitat due to clearing and reservoir construction	2	2	4 (Medium)
Reduction in biodiversity due to loss of habitat for native species.	2	2	4 (Medium)
Mortality of fish and plankton from additional lake water intake	2	2	4 (Medium)
Impact upon threatened species.	2	3	5 (High)
Effects on seagrass and in Lake Macquarie	2	3	5 (High)
Entrainment of aquatic biota in reservoir	1	2	3 (Low)
Aspect: Resource Implications			
Demand upon community, natural or transport resources	1	1	2 (Low)
Aspect: Socio-Economic			
Impacts upon residential amenity such as noise, visual, etc	1	1	2 (Low)
Job creation during construction	1	1	2 (Low)
Job creation during operation	1	1	2 (Low)
Aspect: Heritage and Cultural			
Damage or removal of Aboriginal artefacts or places	2	2	4 (Medium)
Detrimental impact upon items of non-indigenous heritage significance	1	1	2 (Low)
Aspect: Land Use			
Inappropriate use of land	1	1	2 (Low)
Incompatibility of land use with surrounding environment	1	1	2 (Low)
Aspect: Transport and Traffic			
Increase in traffic on local road network during construction	2	1	3 (Low)
Increase in traffic on local road network during operation	1	1	2 (Low)
Aspect: Landscape and Visual			
Clearing of vegetation for construction of cooling water attemperation reservoir.	1	2	3 (Low)

Table 9 identifies that the prioritisation of environmental issues and therefore the focus of Environmental Assessment for the proposed project should be as follows.

High

- Cooling/salt water use; and

- Flora and Fauna.

Medium

- Air quality; and
- Heritage and Cultural.

Low

- Soils and landforms;
- Groundwater and Surface Water;
- Noise and vibration;
- Resource implications;
- Socio-economic;
- Land use;
- Transport and traffic; and
- Landscape and visual.

9 FINDINGS

The environmental assessment for the proposed upgrade of EPS would focus on the key impacts of the environmental factors addressed in Sections 4-7. This EASR has identified the environmental issues of highest priority as being:

- cooling/salt water use; and
- flora and fauna.

Air quality and heritage and cultural were considered to be of medium priority and other issues were identified as being of low priority.

9.1 Cooling Water Use

The operation of the upgraded cooling water attemperation system may result in impacts to water use associated with the operation of the cooling water system. Likely impacts would be related to an increase in the amount and velocity of water extracted and discharged to Lake Macquarie, changes in the temperature of water discharged to Lake Macquarie, and impacts such as turbidity, stratification and eutrophication which may arise from storing attemperating water in the proposed reservoir.

Assessment of these issues would be undertaken by modelling the thermal and hydraulic cooling water effluent dynamics in Lake Macquarie and modelling thermo-dynamics of water stored in the cooling water attemperation reservoir to determine the nature and extent of these impacts and identify ways in which these would be managed or mitigated.

9.2 Flora and Fauna

Impacts to terrestrial flora and fauna are expected as a result of the construction of the cooling water attemperation reservoir, which would require a construction footprint of approximately 18 hectares of land. There is also considered to be the potential for impacts to aquatic flora and fauna such as seagrass and benthic fauna in Myuna Bay and plankton and fish larvae which become entrained in the cooling water system.

Studies into the impact of the proposal on aquatic flora and fauna would also be undertaken to determine the nature and extent of the potential impacts and identify ways in which these would be managed or mitigated.

A number of biodiversity studies have previously been undertaken on the EPS site, these would be used as a basis for a detailed terrestrial Ecological Assessment of the area to be affected by the proposed cooling water attemperation reservoir to determine the nature and extent of impacts.

9.3 Other Environmental Issues

Additional environmental constraints have been identified, however the impacts resulting from the proposed upgrade of EPS are predicted to be moderate or minimal, and/or confined to the construction period. These constraints include:

- soils and landforms;
- air quality;
- groundwater and surface water;

- noise and vibration;
- resource implications;
- socio-economic;
- heritage and culture;
- land use
- traffic and transport; and
- landscape and visual

Each of these constraints would be discussed in the environmental assessment and appropriate mitigation measures would be identified in the Statement of Environmental Commitment to ensure impacts are minimised and properly managed.

9.4 Level of Assessment

This EASR has undertaken an initial appraisal of potential impacts associated with the proposed project, and has identified the key environmental issues to be:

- Cooling/salt water use;
- flora and fauna

These two issues would be considered in detail in the environmental assessment to be undertaken, which would be determined by the Minister. Air quality and heritage and cultural issues were considered to be of medium priority and would also be appropriately assessed.

Similar to the principles of Part 2 of Schedule 3 of the EP&A Regulation (which does not apply to this project) that allow for alterations and additions to existing facilities to be exempted from the need to prepare a high level assessment if the proposed alterations and additions do not result in a significant increase in the environmental impacts of the total development compared with the existing or approved development, this preliminary scoping assessment has identified that a high level environmental assessment is not required for this project.

9.5 Approvals Process

As discussed in **Section 3.3.3**, the proposed upgrade to the EPS is a candidate for declaration as a 'major development' under SEPP 2005 and is therefore eligible for assessment and approval by the Minister under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) as a major project.

Approval would be required from the Minister and approval under section 75J of the EP&A Act would be sought.

10 REFERENCES

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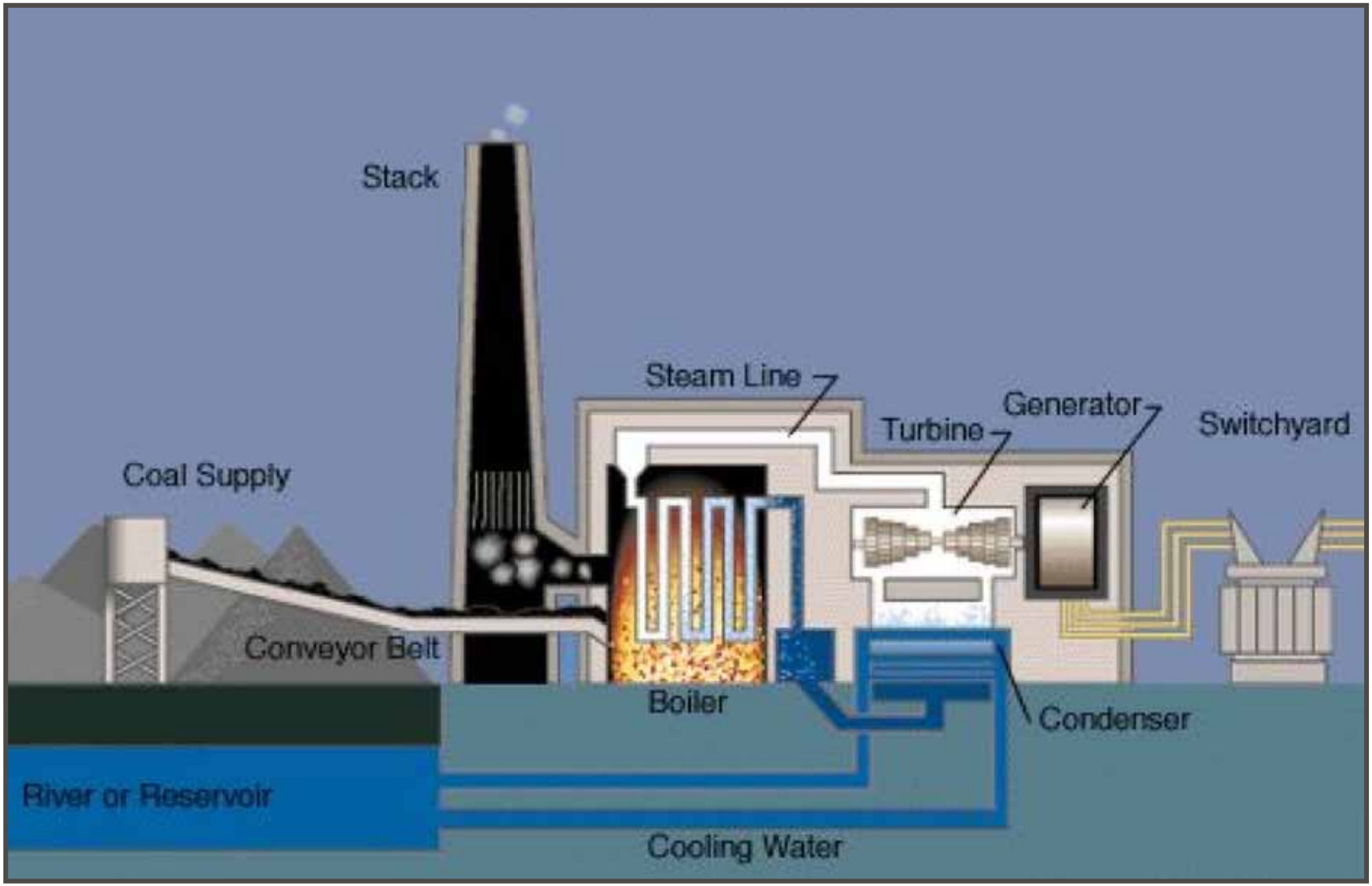
NSW Government (2004) *New South Wales Government Energy Directions Green Paper*, December 2004.

Figures



PROJECT-FILE NAME	N6040001
DATE	26 June 2006
DRAWN	TO
APPROVED	

Indicative Coal-Fired Power Station Operations
Eraring Energy
Environmental Assessment Scoping Report
Eraring Power Station 750mW Upgrade
Rocky Point Road, Eraring NSW

HLA

FIGURE
1

A4

0 400 800 1200 1600 2000

Metres

Legend

Eraring Boundary

HLA

CURRENT SITE LAYOUT
Eraring Energy
Environmental Assessment Scoping Report
Eraring Power Station 750 MW Upgarde
Rocky Point Road, Eraring NSW

FIGURE
2

PROJECT-FILE NAME **N6040001** DATE **June 2006** DRAWN **amt** APPROVED **HW**

PROJECT-FILE NAME	**N6040001**
DATE	**26 June 2006**
DRAWN	**TO**
APPROVED	

Approximate reservoir boundary

N

0 200m

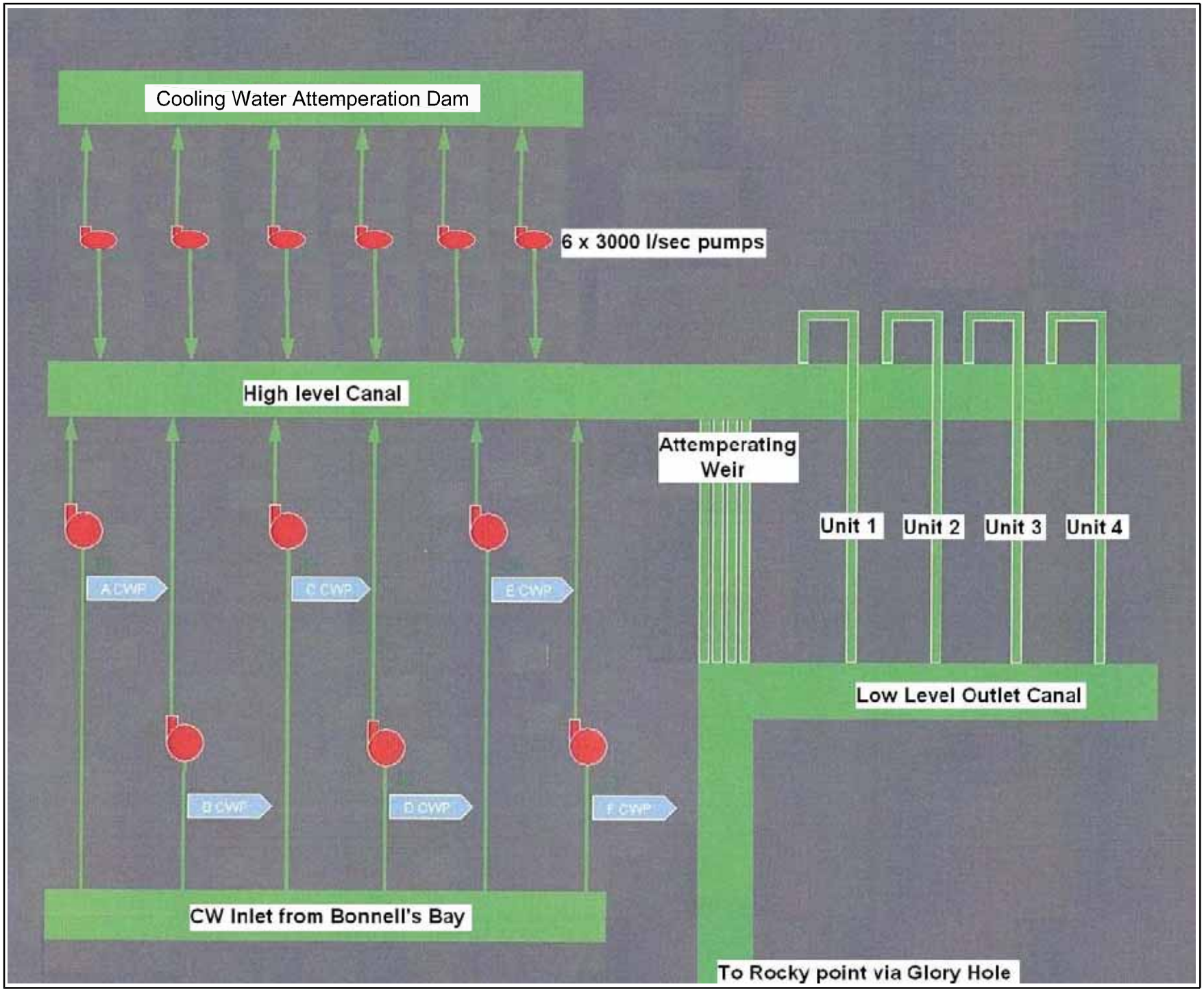
Approximate

Proposed Site Layout
Eraring Energy

Environmental Assessment Scoping Report
Eraring Power Station 750mW Upgrade
Rocky Point Road, Eraring NSW

HLA

FIGURE
3



PROJECT-FILE NAME	N6040001
DATE	June 2006
DRAWN	amt
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FLOW CHART - PROPOSED OPERATION OF COOLING WATER SYSTEM

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Scoping Report
Eraring Power Station 750 MW Upgarde
Rocky Point Road, Eraring NSW

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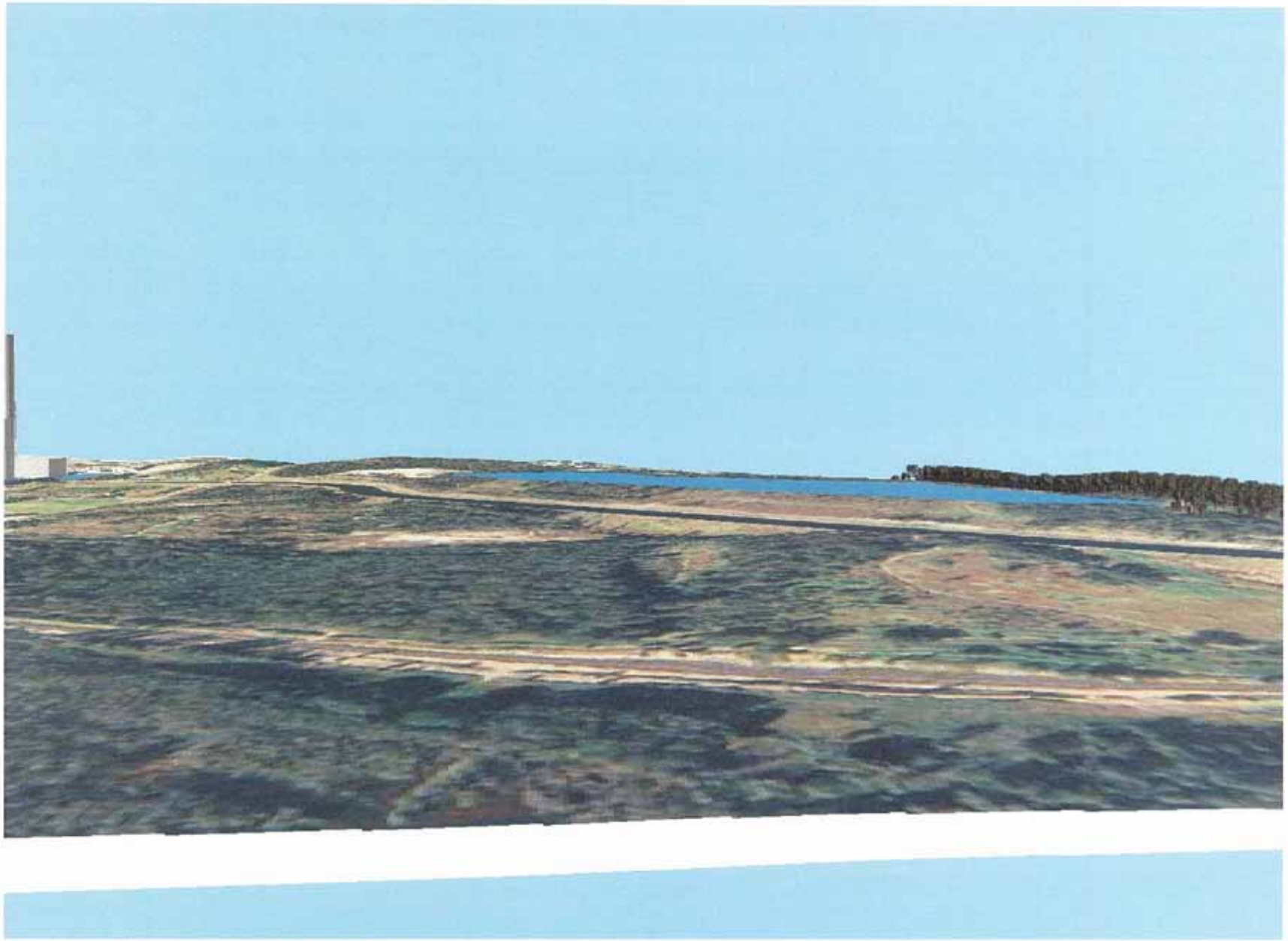
FIGURE

4



PROJECT-FILE NAME	N6040001
DATE	June 2006
DRAWN	amt
APPROVED	HW

SCHEMATIC OF RESERVOIR

Eraring Energy

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Eraring Power Station 750 MW Upgrade
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FIGURE

5

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SCHEMATIC OF RESERVOIR

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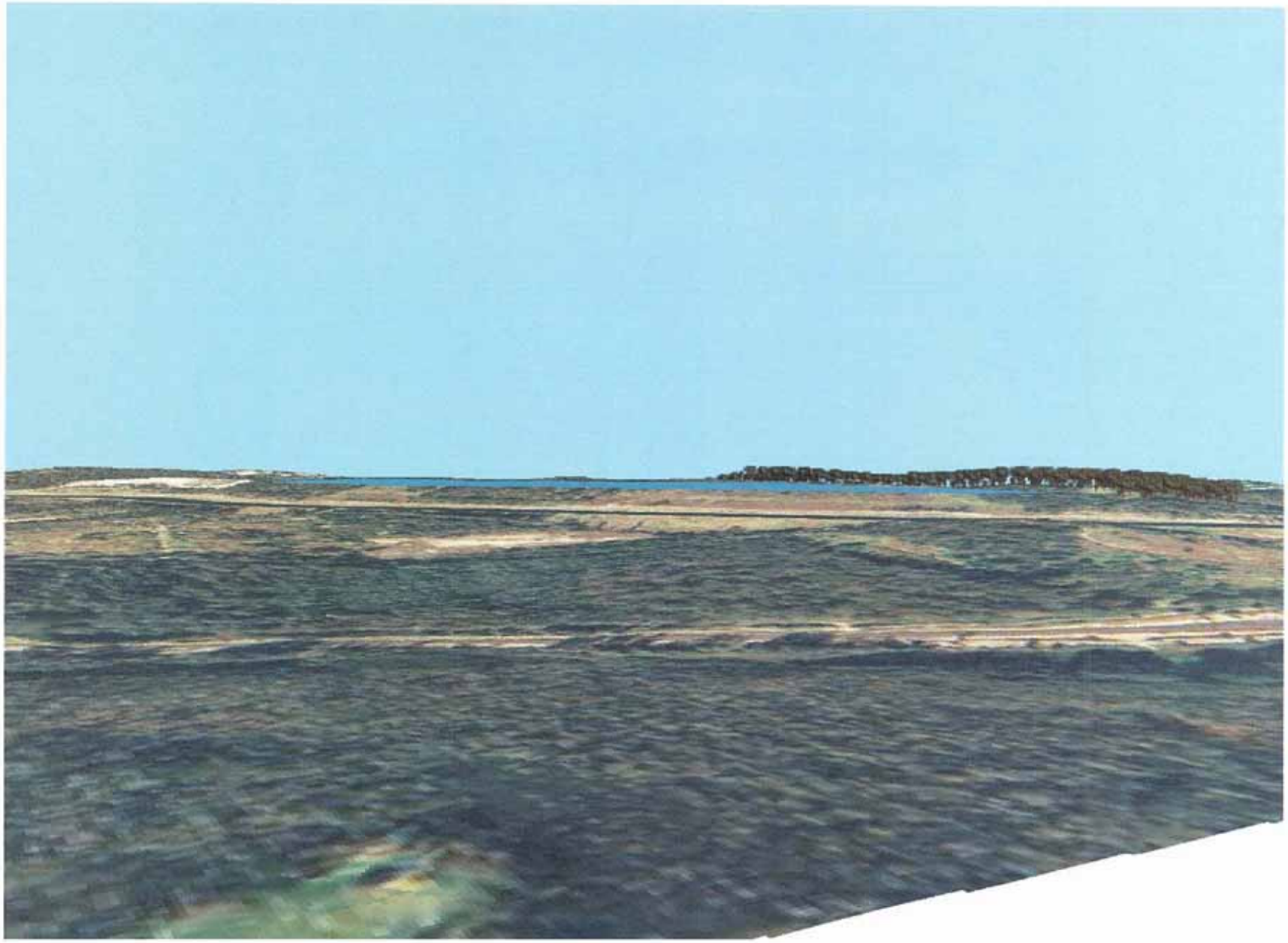
FIGURE

6



PROJECT-FILE NAME	**N6040001**
DATE	**June 2006**
DRAWN	**amt**
APPROVED	**HW**

SCHEMATIC OF RESERVOIR
Eraring Energy
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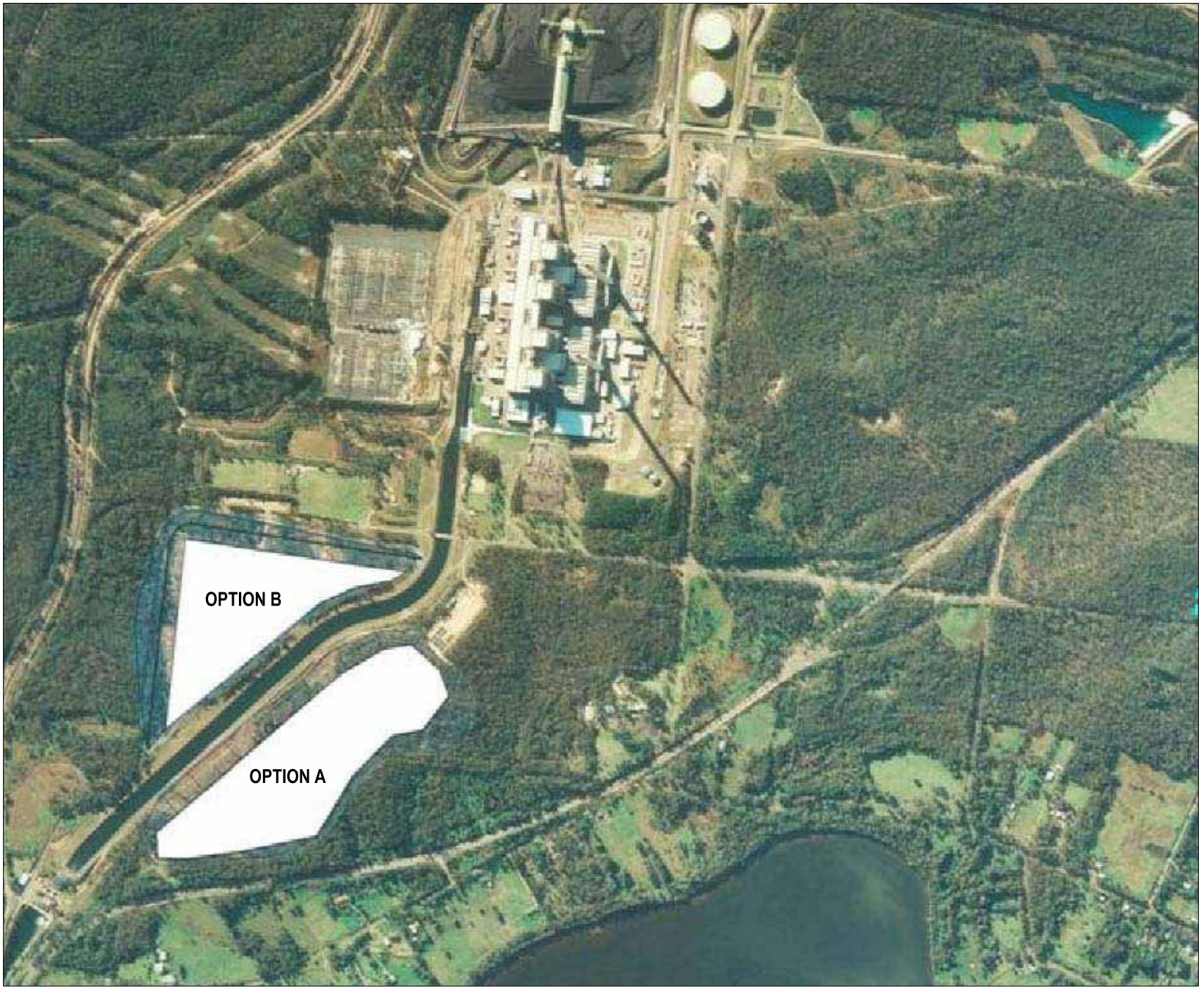
FIGURE
7



PROJECT-FILE NAME	N6040001
DATE	June 2006
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APPROVED	HW

ALTERNATIVE RESERVOIR LOCATIONS

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FIGURE

8