NSW GOVERNMENT
Department of Planning

MAJOR PROJECT ASSESSMENT: Eraring Power Station Capacity Upgrade and Attemperation Reservoir, Eraring

Director-General's
Environmental Assessment Report
Section 75I of the
Environmental Planning and Assessment Act 1979

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CONTENTS

1. BACKGROUND 1
1.1 Proposed Site 1
1.2 Surrounding Land Use 1
2. PROPOSED DEVELOPMENT 3
2.1 Project Description 3
2.2 Project Need 3
3. STATUTORY CONTEXT 5
3.1 Major Project 5
3.2 Critical Infrastructure Project 5
3.3 Environmental Planning Instruments 5
3.4 Minister's Approval Power 5
3.5 Nature of the Recommended Approval 5
4. CONSULTATION AND ISSUES RAISED 7
4.1 Submissions from the Public 7
4.2 Submissions from State Government Agencies 7
4.3 Submissions from Local Government 10
4.4 Submissions Report 11
5. ASSESSMENT OF ENVIRONMENTAL IMPACTS 13
5.1 Air Quality Impacts 13
5.2 Greenhouse Gas Impacts 15
5.3 Surface Water Quality and Impacts on Aquatic Ecology 16
5.4 Impacts on Terrestrial Ecology 23
5.5 Noise and Vibration Impacts 27
CONCLUSIONS AND RECOMMENDATIONS 31
APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL 33
APPENDIX C – STATEMENT OF COMMITMENTS 35
APPENDIX D – RESPONSE TO SUBMISSIONS 37
APPENDIX E – ENVIRONMENTAL ASSESSMENT 39

1. BACKGROUND

Eraring Energy (the Proponent) proposes to increase the capacity and performance level of the Eraring Power Station through a number of upgrades to its existing four generating units. The Proponent also intends to construct and operate an attemperation reservoir which once operational would allow the power station to better manage cooling water temperatures and permit extended operation of the plant. The project would be located on the existing Eraring Power Station site on Rocky Point Road, Dora Creek; approximately 40 kilometres southwest of Newcastle. The site is located within the Lake Macquarie local government area.

1.1 Proposed Site

The project would be located in the Eraring Power Station site which comprises of approximately 1200 hectares of land on the western shore of Lake Macquarie, of which 150 hectares is currently occupied by the power station itself. The remainder of the land is largely undeveloped, consisting of open grasslands, canals and bushland (refer to Figure 1 for site context). The proposed development is to be carried out on land owned by the Proponent and consisting of the following lots:

- 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 and 101 DP 828283;
- Lot 211 DP 840670;
- Lots 50 and 51 DP 840671;
- Lots 1, 2 and 3 DP 621697;
- Lot 1 DP 816174; and
- Lots 20 and 21 DP 734860.

In addition to the abovementioned land, the Proponent is in negotiations with the Department of Lands to procure approximately 32 hectares of land to the north of the existing ash dam, known as Crown Land adjoining the northern boundary of Lot 11 DP 1050120 to the ridge line.

1.2 Surrounding Land Use

The power station itself is separated from surrounding land uses by tracts of largely undeveloped land including open grassland, canals and bushland. This undeveloped land has been retained by the Proponent to serve as a buffer between the power station and more sensitive land uses such as residential areas which surround the southern part of the site. The buffer area also provides the Proponent with additional land within which to undertake upgrade works or plant expansions should they be required by the power station. The attemperation reservoir component of this project represents one such works.

Land uses surrounding the Eraring power station site include:

- quarries, coal loading and unloading and railway lines to the north;
- Lake Macquarie, rural and residential lands to the south, with further residential lands to the south-east;
- Whiteheads Lagoon to the east; and
- the Main Northern Railway line, Cooranbong Colliery and Muddy Lake wetland located to the west.

The closest residential area to the Eraring power station is Dora Creek which lies approximately two kilometres to the south-west. The nearest sensitive land use is the Eraring Public School which is located about 1.5 km south-east of Eraring Power Station main building.

Figure 1 - Site Location and Regional Context

2. PROPOSED DEVELOPMENT

2.1 Project Description

The Proponent proposes to upgrade the four existing 660 megawatt generators to a generating capacity of 750 megawatts. The physical works to be undertaken include upgrades to the high, intermediate and low pressure stages of the turbines, upgrades to the generator and generator transformer cooling system, additional boiler tubing, replacement of boiler burners with low-NO_x burners, and other miscellaneous works.

The Proponent asserts that these upgrades would serve to increase the performance level of the power station through increased generator capacity, improved load change rates, improved accuracy and response to the National Electricity Market, reduced forced outage rate and improved automatic start-up and shutdown operations. Other benefits are stated to include reduced carbon dioxide and nitrogen oxide emissions, and reduced operation and maintenance costs.

The Proponent also proposes to construct and operate an attemperation reservoir. The reservoir would have an area of approximately 15.4 hectares and would hold up to around 920 megalitres when full. It would be used to store water extracted from Lake Macquarie to provide additional attemperation cooling water the power station. Broadly, the reservoir would be operated to release water into the existing cooling water discharge canal (flowing back into Lake Macquarie) to reduce the temperature of discharge water before it reaches the Lake. Discharge water volumes into Lake Macquarie would not exceed the current Environmental Protection Licence limit of 11,000 megalitres per day.

The attemperation reservoir would require significant earth works in order to construct the reservoir with around 763,000 m^3 of fill material necessary. Most of this would be sourced from the excavation of the reservoir itself with the balance sourced from local off-site quarries and the existing borrow pit area located on the Eraring Power Station site. New transfer pumps and associated pipes would also need to be installed to allow the transfer of water from the existing high level canal to the reservoir.

Upgrade works associated with the increase in turbine capacity would be undertaken within the existing footprint of the power station. The proposed new attemperation reservoir, and the infrastructure into which it will connect is show in Figure 2.

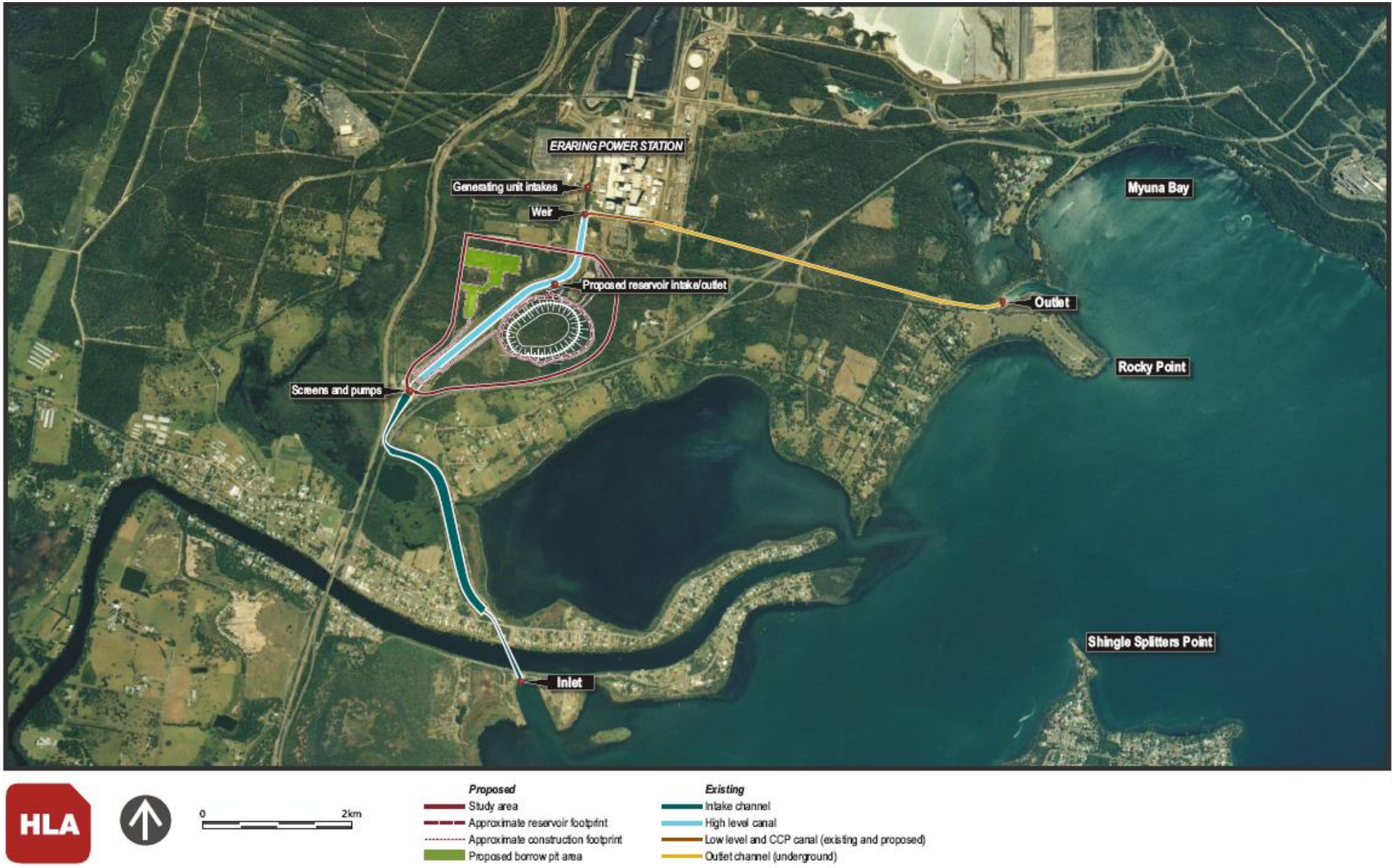
2.2 Project Need

On 9 May 2007, the Premier announced the establishment of the Inquiry into Electricity Supply in NSW, and the appointment of Professor Anthony Owen to undertake the Inquiry. Professor Owen is professor of energy economics at the Curtin University of Technology. The Owen Inquiry found that new baseload generating capacity would be required to be operational in 2013/14. In particular, the Inquiry found that an additional capacity of approximately 10,500 GWh may need to be provided by that time. This equates to approximately 1200 to 1500 megawatts of additional generation by 2013/14, and 1800 to 2000 megawatts by 2016/17. This is the equivalent of providing an additional 250-300 megawatts of generating capacity every year for the next decade.

There are inherent risks associated with implementing any new power generating facility, regardless of technology or fuel source. To mitigate some of the risk in the short to medium term, it is prudent to investigate options for improving the efficiency and/ or increasing the capacity of existing generating facilities to accommodate additional generation demands until such time as new facilities can be established. These short to medium term options also provide opportunity to consider the success, or otherwise, of demand management and efficiency measures.

The current project application aims to provide one such short to medium term option for securing the State's energy future. At the same time as providing additional generating capacity, it serves as an opportunity to improve the efficiency and performance of an existing power station. In this regard, the project is justified in terms of need for additional generating capacity and as a potential environmental improvement.

Figure 2 - Project Location and Site Context



3. STATUTORY CONTEXT

3.1 Major Project

The project is declared to be a Major Project under *State Environmental Planning Policy (Major Projects) 2005* because it is development for the purpose of an electricity generation facility that has a capital investment value of more than $30 million for coal-fired generation (clause 24(a)). The project will therefore be assessed and determined by the Minister for Planning under Part 3A of the *Environmental Planning and Assessment Act 1979*.

3.2 Critical Infrastructure Project

The project is a 'critical infrastructure project' by virtue of an Order made by the Minister for Planning on 26 February 2008, applying to development for the purpose of a facility for the generation of electricity, that:

1) has capacity to generate at least 250 megawatts; and
2) is the subject of an application lodged pursuant to section 75E or section 75M of the *Environmental Planning and Assessment Act 1979* prior to 1 January 2013.

The project will have a net capacity of 360 megawatts (increasing four turbines from 660 to 750 megawatts) and is the subject of an application made prior to 1 January 2013. The project is therefore a critical infrastructure project.

3.3 Environmental Planning Instruments

There are no State Environmental Planning Policies that substantially govern the carrying out of the project.

3.4 Minister's Approval Power

The application and environmental assessment were placed on public exhibition from 30 August 2007 to 1 October 2007 and submissions invited in accordance with Section 75H of the Act. The Department has met all of its legal obligations so that the Minister can make a determination regarding the project.

It is also noted that the Environmental Assessment submitted in support of the subject application adequately addresses the Director-General's requirements.

3.5 Nature of the Recommended Approval

On application from the Proponent, the Minister has authorised the submission of a concept plan for the project. At the time of making this decision, the Proponent was considering implementing the upgrade works over an extended period of time as demand arises in the electricity supply network, and to coincide with the operational requirements of the facility (for example, shut-down periods). Because the upgrade and capacity expansion works are expected to be undertaken progressively from 2006 to 2012 (and potentially longer, depending on demand), the Proponent suggested that there may be opportunities in future to refine detailed design in response to further consideration or improvement in equipment performance. The Proponent asserted that in light of these considerations that a concept approval be sought for the project at this time, with a project application(s) to follow in the future (particularly with respect to the power station upgrade aspect of the proposal), once demand for the project and final design of equipment is determined.

Since that time, the Proponent has finalised design requirements and completed a detailed environmental impact assessment of the proposal, including the upgrade works. This information was included in the Environmental Assessment submitted in support of the application. The Department considers that the Proponent has provided sufficient information such that an adequate level of assessment of both project components (capacity upgrade works and attemperation reservoir) could be undertaken, and consequently recommends that the Minister form the view that no further environmental assessment of either component is necessary.

4. CONSULTATION AND ISSUES RAISED

The Department received eight submissions during the exhibition of the application and Environmental Assessment. Of these, one was received from a member of the public. This submission stated its objection to the proposal. All other submissions were received from Government agencies and Council, of which none expressed objection to the proposal. Consideration of the issues identified in submissions and assessment of the environmental impacts of this proposal are provided in section 5 of this report.

4.1 Submissions from the Public

One submission was received from the public. It stated objection to the proposal because of the proposed loss of bushland that would result from the construction of the attemperation reservoir. Concern centred on the adequacy of the proposed habitat offsets. The submission stated that the proposed offsets were inconsistent with the offsetting principles stipulated in the *Draft Lower Hunter Regional Conservation Plan*, specifically:

- the proposed offsets do not complement other government programs (principle four) because in this instance the offset proposed is already covered by Eraring Energy's *Land Management Policy*;
- the proposed offsets do not result in a net improvement in biodiversity over time (principle six) because the offset proposed is not improvement as it is already provided for in the existing *Land Management Policy*; and
- the proposed offsets are not supplementary (principle twelve) because they do not go beyond existing requirements, rather they seek to "introduce" a condition that already exists.

The submission asserts that the Land Management Policy predates the current application and is separate from it. The Policy is explicit in providing for conservation of the management area without reference to the current application. The submission states that any compensatory habitat proposed as part of this proposal should be outside of the existing management area covered by the Land Management Policy. Any proposed area should be located nearby to the attemperation reservoir and improve biodiversity values.

4.2 Submissions from State Government Agencies

Six submissions were received from State Government agencies: the Department of Environment and Climate Change; Department of Water; Department of Primary Industries; Roads and Traffic Authority; Hunter – Central Rivers Catchment Management Authority; and the Mine Subsidence Board. None of the agencies objected to the proposal, but raised a number of key issues for further consideration. Issues identified included: air quality impacts; noise impacts; hydrology impacts; and ecology impacts. Comments made by each agency are summarised below.

Department of Environment and Climate Change (DECC)

Air quality impact

- notes that the installation of low-NO_x burners would reduce NO_x emissions from the plant by around 20 %, from 1366 mg/m^3 to 1089 mg/m^3, but this would not achieve the regulatory limit of 500 mg/m^3;
- notes that Eraring Energy seeks an exemption from the regulatory limit for NO_x on the basis that the proposed rate of emissions would not significantly affect the environment or health on a regional or inter-regional scale, and that alternative emission limits for NO_x only would be considered; and
- concurs with the finding of the assessment that proposed limit is suitable and at this limit emissions from the plant are not predicted to have any adverse environmental impacts.

Greenhouse gas

- the Environmental Assessment does not include a comprehensive gas assessment, incorporating a quantitative model, present figures for each year over the life of the project, nor indicate how the total volumes of greenhouse gases emitted and the greenhouse gas intensity of the power station would change as a result of the project;
- noting the above point, DECC considers the net impact of the project on total greenhouse emissions is likely to be small and possibly result in an overall reduction;
- recommends that the proponent be required to conduct a comprehensive assessment of greenhouse gases using a credible model of the National Electricity Market to ensure transparency and to enable benchmarking on a state-wide basis; and

- the Proponent needs to confirm whether it intends to apply for accreditation for the project as an accredited Abatement Certificate Provider under the NSW Greenhouse Gas Abatement Scheme so that it is evident whether the project would reduce the financial burden on participants (and in turn consumers of electricity in NSW) or whether the benefit would go directly to Eraring Energy instead.

Noise impact

- recommend that noise limits apply to the entire power station facility in order to ensure that the upgrades to the power station do not result in additional noise emissions;
- noise modelling has indicated an exceedance of the project specific noise levels (PSNL) at one receiver location of up to 4 dB(A) primarily as a result of the operation of the existing cooling water pumps; and
- it is noted that this exceedance of the PSNL results from existing plant and there is no proposal suggested by the Proponent to mitigate the existing cooling water pumps, hence DECC recommends that an investigation to this effect be undertaken by the Proponent.

Thermal discharge to lake

- the impact of thermal discharge on Lake Macquarie has been assessed and the model predicted that the additional discharge will comply with the existing licence limits that apply to the plant;
- it is noted that a series of studies were undertaken by the power industry to comprehensively investigate the impacts of thermal discharges on Lake Macquarie and that the results of these studies would provide the DECC with a sound scientific basis for setting future discharge limits; and
- the thermal discharge studies were recently submitted to the DECC the DECC's review of the results of the joint study may not be completed until March 2008 at which point the existing licence conditions would be amended consistent with the results of the studies and that consent conditions should be consistent with this approach.

Flora and fauna

- while the proposed compensatory habitat meets the DECC's requirements for a 2:1 offset ratio, the flora and fauna assessment did not examine the proposed offset areas so it is difficult to determine whether the offset represents 'like for like' to that of the area that would be cleared;
- the future title of the proposed habitat offset areas has not been determined and hence it is unclear how the proponent intends to conserve these areas in perpetuity;
- compensatory measures should be provided in accordance with DECC's 'Offsetting Principles' which are outlined in the *Draft Lower Hunter Regional Conservation Plan* (2006); and
- DECC recommends that the Proponent be required to prepare a Habitat Offset Plan in accordance with the DECC's offsetting principles for approval by the DECC prior to the commencement of works.

Aboriginal Cultural Heritage

- while aboriginal cultural heritage sites are not known in the area the conditions of approval should provide the possibility of such objects being unearthed during construction and in the event that any objects are unearthed then all works should cease and a DECC archaeologist should be contacted to provide expert advice.

Recommended Conditions of Approval

- A number of recommended conditions of approval have been provided in relation to air quality impacts, water, waste, noise, flora and fauna, heritage, and reporting.

Department of Water and Energy (DWE)

- DWE recommends conditions of approval which require the Proponent to prepare a groundwater monitoring program which is to be prepared and endorsed by DWE;
- the monitoring plan should include contingency strategies and audit reporting provisions and DWE should be provided with a copy of the schedule of work to be undertaken as part of the construction of the attemperation reservoir prior to construction; and
- the proposed works should not intercept the groundwater.

Department of Primary Industries (DPI)

- several concerns exist primarily in relation to the potential impacts on the fish stocks of Lake Macquarie both at adult and larval stages;

- the station currently pumps about three times the entire volume of Lake Macquarie annually and this proposal is to increase this by another 3.6 % of the volume of the Lake;
- the information in the Environmental Assessment shows that currently the operation of the power station screens impinges approximately 25 % of the equivalent recreational adult fish catch in Lake Macquarie;
- the high recovery rate of impinged fish is noted, however there is also a significant loss of adult species from the system;
- entrainment of larval species is of concern as there is a significantly high number of larval fish and prawns that are entrained in the cooling water flows and increasing this number by only a marginal amount is viewed with concern;
- data for the entrainment study was undertaken in August which is considered to be a period of lower fish activity than the spring and summer months;
- concern also exists in relation to the long term impact of the higher temperatures generated in the discharge water and the modelled impact on the seagrass beds;
- concern exists about the potential long term impact of higher water temperatures in the long term with potential climate change implications of higher temperatures, increased power demands and increasing lake water temperatures;
- DPI recommends that a comprehensive monitoring program be initiated to address concerns regarding the effects of seasonal variation on fish and larval entrainment;
- a comprehensive monitoring program in relation to the distribution and health of the seagrass beds and fish/ invertebrate in the potential impact footprint for the heated discharge water should be developed and implemented; and
- a habitat offset program to offset potential seagrass loss should be developed and implemented.

Roads and Traffic Authority (RTA)

- a Transport Management Plan (TMP) should be prepared prior to any construction on-site to identify and mitigate any traffic impacts during the construction phase to the satisfaction of the RTA and Council;
- the Traffic Management Plan shall include, as a minimum, the control measures to be established in conjunction with any blasting activities that may impact on Wangi Road;
- all access to the site and the proposed project should be via the existing grade-separated interchange at Wangi Road/ Rocky Point Road;
- any blasting or cut/ fill activities that may impact upon the current condition of Wangi Road should be undertaken to the satisfaction of the RTA and Council, and if such activities are proposed then a Geotechnical report should be prepared to determine the likely impact of the activities; and
- any works or mitigation measures required as a result of the proposal shall be undertaken at full cost to the Proponent.

Hunter-Central Rivers Catchment Authority (CMA)

- the site of the proposed reservoir and borrow pit area contains areas of native vegetation, including endangered, vulnerable and threatened flora species and given the zoning that applies to the site the *Native Vegetation Act 2003* (NV Act) would normally apply to the site if it were not to be assessed under Part 3A of the EP&A act;
- the CMA is of the view that the 2:1 offset ratio proposed is insufficient and that for assessments under the NV Act similar situations result in offset ratios of between 10:1 and 50:1 established offset ratios;
- any offset provided should be secured in perpetuity;
- the offset area should be linked to the title of the land (in perpetuity) and contain management conditions to improve the condition of all the native vegetation including the threatened species;
- no map of the proposed offset area or details about species and conditions has been provided and clarification is sought to determine whether the intended area represents a 'like for like' offset;
- an additional 10 hectares is stated in the Ecology Assessment appendix which is not referred to in the main document, consequently as this represents an increase to the cleared area then a further 20 hectares needs to be protected (assuming 2:1 ration);
- the CMA should be involved in consultation with the DECC and the Proponent regarding the selection of appropriate offset areas; and
- the Proponent should consider the Catchment Action Plan (CAP) in particular the section on Guiding Principles and how the principles apply to this site.

Mine Subsidence Board (MSB)

- the proposal has been discussed with the Development and Rezoning Liaison (DARZL) Committee and the MSB and there was no objection to the proposal; and
- the Proponent should seek the MSB's approval for the erection of the improvements at the appropriate time.

4.3 Submissions from Local Government

A submission was received from Lake Macquarie City Council, with neither expressly stating support nor objection to the proposal. Council did, however, raise a number of matters that it considered should be carefully considered as part of the assessment of the proposal. The key matters are as follows:

Greenhouse Gases and Climate Change

- Council is concerned that the proposed capacity upgrade will not only result in increased greenhouse gas emissions from the City, but also may potentially increase the community's reliance on coal-fired power stations as an energy source (at the expense of investment in renewable energy technologies);
- while the slightly lower greenhouse emissions per unit of generating output are acknowledged, the proposal will still result in a net increase in emissions;
- the greenhouse gas analysis provided in the Environmental Assessment does not consider the impact on carbon emissions resulting from the clearing of 19.5 hectares of bushland to the construction of the attemperation reservoir or the ash dam expansion;
- Council requests that the Proponent's Statement of Commitments and any approval provided by the Minister include a mechanism to offset any greenhouse gas emission resulting from this proposal;
- the historical annual generation rate of 15,000 GWh and resultant greenhouse gas emission of 13.1 million tonne CO_2 equivalent should be used as a baseline for comparison with any increase above this level being offset via accredited Carbon Offset schemes;
- Council is willing to assist the Proponent to assist in developing Carbon Offset schemes to ensure that they provide the maximum benefit to the local community;
- the Environmental Assessment does give sufficient consideration to alternative energy generation technologies and this should be investigated prior to an approval being granted; and
- it is acknowledged that carbon capture technologies provide a potential mechanism to achieve large scale emission abatement and therefore analysis should be undertaken prior to any approval to ensure that the current upgrade proposal does not include any design impediments that would preclude the potential future implementation of carbon capture technology.

Aquatic Ecology

- Council is concerned that the proposal may result in increased impacts on the aquatic ecology of Lake Macquarie because of additional cooling water discharges;
- while it is noted that minimal changes in the maximum water temperature would occur, the amount of area impacted by the minimum range temperatures (29-31ºC) may increase significantly with one model scenario suggesting an increase from 58 hectares to 279 hectares (a 481 % increase);
- Council is concerned that the Environmental Assessment provides limited details on potential ecology impacts of increases in the minimum temperature range and limited details are provided to describe what temperature ranges trigger a decline in aquatic health;
- Council is aware that the Proponent is currently seeking to amend its current licence conditions with respect to cooling water discharges and concern exists that the impact of an increased maximum outlet temperature when combined with an increase in the volume of water discharged could further increase adverse impacts on aquatic health; and
- further analysis should be undertaken prior to any approval to examine potential ecology impacts of increases in minimum range temperatures and the combined impact of any future variations to the licence conditions.

Flora and Fauna

- Council is concerned about the 19.5 hectares of native vegetation clearing proposed and would prefer the design and siting of the attemperation reservoir to be modified to minimise clearing;
- Council requests that the "maintain or improve the condition and extent of native vegetation" principles be applied to the proposal as described in the Native Vegetation Act and Regulations;

- Council requests that the determination of any native vegetation offset ratios be determined in accordance with the methodology established in the Native Vegetation Act;
- the ecology report from East Coast Flora Surveys (Appendix E) is missing and therefore Council was unable to establish survey methods however it appears that conclusions regarding the significance of impacts on threatened flora and fauna have not been based on adequate targeted surveys;
- prior to construction the Tetratheca juncea population should be quantified within both the impact zone and offset areas in accordance with the Lake Macquarie *Tetratheca Juncea Management Plan* (TJCMP((Payne 2001);
- the study should be undertaken by a qualified ecologist and if Tetratheca juncea is detected then stepping stone conservation must be addressed by surveying the extent of the population and also areas of potential habitat that occur within 500 meteres of the local population;
- suitable ameliorative measures should be proposed in accordance with the TJCMP and incorporated into a Vegetation Management Plan;
- prior to construction the Acacia bynoeana population should be quantified within both the impact zone and offset areas and suitable ameliorative measures proposed within the Vegetation Management Plan;
- a binding agreement should be placed on the offset land;
- Powerful and Masked owl roost and nest trees are a scarce resource within Lake Macquarie LGA and should be identified, mapped and stag watched by a qualified ecologist prior to clearing;
- should a Masked or Powerful Owl roost tree be identified then all possible efforts should be made to retain it and where this is not possible an owl expert should be engaged to advise on appropriate impact mitigation and measures for its removal;
- the Vegetation Management Plan referred to in the Environmental Assessment should include strategies for the rehabilitation and enhancement of the vegetation surrounding the proposed attemperation reservoir;
- the area to the south of the proposed reservoir has been mapped as a strategic corridor on the Lake Macquarie Native Vegetation and Corridors Map (2007) and rehabilitation/ enhancement of this area should be undertaken and should include restoration of canopy, shrub and ground cover layers consistent with vegetation communities identified in this area;
- a suitably qualified and experienced ecologist must prepare a Fauna Management Plan prior to the commencement of works relating to the proposal; and
- the Flora Management Plan should address the handling of fauna species in impacted areas, the number of roosting and denning hollows to be removed/ isolated by the development, the suitability of offsets for the creation of replacement denning habitat via artificial nest boxes and their monitoring, and the timing and supervision for the removal of hollow bearing trees.

Traffic Management

- the Proponent should submit to Council details of the proposed haulage routs to be used during construction works at least one week prior to the commencement of haulage opertions;
- no haulage operations should take place prior to approval of the routes by Council and should such routes should not be varied without the approval of Council;
- the Proponent shall maintain and restore haulage route roads as near as possible to their original condition; and
- any damage or injury caused to a public road or associated structures including drains, kerbs and gutters shall fund an consequent works.

4.4 Submissions Report

On review of the issues identified in submissions, the Department required the Proponent to prepare a Submissions Report to address each of the issues raised in those submissions. As part of this process, the Proponent provided additional information on the greenhouse gas implications of the project and made modifications to the proposed compensatory habitat package. Additional compensatory habitat considerations were undertaken in consultation with the DECC and included provision for coordinating offsets with other projects on the power station (particularly the ash management facility expansion). A copy of the Submissions Report is provided as Appendix D.

5. ASSESSMENT OF ENVIRONMENTAL IMPACTS

After consideration of the Environmental Assessment, submissions and the Submissions Report, the Department has identified the following key environmental issues associated with the proposal:

- air quality impacts;
- greenhouse gas impacts;
- surface water quality and impacts on aquatic ecology;
- impacts on terrestrial ecology; and
- noise impacts.

All other issues are considered to be minor and have been adequately addressed as part of the Proponent's Statement of Commitments.

5.1 Air Quality Impacts

Issues

The Environmental Assessment presents the outcomes of an air quality modelling process undertaken in accordance with *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2005). The modelling considers current operations at the power station (at 660 MW) and compares this with proposed future operations (at 750 MW). Modelling results for key pollutants under these two scenarios is reproduced in Table 1 below.

Table 1 – Predicted Groundlevel Concentrations for Current and Proposed Operations

Pollutant	Existing Operations (μgm^{-3})	Proposed Operations (μgm^{-3})	Criteria (μgm^{-3})
Sulfur dioxide (10-minute)	237.2	222.6	712
Sulfur dioxide (1-hour)	173.2	159.8	570
Sulfur dioxide (24-hour)	58.7	58.4	228
Sulfur dioxide (annual)	7.7	7.7	60
Nitrogen dioxide (1-hour)	160.4	104.4	246
Nitrogen dioxide (annual)	6.5	4.6	62
Total suspended particulates (annual)	0.4	0.4	90
PM_{10} (24-hour)	0.6	0.6	50
PM_{10} (annual)	0.07	0.08	30
Hydrogen fluoride (24-hour)	0.7	0.7	2.9
Hydrogen fluoride (7-day)	0.3	0.4	1.7
Hydrogen fluoride (90-day)	0.2	0.2	0.5

From the information provided in the table above, the Proponent highlights that current and future operations of the power station are expected to comfortably meet established ambient air quality criteria. In the case of key pollutants such as sulfur dioxide and nitrogen dioxide, the Proponent also highlights that the proposed upgrade of the power station will lead to a reduction in ambient concentrations of pollutants attributable to the operation of the facility. There is, however, expected to be a marginal increase in the concentrations of particulates (PM_{10} as an annual average) and hydrogen fluoride (as a 7-day average), although these increases are considered to be within the confidence levels of the modelling package.

Based on historical monitoring data at Marks Point and Dora Creek (existing ambient air quality monitoring locations for the power station), the Proponent has considered and presented the cumulative impact of the proposed upgrade. Predicted maximum pollutant contributions from the upgraded facility were combined with average monitoring results over the period 2000 to 2005 to establish the cumulative impact predictions in Table 2. These calculations demonstrate that cumulatively, the upgrade power station will not contribute to an exceedance of ambient air quality criteria.

Table 2 - Predicted Cumulative Impacts at Marks Point and Dora Creek

Pollutant	Cumulative Impact at Marks Point (μgm^{-3})	Cumulative Impact at Dora Creek (μgm^{-3})	Criteria (μgm^{-3})
Sulfur dioxide (1-hour)	310.4	320.5	570
Sulfur dioxide (24-hour)	86.4	83.0	228
Sulfur dioxide (annual)	12.1	11.8	60
Nitrogen dioxide (1-hour)	207	195.4	246
Nitrogen dioxide (annual)	20.1	16	62
Hydrogen fluoride (7-day)	-	0.6	1.7

A significant outcome from the proposed upgrade is a reduction in the concentration and total load of nitrogen oxides from the power station stacks as a result of the installation of low-NO_x burners. The Environmental Assessment suggests that that proposed upgrade will lead to a reduction in emissions rate from the current 1753 gs^{-1} to approximately 1394 gs^{-1}. In terms of concentrations at the point of discharge, nitrogen oxides will fall from 1366 mgm^{-3} to 1086 mgm^{-3}.

As the upgraded power station will be considered as 'new plant' operational after 1 September 2005, it is required to meet the Group 6 discharge concentration limits specified under *Protection of the Environment Operations (Clean Air) Regulation 2002*, unless an exemption is granted by the DECC. Current and future pollutant concentrations at the point of discharge will meet these regulated limits, with the exception of nitrogen oxides. The Proponent has sought an exemption to the regulated limit of 500 mgm^{-3} based on the application of what it considers to be best available, economically achievable control technology (low-NO_x burners to reduce the discharge concentration to 1086 mgm^{-3}) and the fact that air quality modelling has predicted that ambient air quality criteria will be met.

Consideration

The Department is generally satisfied that the Proponent has undertaken an adequate and appropriate level of assessment of the air quality impacts of the project. This is a view shared by the DECC and expressed in its submission on the project. The DECC has indicated that it is prepared to amend the existing Environment Protection Licence for the facility accordingly.

The Department highlights that although the generating capacity of the power station will increase as a result of the project, improvements to the efficiency and environmental performance of the facility are expected to result in a decrease in the impacts on air quality. This is apparent from modelling results that show a decrease in expected ground level concentrations of key pollutants. In this context, the Department considers the project likely to result in an air quality improvement in the locality.

The DECC has indicated that it is willing to grant an exemption to the regulated NO_x concentration at the point of discharge for the project. The Department notes that the *Protection of the Environment Operations (Clean Air) Regulation 2002* expressly provides for such exemptions in certain circumstances. Given that the subject project application relates to an upgrade of the power station and that the Proponent has committed to air quality improvements, particularly through the installation of low-NO_x burners, the Department considers that an exemption is warranted in this circumstance. Further, the Department highlights that the exemption granted by the DECC in this case is a regulatory/ administrative exemption and does not alter the fact that ambient air quality criteria will be met by the project. There will be no adverse environmental or human health impacts associated with the regulatory exemption.

The Department has recommended imposition of air discharge limits consistent with the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2002* and reflecting the NO_x limit exemption endorsed by the DECC. The Proponent has indicated that it may seek further exemptions from the DECC in future, but these do not form part of the proposal at this time. Should the Proponent seek these further exemptions, it would need to concurrently seek the Minister's approval to amend the planning approval. This would require a separate merit assessment to be undertake at the time, consistent with the requirements of the *Environmental Planning and Assessment Act 1979*. The Department does not consider it appropriate to pre-empt or predict the outcomes of any such modification request, should it be made in future.

The recommended conditions of approval also include a comprehensive suite of air quality monitoring requirements, covering both annual and continuous monitoring of key pollutants. This approach will ensure that the air quality performance of the upgraded power station lies within acceptable limits, and consistent with the predictions made in the Environmental Assessment.

5.2 Greenhouse Gas Impacts

Issues

The Environmental Assessment indicates that current greenhouse gas emissions from the power station contributes between 2.2% and 2.6% to Australia's total annual greenhouse gas production. The Proponent suggests that because the project will improve performance and efficiency of the power station, a reduction of approximately 12 to 14 tonnes of $CO_{2\text{-}e}$ per gigawatt-hour of power sent out could be expected. This represents a reduction in greenhouse gas intensity of approximately 1.5%, or about 180,000 to 210,000 tonnes of $CO_{2\text{-}e}$ per annum. Because the greenhouse gas intensity of the power station would decrease, the Proponent argued in the Environmental Assessment that the NSW Pool Coefficient would also reduce over time.

The Proponent provided additional consideration of greenhouse gas emissions and implications for the NSW Pool Coefficient in its Submissions Report, in response to queries made by the DECC in relation to modelling and predictions presented in the Environmental Assessment. In particular, the Submissions Report examines the change in greenhouse gas emissions intensity for the operation of power station under scenarios of continued market-share, and increased market-share, and the expected effect for the NSW Pool Coefficient for those same two scenarios.

The Proponent predicts that the project will reduce the greenhouse gas intensity of the project from approximately 0.928 tonnes of $CO_{2\text{-}e}$ per megawatt-hour to approximately 0.905 tonnes of $CO_{2\text{-}e}$ per megawatt-hour if market-share is maintained (currently about 20%) and to approximately 0.899 tonnes of $CO_{2\text{-}e}$ per megawatt-hour if market-share is increased by 15% (from 20% to 23%). In relation to NSW Pool Coefficient, the Proponent suggests that forward-predictions for the Coefficient place it around 0.964 tonnes of $CO_{2\text{-}e}$ per megawatt-hour in 2011. The project, if implemented by then, would reduce the NSW Pool Coefficient to around 0.962 tonnes of $CO_{2\text{-}e}$ per megawatt-hour if market-share is maintained, and 0.960 $CO_{2\text{-}e}$ per megawatt-hour if market share is increased. If the power station increases its market share, the Proponent predicts that there will be a net reduction in national greenhouse gas emissions of approximately 400,000 to 500,000 tonnes per year.

Consideration

The Department recognises that the issue of greenhouse gas emissions is both a complex and a contentious issue. In considering the greenhouse gas implications of any fossil fuel-based generating proposal, it is necessary to recognise that greenhouse gas issues relate both to the total load of greenhouse gas emissions produced and to the intensity of those emissions per unit of energy produced. In the case of the former, impacts will be related to total energy demand and the availability and viability of alternatives. In the latter, considerations are complicated by the operation of independent market forces and regulatory influences that may alter the balance between generators and technologies over time.

As noted in submissions, and particularly in the submission received from Council, the total annual production of greenhouse gases from the power station will increase with the increase in turbine capacity, irrespective of savings in net greenhouse gas intensity. This net increase in total greenhouse gas emissions from the power station is directly related to the proposed increase in capacity, which is driven by energy demands.

Whilst the Government is working to manage demand and improve energy efficiencies, it would be unreasonable to expect that growth in energy demand could be stopped or reversed, at least not in the foreseeable future and not without potentially significant deleterious socio-economic outcomes. One must therefore accept that there will be a need for additional generating capacity into the future. The most effective way of ensuring that the need for additional generating capacity is met, and that a secure energy future is assured for New South Wales, is to provide for a diverse and competitive energy market. This can be done with the delivery of appropriate planning and environmental approvals for generating facilities, to be implemented by the market as may be required.

Despite the fact that the Minister has approved more than 500 megawatts of wind farms over the last three years, only the Capital wind farm (132 megawatts) has commenced construction, and the Cullerin II wind farm (30 megawatts) is likely to commence construction in the near future. A further 1,700 megawatts of wind farm

proposals are currently in various stages of assessment with the Department. Given this experience, it is clear that although wind farm proposals are being approved, there is a lag in their implementation. It is unlikely that wind farms will be implemented in the short to medium term at a sufficient rate to address demand growth.

In the case of gas-fired plant, approximately 2,200 megawatts of generating capacity has been approved over the past five years. Most of these facilities are configured as peaking plants and under current market conditions would not operate economically as baseload generators. Of the two approved proposals with potentially economic baseload capacity, the Tallawarra No 1 power station (400 megawatts) is in the final stages of construction, and the Tomago facility (790 megawatts) has yet to be implemented. Gas-fired facilities therefore present reasonable potential for implementation to meet growing baseload demands, but are not currently being implemented at a sufficient rate to fully accommodate total demand growth (250-300 megawatts per annum).

Therefore, there remains a significant risk that wind and gas facilities by themselves will not be sufficient to address growing power demands and the need to secure the State's energy future. The reality is that coal-fired generation will remain a necessity in this context. It is prudent therefore, that opportunities are examined at existing coal-fired facilities to increase capacity to address this short to medium term risk. In doing so, there is also opportunity to investigate and implement performance and efficiency improvements to ensure that any coal-fired proposal reflects best practice. The current project applies this prudent approach to managing risk in the context of baseload generating capacity. While there will be an increase in the total greenhouse gas emissions from the facility, the impact of these emissions must be balanced against the risks associated with a generating shortfall and the significant social and economic implications to the State should such a situation eventuate. On balance, therefore, the Department considers that the generation of additional greenhouse gases from the proposal is justified and reasonable.

Despite the fact that total greenhouse gas emissions will increase with the implementation of the project, the intensity of emissions per unit of energy produced will improve. The Department considers this a positive outcome. In the absence of options that can completely remove growth in energy demand, or entirely address demand through non-emissive generation, it is important that the greatest energy value be derived for each unit of greenhouse gas emissions produced. The current project achieves this outcome.

In relation to the impacts of the project on the electricity market, and in particular, the NSW Pool Coefficient, the Proponent has argued potentially significant benefits from the project 'displacing' other less-efficient generators with a resultant drop in the Coefficient. While this may be the case, depending on market conditions and the status of other existing and proposed generators, the Department considers that the net effect on the Pool Coefficient is likely to be small. This view is shared by the Department of Environment and Climate Change.

5.3 Surface Water Quality and Impacts on Aquatic Ecology

Issues

The project has the potential to impact on aquatic ecology through thermal load and surface water quality effects associated with the discharge of cooling water from the site.

In relation to thermal load, the existing Environment Protection Licence for the power station imposes a number of restrictions on the temperature of water discharged from the site. Under normal operations the power station is allowed to discharge cooling water to Lake Macquarie at no greater than 35^{o}C, but is permitted 131 hours of discharges between 35^{o}C and 37.5^{o}C to accommodate periods of high thermal load (for example, during operations on hot days in summer). In 'emergency situations' when the power station is required to operate to address a pending shortfall in electricity supply, it is permitted an additional 69 hours of discharges at between 35^{o}C and 37.5^{o}C. The Proponent does not propose to alter these restrictions. However, the increased capacity of the power station associated with the upgrade will increase the thermal load of the facility (to be released in cooling water), and the attemperation reservoir is proposed as a means to reduce this load during periods of high power generation or when water inlet temperatures are elevated (summer).

Additional heat discharge in cooling water has the potential to increase ambient water temperatures, and as a result, to adversely impact on aquatic ecology (particularly seagrasses). To assess this potential, the Environmental Assessment models thermal effects from cooling water discharges for existing and upgraded operations. The results of the modelling suggest that the project will result in increases to ambient water temperatures, principally contained within Myuna Bay, and that the maximum expected increase in temperature

at any one location is 0.5°C. The most marked increases in the lateral extent of thermal isopleths are predicted in the afternoon, and on the surface of the Bay (rather than at its bed). Therefore, the worst-case scenario for existing and upgraded operations are represented by afternoon surface temperatures, as reproduced in Figure 3 and Figure 4. However, in the context of potential seagrass beds, thermal impacts at bed-level are more relevant and these are shown in Figure 5 and Figure 6. The Proponent highlights that the expected change in the lateral extent of thermal isopleths is significantly less at bed-level that at the surface of the Bay.

The Proponent is currently undertaking studies required by its Environment Protection Licence into the effects of temperature on seagrass health. No conclusive data has been established from these studies at this stage. The Proponent relies on studies undertaken in 1987 that suggest a 2-3°C increase in water temperature above ambient will cause seagrass decline and species shift, and that little impact has been observed in areas affected by less than 1°C increase above ambient water temperatures. The Proponent suggests that given a predicted maximum temperature change of 0.5°C, and in the order of 0.1-0.2°C at the top of seagrass beds (about 30 centimetres above the bed), thermal impacts on seagrasses are expected to be minimal. Further, the Proponent highlights that areas affected by elevated temperatures under existing and upgrade scenarios are around the cooling water outlet, which is already characterised by patchy, generally poorer quality seagrass communities.

The ability to predict the impacts of the project on seagrass beds in Myuna Bay is complicated by the accuracy of seagrass mapping (± metres from the shore), identified limitations on seagrass survey methods and the resolution of the thermal load model (0.5°C). While it may not be possible to conclusively determine the extent of seagrass impacts in a quantitative manner, the Proponent has made estimates of the total change in seagrass bed areas for thermal isopleths from 28°C to 31°C. These estimates are presented below.

Table 3 – Predicted Changes to Areas of Seagrass Affectation by Thermal Isopleth

Isopleth	Existing Seagrass Area (ha)	Upgrade Seagrass Area (ha)	Change in Affectation Area (ha)	Change in Affectation Area (% of total seagrass)
28°C	219.87	219.87	0	0
29°C	218.95	219.35	0.4	0.2
30°C	83.63	104.42	20.79	9.5
31°C	32.30	38.10	5.8	2.6

In addition to impacts on seagrasses, the project has the potential to impact on other aquatic species, particularly in and around the water intake for the site. The project will result in increase water intake requirements for less than 5% of the year with a maximum increase in water intake volumes of approximately 1.2%. The Proponent highlights that additional water would be extracted during the day, and generally during the summer period from December to March. The additional water extraction has the potential to impact on aquatic fauna through impingement and entrainment of individuals.

The Proponent argues that additional impingement effects are likely to be minimal given the small amount of additional water extracted, the fact that surveys have indicated that the lowest numbers of fish are present or become impinged during the day, and the reasonable survival rates (93%) and damage rates (28%) of individuals upon impingement. The Proponent makes a similar argument about entrainment of fish larvae, noting diurnal differences in population numbers, and current experience suggesting that entrainment rates for fish and prawn larvae are approximately 18.2% and 7.8% respectively.

The discharge of cooling water has the potential to impact on the quality of water in Myuna Bay, and consequently on aquatic ecology, principally as a result of the quality of water released from the attemperation reservoir. Although water from the reservoir will have come from Lake Macquarie originally, storage of the water for extended periods can lead to stratification and increases in biological oxygen demand, decreases in dissolved oxygen and elevated nutrient levels. There is also potential for algal blooms in the attemperation reservoir. The Proponent proposes to deal with these potential issues through a management and monitoring approach to optimise filling and emptying cycles, and to ensure the quality of attemperation water before its release to the environment.

Figure 3 - Existing Surface Thermal Isopleths - 6pm

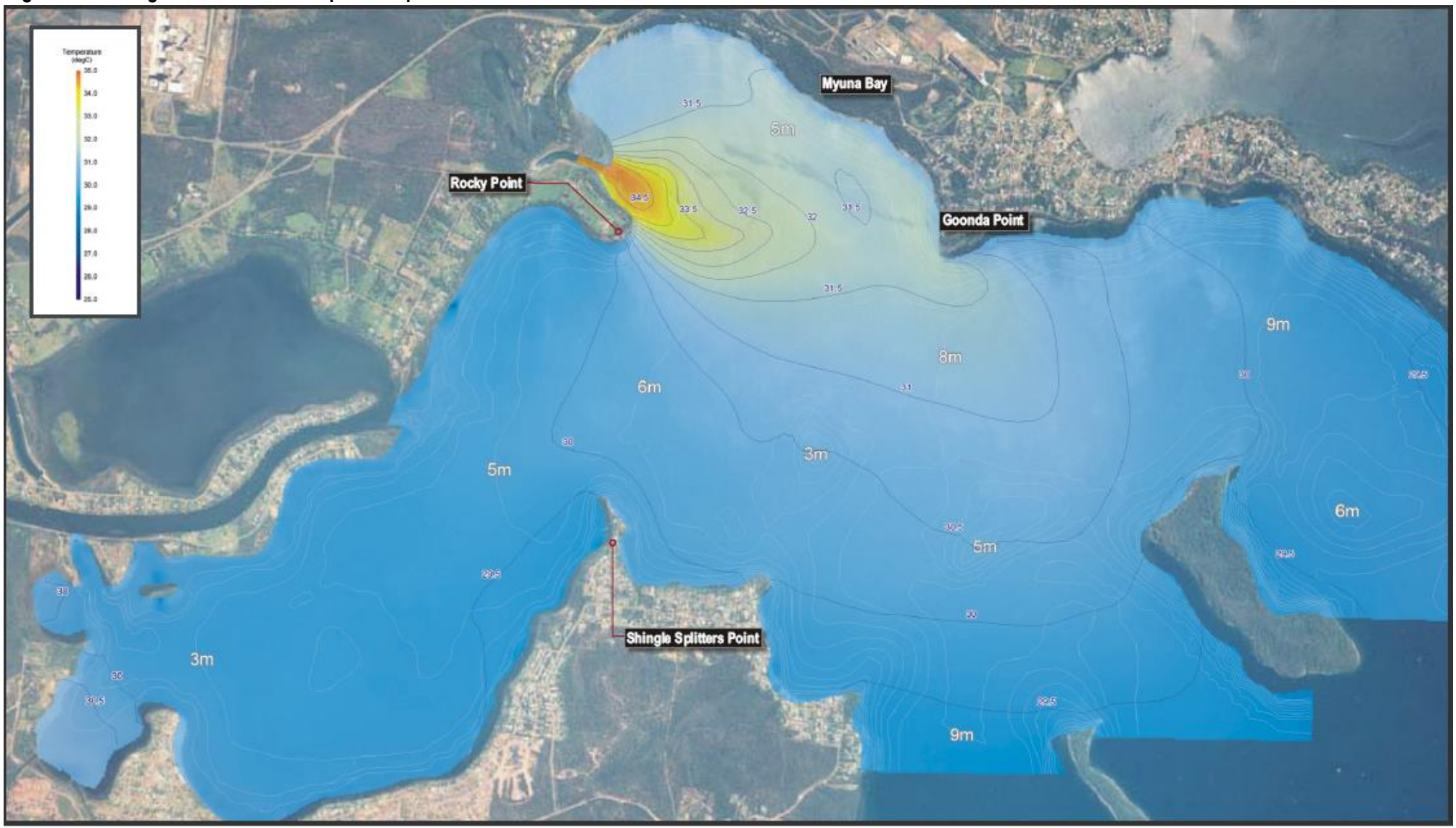


Figure 4 - Upgraded Surface Thermal Isopleths - 6pm

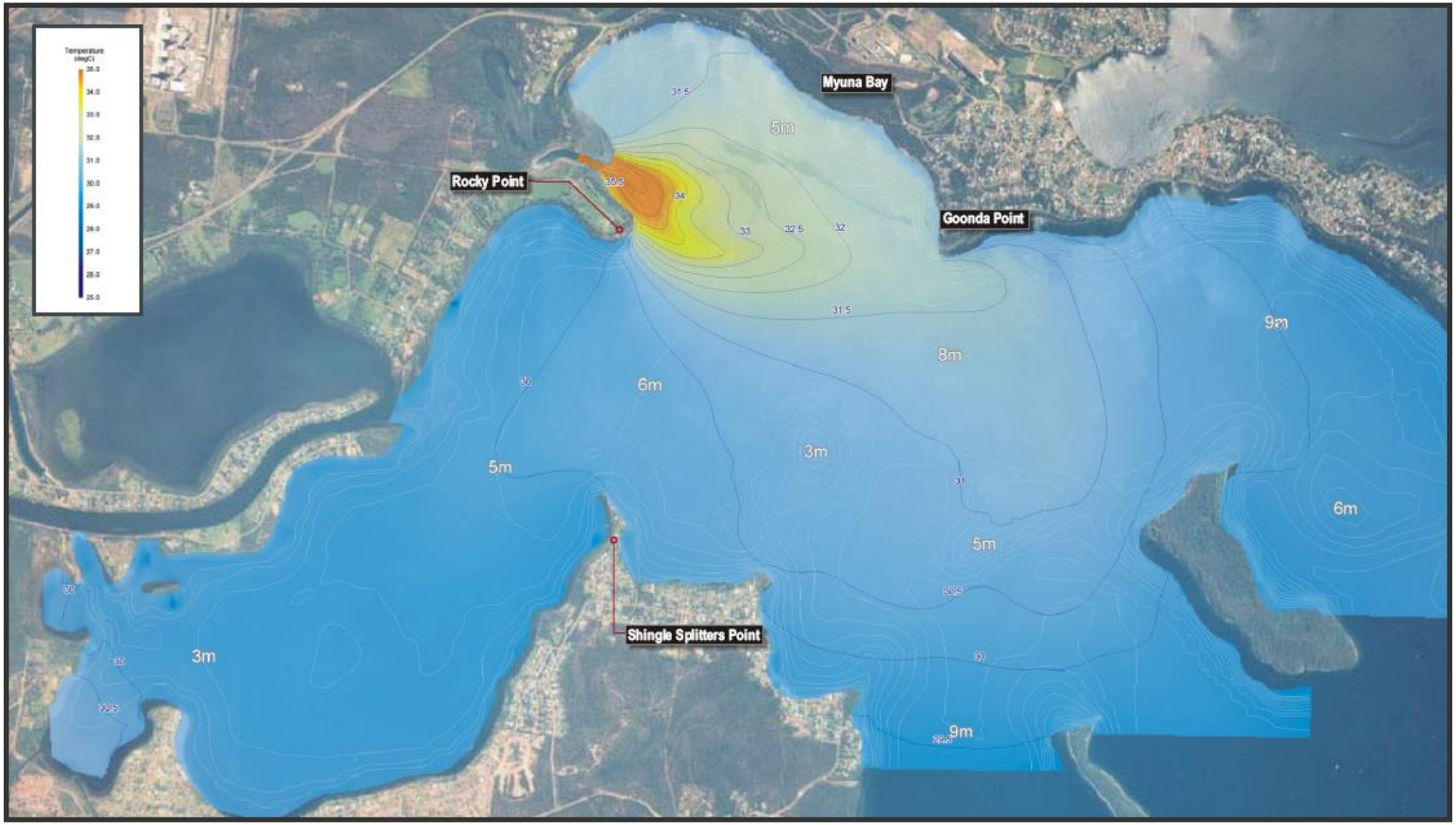


Figure 5 - Existing Bed Thermal Isopleths - 6pm

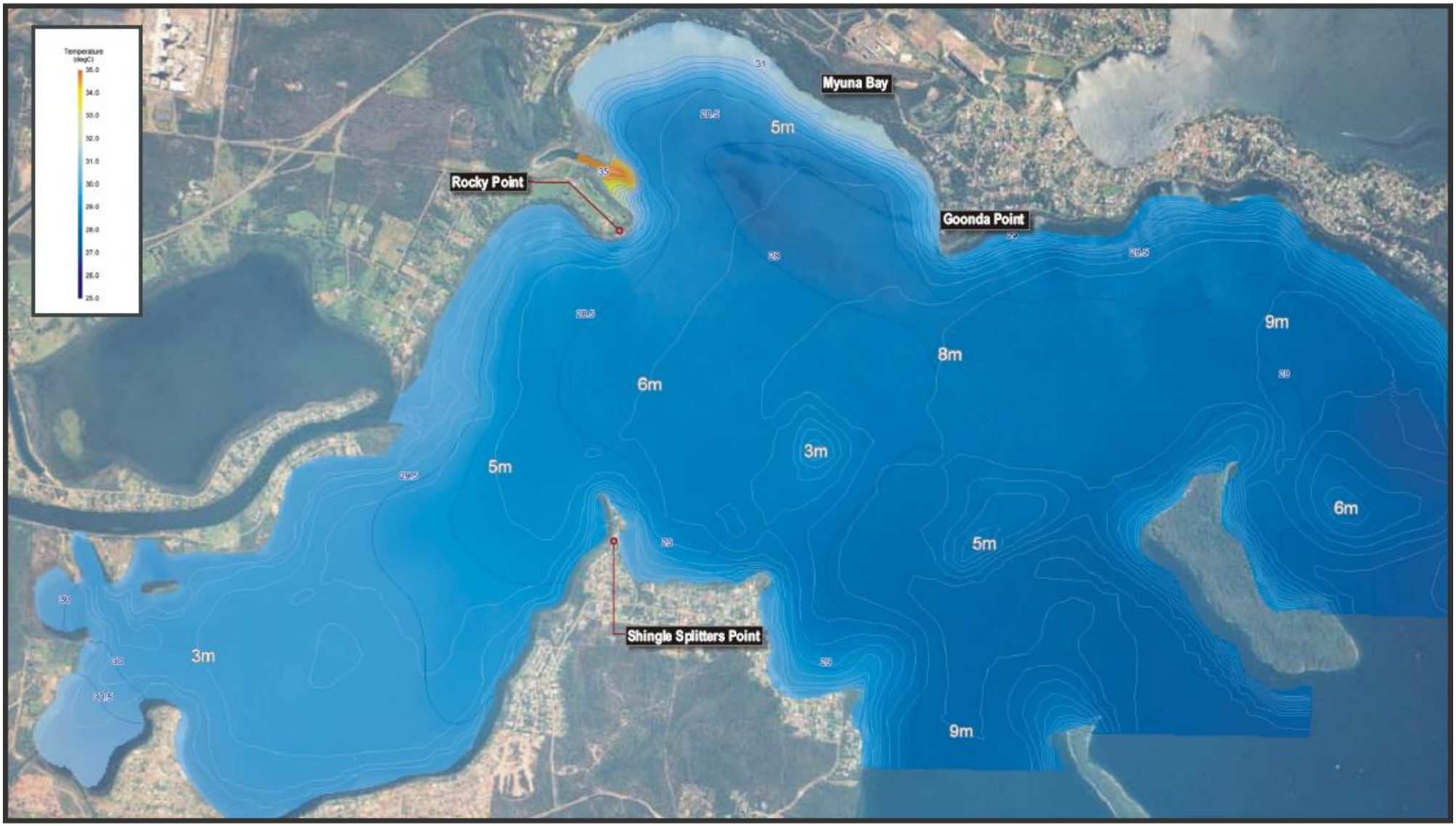
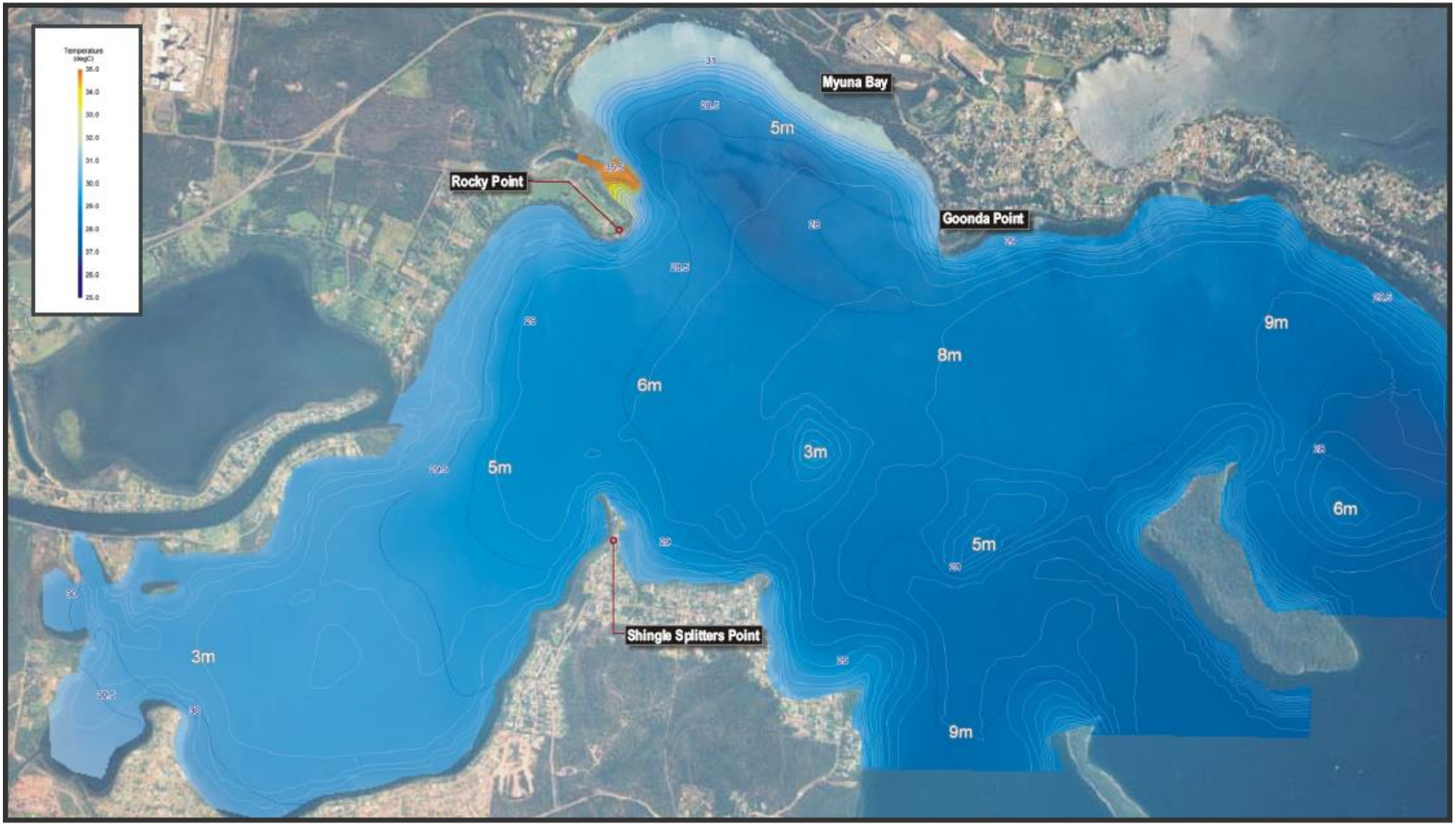


Figure 6 - Upgraded Bed Thermal Isopleths - 6pm



Consideration

The Department is generally satisfied that the Proponent has undertaken an appropriate level of assessment of water quality issues and impacts on aquatic ecology.

In relation to impacts from the project, the Department highlights that it is important to recognise that the current power station involves impacts on the surrounding environment, and that the assessment of the current project requires consideration of the incremental change in those impacts. It is not the role of this assessment to return to the existing planning and environmental approvals for the power station as they may currently exist. In particular, the Department notes the role of the role of the existing role of the Environment Protection Licence for the site in this regard.

With respect to the impingement and entrainment of aquatic fauna on and in the water intake for the power station, the Department notes that cooling water intake volumes are expected to increase by no more than 1.2%. This increase is unlikely to be a continuous additional intake, and will only be applied during periods of high load or elevated ambient temperature. Given this and the generally good rate of survival of impinged species, the Department considers that the project will not have a significant impact on aquatic quality as a result of the cooling water intake. The project will result in a minimal increase in impingement and entrainment effects compared with the existing facility.

The Department also concurs with the Proponent that potential water quality impacts associated with the operation of the attemperation reservoir can be adequately and appropriately address through effective management. To ensure that this is the case, the Department has recommended that the Proponent be required to develop and implement a specific management plan to detail how the attemperation reservoir will be filled and emptied to avoid issues associated with stratification, increased BOD and potential algal blooms. The management plan is expressly required to including monitoring of key water quality parameters and contingency measures in the event that unacceptable water quality is detected.

Thermal load effects from the discharge of cooling water are a key environmental impact associated with the project, and the principal concern raised in a number of submissions. In the first instance, the Department considers it important that the Proponent does not intend to alter the temperature and discharge volume constraints already imposed on the facility through its Environment Protection Licence. These limits act to address the potential for acute impacts that may be experience through elevated temperatures and flow rates over short periods of time. To ensure that these restrictions are met with respect to the current project application, the Department has recommended that these restrictions be reflected in the conditions of approval. The Department also considers it important for the Proponent to proactively work towards minimising thermal loads wherever possible, and therefore recommends that the Proponent prepare and implement a Thermal Load Strategy to minimise instances of elevated temperature discharges and to reduce the frequency and duration of such emissions.

Overall, the Department highlights that the maximum predicted thermal load impact from the project would be 0.5^{o}C. This maximum impact has been derived by the Proponent based on maximum load and worst-case ambient conditions. Further, the Department also highlights that seasonal variations, changes in power station load and thermal distribution across and through Myuna Bay mean that this maximum impact is unlikely to occur continuously and not at all locations across the Bay. The Proponent has noted in the Environmental Assessment that on average, temperatures in the Bay are not likely to increase by more than 0.1-0.02^{o}C. The Department considers this outcome to be acceptable. As noted above, the recommended Thermal Load Strategy aims to minimise this impact through proactive and reactive management measures.

The issue of the expected impact of thermal impacts on seagrasses is a problematic issue, given that conclusive research is limited and knowledge of the extent and quality of seagrasses in Myuna Bay currently and over time is incomplete or conflicting. Further, the thermal impact of the upgraded power station on Myuna Bay will not be constant, adding a temporal parameter to potential impacts on seagrasses. It is relevant to note, however, that the operation of the existing power station has had and is continuing to have an impact on seagrasses. Equally, environmental factors quite separate from the power station operation are likely to have influenced seagrass health, both positively and negatively. However, given that the net change in thermal impacts from current to upgraded operations is predicted to be minimal in terms of lateral extent (particularly along the bed), one can deduce that there is likely to be a minimal change in impacts on seagrasses compared with the current situation.

The Department generally concurs with the Proponent that a conclusive answer to the question of quantified impacts on seagrasses could never reasonably be answered without actual empirical data from Myuna Bay during operation of the upgraded power station. The Department therefore considers that the adaptive management approach is the only reasonable means of dealing with this potential issue. In particular, such an adaptive management approach would include the recommended monitoring requirements highlighted by DPI, including more detailed surveys of seagrass beds pre- and post-operation. Monitoring of seagrass health over time would allow any impacts to be identified, and appropriate changes to operating regimes made where possible. In the event that seagrass loss occurs, the Proponent would be required to implement seagrass off-sets, as recommended by DPI. This approach is reflected in the recommended conditions of approval as part of an Aquatic Ecological Monitoring Program.

5.4 Impacts on Terrestrial Ecology

Issues

The project will directly impact on terrestrial ecology through the removal of vegetation associated with the attemperation reservoir. This vegetation clearing includes the area within the footprint of the attemperation reservoir, including areas for construction access, and the area in and around a borrow pit required for the extraction of additional spoil to contribute to the construction of the reservoir.

The Proponent has estimated that approximately 19.5 hectares of native vegetation would need to be removed to facilitate the construction of the attemperation reservoir (including borrow pit and associated works). Vegetation communities identified within the footprint of the attemperation reservoir are shown in Figure 7, and include the regionally-significant Coastal Sheltered Apple-Peppermint Forest and the Swamp Sclerophyll Forest on Coastal Floodplains Endangered Ecological Community. The majority of vegetation to be removed comprises the Coastal Plains Scribbly Gum Woodland. Survey work conducted across the vegetation to be removed identified two threatened flora species: *Acacia bynoeana* (endangered) and *Tetratheca juncea* (vulnerable).

Vegetation to be cleared includes 13.7 hectares of Coastal Plains Scribbly Gum Woodland and 5 hectares of Coastal Sheltered Apple-Peppermint Forest. The remaining 0.8 hectares would involve removal of pine plantations. Impacts on the Swamp Sclerophyll Forest on Coastal Floodplains Endangered Ecological Community would be limited to individuals along the boundary of the borrow pit area. The Proponent proposes to off-set this loss of vegetation through a compensatory habitat area established within the buffer lands surrounding the power station at a ratio of 2:1 (approximately 39 hectares). The proposal for compensatory habitat presented in the Environmental Assessment was initially considered by the Department and the DECC to be inadequate based on fragmentation, edge effects, lack of connectivity and quality of vegetation. As a result, the Proponent reviewed the off-set package, in combination with off-set requirements for the separate ash dam expansion proposal, and presented a revised off-set area as part of its Submissions Report. The original and revised off-set proposals are presented in Figure 8.

Surveys also identified that the vegetation to be disturbed is used by four threatened fauna species (Grey-headed Flying Fox, Eastern Freetail Bat, Little Bent Wing Bat, and Eastern Bent-wing Bat). The Proponent indentified that a further 13 threatened species, although not found on the site, had the potential to utilise the habitat.

The Environmental Assessment concludes that the project is unlikely to have a significant impact on threatened flora or fauna species. Key mitigation measures proposed by the Proponent include the provision of 39 hectares of habitat offset, and the implementation of a Rehabilitation and Vegetation Management Plan.

Consideration

The Department is satisfied that the Proponent has undertaken an appropriate level of assessment of the impacts on the project on terrestrial ecology. With respect to impacts on fauna and individual threatened flora species, the Department is satisfied that the Proponent has demonstrated that the project will not have a significant impact on these ecological values.

The key issue in relation to ecological impacts from this project relates to the justification, location and extent of compensatory habitat measures. The Department considers that given the level of clearing associated with the project, and the type and quality of vegetation to be removed, an off-set package must be implemented.

Figure 7 - Vegetation Communities in and around Attemperation Reservoir

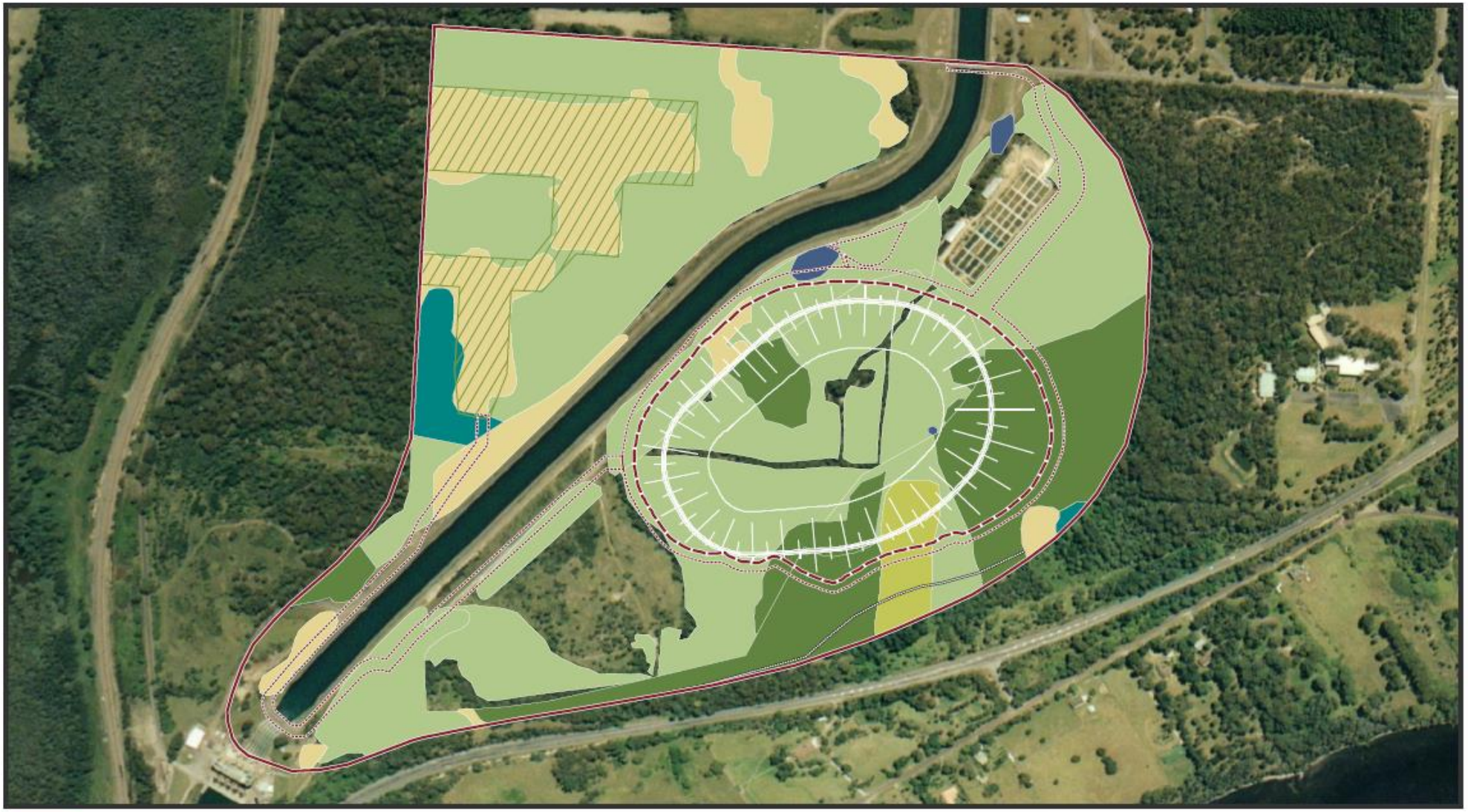


Figure 8 – Original and Amended Off-set Areas

A number of submissions raised concern over the location of the attemperation reservoir, arguing that it could be relocated to either reduce or entirely remove the need for vegetation clearing. The Department recognises, however, that the attemperation reservoir needs to be located in general proximity to existing cooling water infrastructure, both for practical and economic reasons. This locational constraint effectively limits the possible locations of the reservoir, as does the location of other infrastructure surrounding the power station (including transmission easements, access roads and other facilities). In this light, the Department considers that the Proponent has selected an appropriate location for the attemperation reservoir, noting that it is proposed towards the edge of an existing vegetated area (rather than in the middle of vegetation) and is to be situated close to other disturbed areas (including the borrow pit and pine plantation). The Department therefore considers that the Proponent has applied reasonable measures to reduce the need for vegetation clearing and the quality of vegetation impacted, within the constraints posed by the site.

Submissions also argued that the Proponent should be required to off-set vegetation loss at a ratio greater than 2:1. The Department highlights that alternative suggestions presented in submissions are based on experiences with other projects, which had their own specific issues with respect to the extent and quality of vegetation to be impacted. It is not appropriate to simply transfer the outcomes of one merit assessment to another without confirming that the factors informing the assessment are identical in both cases. In the situation of the current project, taking into account the extent of proposed clearing and the quality of vegetation, the Department considers that an off-set ratio of 2:1 is appropriate. This is supported by the DECC and is consistent with the aims and objectives of the draft *Lower Hunter Regional Conservation Plan* (DECC, 2006).

The Department has therefore recommended that the Proponent be required to develop and implement an off-sets package, at a ratio of 2:1, to provide biodiversity outcomes at least equivalent to those lost as a result of the project. The package would need to be consistent with the off-setting principles in the draft *Lower Hunter Regional Conservation Plan* and the Lake Macquarie *Tetratheca juncea* Management Plan. The Department is also cognisant of the cumulative impacts of various projects across the power station site, and in particular the off-set requirements for the recently-approved ash disposal facility upgrade and expansion. The recommended instrument of approval therefore reflects that a coordination and connection between off-sets for the two project should be pursued.

5.5 Noise and Vibration Impacts

Issues

The project has the potential impact on local acoustic amenity during construction, including blasting activities, and as a result of the operation of the upgraded power station.

The Environmental Assessment recognises that peak construction noise levels generated by the project would be dominated by the relatively short-duration land clearing phase. During this phase, the construction noise goal of 54 dB(A) may be exceeded by up to 4 dB(A) when all construction plant and equipment is operational and concentrated at the closest point to residential receivers. The Proponent suggests that there is limited potential for this scenario to occur, and in reality, plant and equipment would be more evenly spread across construction areas. Under these more realistic circumstances, and for the remainder of the bulk earthworks, the Proponent predicts that construction noise goals would not be exceeded. The Proponent intends to develop and implement a management plan to ensure that construction noise impacts are appropriately mitigated, monitored and managed.

During construction, the Proponent suggests that there may need to be limited blasting activities associate with the construction of the attemperation reservoir to dislodge or fracture material that cannot be removed through standard excavation techniques. These blasting activities have the potential to impact on local amenity through the generation of ground vibration and airborne overpressure impacts. In the case of ground vibration, the Environmental Assessment presents modelling data indicating that established vibration criteria (5 mms^{-1}) for the protection of human amenity will be met at all residential and sensitive receivers (predicted maximum vibration is 1.3 mms^{-1} at Border Street). In the case of blast overpressure, the established airblast criterion on 120 dB(Lin Peak) would be comfortably met at all locations. A further criterion, 115 dB(Lin Peak) (5% of blasts over a twelve month period) is not predicted to be exceeded, although it is expected to be approached at the closest receiver (Border Street). The Proponent suggests that it can manage blasting activities to ensure that the 115 dB criterion is not exceeded more than 5% of the year.

With respect to operational noise from the upgraded power station, the Proponent derived noise criteria and undertook noise modelling in accordance with the *NSW Industrial Noise Policy*. The results of this noise modelling at residential and sensitive receivers near the project site is reproduced in Table 4, and compared with applicable noise criteria. Where predicted noise levels exceed noise criteria, this has been highlighed in red. The Proponent reincorces that predicted noise levels are a result of existing operations and additional works associated with the upgrade project.

Table 4 - Predicted Noise Levels at Nearby Receivers

Location	Period	Predicted Maximum Noise Level (dB(A))			Noise Criteria (dB(A))
		Calm	Temperatue Inversion	Windy	
50 Border Street	Day	38	-	37	44
	Evening	38	-	44	45
	Night	38	43	44	40
8A Border Street	Day	30	-	30	49
	Evening	30	-	36	45
	Night	30	37	36	40
Point Piper Road	Day	30	-	<30	38
	Evening	30	-	36	40
	Night	30	35	36	38
Eraring Primary School	When in use	30	-	<30	45 (external)

From the above table, it can be seen that applicable noise criteria can be achieved at most receivers under most meteorological conditions. The only exception is during adverse weather conditions, at night, at 50 Border Street when exceedances of the applicable noise criteria are expected to be approximately 3-4 dB(A). The Proponent argues that these exceedances are a direct result of the operation of the existing power station, in particular cooling water pumps, and are not caused by the upgrade project. The upgrade project itself would generally only increase existing noise levels by approximately 1 dB(A). As an existing noise source for which noise complaints are not currently made, the Proponent suggests that predicted noise exceedances at 50 Border Street are acceptable. The Proponent further highlights that adverse weather conditions would be limited in frequency and duration, and as such, noise criteria would be met at that location most of the time. The Proponent has proposed to liaise with surrounding residences and to monitor the situation with noise generated by existing cooling water pumps.

In relation to sleep disturbance impacts, modelling presented in the Environmental Assessment that sleep disturbance criteria can be met by approximately 15 dB(A) for all residential receivers.

Consideration

The Department is satisfied that the construction and operation of the project could be undertaken within acceptable environmental and amenity limits.

The Department notes the conservative nature of the construction noise assessment presented by the Proponent. For most scenarios, the assessment has demonstrated that established construction noise goals would not be exceeded. Only for the most extreme scenario, assuming all plant and equipment operating at the closest point to the nearest receptor, is the construction noise goal expected to be exceeded (by up to 4 dB(A)). In reality, the Department considers it reasonable for the Proponent to schedule activities to ensure that construction noise goals are met, even when working at the nearest point to residential receptors. Further, given that construction noise is a transient impact of limited duration, the Department considers it appropriate to apply a management approach to this issue, through the preparation and implementation of a Construction Noise Management Plan for the project. The Department has also recommended imposition of standard construction hours for audible works to ensure project of local amenity.

The Proponent has demonstrated that in the event that it needs to undertake blasting activities, that established vibration and overpressure criteria can be met. The Department has recommended that these criteria be imposed through conditions of approval. Further, given the potential peak impacts of blasting activities, the

Department has recommended that the Proponent only be permitted to undertake blasting during the week, from 9:00 am to 5:00 pm.

Operation of the upgraded power station will comfortably meet noise criteria under most scenarios. In one circumstance, at the nearest receptor under adverse weather conditions, the upgraded power station is expected to exceed established criteria by 3-4 dB(A). In context, however, this exceedance is dominated by noise sources associated with operation of the existing power station and is not caused by the project currently under assessment. As such, the Department considers that the noise impacts of the upgrade project are acceptable.

The DECC has recommended a series of noise limits for the upgraded power station, which have been reflected in the recommended conditions of approval. These noise limits recognise that the power station will operate continuous, and as such, noise impacts will be the same regardless of whether assessed during the day or night. The DECC has therefore recommended noise limits for each receptor to be applied consistently across day, evening and night periods. Further, given the Proponent has identified that in most cases it can achieve noise outcomes that are better than established noise criteria, the DECC has recommended noise limits that reflect the best achievable noise outcomes for each receptor location. This results in the imposition of noise limits that range from 2 to 12 dB(A) below noise assessment criteria in some cases.

To ensure on-going management and monitoring of the noise performance of the upgraded power station, the Department has recommended that the Proponent be required to prepare and implement an Operation Noise Management Plan. In addition, the Proponent would be required to undertake a noise audit of the upgraded power station within three months of the completion of works to demonstrate that acceptable noise outcomes are being achieved. If not, the recommended conditions of approval require the Proponent to identify and implement additional noise mitigation measures to achieve this outcome.

CONCLUSIONS AND RECOMMENDATIONS

The Department has assessed the Environmental Assessment, Statement of Commitments, submissions on the proposal and Submissions Report, and is satisfied that the impacts of the proposal can be mitigated and/ or managed to ensure an acceptable level of environmental performance. The Department recommends approval of the project accordingly.

APPENDIX A – RECOMMENDED CONDITIONS OF APPROVAL

APPENDIX C – STATEMENT OF COMMITMENTS

APPENDIX D – RESPONSE TO SUBMISSIONS

APPENDIX E – ENVIRONMENTAL ASSESSMENT