# Delta Electricity

## Proposed Gas Power Facility at Bamarang

### Submissions Report

August 2006

# Contents

# Table Index

## Figure Index



## Appendices

# 1. Introduction

## 1.1 Overview

GHD Pty Ltd (GHD) was commissioned by Delta Electricity (Delta) in June 2005 to prepare an Environmental Assessment for the proposal to develop a gas turbine power facility at Bamarang, near Nowra in NSW.

The Environmental Assessment was prepared to support Delta's application for approval for the proposal under Part 3A of the *Environmental Planning and Assessment Act 1979*. The Minister for Planning is the approval authority for the proposal.

The Environmental Assessment was placed on public exhibition by the Department of Planning between 19 May and 19 June 2006. Following exhibition, on 29 June 2006 the Department of Planning provided Delta with a copy of submissions received and a summary of the issues raised in the submissions.

The letter stated that in accordance with clause 75H(6) of the Act, the Director-General of the Department of Planning (DoP) requires Delta to respond to issues raised in the submissions.

This report provides Delta's responses to this requirement.

No modifications to the proposal described in the Environmental Assessment are proposed by this report.

## 1.2 Background to the proposal

Delta is an electricity generation company owned by the NSW Government (a State owned corporation). Delta produces around 12% of the electricity consumed in the national electricity market, which covers consumers in NSW, South Australia, Queensland, Victoria and the ACT. Electricity is currently produced by Delta using a range of fuels including coal, water and biomass materials.

Delta currently operates four major power stations in NSW: Vales Point, Munmorah, Mt Piper and Wallerawang, which have a combined generating capacity of 4,240 megawatts. In order to secure NSW's future electricity supply, Delta is currently proposing the development of a number of other power facilities (of which this proposal is one).

A shortfall in electricity supply is predicted to occur in NSW within the next few years. Analysis of electricity supply and demand shows that the level of demand in NSW is increasing by approximately 3% per year, with summer peak load demand growing by approximately 500 megawatts per year. Based on current rates of supply, it is predicted that NSW will need to rely on imports from interstate to meet minimum requirements from 2005/2006, and that by 2008/09, NSW will require additional generating capacity to meet peak electricity demands.

The development of a gas peaking facility (stage one) would supplement electricity supply during times of peak demand, such as on hot summer days. Gas power facilities provide an efficient means of meeting peak demands.

When the overall level of demand increases further, approval would be sought to convert the facility to a combined cycle facility (stage two), allowing it to operate efficiently full time, producing a constant supply of electricity.

This two stage development would provide a cost effective way of meeting short-term demand requirements, whilst providing the option to fast track development of a base load facility when required.

## 1.3 Proposal summary

As described in the environmental assessment, the proposal is to construct a gas power facility in two stages. The proposed gas power facility would be located at 681 Yalwal Road, Bamarang near Nowra on the south coast of NSW. The site subject to the proposal was formerly developed (but never operated) for an abattoir.

Stage one would involve development of a gas turbine peaking facility; a gas pipeline to supply the proposed facility with gas from the Eastern Gas Pipeline; and a 132 kilovolts electricity transmission line to transfer the electricity produced to the national electricity network. The stage one facility, which would incorporate two gas turbines in open cycle configuration, would operate during peak periods when the demand for electricity peaks. The stage one facility would have the capacity to generate approximately 300 megawatts of electricity at any one time. Ancillary infrastructure for stage one would include an electrical control building, administration building, access roads, car parking area and site drainage.

The second stage would involve converting the proposed facility to a combined cycle configuration by adding two heat recovery steam generators and a steam turbine. This would increase the amount of energy recovered from the gas and therefore the amount of electricity produced. The stage two facility would provide a constant supply of electricity (approximately 400 megawatts of electricity at any one time) and would be classified as a base load facility. Ancillary infrastructure for stage two includes a cooling tower (water), water storage and treatment plant

Further information on the proposal is contained in the environmental assessment.

## 1.4 Contents of the report

The report provides a summary of submissions and presents Delta's responses to these submissions. The report also includes (as appendices) additional investigations that were undertaken to address some of the issues raised in the submissions. Finally, it presents mitigation measures that Delta agrees to undertake should the proposal be granted approval (the statement of commitments).

# 2. Consultation activities

## 2.1 Consultation during the environmental assessment process

Consultation activities are described in Chapter 4 of the environmental assessment.

Since the commencement of the environmental assessment, a number of consultation activities have been undertaken, as outlined in Table 2.1 below. The objective of these activities has been to raise awareness of the project and provide an opportunity for statutory authority and community input.

**Table 2.1 Consultation activities undertaken as part of the Environmental Assessment**

| Activity | Date |
|---|---|
| Operation of a project information line (1800 810 680) | Ongoing |
| Planning focus meeting with government agencies organised by Department of Planning | 18 July 2005 |
| Distribution of newsletter 1 to local residents and community groups | August 2005 |
| Advertisement in South Coast Register and Shoalhaven & Nowra News | 17 & 18 August 2005 |
| Media release to local newspapers and radio stations | 19, 29 & 30 August 2005 |
| Project website | Established at beginning of project and regularly updated. Ongoing. |
| Meetings with landowners potential affected by property acquisition | Ongoing |
| Distribution of newsletter 2 to local residents and community groups | November 2005 |
| Distribution of newsletter 3 to local residents | May 2006 |
| Distribution of summary brochure to community groups and those who registered to be on the project mailing list | May 2006 |
| Advertisement in the Nowra Shoalhaven News | 18 May 2006 and 1 June 2006 |
| Public exhibition of the environmental assessment | 19 May 2006 – 19 June 2006 |

## 2.2 Consultation during exhibition

The exhibition of the environmental assessment, including receipt of submissions, was coordinated and managed by DoP. To supplement this, Delta carried out the following consultation activities:

» Provided updated information on the project website (www.bamaranggasturbines.com.au), including an electronic copy of the environmental assessment;

» Distributed a newsletter announcing the public exhibition (newsletter 3); and

» Distributed summary brochures, which provided an overview of the environmental assessment to people who had requested (by registering in response to the advertisement, or newsletters 1 and/or 2) to be on the project mailing list.

## 2.3 Advertisement

DoP placed an advertisement in Nowra Shoalhaven News on 18 May 2006 and 1 June 2006. The advertisement announced the public exhibition and provided details on how to view a copy of the environmental assessment and make a submission. It also provided contact details for members of the community who required more information on the project or the exhibition and approvals process.

## 2.4 Newsletter 3

Delta prepared and distributed over 700 copies of a third newsletter in May 2006 to all households that received newsletter 1 and 2. In addition, copies of the newsletter were left in the Shoalhaven City Council foyer and Nowra City Library. Copies were also made available for the June meeting of Council's Industrial Development and Employment Committee.

The newsletter announced the public exhibition of the environmental assessment and provided a brief outline of the structure of the environmental assessment. It also provided details on how members of the community could view a copy of the environmental assessment, acquire a copy of the summary brochure, make a submission and obtain more information.

## 2.5 Summary brochure

Delta prepared a summary brochure, which provided overview of the environmental assessment. The summary brochure was distributed to:

» Those who had registered to be on the project mailing list;

» Local community and environmental groups;

» Councillors; and

» State and Federal members.

Copies of the brochure were available at Shoalhaven City Council and were provided upon request. Copies were also distributed to anyone who called the GHD project information line to request a copy.

## 2.6 Website

The project website (www.bamaranggasturbines.com.au) was updated at the beginning of the exhibition period to provide updated information on the status of the environmental assessment, and the next steps in the approvals process.

An electronic copy of the environmental assessment was uploaded onto the website to enable internet users to view a copy of the report. Electronic copies of newsletter 3 and the summary brochure were also made available on the website. The website also provided details on how to make a submission and obtain more information and included a link to the DoP website.

## 2.7 Public exhibition of the environmental assessment

The environmental assessment was exhibited from 19 May to 19 June 2006 at the following locations:

» Shoalhaven City Council
City Administrative Centre, 36 Bridge Road
Nowra

» Department of Planning
Information Centre, 22-33 Bridge Street
Sydney

» Nature Conservation Council of NSW
Level 5, 362 Kent Street
Sydney

» Department of Planning website - www.planning.nsw.gov.au/asp/major_projects.asp

» Project website - www.bamaranggasturbines.com.au

## 2.8 Submissions received

In total, 74 submissions were received (36 during the exhibition and a further 38 in the two weeks following the submission closing date), which comprised:

» 5 written submissions from government bodies

» 1 submission from a university

» 6 written submissions from the public

» 1 written submission from a private organisation

» 61 form letters (A standard letter, copied and signed by a number of individuals - Form 1)

Of those 74 submissions, 14 were unique submissions. Delta considered all submissions received by 29 June 2006.

### 2.8.1 Processing of submissions

Each submission was given a unique identification number by the Department of Planning. The comments raised were classified against issues headings and entered into a submissions database. GHD has sorted the comments under the issues headings and then analysed the issues raised and assisted Delta to prepare a response.

DoP identified a form letter, an identical copy of the same letter, with space provided to insert a name, address, signature and date, of which 61 copies were received. Each copy of the form letter was signed by different stakeholders individually. As the issues raised in each form letter were identical, Delta was given a sample copy and has prepared a single response to the issues raised.

A list of all submissions, with the submission identification number and the classification of issues raised is provided in Appendix A. Where a firm opinion of the proposal has been

expressed, this has been recorded. For privacy reasons, personal details of public and private organisations have been withheld.

Delta's responses to issues raised in submissions is provided in the following section.

# 3. Responses to issues raised in submissions

## 3.1 Air quality

### 3.1.1 Nature of emissions

**DEC recommends an emission concentration limit for nitrogen oxides from the gas turbines. Emission limits are not required for other air pollutants because of the clean burning nature of the natural gas. In addition to setting a limit for oxides of nitrogen, continuous emissions monitoring is required to demonstrate compliance with the limits on an ongoing basis**.

(Submission 7)

The current emission limit for in-stack concentrations of nitrogen oxides for gas turbines of capacity >30 MW, as defined by the *Protection of the Environment Operations (Clean Air) Regulation 2002*, is 70 mg/$m^3$.

DEC has recommended an emission concentration limit for nitrogen oxides from the gas turbines of 50 mg/$m^3$.

It is noted that the DEC recommendation is below the limits set out within the *Protection of the Environment Operations (Clean Air) Regulation 2002*, the in-stack concentration of nitrogen oxides is designed to be 46 mg/$m^3$ during conventional operation (excluding start-up and shut-down).

Therefore, while the proposed DEC in-stack concentration is below that of current NSW Air Quality Regulations, the proposed facility is expected to satisfy the DEC's recommendation.

It is anticipated that a Continuous Emission Monitoring System (CEMS) would be incorporated within the detailed stack design to ensure that emission levels meet relevant pollutant criteria.

**What is the content of the vapour being projected in the atmosphere from the stacks?** (Submission 8)

As per Section 2.8 of the Air Quality Assessment (Appendix D of the Environmental Assessment), the primary pollutants from gas turbine engines are oxides of nitrogen ($NO_X$); formed by the high temperatures generated in the combustor; carbon monoxide (CO) and volatile organic compounds (VOC); which are formed predominately by the incomplete combustion of fuel. Particulate matter less than 10 microns in aerodynamic diameter ($PM_{10}$) and sulphur dioxide ($SO_2$) are emitted in trace to low amounts from gas turbine operations. Potential impacts of these pollutants have been comprehensively addressed with the Air Quality Assessment.

Greenhouse gases carbon dioxide ($CO_2$) nitrous oxide ($N_2O$) and methane ($CH_4$) are all produced during gas turbine operation (USEPA, 1995). $CO_2$ and $N_2O$ are produced during the combustion process, while $CH_4$ is present in the exhaust gas as unburnt fuel when the fuel is natural gas. Greenhouse gas impacts were also addressed within the Air Quality Assessment.

Water vapour would also be present as a product of natural gas combustion.

**This facility will pump some 5000 tonnes per annum of additional ozone depleting carbon dioxide into the atmosphere. Can any carbon removal apparatus (sequestration devices) be designed or specified into the contract?**

(Submission 37)

It is noted that carbon dioxide, while a significant greenhouse gas, has no ozone-depleting potential.

Carbon dioxide removal techniques, such as geo-sequestration, are currently in relatively early stages of development, and while many schemes are being piloted, are not a viable option on a commercial scale at this point in time.

Additionally, it is noted that the use of natural gas as a fuel source would generate significantly less emissions of carbon dioxide than alternative hydrocarbon sources such as coal and oil.

**The cooling towers will generate steam and this will rise into the air being visible for many kilometres and will have a negative impact.**

(Submission 2)

As indicated in the Environmental Assessment, the proposed facility would be constructed in two stages. The first stage, the peaking facility, does not use cooling towers. The second stage, the base load facility, would involve the addition of plant that requires greater cooling. A cooling tower would cool the heated water from the steam condenser with primary cooling effect from the evaporation that takes place when air and fan are brought into direct contact. A mechanical draught tower has been chosen for the proposed facility, which uses fans to create more airflow through the tower. This is commonly referred to as a mechanical induced draught tower. Under certain atmospheric conditions there can be visible plumes. These are commonly mistaken to be steam. It is in fact a saturated air stream, visible due to the elevated temperature and moisture content in relation to the surrounding ambient air. The density and persistency of the plumes would depend on the amount of generation heat load and the atmospheric conditions. The height of the cooling tower at Bamarang has been chosen to minimise the distant visual impact of the plume, at the times it does occur.

### 3.1.2 Analysis and modelling results

**Coastal circulation is experienced about 80-100 days per year at Bamarang. Given the shallow nature of the sea breeze, its inland penetration is limited by the rising topography located west of the proposed site. This could result in a return circulation of pollutants from the site that may well be carried back over the built-up areas of Nowra. Models of pollutant dispersion should include a study of coastal circulation.**

**What if any physical analysis has been done has been done to ensure that air quality at the Bamarang Bush Cabins and Yoga Retreat will not be compromised? Local experience can confirm that southerly winds generally push colder and heavier air over the escarpment and down onto our facility.**

(Submission 2, 37)

For the purposes of generating regional meteorology to drive the pollutant dispersion modelling of the Air Quality Assessment undertaken for the Environmental Assessment, the CSIRO TAPM

model was used. TAPM is a prognostic model which is capable of predicting three-dimensional meteorological data, and through the use of various databases, including terrain and vegetation cover, can simulate daily variations in meteorological conditions, including coastal circulation. Consequently, any potential for return circulation of pollutants has been adequately addressed within the atmospheric dispersion modelling.

Furthermore, the TAPM model incorporates influences of local topography in the meteorology and pollutant dispersion modelling.

The Bamarang Bush Cabins were selected within the Air Quality Assessment as the representative property for the residential dwellings located along Bamarang Road. Maximum predicted air quality impacts at the Bamarang Bush Cabins have been explicitly addressed within the Air Quality Assessment, with results indicating that negligible air quality impacts would occur at this location.

**Background levels at Albion Park were taken as a representative background levels, which is totally unsuitable. Undertake actual background readings of all possible pollutants at Bamarang and re-do all tables and plots in the report and install a permanent pollution monitoring station as part of the facility to ensure that predicted increases in pollution are not exceeded.**

(Submission 36)

The background values selected for the atmospheric pollutants modelled correspond to the maximum recorded concentrations from the total 2004 dataset at Albion Park. This approach has been undertaken to conform to the NSW DEC's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW (2005).

This methodology is conducted such that 'worst-case' background ground level concentrations on any given day be combined with 'worst-case' incremental increases in ground level concentrations, such that a 'worst-worst' case air quality impact may be established. This approach is designed to protect the community from adverse air quality impacts by building conservatively high assumptions into the air quality assessment process.

While it is noted that Albion Park may have a higher concentration of all key pollutants than the project site, for the purpose of having consistent annual data, its use was deemed appropriate in the absence of data recorded at Bamarang. The use of conservatively high background air quality data within an assessment is generally considered to be good practice when estimating worst-case air quality impacts from a proposed development.

Subsequent to the production of the Air Quality Assessment report, Delta Electricity has established an ambient air quality monitoring station to record local meteorological conditions and concentrations of nitrogen oxides within the region of the project site. It is understood that this monitoring station would be used to assess ambient air quality both before and after commissioning of the proposal.

**Misrepresentation of modelling results - The increase in the more dangerous $PM_{10}$ is still of concern. The plots and figures are open to misinterpretation.**

(Submission 36)

As natural gas is a gaseous fuel, particulate matter emissions are typically low.

As noted within submission 7, provided by the NSW Department of the Environment and Conservation (DEC), increased particulate matter emissions may result from poor air-fuel mixing or maintenance problems. As such, all DEC Environmental Protection Licences include conditions requiring all plant to be operated and maintained in a proper an efficient manner. Efficient operation of the facility would ensure that emissions of particulates remain well below levels that are likely to have an adverse impact on air quality.

### 3.1.3 Potential for pollution impacts on water quality

**The site is close to Bamarang Dam. The prevailing winds are north easterlies with photochemical fallout directly over and across Bamarang Dam**.

**What effect will the fallout from the stacks have on the Dam and the Shoalhaven River?**

**Many properties in the area collect water into tanks for drinking water. The EA has not addressed the effects the facility will have on the quality of water collected both for personal use and tourist use**.

(Submission 2, 8, 37)

The atmospheric pollutant contours produced from the modelling component of the Air Quality Assessment indicate that neither the recreational amenity nor the water quality of the nearby Bamarang Dam is predicted to be impacted by emissions from the proposed facility. Due to the predicted low level increase in pollutants in the region surrounding the proposed facility, there is not anticipated to be any impact on the Shoalhaven River, Bamarang Dam or areas of rainwater collection.

None of the anticipated emissions to air associated with the proposed facility are associated with significant water solubility in the near-field, and are therefore not anticipated to enter the water cycle through wet deposition processes (stripping of atmospheric pollutants during rain events).

### 3.1.4 Plume modelling

**The Department of Defence seeks additional information on plume impact, including information on buoyancy factors, compliance with CASA Advisory Circular AC 139-05(0) and a full plume assessment for stage one and stage two operations.**

(Submission 5)

This has been addressed by the revision to the original plume rise assessment prepared for the environmental assessment (as contained in Appendix F to the Air Quality Assessment). The revised plume rise assessment is included in Appendix B to this report.

The report concluded that the results of the assessment indicate that the probability of an exceedance of the critical vertical velocity (4.3 m/s) decreases significantly with altitude, particularly between 100 m and 200 m AGL for Stage 1 and 50 m and 100 m AGL for Stage 2. Approximately 70% and 97% of all predicted exceedances of the critical vertical velocity occur beneath 100 m AGL, (60 m above stack height) for Stage 1 and Stage 2 respectively.

The maximum height at which the average vertical plume velocity is predicted to exceed the critical vertical velocity is 1,040 m and 388 m AGL for Stage 1 and 2 respectively. The frequency with which this was predicted to occur was less than 0.05% for both Stages.

The operations modelled in Stage 1 represent the power facility operating on a peak-load basis only, for approximately 440 hours per annum. The frequency of occurrence of an exceedance of the critical vertical velocity predicted within the Stage 1 modelling should therefore additionally be multiplied by the frequency of operation of the facility under these conditions to derive an overall likelihood that critical conditions may occur.

In view of the above, the probability of occurrence of a vertical velocity in excess of 4.3 m/s at 100 m AGL, (60 m above stack height) taking into account proposed hours of operation, is thus $1.5 \times 10^{-2}$ for Stage 1 and $3.0 \times 10^{-2}$ for Stage 2.

It is noted that the aviation authority would apply the information contained within this assessment to assess the probability of aircraft traversing each height band within the plume influence area. This then allows calculation of the combined probability of the two events – an aircraft being exposed to a vertical velocity in excess of 4.3 m/s. The acceptable risk criterion is one chance in 10,000 ($1 \times 10^{-4}$) each year of having a fatality due to an aircraft accident. Depending on severity (eg the possibility of 100 fatalities due to a single aircraft crash) the acceptable frequency of an occurrence is reduced accordingly – in this instance, to $1 \times 10^{-6}$ (Pers. Comm., Rehbein AOS, April 2006).

Using the example above, provided that the probability of aircraft traversing 60 m above the proposed stack height is less than $7 \times 10^{-5}$ in any given year, the risk of exposure to the critical vertical velocity should be deemed acceptable for this height band.

Quantification of the probability of aircraft traversing within the plume influence area must necessarily be derived by a third party aviation expert. However, in view of the foregoing it is anticipated that the resultant combined probability of an aircraft being exposed to a vertical velocity (attributable to the gas turbine power facility stacks) in excess of 4.3 m/s would be acceptable in terms of the above risk criterion for both Stage 1 and Stage 2 operations.

## 3.2 Bushfire

### 3.2.1 Crown bushfires

**The immediate area around the proposed site appears to be situated in a swathe that is regularly subjected to crown bushfires. In 24 years, four fires have passed through and burnt vegetation at the proposed site, with additional bushfires occurring in the vicinity.**

(Submission 4)

The Bushfire Risk Assessment (Appendix F of the Environmental Assessment) applies the processes set out in the NSW Guidelines, 'Planning for Bushfire Protection' (NSW Planning 2001).

Asset Protection Zones (as described in Section 8.4 and Appendix F of the Environmental Assessment) were determined based on the relevant state guidelines in consultation with the NSW Rural Fire Service. The guidelines assume maximum fuel load for the vegetation type and

a Fire Danger Rating of 80 – Extreme, which on most days would see a Total Fire Ban proclaimed. The Asset Protection Zones as recommended by the NSW Rural Fire Service, account for those assumed conditions. This would match or exceed the history of fires that have burnt through the area. The Asset Protection Zones account for the potential for repeated fires and crown fires.

The passage of fires, and the fire history of NSW, was considered in the process that led to the development of 'Planning for Bushfire Protection' (NSW Planning 2001). This guideline was developed taking into consideration events such as repeated fires and crown fires.

**Serious thought needs to be given as to how authorities will deal with a major crown fire approaching the site from the west or north-west (the predominant wind directions of major crown fires in this locality).**

(Submission 4)

There are no means of suppression for crown fires. The limits of fire suppression capacity are generally understood to be approximately 5,000 kilowatts per metre of bushfire flame front, a level that is exceeded by fires of moderate intensity under conditions of moderate fire danger. The approach of fire fighting authorities under conditions of crown fires is to adopt extremely defensive tactics, emphasising safety, and wait for weather conditions to moderate, or for the bushfire to encounter landscape elements that will moderate fire behaviour such as water bodies, significant changes in vegetation, major infrastructure elements and coastlines.

### 3.2.2 Bushfire risk assessment

**A detailed risk assessment needs to be conducted in order to protect personnel and the facility from the impact of a major crown bushfire and the potential for spot fires.**

**There seems to be no bushfire risk assessment mentioned in the Preliminary Hazard Analysis document.**

(Submission 4)

The Bushfire Risk Assessment meets the requirements in the guidelines, 'Planning for Bushfire Protection' (NSW Planning 2001) and is a risk assessment. This approach accounts for risk by setting standards to meet extreme conditions of maximum fuel load for the vegetation type and a Fire Danger Rating of 80 - Extreme. The Asset Protection Zones nominated are for those assumed conditions; and in effect, the risk of extreme fire conditions is taken into account, including crown fires and fire spotting.

### 3.2.3 Access road

**The only access road (Yalwal Road) to the site leads through bushfire-prone land. Yalwal Road has been blocked in the past by bushfires.**

**Detailed consideration needs to be given on how any persons at the site will be evacuated during a bushfire if the only access road is blocked and how fire fighting crews will be able to reach the site.**

**Consideration should be given to the establishment of an alternative, preferably bushfire-free, road access to the proposed site.**

(Submission 4)

The emphasis in all bushfire management is on safety. Roads are temporarily closed to the public and to bushfire fighters from time to time. The closing of roads and the management of traffic, including fire-fighting appliances near or adjacent to the proposed facility, would always be at the discretion of the NSW Rural Fire Service or its appointee. There are no alternative road access options for the site. In addition, there is no way of making a road 'bushfire-free'.

No staff would reside at the site on a permanent basis. It is the policy of the NSW Bush Fire Coordinating Committee that capable persons should generally not be evacuated from properly prepared dwellings likely to be impacted upon by bush fires in accordance with the Australasian Fire Authorities Council Position Paper on Community Safety and Evacuation During Bush Fires. The design and construction of the proposed facility would include an appropriate location of refuge for staff and others that may be present should a bushfire threaten.

The procedures for requiring people to take shelter would also be developed as part of standard processes for the management of the proposed facility. The procedures would include scheduling maintenance at the proposed facility so as not to coincide with high fire danger periods or when fires are actively occurring in the district.

### 3.2.4 Fire-fighting

**Detailed consideration needs to be given as to what fire suppression equipment will be available on site and how it will be used by personnel.**

(Submission 4)

The facility would be constructed of non-combustible material and water supply would be provided on the site according to the requirements set out in the Bushfire Risk Assessment. The hoses and hydrants supplied, combined with appropriate training, would ensure that the equipment provided; would be both sufficient and effectively used if a bushfire threatens the proposed facility.

**Consideration also needs to be given to how personnel will deal with 60kph+ wind-driven 15m+ high flames and airborne burning embers.**

(Submission 4)

Personnel would not be required to address the behaviour of fires. The maintenance and management of the Asset Protection Zone on an ongoing basis would be required. During a bushfire, activities would involve putting out spot fires that may ignite in the Asset Protection Zone or adjacent to the proposed facility. This would be conducted by staff who have been appropriately trained and equipped.

**The asset protection zone will be ineffectual in stopping or controlling these airborne embers.**

**What measures will be put in place to reduce or stop airborne embers from entering the site and igniting spot fires? How will the personnel, if they have not been evacuated, deal with airborne embers and any resultant spot fires?**

(Submission 4)

The Asset Protection Zones included as part of the proposal were identified using the NSW Guidelines, 'Planning for Bushfire Protection' (NSW Planning 2001). The guidelines took into account the behaviour of fires and have been developed to enable adequate protection of buildings from airborne embers, spot fires, radiant heat and direct flame contact. The guidelines assume maximum fuel load for the vegetation type and a Fire Danger Rating of 80 – Extreme, which on most days would see a total fire ban proclaimed. There are no measures that can be put in place to completely prevent airborne embers, which have been recorded up to tens of kilometres from a main bushfire front, nor the potential for spot fires. The planning approach taken in NSW is to identify Asset Protection Zones based on the relevant state guidelines in consultation with the NSW Rural Fire Service. The Asset Protection Zone is not intended to stop or control airborne embers but to provide a space in and from which fire prevention can be carried out and fire suppression can be undertaken. Fire suppression involves putting out spot fires in the Asset Protection Zone and adjacent to the facility and establishing a fire edge.

The response to the issue relating to evacuation is provided under 3.2.3 above.

## 3.3 Community consultation

**There has been no contact with the property owners.**

**Have undertaken a survey of 100 of the nearest residents and found that no individual contact had been made with any of these private owners. Approaching close of submissions, people were unaware of the proposal.**

(Submission 8, 37)

As described in Chapter 4 of the Environmental Assessment (and summarised in Section 2 above), at the beginning of the project an advertisement was placed in the South Coast Register (17 August 2005) and the Shoalhaven and Nowra News (18 August 2005), whose distribution area covers the study area and beyond. The advertisement announced the proposal and the commencement of the technical feasibility and environmental assessment studies. It also provided contact details for members of the community who required more information. Everyone who registered their interest in the project in response to the advertisement was placed on the project mailing list.

Delta subsequently issued three newsletters during the preparation of the Environmental Assessment. The mailing list for the newsletters was based on information supplied by Shoalhaven City Council, with the information requested from Council being ratepayers who lived in properties surrounding the site (approximately 700 people), including residents between the site and the high voltage substation at the corner of Yalwal and Albatross Roads. Newsletters were also sent to local community and environmental groups, councillors, State and Federal government members and others who requested copies by calling the project

information line. Copies of each newsletter were also left in the Shoalhaven City Council foyer and Nowra City Library. Any individuals or groups who contacted the project team to register their interest in the project in response to the newsletters were placed on the project mailing list to receive future newsletters.

In addition, Delta met with potentially directly affected property owners (those from which property acquisitions may be required and adjoining property owners) to provide an opportunity to discuss the proposal in more detail and address any issues or concerns. Only those landowners who stood to be directly affected by the proposal were contacted personally. Meetings were held with these stakeholders in August 2005.

## 3.4 Cultural heritage

**The EA does not provide sufficient evidence to determine whether the foothold tree is associated with Aboriginal activity. There is no information indicating Aboriginal interest in or associations with the tree to inform management decisions.**

**Consultation with Aboriginal people has not been conducted in accordance with DEC's guidelines. The EA does not contain correspondence from relevant Aboriginal organisations.**

(Submission 7)

The Aboriginal representatives consulted in the course of the Aboriginal Cultural Heritage Assessment (Appendix J the Environmental Assessment), had no prior knowledge of the foothold tree.

The study area falls within the boundaries of the Nowra Local Aboriginal Land Council (Nowra LALC). The Land Council was contacted and a representative was invited to participate in the field survey for the project. Subsequently Mr John Pender represented the interests of the Nowra LALC in the project and participated in the field survey. The field results and potential management strategies were discussed with Mr Pender during the field survey.

Ms Delia Lowe of the Wandrawandian Elders Group was contacted and invited to participate in the field survey for the project. Ms Lowe indicated that she, or a designated representative, would attend the survey. A representative did not attend on the day of the survey.

Several attempts were made to contact Lena Bloxsome of the Shoalhaven Aboriginal Corporation of Elders and Friends by phone prior to the field survey. These attempts were unsuccessful.

Draft copies of this report were forwarded (by mail) to the Nowra LALC, the Shoalhaven Aboriginal Corporation of Elders and Friends and to Ms Delia Lowe. The participating Aboriginal groups were invited to provide written comment on the findings and recommendations provided in the report. No responses had been received at the time of submission of the final report in August 2006.

*A Record of Aboriginal Participation* was provided in Appendix 1 of the Aboriginal Cultural Heritage Assessment report prepared by Navin Officer.

## 3.5 Ecology

### 3.5.1 Additional assessments

**Further flora and fauna assessment is required in relation to potential habitat and potential impacts of clearing for Southern Brown Bandicoots, Eastern Pygmy Possum, Long-nosed Potoroo and White-footed Dunnart, quantification and occupancy of the hollow-bearing resource, the possible new Prasophyllum found on the electricity transmission line easement and monitoring measures to determine whether 'mitigation' or potential offsets are effective.**

(Submission 7)

Additional surveys were undertaken during the week of 24 July to address these matters and included trapping for mammals, fauna habitat mapping for threatened species and hollow-bearing tree counts across the site. The findings of these surveys are outlined in the *Ecological Assessment Addendum Report* (GHD 2006) included in Appendix C.

The general findings of the survey included:

- The majority of hollow-bearing trees at the site could be conserved. The majority of those within the proposed development area were within the Asset Protection Zones and therefore most could be avoided. Furthermore a variety of hollow-bearing tree types would be conserved across the site;
- Some areas of potential habitat for all of the threatened fauna species would be conserved at the site;
- No threatened species were recorded during the survey;
- No evidence of microchiropteran bat use was recorded within the disused abattoir. All scat samples collected were from common ground-dwelling mammals; and
- The *Prasophyllum* sp. recorded during the previous surveys has not yet flowered. It is possible that this species may not flower this season as many *Prasophyllum* species are known to have infrequent flowering patterns often missing a complete flowering season.

Post-construction monitoring of threatened species is not proposed.

**Impacts on riparian corridor, as identified by DNR in consultation with Shoalhaven City Council, not examined. It appears that the footprint of the proposed development is likely to encroach on the recommended riparian buffers. Extent of encroachment and justification to impact on these areas needs to be detailed.**

(Submission 39)

An aquatic habitat assessment was undertaken during the 24 July 2006 survey period. It is not anticipated that the proposed footprint would impact on the drainage lines at the site but the proposed Asset Protection Zones may encroach on the riparian buffers. However, only partial clearance of vegetation in these areas would be required.

### 3.5.2 Habitat offsets

**An area of land recently granted to the Nowra Aboriginal Land Council on the northern side of Bamarang Nature Reserve has been identified as the site for a potential offset, as it contains significant Triplarina nowraensis and good arboreal fauna habitat. Another site is the area of degraded retained vegetation in the southern area of power station site, which could be rehabilitated as a partial offset.**

(Submission 7)

Discussions have taken place with DEC regarding this matter. Delta is considering options for habitat offsets and further discussions with DEC are anticipated.

### 3.5.3 Clearing of vegetation for electricity transmission lines

**There are a number of direct and indirect impacts on Bamarang Nature Reserve and Triplarina Nature Reserve from the proposal. Of greatest concern is the proposed clearing of native vegetation within the Reserves for the establishment of new electricity transmission lines. The EA report contains some conflicting information on the scale of clearing within or adjacent to these Reserves.**

(Submission 7)

Table 6.1 of the Environmental Assessment provides information on the key features of the proposed electricity transmission line, including the estimate of clearing required and the ownership of land. The table is reproduced below.

**Table 6.1 Key features of the proposed electricity transmission line**

| Section (corridor width/length) | Location characteristics | Existing transmission line status | Land ownership | Corridor/ acquisition characteristics | Estimate of total clearing required (hectares) and approx dimension |
|---|---|---|---|---|---|
| Site to Yalwal Road | Located on site | 11 kilovolts line would be retained for construction and removed for operation. | Delta | Corridor would be 25 metres wide, 250 metres long; acquisition required. | 0.5<br>(20 x 250 metres) |
| Yalwal Road to the existing corridor through Crown Land | Follows existing roadway | 11 kilovolts line would be retained for construction and removed for operation | Crown land | Acquisition of an easement of 28 metres wide and 400 metres long would be required. | 0.5<br>(13 x 400 metres) |
| Along existing corridor to the intersection of Flat Rock/Yalwal Roads | Along existing transmission line and water line corridor through (predominantly) Bamarang Nature Reserve | 33 kilovolts line would be removed | Private land, NPWS land, Aboriginal owned land and Crown Land | Acquisition from landowners required.<br>The existing cleared corridor is approximately 28 metres wide and 2.3 kilometres and no further clearing is planned. | Nil |
| Flatrock/Yalwal Road intersection | Travels along the south side of the | 11 kilovolts line would be | Council road corridor and | Within existing easement | 0.1 |

| Section (corridor width/length) | Location characteristics | Existing transmission line status | Land ownership | Corridor/ acquisition characteristics | Estimate of total clearing required (hectares) and approx dimension |
|---|---|---|---|---|---|
| to Cabbage Tree Lane | road within the cleared road corridor. | relocated to the 132 kilovolts line | private land | (approximately 10 metres wide) within private property. | (10 x 125 metres) |
| Cabbage Tree Lane to George Evans Road (university access) | Travels along the south side of the road adjacent to Crown Land | 11 kilovolts line would be relocated to the 132 kilovolts line | Council road corridor | Council is proposing to widen the road corridor to 40 metres. Within this corridor, a section 8 metres wide for a distance of 1.4 kilometres would need to be cleared. No easement is required within the road corridor. | 1.1<br>(8 metres x 1.4 kilometres) |
| George Evans Road to east of Flat Rock Creek | Travels along south side of the road adjacent to Triplarina Nature Reserve | 11 kilovolts line would be relocated to the 132 kilovolts line. | Council road corridor | A section 8 metres wide for a distance of 0.7 kilometres would need to be cleared. No easement is required within the road corridor. | 0.6<br>(8 metres x 0.7 kilometres) |
| East of Flat Rock Creek to substation | Underground | - | Within Council road corridor | No easement required within the road corridor. | Nil |
| TOTAL | | | | | 2.8 hectares |

It is evident from the above table that no clearing would be required in nature/conservation reserves.

Additional individuals of Nowra Heath-myrtle (*Triplarina nowraensis*) were recorded by DEC adjacent to Flat Rock Dam within the road reserve in 2006. These individuals were not recorded during the GHD August 2005 surveys and it is thought to be attributable to the plants having been slashed at the time of the GHD surveys and therefore not detected. Therefore GHD undertook another survey of the location identified by DEC and further east along Yalwal Road. A total of 60 new plants were recorded during the survey. The Assessment of Significance for this species has been updated and included in the *Ecological Assessment Addendum Report* (GHD 2006) provided in Appendix C to this report.

## 3.6 Land use and future planning

**The EA does not detail all surrounding land uses – does not mention storage business 100 metres from the power lines, St Vincent De Paul's complex, three households next door or residents in Bamarang Road.**

(Submission 8)

Section 2.2 of the environmental assessment includes a general description of the main land uses in the study area.

Page 2.4 of the environmental assessment notes that:

'The nearest existing residential dwellings to the site are:

- A caretaker's caravan located on the site of Make it Mudbricks. It is noted that a development application for a permanent dwelling on this property has been lodged with Council;
- Dwellings located along Bamarang Road (approximately 1.25 kilometres to the north); and
- Rural residential dwellings approximately 2 kilometres to the east.'

**Consideration not given to the Nowra-Bomaderry Structure Plan. The implications of the proposal on future settlement needs for this growth centre have not been specifically addressed.**

**The area adjacent to Cabbage Tree Lane is earmarked as a 'new living area' in the Bomaderry Structure Plan, and land further west has been identified as 'further investigation area' for additional residential expansion. The EA has made no analysis of the impacts on the growing population in the immediate area.**

**In 10 to 20 years this area will have high density housing (refer to future plan at Council) – there are already proposals in place to develop/subdivide land.**

(Submission 2, 8, 39)

Section 2.2 of the Environmental Assessment notes that preparation of the structure plan for Nowra Bomaderry is underway. The draft plan was exhibited between 1 March to 28 April 2006.

The Bamarang area is located near the western boundary of the structure plan area. On Map 1.2 of the structure plan, the site is surrounded by rural and conservation areas.

The area around the existing Cabbage Tree Lane subdivision has been identified by the draft plan for further residential development. The draft plan describes this as 'Area 6: Cabbage Tree Lane', with the western boundary of this 'future living area' located approximately 1.5 kilometres east of the site. The desired future character of this future living area is described as follows:

'Area 6 will be characterised by residential development within a natural setting. Commercial facilities, a school and a recreational facility will provide a centre at the main entrance to the neighbourhood at the intersection of Yalwal Road and Cabbage Tree Lane. Residential development will be predominantly detached housing. Some small areas of medium density development are appropriate, in the form of villas, town houses and terrace houses. Areas of medium density development will adjoin areas of open space.'

The residential capacity is indicated at approximately 2,180 dwellings.

An area designated as a 'future long term living area' (Area 8: Bamarang) is located to the west of Area 6.

In terms of indicative development phasing, Area 6 is identified as a 'phase 3' development, with area 8 a 'phase 6' development. Area 8 is therefore is a low priority in terms of the growth strategy, with other areas identified as being more suitable to accommodate growth.

Other surrounding infrastructure identified by the plan includes the future western bypass, located in the corridor described by the Environmental Assessment as the regional services corridor.

## 3.7 Noise and vibration

### 3.7.1 Mitigation measures during stage one

**The Department (of Planning) requests that specific consideration be given to measures that will be undertaken as part of Stage 1 of the project to meet the project specific noise levels at potentially-affected noise receivers.**

Additional noise modelling has been undertaken for Stage 1 mitigation measures and is detailed in the report included in Appendix D. The predicted results for the Stage 1 proposal indicate that the project specific noise goals can be meet for all scenarios.

In terms of operation noise management for stage one, it is recommended (as noted in the Environmental Assessment) that:

> 'The specification provided to prospective equipment suppliers would dictate the acoustic performance the units would be expected to meet, based on the conditions of consent for the proposal. The equipment suppliers would develop the mitigation measures such that the noise attenuation is maximised and impacts are minimised. The usual practice is to provide a performance-based approach involving a sound level specification, rather than a prescriptive requirement to include specific mitigation measures. This promotes design flexibility and the ability to achieve the optimum outcome in an efficient and effective way.
>
> Delta commits to placing a requirement on the contractor responsible for the design and management of the overall facility to ensure they meet the required noise performance. The designer would be expected to incorporate appropriate mitigation features in the overall design to ensure that noise criteria at residential receivers are not exceeded.
>
> The following represents typical noise mitigation strategies for major equipment of similar power facilities. Final selection would be undertaken by the contractor, in accordance with the above requirement.
>
> ***Gas turbine (developed as part of the stage one proposal)***
>
> » Air inlet silencing.
>
> » Acoustic insulation on the outside of the air inlet.
>
> » Upgrades of the standard acoustic enclosure.
>
> » Upgrades of the cooling system with low noise fans and/or acoustic treatment.
>
> » Upgrades of exhaust silencing.
>
> » Acoustic walls and/or additional acoustic treatment for the generator enclosure.
>
> » The air inlet and cooling systems are generally outdoor sources and could potentially be attenuated.
>
> » Placing the gas turbine in a building is usually the last resort due to capital outlay considerations.'

In addition, it is noted that it has been noted that construction noise has the potential to reach project specific noise levels however this cannot be properly assessed until a construction schedule has been determined. Therefore it is recommended that further assessment be undertaken once a construction schedule is determined and a construction noise management plan be implemented.

### 3.7.2 Noise impacts

**The facility will generate noise - negative impact for tourism and the local residents. People walk in the area for recreation and the noise will spoil this.**

(Submission 2)

With the implementation of proposed noise mitigation measures detailed in the report, it is anticipated noise levels would not negatively impact on tourism and recreation facilities such as bushwalking, given that no bushwalking tracks pass along the site boundary.

**The population in the area is planned to increase significantly and it is very unhealthy to locate the facility in this area. Like to see further noise analysis studies to assess the impact at a radius of up to 6km.**

(Submission 2)

Responses to issues regarding future population increases are provided in Section 3.7 above.

The noise modelling undertaken within the Noise Impact Assessment (Appendix H of the Environmental Assessment)) extended to a radius of approximately 2 km, with contours colour-coded to represent different received noise levels (decibels) within that radius. As the contours show, the predicted received noise levels are unlikely to exceed the adopted assessment criteria at the boundaries of this radius, therefore a 6 km radius is unlikely to show any difference. Distance acts as an attenuation factor for noise, so the further from the site, the less received noise.

**Concerned that there will be unacceptably high background noise levels generated from the plant after working hours which will affect a proposed manager's residence at the mudbrick manufacturing site located opposite.**

(Submission 6)

The site has been assessed in accordance with the NSW Industrial Noise Policy (2000). The findings of this assessment suggest that background noise levels from the proposed facility should not affect the premises if the recommended mitigation measures are incorporated into the design.

### 3.7.3 Noise criteria

**Noise emitted must not exceed the Estimated Average Background A-Weighted Sound Pressure Levels, Australian Standard 1055-1997 for Noise area category R1.**

**During business hours noise must not exceed 40 $L_{A90,T}$ and after hours it should not exceed 30 $LA_{90,T}$ .**

**These noise limits must be included in the DEC (EPA) licence agreement for this development. It is essential that noise level specifications be required for tenderers supplying of equipment for the plant.**

(Submission 6)

Noise generated by the facility has been assessed with consideration to the NSW Industrial Noise Policy (2000). AS 1055-1997 specifies it should only be used as a guide in the absence of measured results.

**The report acknowledges that the noise generated may exceed the noise goals.**

**As stated in the report, the majority of background noise is attributed to local fauna. Machinery noise radiating at the same energy can be very disturbing. Furthermore, man made noises are more noticeable in rural areas because of the lower background noise and the lack of sound absorbers, such as buildings. Another factor that must be taken into account is the refraction of noise during the autumn and winter months when inversion layers are present which is very common in the area and can increase the noise level by 10dBA.**

**Maximum level of 35dBA must be strictly enforced at the monitoring sites in the report and permanent monitoring equipment set up to continuous monitor the noise levels. The plant level is to shut down when noise levels are exceeded.**

(Submission 36)

GHD has undertaken modelling under a number of different meteorological scenarios, including temperature inversions, which as specified in the Noise Impact Assessment, would be considered worst case. The results are graphically displayed on the modelled contours in the report, with supporting text.

The report acknowledges that the project specific noise goals would be exceeded by 3 dB(A) for the 96 dB(A) mitigation specification in the presence of an F-Class inversion and a 2 m/s drainage flow in the direction of the residence. This is an extreme case and is unlikely to occur on a regular basis. A regular basis according to the Industrial Noise Policy is more than 30% of the time during the night time period.

Additionally under the 91 dB(A) SWL specifications there are no predicted exceedences. It should be noted that there was a typographical error in table 7.1 of the Environmental Assessment where 39.2 should have read 32.9 for scenario 8. The correct levels were displayed on the noise contours.

**Existing background noise level analysis performed at Make it Mudbricks would give a non typical base level criteria to establish a benchmark. The most effected neighbour being the Bamarang Bush Cabins and Yoga Retreat were not assessed in terms of pre-existing background noise. The proposed plant will be capable of operation 24hrs per day and during the still of night any industrial noise would totally ruin the ambience and potential longevity of this established business.**

**Stringent noise level criteria, in accordance with Australian Standards, needs to be specified with criteria based on the least common denominator or weighted average of surrounding properties.**

(Submission 37)

The Noise Impact Assessment included background noise monitoring at a location on Bamarang Road less than 1 km from these cabins and therefore further analysis referred to this location (as well as the other 2 locations monitored) to compare predicted operational noise against the criteria. Background noise levels from this location were used in the assessment to assist in defining project specific noise goals.

The noise models took into account existing topography of the area, including the natural drop over the escarpment to receivers located below this area.

The Make it Mudbricks site has been assessed in accordance with the NSW Industrial Noise Policy. The findings of this assessment suggest that background noise levels from the plant should not effect the premises during night time if the recommended mitigation measures are incorporated into the design.

### 3.7.4 Potential vibration impacts

**What if any vibration/resonance analysis has been performed? Concerned that that constant hum from a 24 hr per day operation adjacent to the edge of a sandstone escarpment could well transmit noise/vibration through the rock resulting in noise being transmitted over further distances than would normally be anticipated.**

(Submission 37)

Based on separation distance and specified sound power recommendations it is considered the risk of vibration impact is extremely low. Ground vibration in nature diminishes in strength with distance and is only an issue when activities such as pile driving or blasting are undertaken in close proximity to a receptor.

### 3.7.5 Noise monitoring

**Concern - plans for the control of noise especially in Stage 2 development should be monitored as part of the process. The University's site at George Evans Drive is some distance from the proposed facility but in noise terms, Shoalhaven Campus is a pristine site. Hope that the gas turbines can be constructed with real noise control not cosmetic noise control.**

(Submission 38)

Should development approval be granted, the facility would require a licence, pursuant to the *Protection of the Environment Operations Act 1997,* to operate. Any requirements for monitoring of operational noise would be prescribed by DEC as part of this licence.

Additionally, the predicted noise contours included in the Noise Impact Assessment indicate that there should not be any significant impact at the university site.

## 3.8 Power lines

**The power lines that will pass through the mud brick property should be installed underground to prevent property devaluation and limit health risk.**

**The power lines should be installed underground to prevent this loss of visual amenity.**

**Place electricity line underground – extend underground line to 2 kms west of Flat Rock Creek Dam.**

(Submission 6, 8)

Delta's proposal, as described in the environmental assessment, is for the transmission lines to run north from the site (above ground) to the existing transmission corridor located within Bamarang Nature Reserve, then east along the corridor to Yalwal Road. It would then continue along the south side of Yalwal Road to the eastern side of Flat Rock Creek. At this location, it would run underground through the urban areas of West Nowra to the substation.

**There are negative health effects of working and/or living under high voltage power lines. The manager of Make it Mudbricks will be both working and living at the mudbrick yard in very close proximity to the overhead power lines. The voltage on these power lines will increase from 11,000 Volts to 132,000 Volts, a 12 fold increase. This will significantly increase the potential risk from the exposure to EMFs.**

(Submission 6)

As noted in the environmental assessment, Delta is a member of the Electricity Supply Association of Australia (ESAA) and adopts the ESAA's Policy Statement on Electric and Magnetic Fields. This includes a commitment to the ongoing monitoring of engineering and scientific research, including overseas policy developments and a commitment to the policy of prudent avoidance as endorsed by the ESAA with regard to the location of assets and electric and magnetic fields.

**Would like some reassurance that we will not be troubled by power surges or other electrical problems, particularly during storms.**

(Submission 9)

Storms can cause power surges however this is normally associated with the greater electricity network or a particular local problem, such as when a tree falls on a line, and is not directly attributable to electricity generators. Given that the proposed power lines would carry a higher voltage, they would be more robust in design than those that normally run along a residential street. The proposed power lines would be built to withstand storms that would normally be experienced in the Nowra area, and would be designed so that lightning does not affect them. The proposed facility would be similarly designed. There would be a clear easement near the power lines to prevent problems with falling trees.

The National Electricity Rules outline strict requirements to be met by any new power facility being added to the electricity network. These requirements relate to power surges, flicker etc. The stability studies undertaken for the Environmental Assessment (refer Appendix B) demonstrated that the proposed facility would meet the requirements for connection to the network. Integral Energy are currently undertaking another study to ensure that the proposed facility would meet both their rules and the National Electricity Rules, which include:

> '5.2.5 Obligations of generators
>
> (a) Each Generator must plan and design its facilities and ensure that its facilities are operated to comply with:

(1) its connection agreement with a Network Service Provider;

(2) subject to clause 5.2.5(a)(1), all applicable performance standards; and

(3) subject to clause 5.2.5(a)(2), the system standards.'

The system standards define levels of voltage fluctuation, frequency etc. The rules can be viewed online at http://www.aemc.gov.au/rules.php.

**What noise sound will be generated from the volume of electricity moving through the high voltage wires?**

(Submission 8)

Electricity moving through transmission lines does not generate sound. The transmission lines would be designed and constructed according to Internal Energy's standard requirements and guidelines.

## 3.9 Site justification and alternative sites

**Other locations are more suitable and these should be considered.**

**The project is not appropriate for this site. It is suited to an industrial area or an urban landscape.**

**It is a quiet non-industrial location, totally unsuitable from an environmental perspective. Gas power facilities should be located in industrial areas and not areas of significant conservation and scenic value.**

**Delta's other plants are located in industrial zonings.**

**Why hasn't the Flinders industrial estate been considered as the preferred site? Connection to and reticulation from the eastern gas pipeline would be more extensive but easily accommodated in the existing road corridor easements of Yalwal Rd and Cabbage Tree Lane which would eliminate the costly, unsightly and potentially hazardous installation of high voltage transmission lines as proposed.**

(Submissions 2, 10-35, 37, 40-74)

As outlined in Chapter 7 of the Environmental Assessment, a number of alternative sites were considered during the development of the proposal. In order for a site to be considered, it had to be available for purchase. Delta's site selection was guided by a set of selection criteria, which related to both key criteria and desirable characteristics of a potential site. Key criteria included proximity to high voltage electricity distribution systems, gas supply and water supply. In addition, the following characteristics were deemed to be desirable at the site:

- Availability of existing easements/corridors for electricity transmission;
- Distance from built up areas;
- Existing land use zoning permits use for a power facility;
- Development would not require significant amounts of large scale clearing (for on site uses or transmission); and
- The size of the site permits the facility to be adequately buffered from surrounding land uses.

Delta investigated a range of possible sites that were available for purchase and met the locational requirements. In total, nine sites were considered, as detailed on page 7.2 of the Environmental Assessment. The site at Bamarang was considered to have the following advantages:

» Proximity to the Eastern Gas Pipeline (located 600m to the east of the site);

» Proximity to high voltage transmission lines (the 132 kilovolts lines are located approximately 6 kilometres to the east of the site, 330 kilovolts lines are located 4 kilometres to the west of the site, with an existing substation located near the intersection of Albatross and Yalwal Roads 6 kilometres from the site);

» The gas supply tariff is competitive as the site is located closer to the gas pipeline that other available sites;

» The site was available for purchase. It had been developed for use as an abattoir and was considered appropriate for the proposed facility;

» With approximately 2.5 hectares already cleared for the abattoir development, the need for large scale clearing was reduced;

» The land use zoning permits the proposed facility; and

» The site is surrounded by bushland, which minimises the visibility of the facility, and the potential for impacts on surrounding land uses.

The other eight sites were discounted as for various reasons, such as high gas transportation costs, capacity constraints in the local transmission network which would limit the plant output, lack of infrastructure and land use constraints. These are detailed on page 7.2 of the Environmental Assessment.

It is not uncommon for power facilities to be located outside of urban areas. There are a number of other gas power facilities located in rural areas in Australia, such as the Pinjar Gas Turbine station (north of Perth in Western Australia), the Mungarra Gas Turbine Station (southeast of Geraldton in Western Australia) and Barcaldine Combined Cycle Gas Turbine facility (just outside the town of Barcaldine in Queensland).

**The facility does not have close proximity to the 132KV electrical network - it is 7.2km away; and availability of water is actually a minimal requirement according to the EA - unless there is an unstated point of seeking to draw water from the Shoalhaven River for stage two process water. If this is the case then this is a very serious shortcoming of the proposal.**

(Submission 2)

Figure 5.4 in the Environmental Assessments demonstrates the central location of the site with respect to the regional gas and electricity distribution network. A substation providing access to Integral Energy's high voltage electricity distribution network is located approximately 6 km from the site. Delta considers this to be an acceptable proximity. Water supplies are available in the region. It is estimated that the stage one facility would require approximately 2.2 megalitres per year of potable water for domestic and process requirements. Water supply options for stage two are subject to further investigations. This is why a concept approval only is being sought for stage two.

## 3.10 Groundwater

**The EA mentions that no measurement of groundwater quality was undertaken and that the direction and flow of groundwater beneath the site could not be confirmed. It also states that given the low risk of any spills and minimal disturbance to subsoil structures, the proposal did not pose a significant threat to the environment.**

**As pile driving will possibly be used in the construction of the facility (Section 9.2.4), it is suspected that there will be some disturbance to the sub-soil structure with potential effects on groundwater.**

**Given the storage of hazardous materials on site, the potential for a hazardous spill, degraded infrastructure as the gas power facility ages, and a disturbed sub-soil structure, it is very likely that groundwater will eventually become contaminated and Bamarang Reservoir itself could become contaminated.**

**Given the site's proximity to Bamarang Reservoir, which supplies the water needs of the northern Shoalhaven area, a detailed analysis of the depth, quality, direction and flow of groundwater beneath the site needs to be undertaken.**

**A detailed risk assessment needs to be conducted on the effects of a hazardous spill contaminating the groundwater beneath the site and its potential impact on the water quality of Bamarang Reservoir.**

**As the plant ages or is decommissioned, the site itself will be contaminated and require continuous monitoring to stop potential contamination of the reservoir.**

**A detailed risk assessment needs to be conducted on what possible effects there might be from hazardous materials stored on site when the site's infrastructure ages or the plant is decommissioned, and whether this will effect the water quality of Bamarang Reservoir.**

(Submission 4)

The proposed facility was considered to be low risk in terms of the potential for groundwater impacts, and a groundwater impact assessment was not identified as a key assessment requirement for the proposal.

Although groundwater flow directions were not directly measured, it is likely that Bamarang Reservoir acts as a local groundwater recharge zone given the large volume of water held in the reservoir, the surrounding topography, and the dominance of low permeability fractured siltstones, sandstones and shales in the underlying geology. Hence groundwater is unlikely to be moving from the site towards the Bamarang Reservoir, but is more likely be flowing away from the Reservoir.

Pile driving would not likely affect the overall groundwater flow given these conditions. Additionally, as stated in the Environmental Assessment, engineered drainage systems combined with appropriately bunded enclosures would be used to contain potential hazardous materials. Regular inspections and integrity testing of the systems would be undertaken to ensure that these systems comply with Australian Standards 1940-1993 to ensure they continue to provide adequate protection against fuel and oil spills. Given these management procedures

and the overall hydrogeologic conditions, groundwater is not anticipated to be a major issue for the proposed facility.

## 3.11 Water

**DEC has recommended replacing the two existing measures with a single measure. The recommended changes to the draft Statement of Commitments are required to ensure clearly defined and enforceable water protection outcomes and DEC will be able to issue an Environmental Protection Licence consistent with the recommended Commitment.**

(Submission 7)

This has been done.

**Effluent waste is proposed for stage two water requirements. Effluent requires treatment and this can cause odour problems, which the EA hasn't addressed.**

(Submission 2)

Stage two of the proposed facility would not be required until such time that electricity demand reaches a level where additional base load supply is required.

The assessment of infrastructure associated with the supply of water to the proposed facility does not form part of the scope of the Environmental Assessment. One of the reasons Delta is seeking a concept approval for stage two of the proposal is, because it is not possible to confirm the water supply option for stage two at this time (as noted on page 3.4 of the Environmental Assessment):

> 'The proposed facility is a staged project and there is uncertainty regarding timing of the second stage, which requires large volumes of water to be supplied. As a result, it is not possible at this time to confirm and secure the water resource (from either current wastewater streams or the existing fresh water supply network) and determine a water pipeline route. If water were not available, Delta would have to revert to dry cooling for the stage two operations, which is more costly and less efficient. Prior to commencing stage two, Delta would need to further investigate and confirm the availability of water.'

A detailed study of water supply options would need to be undertaken, including an environmental impact assessment of the preferred option, and/or any modification to the proposal (as currently described in the Environmental Assessment), prior to the commencement of stage two. This commitment is included in the final statement of commitments for the proposal (refer Section 5).

With respect to effluent treatment, the Water Cycle Management report (Appendix G of the Environmental Assessment) notes on page 16 that the use of industrial effluent would require the following works:

a. Construction of pump station and pipework to transfer water to the Bamarang power facility. To the extent possible, pipework routes would follow existing easements.

b. Storage ponds to allow for process flow variations. Some holding capacity is available at Manildra Starches but would need to be assessed for capacity. Storage capacity is also allowed for within the Bamarang power facility.

c. Effluent treatment. Both effluents are understood to be of a reasonable quality (Manildra's because it consists of a condensate stream only and Australian Paper's

because flows pass through a secondary treatment plant). However add on processes such as tertiary filtration and disinfection for these streams might be necessary to achieve a water quality suitable for use in the power facility process water stream. The location of the wastewater treatment process could be either at the industrial facility or at the power station. Alternatively, this water stream might be managed by Shoalhaven Water (which would allow for greater community flexibility in the allocation of water resources). In this case it might be reasonable to assume that the industrial effluent streams would pass through the Nowra treatment plant (although this would probably require augmentation) or another plant specifically built for the purpose.

**Water source for stage two has not been thought through sufficiently. Fear that there may be intention to increase water extraction from the Shoalhaven River System. The river system is already under extreme duress due to extractions going to Sydney. The water system cannot cope with more stress. Stage two water requirements are huge. This whole area requires further investigation and analysis.**

(Submission 2)

See response below.

**Stage 2 will use 3,100 megalitres per day which is a large consumption of water. Concern for the Tallowa Dam and the Shoalhaven River. The extraction of water to Sydney is imposing a further demand on water supply as well as the increase in the population of Shoalhaven.**

**The report states that industrial effluent would be piped to the site to meet this demand. However, the source of this water is not identified and it is doubtful this will actually happen as water could be pumped from Manildra but the maximum flow rate is only 4.6 megalitres per day, a major upgrade to the Nowra sewage plant would be required to process waste water suitable for the plant and pumping of water from Nowra to Bamarang would be expensive as Bamarang is higher than Nowra.**
**Recommendation: The provision of industrial waste water and the cost of supplying this waste water be assessed prior to any approval for the facility.**

(Submission 36)

See response below.

**Stage 2 represents a significant increase (33%) in the current daily Nowra usage and appears unacceptable at any time let alone during a period of drought. What controls will there be on water consumption? The actual usage combined with any commensurate increases due to plant expansion will no doubt see far greater volumes of this most valuable resource being sought.**

**It is noted that some consideration has been given to drawing brackish cooling water from the Shoalhaven River, which is 'tidal'. Has this been discounted simply on the basis of additional cost required to provide anti-corrosive infrastructure?**

**I do not believe that the proposals for the future use of recycled waters will ever eventuate; this is a smokescreen. Should the proposal be approved the contract documents should clearly specify the requirement for the use of recycled waters for stage 2 or alternatively impose heavy cash penalties or plant closure for not adopting**

**alternative cooling water options beyond a certain date. The use of the projected volume of potable water for stage 2 is just not on.**

(Submission 37)

As noted above and in the Environmental Assessment, Delta recognises that prior to commencing stage two, further investigation of the issues and options associated with meeting the stage two water demands is required.

The Water Cycle Management report identifies the following in Section 5.2 (Preferred Water Sourcing Option):

> 'Based on the above overview of potential water sources, the preferred water source involves the use of industrial effluent in combination with internal water recycling (of site "wastewaters") and utilisation of stormwater runoff. This ensures that access to raw water (a source of potable water for the community) is minimised and retained for more sensitive water uses.
>
> For stage 1 the plant and equipment requires only minimal water, which can be sourced from the Nowra potable (treated) water supply or on an as required basis. The power plant facility will also require water for domestic purposes and this will also be supplied from the Nowra potable water supply system or rain water tanks if a nearby connection is not considered warranted for the required volumes (as determined during detailed design).
>
> At stage 2 the CCGT plant requires water for cooling and processes. The preferred source will be treated industrial effluent (or other effluent if available) which is likely to be sourced directly from Australian Paper and Manildra Starches or through an arrangement with a third party (eg. Shoalhaven Water). However, if at the time of construction of the Stage 2 plant, these sources can not be considered a reliable source then consideration will be given to the use of raw water from Bamarang Reservoir as a preferred source (subject to negotiations with Shoalhaven Water).
>
> Shoalhaven Water have indicated that in the longer term, other water supply options (such as the raw water or water from the REMS scheme) could become available. This availability may coincide with the Stage 2 development and hence a firm commitment to the adopted water source for this stage of the development has not yet been made. Furthermore, if all water sources are found to be unviable then the use of a dry cooled process may be adopted.'

As noted above, when the need for stage two of the facility is confirmed, Delta commits to undertaking a detailed study of water supply options, and an environmental impact assessment of the preferred option and/or any modification to the proposal (as currently described in the Environmental Assessment), prior to the commencement of stage two.

**No information on the potential impacts of water supply infrastructure for Stage 2 of the proposal. DNR supports the option of reusing industrial waste/reclaimed effluent for cooling waters but questions the notion of piping water some 10km from Bomaderry to the site. The EA makes no reference to potential impacts associated with accessing industrial water from the north side of the Shoalhaven River. Submission contains information regarding licensing requirements regarding the identified options for water supply in stage 2.**

(Submission 39)

As noted above, the assessment of infrastructure associated with the supply of water to the proposed facility does not form part of the scope of the environmental assessment.

## 3.12 Visual impact

**The stacks will be visible from various locations. The stacks are unsightly and a big negative for the town as a whole. Further data needs to be seen to confirm where the stacks will be visible and in all directions.**

**The site is situated on the highest point of Nowra Hill. The structure will extend pass the treeline and be the most prominent visual point in the skyline.**

**The proposed site is the 2nd highest location in the district, with Nowra Hill being the highest. The plant will be highly visible from all aspects and approaches to region providing a negative focal point to a tourist destination of the Shoalhaven.**

**The weight of argument in management of visual impact lies in the "distance from the site" - this view is nullified in light of future developments proposed by council it can be expected that distances between the site and future residences will be significantly reduced.**

**A vegetation screen must be grown to shield the plant from Yalwal Road. It is important that the native bushland visual amenity is preserved and that the proposed development will not be seen from Yalwal Road.**

(Submission 2, 6, 10-35, 37, 40-74)

As noted in Section 9.5 of the Environmental Assessment, the site is set back from the road and is surrounded by heavily wooded bushland areas, dominated by a tall upper storey of trees of approximately 30 metres in height. Existing buildings on site reach a similar height.

The majority of the proposal would be surrounded by heavily wooded areas which significantly reduces its overall visibility. The concept design for the proposed facility has also attempted to maximise the use of existing cleared areas on the site to reduce the potential impacts associated with clearing.

Heights of major facilities in stage one would be as follows:

» The two gas turbines would be approximately 11 metres high; with the gas turbine air intake filters would be 24 metres high; and

» The two exhaust stacks associated with the turbines would be approximately 40 metres high.

Heights of major facilities in stage two would be as follows:

» The two heat recovery steam generators connected to the stage one gas turbines would be approximately 32 metres high;

» The cooling tower would be approximately 11 metres high; and

» The steam turbine building would be approximately 11 metres high.

Views of the proposed facility are expected to be limited to filtered views into the site for vehicles driving along Yalwal Road, and the top of the stacks which extend above the tree line.

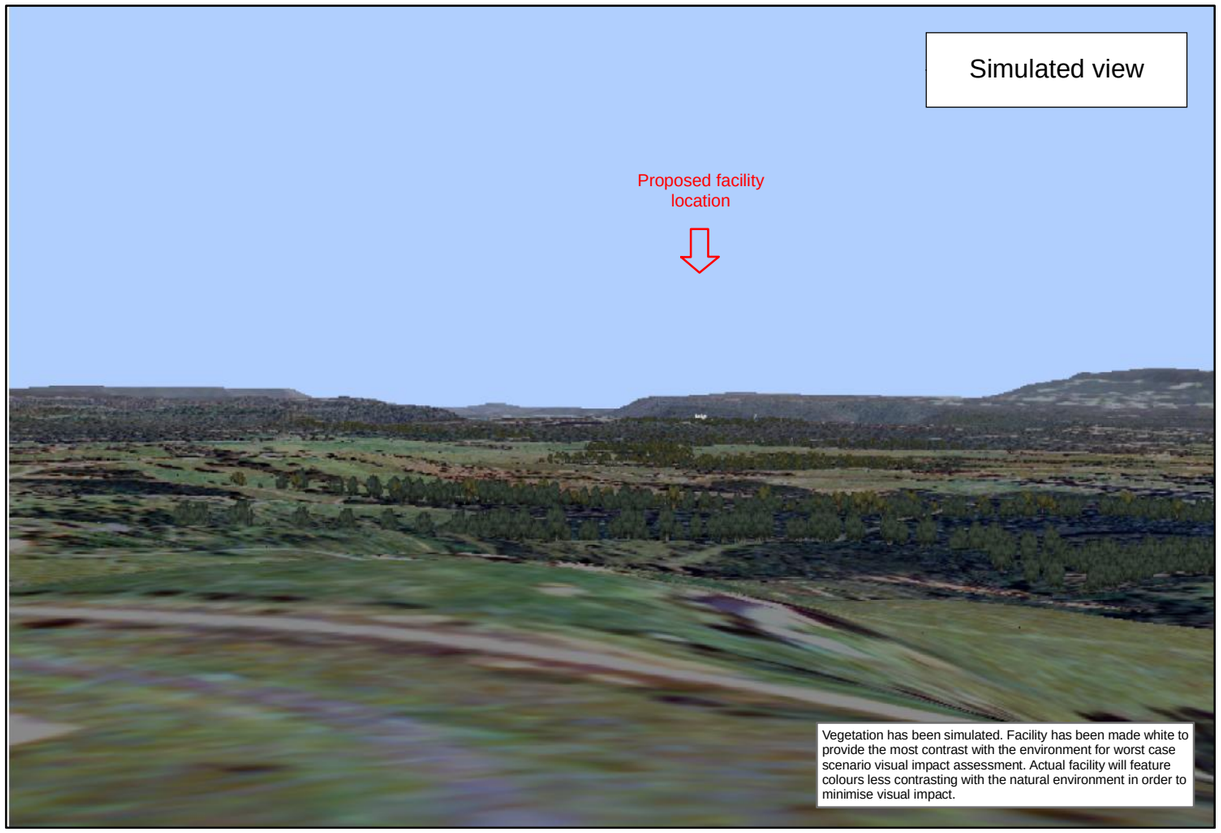
Other than passing vehicles, visual receivers in the immediate vicinity of the site are limited.

Views towards the site are potentially available from the Nowra Hill lookout (located near HMAS Albatross) and from certain points in the Cabbage Tree Lane subdivision area.

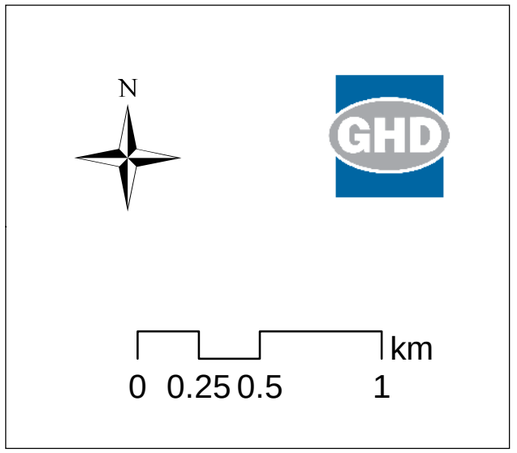
Due to the screening provided by the trees, the abattoir is not currently visible from the Nowra Hill lookout. As noted on page 9.17 of the Environmental Assessment with respect to Nowra Hill: 'The potential for views of the proposal would be limited by the distance from the site (approximately 6 kilometres) and the significant screening that would be provided by surrounding bushland. The top section of the stack may just be visible from the look out, however the potential for visual impacts are considered to be low as a result of the distance from the site.'

With respect to Cabbage Tree Lane, it is noted on page 9.17 that: 'The potential for views of the proposal would be limited by the distance from the site (approximately 2 kilometres) and the significant screening that would be provided by surrounding bushland. Limited background views of the top section of the stack may be possible, however the potential for visual impacts are considered to be low as a result of the distance from the site.'

GHD has undertaken some modelling of the potential impacts of the proposal using the geographic information systems (GIS) software ArcGIS and ERDAS Imagine (a virtual GIS/landscape simulation package). The results are shown in Figures 1 to 3. It is noted that the proposed facility has been shown in white to enhance its visibility for mapping purposes, however other colours will be chosen during the design phase to reduce the contrast with the natural environment.



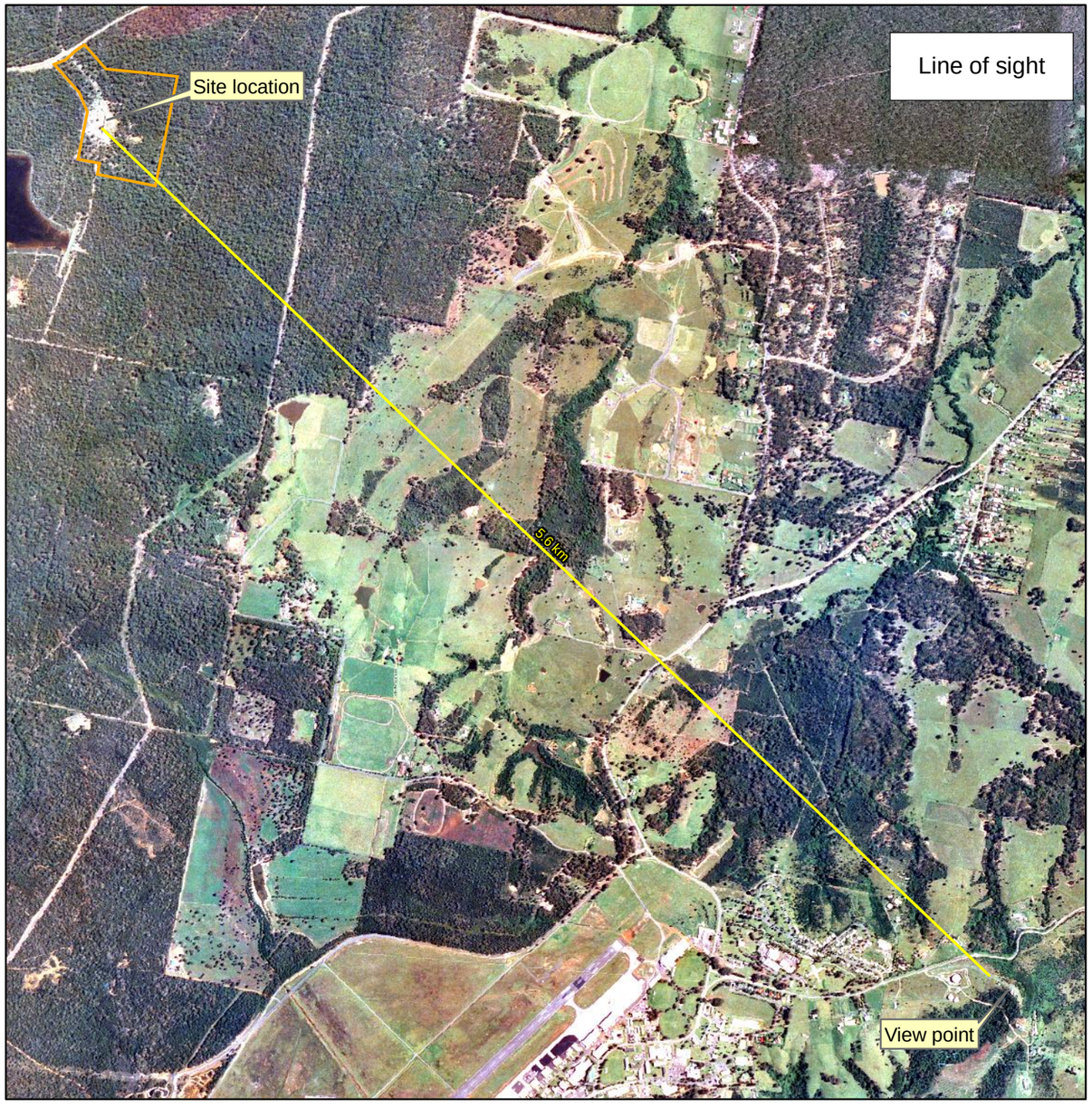





Delta Electricity

Environmental impact assessment
for the proposed gas power plant at Bamarang

Figure 1: Simulated view of development
Lookout

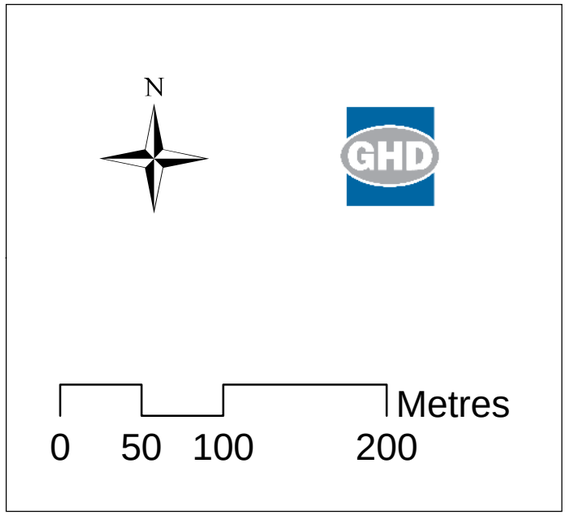


Simulated view

Taller elements of facility

Vegetation has been simulated. Facility has been made white to provide the most contrast with the environment for worst case scenario visual impact assessment. Actual facility will feature colours less contrasting with the natural environment in order to minimise visual impact.

Current view

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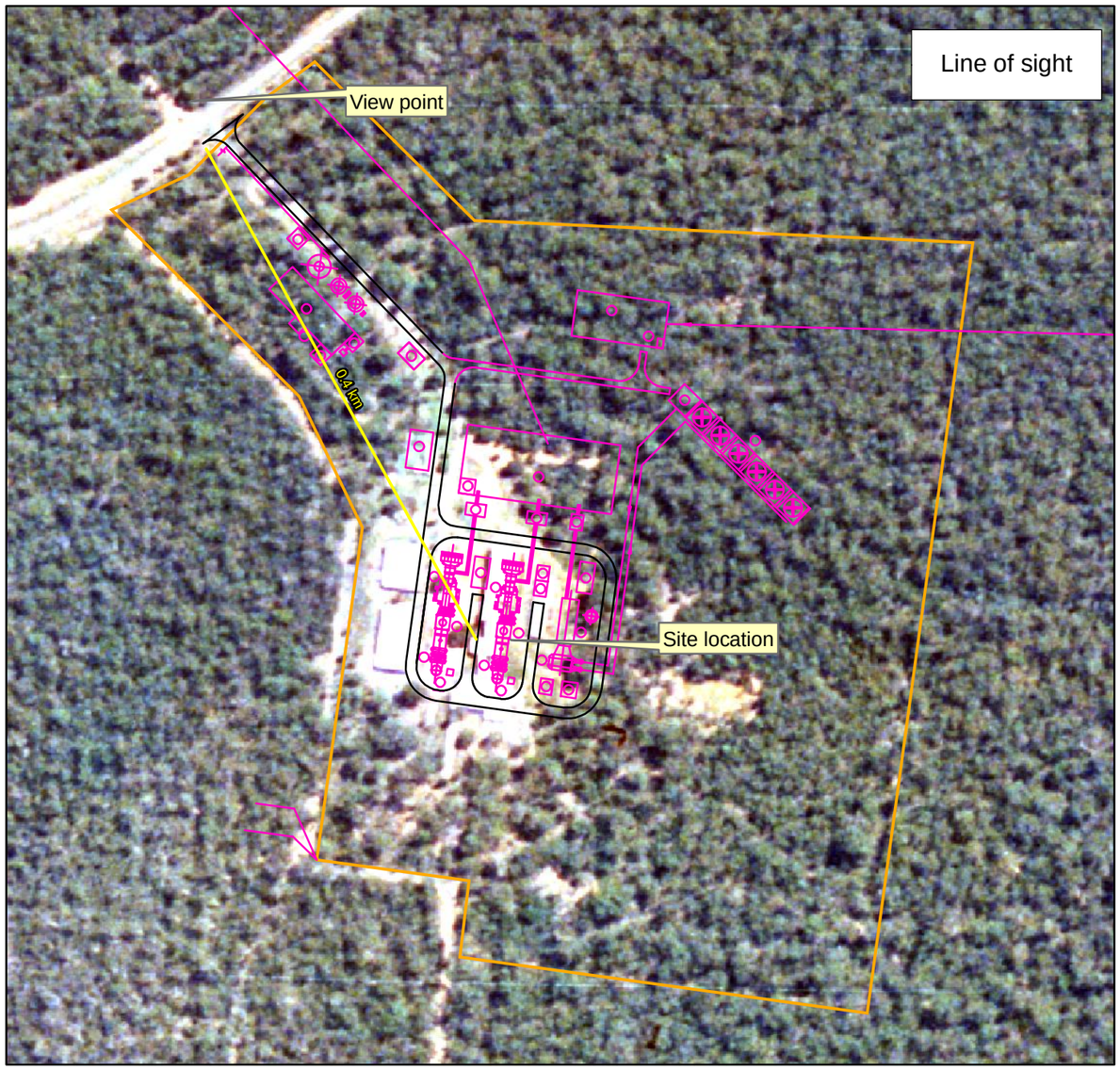
Environmental impact assessment
for the proposed gas power plant at Bamarang

Figure 2: Simulated view of development
Front gate of property



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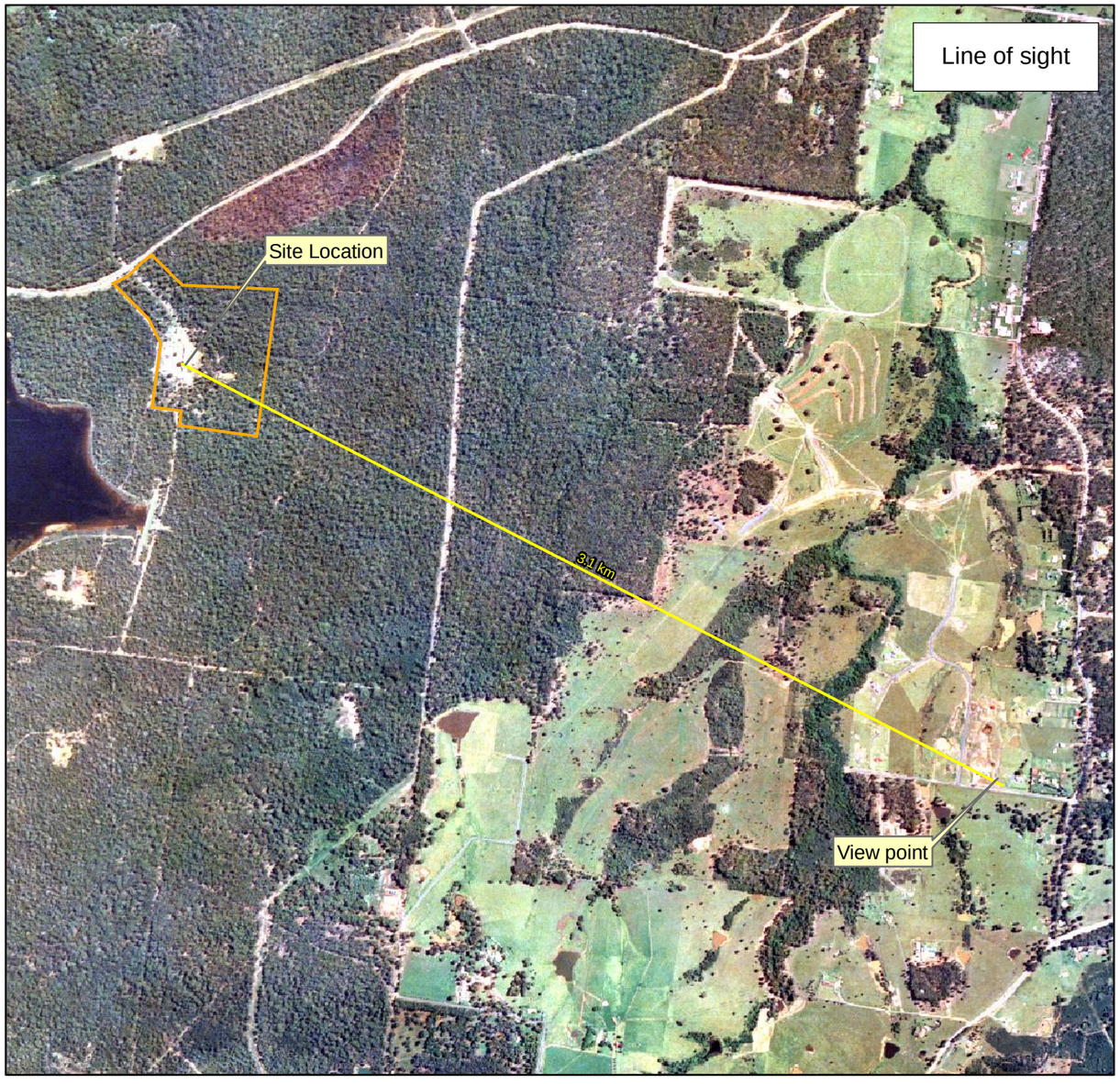
Environmental impact assessment
for the proposed gas power plant at Bamarang

Figure 3: Simulated view of development
Cabbage Tree Lane area



Comment regarding future residential development in the vicinity of the site is provided in section 3.6 above.

The environmental assessment recommends a number of measures to mitigate the potential for visual impacts, including maximising the use of existing cleared areas on site; retention of vegetation outside areas required to be cleared; additional tree planting at the site entrance to screen the proposed facility from Yalwal Road; and appropriate choice of building materials and treatments/colours.

**Would like the stacks height to be reduced.**

(Submission 2)

The stack height is determined by the physical height of the heat recovery steam generator attached to the gas turbine and the need to safely disperse the exhaust gases. The exact height would be subject to final design details but it is not expected to be different to that proposed.

**The facility will have a negative impact on tourism. If the proposal is to proceed, the EA should analyse the potential negative impacts on tourism in the area.**

**The appeal this area offers to future and existing residents, businesses and tourism will be at risk with the high visibility of an operative industrial site within a bush setting.**

**The project will devalue land and property, casting the appearance of an industrial landscape.**

(Submissions 2, 10-35, 37, 40-74)

An assessment of impacts on property values or regional tourism did not form part of the requirements for the Environmental Assessment.

It is difficult to assess the impact of a proposal on property values, as it is difficult to isolate the effect of proposal on property values alone, since several other factors (interest rates, local economy, population trends, etc) also have significant effects. However, the proposal is not anticipated to result in an impact on property or tourism values in the surrounding area.

As noted in the Environmental Assessment and in the responses to submissions given above, no significant air quality, noise or visual impacts are predicted. As a result, the amenity for residents and visitors to the surrounding area is not predicted to decline.

**For navigational reasons the facility will be lit up at night further impacting on residences.**

(Submission 10-35, 40-74)

In section 6.4.6 it is noted that site lighting would be designed to ensure that light overspill to areas outside the boundaries of the facility is minimised. There is no requirement to light the whole facility for navigation reasons.

The Department of Defence advised, by letter dated 17 November 2005, that the proposed stacks would not infringe any Obstruction Clearance Surface for the Naval Air Station Nowra (Albatross base).

The Civil Aviation Safety Authority, in their submission on the environmental assessment, noted that the proposal is wholly within the Nowra Defence aerodrome area and that they had no comment to make.

The need for any obstruction warning lighting at the top of the proposed stacks would be determined during the detailed design phase in consultation with the Department of Defence.

**In operation, the constant release of steam into the atmosphere will further impact visually**

(Submission 10-35, 40-74)

See response under Section 3.1.1 above.

## 3.13 Other issues

### 3.13.1 Safety

**Danger of lightning strikes.**

(Submission 8)

The design of the proposed facility and transmission lines would incorporate protection against lightning. If a strike occurs it would be safely conducted to earth via specifically designed earth wires and lightning rods.

### 3.13.2 Easements

**In relation to the proposed route along Yalwal Road adjacent to Triplarina Nature Reserve, the proposal that any clearing would be contained within the road reserve requires clarification. Once the actual position of the electricity transmission lines relative to the road reserve is determined, DEC will be able to determine the need for the easement and/or possible closure of the road reserve.**

(Submission 7)

It is our understanding that widening of the Yalwal Road corridor adjacent to the Triplarina Nature Reserve to 40 metres is proposed by NPWS/Council. The extent of clearing would need to be defined in more detail when the proposed widening of the corridor is finalised and surveyed.

Delta proposes that the transmission line be aligned alongside the southern boundary of the road corridor within the proposed widened 40 metre road corridor. It is understood that the boundary of the 40 metre wide road corridor is to be determined with a view to minimising native vegetation clearing. The impacts of the proposed widening of the corridor would need to be assessed separately.

Delta does not intend to acquire an easement for the electricity transmission line in this section. Easements are not required for electricity lines transmission lines within road corridors under the terms of the Electricity Supply Act.

### 3.13.3 Operating hours

**The EA gives no apparent indication of the likely duration of Stage 1 operations nor how the 440 hours will be spread throughout the year.**

(Submission 5)

Stage one would involve the development of a peaking facility, designed to operate during periods when the demand for electricity peaks (such as on hot summer days when peak use of air conditioning occurs). Section 6.6.1 of the Environmental Assessment notes that 'For stage one, operating times and duration would depend on the requirements of the national electricity market. Operating hours to a maximum of 440 hours a year (approximately 55 days a year, for up to 8 hours a day) have been assumed for the purposes of the environmental assessment.'

# 4. Statement of commitments

This section provides the final statement of commitments for the proposal. New or amended measures are indicated by blue text.

## 4.1 Overall commitments

**Obligation to minimise harm to the environment**

Delta confirms its commitment to ensuring that all practicable measures to prevent or minimise any impacts to the environment that may arise form the construction, commissioning and operation and where relevant, the decommissioning of the proposal.

**Staging of development**

Delta confirms its intention to construct the proposal in two stages. Prior to the construction of stage two of the proposal, Delta would submit to the Director-General:

» Confirmation of the water sources and supply options for stage two;

» A demonstration that, based on extrapolation of relevant monitoring data established during the operation of stage one of the proposal, that the progression to stage two would not cause any air quality impacts above those predicted; and

» An updated construction environmental management plan to reflect the inclusion of stage two works.

Construction of stage two would not proceed until Delta has received written approval of the above documents and addressed any further requirements that may form part of the approval.

**Restriction to fuel consumption**

Delta would only operate the proposal on natural gas for routine firing in the power station turbines. Delta would not use liquid fuels to fire the proposal without written the approval of the Director-General.

**Acquisition of land and land management**

Prior to the commencement of construction, easements for the gas pipeline and electricity transmission line would be acquired where necessary in accordance with the requirements of the *Crown Lands Act 1989* and the *Land Acquisition (Just Terms Compensation) Act 1991*.

## 4.2 Mitigation Measures

Delta commits to implement the measures outlined in Table 4.1 to minimise the potential for environmental impacts.

## Table 4.1 Revised mitigation measures

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| Air quality | *Operating conditions*<br>Natural gas is the only fuel to be used for firing the power station turbines.<br>All activities at the premises would be undertaken in a manner that does not cause or permit the emission of offensive odour beyond the boundary of the premises.<br>In stage one, the proposed facility would only operate to meet peak demand.<br>All plant and equipment installed at the premises or used in conjunction with the construction or operation of the facility activity would be maintained in a proper and efficient condition and would be operated in a proper and efficient manner. | Operation |
| | *Discharge limits*<br>The project air quality goals listed in Table 10.2 (below) are achieved.<br>The proposal would be designed and operated to ensure that the concentration of each pollutant listed in Table 8.4 of the environmental assessment would not be exceeded for each discharge point. | Design, operation |
| | *Dust emissions*<br>All activities undertaken would be carried out in a manner that minimises the generation of dust, or emission of dust from the site, including wind-blown and traffic-generated dust. Measures proposed to minimise dust would be specified in the construction and operation environmental management plans, and would include those listed in Section 8.1.5 of the environmental assessment. | Construction, operation |
| Greenhouse | *Delta's greenhouse commitments*<br>Delta would continue to meet its commitments under the Commonwealth Government's Generator Efficiency Standards and Greenhouse Challenge (Plus) Program. Under these agreements, Delta is committed to achieving greenhouse gas emissions abatement through diversification of its generation portfolio, reflecting community and government expectations of a sustainable future for electricity generation. Delta's approach to greenhouse gas abatement includes:<br>» Minimising impacts of existing coal-fired plants<br>» Investigating transitional, combined technologies<br>» Developing new renewable energy technologies for the future | Construction, operation |
| Flora and fauna | *Physical works to prevent off-site impacts*<br>Fencing of proposed development areas to ensure construction works do not breach the boundaries or enter the adjacent vegetation and National Parks and Reserves.<br>Sediment and erosion control measures to be implemented.<br>Placement of stockpiles away from vegetated areas.<br>Piling of soil that may contain seed of exotic species away from adjacent vegetation or drainage lines where they could be spread during rainfall events.<br>Maintenance of a vegetated buffer between any development and the adjacent reserve. | Construction |
| | *Protection measures*<br>A more thorough inspection of the disused abattoir prior to demolition to verify the absence of the Eastern Bent-wing Bat.<br>Retention of mature, hollow bearing trees within the study area (where possible). | Pre-construction |

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| | *Maintenance measures for easement*<br>Allowance for regeneration to maximum acceptable height along drainage lines supporting potential habitat for Nowra Heath-myrtle.<br>Retention of mature, hollow bearing trees within the study area (where possible).<br>Where avoidance of hollow-bearing trees is not possible, hollow-bearing branches and trunks would be carefully removed and checked by an ecologist for any fauna and then placed within the adjacent woodland to provide habitat for other fauna species.<br>Monitoring and management of weed invasion along the proposed gas pipeline route to ensure regeneration of native species takes place.<br>Fencing of proposed development areas to ensure construction works do not breach the boundaries or enter the adjacent vegetation and National Parks and Reserves. | Design, construction |
| | *Offsets*<br>Delta commits to continuing discussions with DEC on habitat offsets. | Design |
| Bushfire hazard | *Fire management measures*<br>Asset protection zones to be implemented in accordance with the provisions outlined in the Bushfire Risk Assessment report (GHD 2005). | Construction, operation |
| | *Building standards*<br>Level 2 (AS 3959 – 1999) Construction Standards to apply where relevant.<br>Combustible materials likely to be impacted by radiant heat would not used in the construction of the gas fired power facility. | Design |
| | *Operation environmental management plan*<br>The operation environmental management plan would include fire prevention measures to be implemented during construction, including but not limited to:<br>» Work involving risk of ignition would not be carried out during periods of total fire ban;<br>» Fire suppression equipment would be available on site;<br>» Appropriate storage and maintenance of fuels and other flammable materials.<br>» Evacuation procedures would also be detailed for any persons located at the gas fired power facility during a bushfire; and<br>» The local Rural Fire Service control centre would be notified of the dates of construction, dates during which 'hot works' are to be conducted would be highlighted. | Operation |
| Water | *Water quality*<br>All activities at the premises must be undertaken in a manner that does not cause or permit water pollution as defined in the *Protection of the Environment Operations Act 1997*. | Design, construction, operation |
| | *Recycling*<br>The recycling of water is maximised through:<br>» Provision of stormwater retention strategies and infiltration;<br>» Rainwater harvesting; and<br>» Management and monitoring of onsite water related activities and infrastructure. | Operation |

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| | *Further investigations prior to stage two*<br>When the need for stage two of the facility is confirmed, Delta commits to undertaking a detailed study of water supply options, and an environmental impact assessment of the preferred option and/or any modification to the proposal, prior to the commencement of stage two. | Prior to stage two |
| Noise and vibration | *Noise emission limits*<br>The project noise criteria listed in Table 9.2 and 9.3 of the Environmental Assessment are achieved.<br>The proposal would be designed, constructed and operated to ensure that noise criteria are not exceeded. The contractor responsible for the design and management of the facility would be required to meet noise criteria. | Design, construction, operation |
| | *Construction time restrictions*<br>» Monday to Friday – 7am - 6pm;<br>» Saturday – 7am to 1pm if inaudible at a residential premises; otherwise 8am to 1pm; and<br>» No work on Sundays or Public Holidays.<br>*Noise attenuation on machinery*<br>All practical measures would be used to silence construction equipment, particularly in instances where extended hours of operation are required. | Construction<br>Construction |
| | *Noise management strategy to be prepared*<br>» A noise management strategy would be prepared as part of the construction environmental management plan, detailing the methodology proposed by the construction contractor and the relative phasing of different construction activities in different areas. This would also outline a program of operational noise monitoring.<br>» To achieve the construction noise criteria at the closest residence (Location 1) the overall sound power level from construction as a guide should not exceed approximately 112 dB(A). | Construction |
| Soils, contamination | *Removal of wastes*<br>All dumped and buried wastes are removed from the site, either prior to, or as part of the development process. | Construction |
| | *Evidence of oily or putrescible wastes*<br>If evidence of putrescible or oily / liquid wastes are noted during removal, then these materials would be sampled and analysed, to permit classification for off-site treatment and disposal, in accordance with the Environmental Guideline Assessment, Classification and Management of Liquid and Non-Liquid Wastes (NSW EPA, May 1999). | Construction |
| | *Decommission fuel storage facilities*<br>All existing fuel storage facilities would be appropriately decommissioned and removed prior to site development. | Construction |
| Soils | *Prepare a management plan*<br>A construction phase soil and water management plan would be prepared as part of the construction environmental management plan, detailing control mechanisms to be implemented during the construction phase. | Construction |
| | *Ensure appropriate environmental controls*<br>During the construction phase (including site construction, plus pipeline / transmission line installation), soil and groundwater would be protected from contamination via the installation of appropriate bunds, drainage networks and (if required) lined detention basins. | Construction |

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| | *Supervision of subsurface works*<br>An appropriately qualified environmental consultant, who would conduct real-time air monitoring of the excavation zone (using a photoionisation detector) would supervise excavation works along Yalwal Road in West Nowra. | Construction |
| | *OH&S pan to be developed*<br>A detailed Occupational Health and Safety (OH&S) Plan would be developed, prior to excavation works occurring, documenting OH&S protocols to be adopted during the excavation works. | Construction |
| | *Contingency planning*<br>A contingency plan would be developed, documenting procedures to be adopted in the event that potentially contaminated soils or uncontrolled fill is encountered during excavation works. | Pre-Construction |
| | *Chemical storage*<br>Chemicals would be stored in designated and secure bunded chemical storage compounds, designed and constructed in accordance with relevant Australian Standards. Regular inspections and integrity testing of the systems will be undertaken to ensure that these systems comply with relevant standards and continue to provide adequate protection against fuel and oil spills. | Design |
| Hazards and risk | *Design features*<br>The following design features would be implemented:<br>» Undertaking a detailed HAZOP during design and incorporate recommended measures;<br>» Installation of a fire protection system in accordance with the requirements of the Building Code of Australia;<br>» Compliance with dangerous goods storage and transport codes, regular inspections and maintenance of critical components;<br>» Bunding of chemical storage tanks; and<br>» Standard operating procedures for activities, which could have the potential to cause hazards or risks. | Design |
| | *Undertake risk and hazard assessments*<br>Prepare and implement the following as part of the operation environmental management plan:<br>» Construction safety study;<br>» Fire safety study;<br>» HAZOP;<br>» Emergency plan;<br>» Safety management system; and<br>» Hazard auditing. | Design, operation |
| | *Management procedures to be implemented*<br>Management procedures would be implemented incorporating practices to prevent risk scenarios occurring:<br>» Minimising build-up of combustible materials on-site; and<br>» Installing bollards/protective barriers around gas metering station. | Design, construction, operation |
| | *Emergency management procedures to be developed*<br>Emergency management procedures would be developed for response to fire and explosion that may be initiated from either on-site or off-site sources | Construction |

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| Visual amenity and landscape | *Take advantage of existing cleared areas*<br>Maximise the use of existing cleared areas for on-site facilities and the electricity transmission line. | Design |
| | *Retain vegetation*<br>Retention of existing vegetation outside the areas required to be cleared (for fire protection, facility footprint and transmission corridors). | Design/ Construction |
| | *Maintain existing understorey*<br>Maintaining the existing understorey beneath the transmission line where possible. | Design/ Construction |
| | *Additional tree planting*<br>Additional tree planting at the site entrance. | Operation |
| | *Appropriate building materials*<br>Appropriate choice of building materials and treatments, including:<br>» Minimal use of reflective elements, and use of textual cladding where practicable.<br>» Use of darker green/brown colour tones on the buildings and plant to minimise the potential for contrast with surrounding bushland.<br>» Use of a lighter green colour on the upper portion of built elements (including stacks) to minimise the potential for contrast with the sky and treetops. | Design |
| | *Navigation lighting*<br>The need for obstruction warning lighting at the top of the proposed stacks would be determined during the detailed design phase in consultation with the Civil Aviation Safety Authority and the Department of Defence. | |
| Cultural heritage | *Avoid sites if possible*<br>» Where practical, disturbance to site BG1 would be avoided, or limited to the existing areas of disturbed ground adjacent to the Yalwal Road verge. If avoidance were feasible, then the area with surface artefacts would be temporarily fenced to identify a 'no-go' area excluding machinery and ground disturbing activities.<br>Where practical, disturbance to site BG2 would be avoided. | Construction |
| | *Management of sites if disturbance is necessary*<br>» If impact were anticipated in the areas of sites BG1 and BG2, then the surface artefacts would be managed according to the requirements of the local Aboriginal community. This may involve their placement in nearby locations away from the construction zone, or alternatively, their permanent recovery for placement in a Keeping Place or Museum. The allowance of disturbance with no mitigation may also be an option for community consideration.<br>» If impact is anticipated in the area of the potential archaeological deposit associated with BG1, then a limited archaeological program of salvage excavation would be conducted in the anticipated disturbance areas such as the pits for the placement of transmission line poles. | Construction |

| Environmental issue | Mitigation measure | Timing |
|---|---|---|
| Traffic | *Recommended management measures*<br>» Temporary reduction to the signposted speed limit on Yalwal Road.<br>» Installation and operation of traffic control devices provided in AS 1742.3-1996 Traffic Control Devices for Works on Roads.<br>» Additional advanced warning signage on both approaches to the bridge on Yalwal Road to the east of the site.<br>» Limit heavy vehicle movement during peak commuter periods and encourage movement during the off peak period.<br>» Adequate area and management controls would be introduced at the site entry to safely control the movement of vehicle into and from the site, including excavation materials need to be covered before trucks leaving the site.<br>» Loading, unloading and manoeuvring of vehicles would always occur on-site and must be in accordance to AS2890.1 and AS2890.2.<br>» All construction worker parking spaces would be provided off road/ on-site during the entire construction period. | Construction |
| | *Site access*<br>A rural type 'A' intersection would be installed at the access point to the site. | Operation |

## 4.3 Environmental management

### 4.3.1 Environmental representative

Prior to the commencement of construction of the development, Delta would appoint a qualified and experienced environmental management representative on a full-time basis during the construction, commissioning and operation of the development. The environmental management representative would be:

» The main point of contact in relation to the environmental performance of the proposal;

» Responsible for all management plans and monitoring programs required under the conditions of consent;

» Responsible for considering and advising on matters specified in the conditions of this consent, and all other licences and approvals related to the environmental performance and impacts of the proposal; and

» Responsible for receiving and responding to community contact and enquiries during the life of the project.

### 4.3.2 Construction environmental management plan

A construction environmental management plan would be prepared and implemented. The construction environmental management plan would outline environmental management practices and procedures to be followed during site preparation, construction and commissioning of stages one and two of the proposal.

The construction environmental management plan would cover the environmental protection practices, resources and sequence of activities required to comply with relevant environmental legislation, conditions of any applicable licence, approval and permit. The plan would include:

» A description of all activities to be undertaken on the site during site preparation, construction and commissioning of the stage of the development being undertaken;

» Statutory approvals and other obligations that would be fulfilled during site preparation, construction and commissioning, including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;

» Details of how the environmental performance of the site preparation and construction works would be monitored, and what actions would be taken to address identified adverse environmental impacts. In particular, the following environmental performance issues would be addressed:

  – Measures to monitor and manage dust emissions;
  – Measures to monitor and minimise soil erosion and the discharge of sediment and other pollutants to lands and/ or waters during construction
  – Measures to monitor and manage any contaminated soils/ materials encountered during construction and demolition;
  – Measures to monitor and manage any groundwater encountered during construction and demolition;
  – Measures to monitor and control noise emissions during construction and commissioning;
  – Measures to monitor and control air emissions during construction and commissioning, and to ensure that air emissions are both minimised and in compliance with the requirements of this consent and the Environment Protection Licence for the site;
  – Measures to manage traffic during construction; and
  – Measures to manage bushfire risk.

» A description of the roles and responsibilities for all relevant employees involved in the construction of the development;

» The management plans and mitigation requirements listed in Table 4.1 relevant to construction and commissioning; and

» Complaints handling procedures during construction.

### 4.3.3 Operation environmental management plan

Delta would update its existing Environmental Management System to incorporate the operation of the proposal. A dedicated operation environmental management plan would be developed for the operation of the proposal and this would include:

» Environmental policy, objectives and performance targets for operation;

» Identification of all statutory and other obligations, including consents, licences, approvals and voluntary agreements;

» Identification of the roles and responsibilities of all personnel and contractors to be employed on site;

» Management policies, procedures and review processes to assess the implementation of environmental management practices and the environmental performance of the proposal against the objectives and targets;

» The management plans and mitigation requirements listed in Table 4.1 relevant to operation;

» Incorporation of environmental protection measures and instructions in all relevant Standard Operating Procedures and Emergency Response Procedures;

» The environmental monitoring practices described in Section 4.4; and

» Specific procedures in relation to the following, as defined by this environmental assessment and the conditions of consent for the proposal:

  – Air quality management;
  – Emergency planning;
  – Safety management;
  – Soil and water management;
  – Landscape management; and
  – Noise management.

## 4.4 Monitoring

### 4.4.1 Air quality

Emissions to air from the proposal would be subject to Continuous Emissions Monitoring Systems (CEMS). The CEMS would collect and analyse gas samples and record continuous data from the stack exits.

Delta would establish pollutant concentrations and emissions parameters to be monitored in accordance with the requirements specified in 'Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales' (DEC, 2005). This would include location of the sampling points on the discharge stacks in accordance with the requirements set out in test method TM-1. Monitoring would be undertaken annually or in accordance with frequency and requirements otherwise specified in the conditions of approval. Proposed monitoring measures are summarised in Table 4.2.

**Table 4.2 Periodic pollutant and parameter monitoring (air)**

| Pollutant/Parameter | Units of Measure | Method | Frequency |
|---|---|---|---|
| Nitrogen dioxide ($NO_2$) or nitrous oxide (NO) or both as $NO_2$ | $mgm^3$ | CEM-2 | Continuous |
| Velocity | $ms^1$ | TM-2 | Within 90 days of commissioning and annually |
| Volumetric flow rate | $m^3s^1$ | TM-2 | |
| Temperature | $^oC$ | TM-2 | |
| Moisture | % | TM-22 | |
| Dry gas density | $kgm^3$ | TM-23 | |
| Molecular weight of stack gas | $g.gmol^1$ | TM-23 | |

| Pollutant/Parameter | Units of Measure | Method | Frequency |
|---|---|---|---|
| Carbon dioxide | % | TM-24 | |
| Oxygen | % | TM-25 | |

### 4.4.2 Greenhouse gas emissions

Greenhouse gas emissions are not monitored by physical sampling, however, annual greenhouse gas inventories are prepared using approved AGO emissions estimation techniques. Each year, further opportunities for emissions abatement are identified and implemented wherever practicable.

### 4.4.3 Water quality

Monitoring would be undertaken to ensure that stormwater management measures are working effectively. Monitoring would rely primarily on visual inspections and sampling. Visual inspections would be undertaken of sediment basins, pits, diversion and catch drains and all other stormwater conveyance structures. A general indication of frequencies for inspections is provided in Table 4.3. An inspection log detailing the monitoring program would be kept.

**Table 4.3 Monitoring program**

| Sample location | Collection mechanism | Frequency first six months | Frequency normal operation |
|---|---|---|---|
| Sediment basins | Visual Inspection | Every runoff event | Monthly |
| Inlet pits | Visual Inspection | Every runoff event | Monthly |
| Trunk drainage channels | Visual Inspection | Every runoff event | Monthly |
| Overland flow paths | Visual Inspection | Every runoff event | Monthly |
| Trafficable areas | Visual Inspection | Every month | |
| Bunded areas | Visual Inspection | Every runoff event | |
| Other works areas, potentially contaminating stormwater | Visual Inspection and system operation testing | Every month | |

Notes:

» Runoff event must be sufficient;

» Inspect after 24 hour retention period (ie 24 hrs after runoff event);

» For every inspection, date, time and ambient weather conditions would be recorded.

### 4.4.4 Noise

Noise monitoring during construction and operation would be undertaken at the following locations:

» Lot 22 DP 746233;

» 213 Gannet Road; and

» 190 Bamarang Road.

Monitoring would consist of unattended continuous noise logging for one week on a quarterly basis, with operator-attended noise measurements over 15 minute periods also conducted during this quarterly monitoring. All noise monitoring would be completed in accordance with the requirements of AS 1055-1997 Acoustics – Description and Measurement of Environmental Noise, and the NSW Industrial Noise Policy.

### 4.4.5 Auditing

Delta has a rigorous audit program that covers facilities and processes, compliance with legislative and industry best practice requirements, and environmental management systems. The current proposal would be subject to the same auditing rigour as for Delta's other facilities. Specifically, the audit program would cover three levels:

» Internal audit – which is conducted by trained Delta personnel on a regular basis;

» External audit – which is conducted bi-annually be an independent and appropriated qualified third party for facilities and process, compliance, environmental management system and compliance with the ESAA Code of Environmental Practice; and

» DEC audit – which may be conducted at random intervals determined by the authority.

Revision of the Delta environmental management system, to incorporate the requirements for the proposal, would detail the audit program for the operational facility.

Twelve months after the commencement of operation of stage one, Delta would commission and independent, suitably qualified person or team to prepare, to the satisfaction of the Director-General, the following:

» Hazard audit report; and

» Environmental audit report.

Appendix A

# Summary of submissions

## Summary of submissions received

| Submission ID | Type | Organisation | Date received | Position | Issue category |
|---|---|---|---|---|---|
| 1 | Govt | NSW Rural Fire Service | 29/05/2006 | Support | » Bushfires |
| 2 | Public | | 7/06/2006 | Object | » Site justification<br>» Tourism impacts<br>» Air quality<br>» Water<br>» Future planning<br>» Noise and vibration<br>» Water<br>» Visual impact<br>» Alternative sites |
| 3 | Govt | Civil Aviation Safety Authority (CASA) | 13/06/2006 | Not clear | No comment |
| 4 | Public | | 16/06/2006 | Concerns | » Air quality<br>» Bushfires<br>» Groundwater |
| 5 | Govt | Department of Defence | 16/06/2006 | Not clear | » Air quality |
| 6 | Public | | 19/06/2006 | Concerns | » Visual impact<br>» Power lines<br>» Noise and vibration<br>» Power lines |
| 7 | Govt | Department of Environment and Conservation NSW | 19/06/2006 | Support | » Draft Statement of Commitments<br>» Air quality<br>» Flora and fauna<br>» Water<br>» Noise and vibration<br>» Soils<br>» Cultural Heritage<br>» Habitat offsets<br>» National Park Impacts |

| Submission ID | Type | Organisation | Date received | Position | Issue category |
|---|---|---|---|---|---|
| 8 | Public | | 19/06/2006 | Concerns | » Power lines<br>» Community Consultation<br>» Land Uses<br>» Future planning<br>» Safety<br>» Noise and vibration<br>» Air quality<br>» Water |
| 9 | Public | | 19/06/2006 | Concerns | » Power lines |
| 10 - 35 | Form | | 19/06/2006 | Object | » Visual impact<br>» Site justification |
| 36 | Public | | 19/06/2006 | Concerns | » Air quality<br>» Noise and vibration<br>» Water |
| 37 | Private | | 21/06/2006 | Concerns | » Community Consultation<br>» Water<br>» Site justification<br>» Visual impact<br>» Alternative sites<br>» Noise and vibration<br>» Air quality |
| 38 | University | University of Wollongong, Shoalhaven Campus | 23/06/2006 | Concerns | » Noise and vibration |
| 39 | Gov | Department of Natural Resources | 29/06/2006 | Not stated | » Land Uses<br>» Flora and fauna<br>» Water |
| 40 - 74 | Form 1 | | 29/06/2006 | Object | » Visual impact<br>» Site justification |

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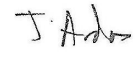
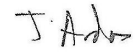
**Document Status**

| Rev No. | Author | Reviewer | | Approved for Issue | | |
|---|---|---|---|---|---|---|
| | | Name | Signature | Name | Signature | Date |
| 1 | A Raleigh | J Ardas |  | J Ardas |  | 25/08/06 |
| 2 | A Raleigh | J Ardas |  | J Ardas |  | 29/08/06 |
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