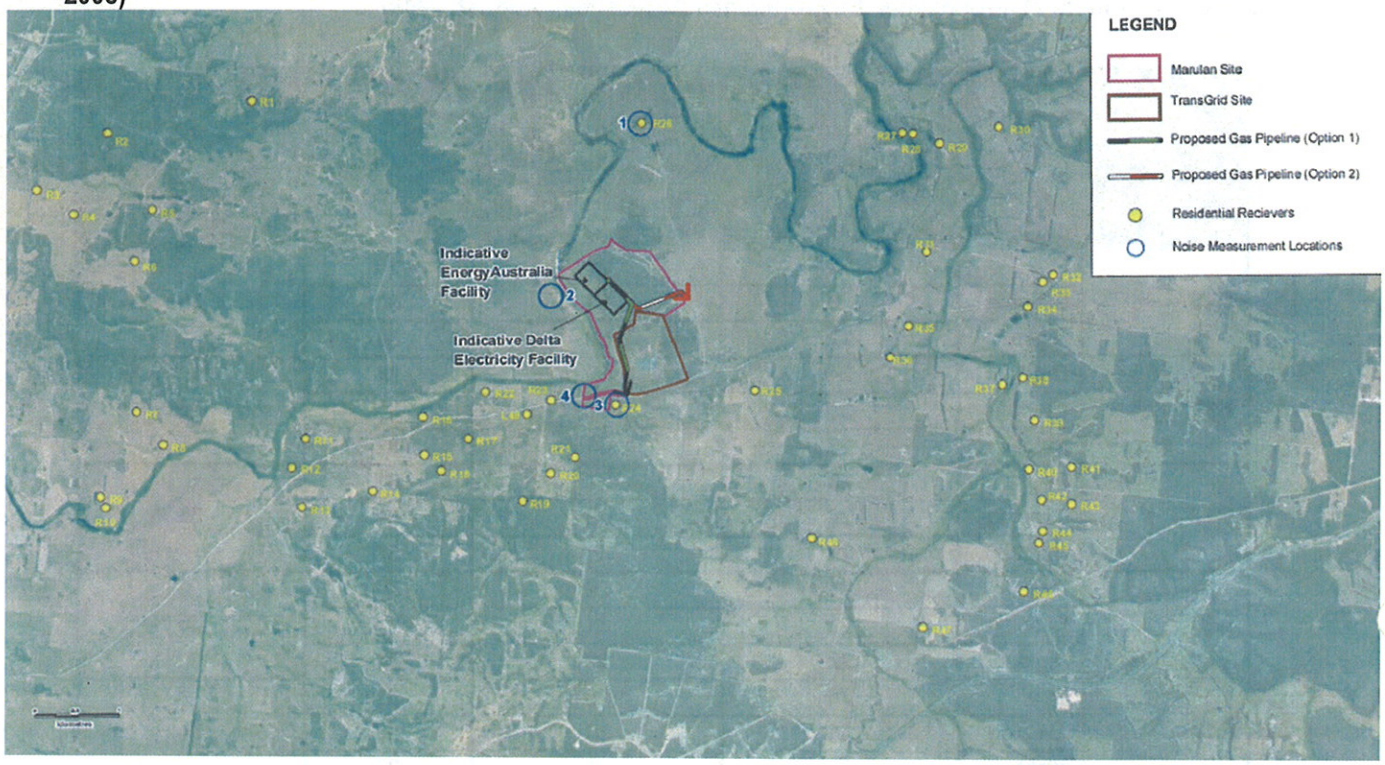
**Figure 11: Location of Nearest Sensitive Receptor (Proponents' Environmental Assessment August, 2008)**




*Traffic Noise – Construction and Operation*

The Proponents' traffic noise assessment has considered the main roads proposed to be used during construction (Canyonleigh Road and Brayton Road) and operation (Canyonleigh Road, Brayton Road, Portland Avenue should water be sourced from the Marulan water/ sewage treatment plant or Canyonleigh Road, Brayton Road, Kennedy Close and Creek Street should water be sourced from the Moss Vale sewage treatment plant). The traffic noise assessment of Brayton Road has included consideration of potential cumulative traffic impacts from the recently approved Gunlake Quarry (for further information on traffic associated with the quarry development refer Section 5.5).

The following roads have not been assessed with respect to road traffic noise:

- Hume Highway - as the noise associated with project traffic during construction and operation is not expected to be perceptible from the noise generated by the existing high traffic volumes on this road;
- Illawarra Highway - as the noise associated with operational water haulage from the Moss Vale water treatment plant is not expected to be perceptible from the noise generated by the existing high traffic volumes on this road; and
- Wollumbi Road - as traffic noise associated with the construction and the operational maintenance of the gas pipeline is unlikely to pose a significant noise risk due to the low volumes of traffic involved and due to the nearest sensitive receivers being located well away from the road; and
- Red Hills Road - as traffic noise associated with the construction and operational maintenance of the gas pipeline is unlikely to pose a significant noise risk due to the low volumes of traffic involved. The more extensive use of Red Hills Road by construction and operational traffic to the facilities site is subject to the road being connected onto Brayton Road and the at-grade intersection with the Hume Highway being upgraded as part of a separate development approval (the Gunlake Quarry – refer Section 5.5). Detailed consideration of potential impacts has been deferred until this option becomes available.

The Proponents have compared predicted traffic noise levels from the project to existing noise levels and to relevant traffic noise goals under the *Environmental Criteria for Road Traffic Noise* (DECC, 2008) - 60 dBA for Canyonleigh and Brayton Roads being 'collector' roads and 55 dBA for Portland Avenue, Kennedy Close and Creek Street being 'local' roads. Traffic noise impacts associated with the project are summarised in Table 6.

**Table 6: Predicted Increase in Traffic Noise Levels**

| Roads | Predicted Increase in Traffic Noise Levels | | |
|---|---|---|---|
| | Construction | Operation | Major Maintenance |
| Canyonleigh Road | Exceeds criteria by 2dBA and existing noise by 3dBA | Meets criteria but increases existing noise by 1dBA | Exceeds criteria by 1dBA and increases existing noise by 2dBA |
| Brayton Road (north of Marulan Village) | Exceeds criteria by 3dBA and existing noise by 4dBA | Meets criteria but increases existing noise by 1dBA | Exceeds criteria by 1dBA and increases existing noise by 2dBA |
| Brayton Road (within Marulan Village) | Exceeds criteria by 1dBA and existing noise by 3dBA | Meets criteria but increases existing noise by 1dBA | Meets criteria but increases existing noise by 1dBA |
| Portland Avenue | N/A | Meets criteria but increases existing noise by 1dBA | N/A |
| Kennedy Close and Creek Street | N/A | Meets criteria but increases existing noise by 1dBA | N/A |

*Vibration – Operation and Construction*

The Proponents have identified that the proposal is likely to pose a low risk of vibration impacts to the nearest sensitive receivers during construction and operation, as the facilities site and the majority of the gas supply pipeline would be located well away from receivers.

*Construction Noise*

The Proponents assessment predicts exceedances of between 1 to 5 dBA of construction noise goals (35 dBA) at two receivers during construction activities within the facilities site, however the affected receivers would be limited to those already purchased by and in the ownership of the Proponents (R23 and R24). The Proponents have determined that noise during the construction of the gas pipeline is not likely to be significant due to the distance from nearest receivers (up to one kilometre). The Proponents have committed to managing noise impacts during construction through the implementation of a range of measures including the use of alternative plant and/or appropriate positioning of plant and appropriate consultation with affected community members.

## Submissions

Several submissions raised concerns regarding the potential noise and vibration impacts of the project during construction and operation, particularly regarding traffic noise associated with the operation of the project as well as potential noise constraints on future development potential. The DECC required that the low frequency noise associated with the project be regulated in accordance with the INP and recommended conditions of approval regarding appropriate noise limits for the operation of the facilities site.

## Consideration

*Facilities Site – Operational Noise*

*Sleep Disturbance and Low Frequency Noise Impacts*

The Department accepts the Proponents' assessment of peak noise events, which indicates that the INP criteria for sleep disturbance would be comfortably achieved at all surrounding receivers. The Department has therefore recommended that the INP sleep disturbance criteria be applied to each of the facilities in the conditions of approval.

With respect to low frequency noise, the Department notes that the Proponents have utilised new methodology developed by the United Kingdom Department of Environment, Food and Rural Affairs (DEFRA) to assess the likelihood of the project to generate low frequency noise, in preference to the approach outlined in the INP. The INP methodology involves determining the difference between C-weighted (dBC) and A-weighted (dBA) sound levels to determine whether the noise generated by the project includes a significant low frequency component. If a difference of 15 decibels exists (which indicates that noise associated with the project is likely to contain a low frequency component), the INP requires that a correction factor of 5 decibels be added to the average ($L_{Aeq}$) operational noise levels predicted to result from the project. The Proponents have argued that as the low frequency noise associated with the project may be beyond the threshold of human hearing, it would be unreasonable to add 5 decibels to predicted average noise levels to account for low frequency noise impacts as

this would create an unrealistic representation of the operational noise levels associated with the project and lead to an overestimation of impacts at receivers (and associated requirement for mitigation).

The Proponent has instead used the dBC–dBA methodology advocated in the INP, as an indicator of the need for further investigation into low frequency noise impacts and utilised the new methodology developed by DEFRA to predict the likelihood of adverse low frequency noise impacts from the project. Based on field and laboratory tests and past research DEFRA has determined a reference curve of noise levels and corresponding frequencies at which low frequency related impacts would be unlikely. If the noise levels associated with the proposal exceed the reference levels developed by DEFRA, then a low frequency noise impact can be reasonably expected. The Proponents assessment indicates that the facilities site would be able to meet the reference criterion developed by DEFRA.

In the absence of comprehensive stakeholder consultation and literature reviews on the application of the DEFRA standards to the Australian situation, the DECC has expressed the view that it cannot endorse the DEFRA methodology at this stage and recommended the application of the INP correction factors. The Department has considered the Proponents' assessment and concurs with the Proponents that it would not be reasonable for a 5dBA penalty to be applied to the average operational noise levels of the project if the low frequency noise associated with the project is unlikely to be audible to the human ear. Notwithstanding, the Department considers that in the absence of a comprehensive technical review of the applicability of the DERFA methodology to the Australian situation, the Department cannot at this stage endorse the application of the methodology to the project. In this regard, the Department has commissioned Dr Norm Broner, an Australian practice leader in acoustic research (including of low frequency noise) to undertake an independent review of the assessment and regulation approaches which apply to low frequency noise, considering both international and national best practice. This review is ongoing and in the meantime, the Department has sought Dr Broner's advice on the most appropriate regulatory approach that should apply to the project in the interim. Dr Broner has advised that low frequency noise is unlikely to be perceptible if the C weighted noise levels associated with the noise source is less than Leq 65dBC.

On this basis, the Department has recommended a condition of approval requiring that in the case where the dBC–dBA difference (as endorsed by the INP) determines that the noise generated by the project is likely to include of a low frequency component (i.e. where the dBC–dBA difference is greater than 15 dB), then the noise penalties required under the INP would only apply where the C weighted noise level associated with the project is greater than Leq 65dBC (which indicates that the low frequency noise is likely to be perceptible). The Department understands that the C weighted noise associated with the project would be lower than Leq 65dBC, indicating that the project is unlikely to pose a risk of low frequency noise impacts. The Department has also recommended that the condition of approval include inbuilt flexibility to enable the above approach to be changed where required (with the Director-General's agreement), so that the results of the ongoing review into low frequency noise review can be taken into account should it recommend an alternate approach consistent with best practice. The Department is satisfied that the above approach provides a reasonable and robust basis for the regulation of low frequency noise associated with the project.

*$L_{Aeq}$ Noise Impacts*

The Department is satisfied that the Proponents have undertaken a conservative and representative assessment of the operational noise impacts of the facilities. In considering the Proponents' assessment, the Department has considered the potential for the proposal to generate cumulative noise impacts at surrounding receivers, by adding to noise levels generated by existing and recently approved quarry operations. However, given the distance from the nearest quarry operation (some 11 kilometres away) the Department is satisfied that the project is unlikely to pose a significant risk with respect to cumulative noise impacts. The Proponents' assessment indicates that project specific (intrusive) noise limits can be achieved at eight of the 12 nearest surrounding receivers. Of the four receivers where exceedances are predicted, two of these involve exceedances of less than three dBA (R25 and R26), whilst the remaining two involve exceedances of greater than 5 dBA. These latter two receivers have been purchased by the Proponents, meaning that only two receivers (R25 and R26) are predicted to be affected by noise levels above noise limits by the proposal.

In relation to receivers R25 and R26, the Department does not consider that the 1 dBA exceedance predicted at R25 to be significant noting that the INP does not deem an exceedance of less than 2 dBA to be a non-

compliance of criteria given that a 2 dBA change in sound level would in most cases be indistinguishable to the human ear. Based on this, the Department considers that the 3 dBA exceedance predicted at R26 is similarly marginal and unlikely to result in a significant impact. Whilst the predicted noise levels would constitute an increase to existing noise levels, the Department notes that the noise levels generated by the proposal should be seen in context, recognising that the levels predicted would be relatively low in absolute terms. This is highlighted by the fact that the worst case noise generated by the proposal (38 dBA at R26) would remain well below the recommended maximum night time amenity criteria for rural residences as outlined in the INP (i.e. 45 dBA). In addition, the Department notes that the worst case predictions reflect the situation of the EnergyAustralia open-cycle facility operating at the same time as the Delta Electricity base-load facility coupled with worst case meteorological conditions. Given that the EnergyAustralia would be a peaking facility it would by nature only operate a small percentage of time of the year (and only for a short number of hours during those days of operation), meaning that in reality the likely percentage of time that there would be simultaneous operation as well as worst case metrological impacts would be low. This means that the worst case noise impacts predicted would not be a continuous but rather infrequent and intermittent impact.

Given the small nature of predicted exceedance (which is likely to be well within the conservatism modelled into the assessment) and likely infrequent nature of impact, the Department does not consider that any specific at receiver mitigation would be warranted at these receivers. The Department notes that this would not preclude the landowners entering into a negotiated agreement with the Proponents at any time with regards to noise impacts. As a measure of good faith, the Proponents have entered into negotiations with both receivers R25 and R26, notwithstanding the marginal exceedance of criteria predicted at these receivers. To ensure that cumulative noise levels do not exceed the maximum noise levels predicted at R25 and R26, the Department has recommended conditions of approval setting a cumulative noise limit for the facilities site and requiring the Proponents to ensure that this noise limit is not exceeded during the individual or concurrent operations of the two facilities.

Noise contour mapping for the project indicates that noise levels which exceed noise criteria would at worst case extend to approximately 2.5 kilometres from the facilities site. There are no known plans for subdivision for residential development within this area or in close proximity to the proposal. Given that the noise impacts of the proposal would be limited to a relatively small area in close proximity to the facilities site, the Department is satisfied that the noise impacts of the proposal are unlikely to significantly limit future development in the area on noise grounds. The Department notes that the Proponents have specifically located the proposal away from highly urbanised areas to minimise impacts to existing receivers and future development potential. Further the Department understands that the recently gazetted *Goulburn-Mulwaree Comprehensive Local Environmental Plan 2009* has retained the rural zoning of the area and increased minimum lot sizes for dwelling from 40 hectares to 100 hectares with the aim of retaining the rural character of the area. On this basis, the Department considers that it is unlikely that the predominant landuse in the area would change in the near future from rural agricultural landuse to higher density residential development and consequently considers that the facilities site is unlikely to pose a significant constraint on future development potential.

To ensure that the facilities site are designed and built to achieve predicted noise limits, the Department has also recommended a range of operational monitoring and performance verification requirements that must be implemented by the Proponent including cumulative performance standards which must be met by the simultaneous operation of the facilities, as well the requirement for an integrated approach to noise monitoring, verification and complaints management as required.

*Traffic Noise – Operation and Construction*

The Department is satisfied that the noise assessment presented by the Proponents provides a representative assessment of the likely main traffic noise impacts associated with the project during construction and operation. The main concerns raised in submissions relates to potential traffic related noise along local roads particularly on Brayton Road within Marulan village. The Proponents' assessment indicates that the change to existing traffic noise levels associated with the operation of the project would be imperceptible (i.e. 1 dBA increase) and notwithstanding would remain within relevant road noise criteria. Whilst a more noticeable increase of 2 dBA above existing noise levels and 1 dBA above traffic noise goals are predicted along Canyonleigh Road and Brayton Road (north of Marulan Village) during major maintenance works, the Department is satisfied that this would not result in unacceptable noise impacts given the infrequency and short duration (3-6 weeks every 6

years) of such maintenance events. The Department further notes that predicted noise levels on Brayton Road within Marulan Village are not predicted to significantly change existing noise levels during major maintenance events (i.e. 1 dBA increase only) and would stay within road traffic noise criteria. Based on the above, the Department is satisfied that the proposal would not result in significant traffic noise impact during operation at local roads including within Marulan Village.

The Department notes that the Proponents have identified the option of utilising Red Hills Road (which is required to be upgraded and connected to Brayton Road as part of the recently approved Gunlake Quarry development) should operational water transport be required from Moss Vale sewage treatment plant as the proposed timing for this road upgrade is likely to coincide with the proposed commencement of facility operation. This would enable water haulage traffic from the Hume Highway to bypass Marulan Village rather than travelling to the facilities site via Brayton Road. Whilst the Proponents have not provided a quantified assessment of potential traffic noise along this road during operation, the Department considers that given the sparsely populated rural nature of the land that is traversed by Red Hills Road, this route is likely to impact on far fewer receivers than a route traversing Marulan Village. Consequently, the Department has recommended a condition of approval requiring the Proponent to use Red Hills Road for operational traffic wherever possible, where this would avoid the need to travel through Marulan Village. The Department also notes that should the option of a water pipeline be progressed, operational traffic requirements would be limited to those associated with operational personnel and some potable water haulage. This would significantly reduce operational traffic volumes such as to have negligible impact on road traffic noise.

Traffic noise levels are expected to be greater during construction due to the higher levels of traffic that would be generated by the proposal during the construction phase. Worst case impacts (i.e. up to 4 dBA increases to existing noise levels) have been determined on the basis of the EnergyAustralia and Delta Electricity facilities being constructed simultaneously and associated cumulative traffic volumes. Whilst the traffic noise impacts are likely to be approximately 1 dBA lower should the EnergyAustralia and Delta Electricity facilities be constructed separately (with associated reduced traffic volumes for each facility), the construction period would be longer and therefore construction traffic would be on the roads for a longer period. The Department accepts that construction traffic associated with the project would result in a noticeable increase to existing noise levels; however notes that the worst case impacts would likely be limited to peak construction period only (i.e. approximately 3 months) where traffic volumes would be at their greatest. Traffic volumes would approximately halve during average construction periods meaning that traffic noise impacts would likely be lower than predicted for the majority of the construction period. Notwithstanding, the Department notes that even under the worst case scenario, traffic noise levels at Brayton Road (within Marulan Village) are not expected to exceed relevant traffic noise goals by more than 1 dBA. To ensure that traffic noise is minimised as far as possible during construction, the Department has recommended conditions of approval requiring the Proponents to prepare a construction noise and vibration management plan which specifically covers traffic generated by the proposal.

*Vibration – Operation and Construction*

The Department concurs with the Proponents' assessment that the construction and operation of the facilities site is unlikely to pose a significant vibration risk to surrounding receptors due to the distance of the facilities site from nearest sensitive receivers (i.e. approximately one kilometre). Whilst the gas supply pipeline has the potential to be located closer to receptors than the facilities site (i.e. 350 metres from the nearest receptor for the "north eastern" route), the Department is satisfied that the construction and operation of the gas pipeline is unlikely to involve any significant vibration generating activities. On this basis, the Department is satisfied that the proposal as whole would pose a low risk of vibration impacts (both annoyance and structural damage) to nearest sensitive receivers.

*Construction Noise*

Although construction works are expected to occur at the facilities site for a considerable period (up to two years), construction related noise is not expected to significantly impact on surrounding receivers due to their distance (>1 kilometre) from the facilities site. Nearest sensitive receivers are expected to be located a similar distance away from the gas pipeline corridor, for the majority of its length. In addition receivers are not expected to be exposed to noise impacts for long periods during the construction of the pipeline given the progressive nature of the works. Notwithstanding, the Department recognises that specific construction activities have the potential to cause annoyance impacts at receivers if not appropriately managed. Consequently, the Department has

recommended conditions of approval requiring the Proponents to develop comprehensive construction noise management measures including community consultation and complaints management processes, prior to the commencement of construction, to manage the construction noise impacts associated with the project.

## 5.4 Water Supply

### Issue

The project will require water supplies during construction (mainly for dust suppression) and for the operation of the power station. The construction (non-potable) water demands for the proposal have been conservatively estimated at 11.6 mega litres per annum for each facility (23.2 ML/a in total assuming simultaneous construction of the facilities) including assuming increased water use for dust suppression during the summer months. Potable water requirements during construction are considered to be negligible and have not been quantified.

The operational phase of the power stations would constitute the main demand for water supplies. This is particularly the case for the Delta Electricity Stage 2 combined-cycle plant, which would require much greater volumes of water than under open-cycle configuration (for the peak electricity generation facilities). The facilities site will require three main types of water during operation: demineralised and non-potable supplies for use as service and process water in the operation of the power plants and potable supplies for personnel use. Demineralised water supplies are expected to be sourced from specialist external suppliers for the peaking plants (EnergyAustralia and Delta Electricity Stage 1) whilst, being treated and converted onsite from non-potable supplies for the base load power plant (Delta Electricity Stage 2). This is due to the higher overall water requirements of the base load plant compared to peaking operations making on site treatment to source demineralised supplies feasible for the base load operations but not for the peaking plants. The operational water requirements for the project are summarised in Table 7. (Non-potable water requirements constitute the net demand assuming the re-use of water within the plant process).

**Table 7: Operational Water Requirements for the Power Stations**

| | Potable (ML/a) | Non Potable (ML/a) | Demineralised (ML/a) | Total (ML/a) |
|---|---|---|---|---|
| EnergyAustralia | 0.04 | 12 | 0.0012 | 12.0412 |
| Delta Electricity – Stage 1 | 0.2 | 3.2 | 0.2 | 3.6 |
| Delta Electricity – Stage 2 | 0.7 | 63.5 | N/A | 64.2 |

The Proponents' investigation of water supplies for construction and operation have focused on potable and non-potable supplies as the small quantities of demineralised water required for the peaking facilities are considered to be easily sourced from existing commercial suppliers. The Proponents have investigated a number of water supply sources including the Marulan and Goulburn water supply network, sewage treatment plants in Marulan and Moss Vale, recycled water from Marulan industrial effluent, groundwater, extraction from the Wollondilly River and onsite stormwater capture. For reasons of insufficient capacity (Goulburn supply network, Marulan industrial effluent), unreliable yield (groundwater), extraction restrictions (Wollondilly River), poor water quality and associated treatment requirements (high saline groundwater and high nutrient load river water), existing stressed resources due to drought conditions (Goulburn supply network) and uncertainties associated with environmental impact (groundwater and Wollondilly River), the preferred water supply options were narrowed down to sourcing water from the Marulan water supply network, and the Marulan and Moss Vale Sewage Treatment Plants, supplemented by onsite stormwater/rainwater capture.

The Proponents have indicated that the final water supply option or suite of options would be determined at detailed design based on available capacity and the likely staging of the construction and operation of the project. Water supplies are expected to be trucked on site, however a water pipeline may be progressed during operation to supply the non-potable requirements of the site to reduce the operational water trucking requirements of the project. Notwithstanding, it is expected that a minor level of water trucking onto site would continue for the life of the project to deliver potable water supplies (as the minor quantities required would not warrant treatment on site to convert non-potable to potable supplies) and to supply demineralised supplies to the peaking plants.

### Submissions

A number of public submissions as well as the Department of Water and Energy raised concerns regarding the availability of adequate and sustainable water supplies to meet the operational water requirements of the project,

particularly for the base-load plant. Public submissions particularly raised concerns that the water requirements of the project would conflict with the water needs of the local area, particularly considering drought conditions.

**Consideration**

The Proponents' assessment indicates that the existing Marulan water supply network has a spare capacity of approximately 80ML based on Goulburn-Mulwaree Council's current extraction limit of 200 ML and existing demand of 120 ML. Council has advised that of the remaining capacity, all but approximately 10 ML has already been allocated to anticipated population growth in the area over the next 10 years. However, since the rate of growth in the area has been slower than anticipated, the Proponents anticipate that spare capacity of at least 10 ML and likely more would be available for the project in the next 10 years until anticipated growth in the area is realised. On this basis, the Proponents have determined that the Marulan water supply network is likely to be able to supply the potable and non-potable water requirements of the project during construction and for the first few years of operation. At the very least, the Proponents have considered that the Marulan water supply network would be able to meet the potable water requirements of the project for the duration of construction and of operation (even if a further percentage of the 10ML spare capacity is allocated to additional future growth) due to the minor quantities involved.

The Proponents have identified the Marulan and Moss Sewage Treatment Plants (STP) as suitable options for meeting the operational non-potable water requirements of the project in the long term. The Marulan STP is currently at or near design capacity (at 60ML/a) and is expected to be upgraded in the near future to a capacity of up to 1100 ML/a to accommodate anticipated population growth in the area over the next 10 years. Whilst the STP in its current form has sufficient capacity to meet almost all of the non-potable water requirements of the project, significant treatment of the water would be required to achieve a water quality suitable for use within the power plants. Consequently the Proponents have identified that for this water supply option to be realistically progressed, the planned upgrade of the STP to accommodate future growth, would need to include sufficient level of treatment to enable the production of water of a suitable quality to be used in the power plants. The Proponents have indicated willingness to financially contribute to such an upgrade in liaison with Council should this water supply option be determined as the preferred option and subject to commercial arrangement with Council. Assuming anticipated population growth in Marulan is realised, the upgraded STP would have sufficient capacity and water quality to meet the operational non-potable water requirements of the project in the long-term.

The Proponents have identified that the additional STP under consideration (Moss Vale STP) would have sufficient spare capacity (600 ML/a) to supply the non-potable water requirements of the project for the duration of operation although some augmentation maybe required to achieve required quality. As with the Marulan STP, the Proponents have identified that there may be scope to contribute to any required upgrade, where necessary. Modelling undertaken by the Proponents also indicates that onsite stormwater/rainwater capture is likely to be able to supplement up to 20 ML of the operational non-potable water requirements of the project per annum.

The Department is satisfied that the Proponents have demonstrated that there are suitable options for meeting the construction and operational potable and non-potable water requirements for the project, without constraining existing or future water needs in the locality. Whilst sourcing non-potable supplies from the Marulan water supply network has the potential to place strain on available water resources to cater for development in the area, the Department notes that this option is only identified as a short term solution and would only utilise available spare capacity that has not already been allocated to existing or new development. Furthermore, the Department notes that the project is not constrained to this non-potable supply source and that if required water can be easily sourced from alternate supplies. The alternative water sources identified for long-term non-potable supply during the operational phase are sewage treatment plants. This would involve the beneficial reuse of wastewater generated by existing and new development rather than competing for town water supplies allocated for these users and would not place strain on available water supplies. With respect to potable water requirements, the Department concurs with the Proponents that given the small quantity of potable supplies required this is unlikely to place an unacceptable constraint on the Marulan water supply network and can be easily accommodated by the spare capacity in the system taking into account existing and new development.

The Department also notes that the suite of preferred options identified by the Proponents would provide flexibility of supply allowing one or a combination of options to be utilised at different stages of construction and operation of the project. The Department understands that the Proponents have progressed consultation with both

Goulburn-Mulwaree and Wingecarribee Councils regarding the sourcing of water supplies for the project and that neither Council has raised objection to the proposal subject to further negotiation on commercial terms.

In summary, the Department is satisfied that the construction and operational water requirements of the project can be sustainabley sourced without placing significant constraint on available water resources in the local area.

## 5.5 Traffic and Transport

**Issue**

*Construction*

The Proponents' construction traffic assessment has focused on traffic to be generated by the facilities site, which is expected to generate the overwhelming majority of traffic associated with construction (in comparison to other construction sites such as the gas pipeline corridor). Construction at the facilities site is expected to progress in three discreet stages: the common shared works (access road, transmission line and earthworks/ pad for facilities); construction of the EnergyAustralia and Delta Electricity Stage 1 facilities; and future conversion of the Delta Electricity peaking (Stage 1) facility into a base-load (Stage 2) facility if required. Construction traffic is expected to traverse from the Hume Highway via Brayton Road (through the village of Marulan) and Canyonleigh Road to the site. Whilst it is likely that the EnergyAustralia and Delta Electricity peaking facilities would be constructed one after another rather than simultaneously, the latter scenario has been modelled to determine potential worst case traffic impacts on the local road network.

The constructed traffic expected to be generated by the facilities site are summarised in Table 8. Furthermore, up to six over-dimensional and/ or over mass escorted vehicles per facility would be required for the transport of pre-assembled large components during the construction of the facilities.

To determine worst case impacts on the local road network the Proponents have also considered cumulative traffic generated by the recently approved Gunlake Quarry which is likely to be operational during the construction of the project. Traffic associated with the operation of the Gunlake Quarry is expected to increase in a staged manner with up to 13 trucks a day traversing Brayton Road (through Marulan village) during Stage 1. During Stage 2 traffic volumes are expected to be split, with approximately 13 trucks continuing through Brayton Road (through Marulan village) and approximately 37 additional trucks traversing Red Hills Road and bypassing Marulan Village. The Red Hills Road bypass of Marulan Village (which comprises a requirement of the conditions of approval for the quarry during Stage 2) will involve the extension of Red Hills Road to connect to Brayton Road north of the village and an upgrade of the existing at-grade intersection of Red Hills Road with the Hume Highway. For a short section of Brayton Road (between the intersection with Red Hills Road and the quarry access) operational traffic volumes associated with the quarry during Stage 2 would total 50 trucks per day and these worst case volumes have been considered in the Proponents' assessment.

**Table 8: Construction Traffic Associated with the Facilities Site**

| Construction Stage | Duration | Heavy Vehicles Per Day | Light Vehicles Per Day | Total Vehicles Per Day |
|---|---|---|---|---|
| Common Shared Works | | | | |
| Average | 12 months | 30 | 60 | *90* |
| Peak | 3 months | 60 | 120 | *180* |
| EnergyAustralia + Delta Electricity Stage 1 | | | | |
| Average - Facilities | 12 months | 48 | 192 | *240* |
| Peak | 3 months | 96 | 384 | *480* |
| Delta Electricity Stage 2 | | | | |
| Average | 12 -18 months | 24 | 96 | *120* |
| Peak | 3 months | 48 | 192 | *240* |

Based on its assessment, the Proponent has determined that a level of service of A would be maintained on Canyonleigh Road during construction under the worst case construction scenario. At Brayton Road (north of Marulan village), the level of service is expected to reduce from A to B during construction particularly when considering cumulative impacts from operational traffic generated by Gunlake Quarry. The level of service of Brayton Road (within Marulan village) is expected to remain at a level of service of A.

The Proponents have indicated that the construction of the pipeline would likely occur at the same time as the construction of the facilities site although for a shorter duration (approximately 6 months). Construction traffic volumes are predicted to be approximately 60 vehicles per day. Should the gas pipeline be accessed both from the north (Canyonleigh Road) and the south (Red Hills Road/ Wollumbi Road) the traffic volumes would be spilt between the two access points.

*Operation*

The Proponents have also estimated traffic volumes generated during the operation of the project considering operational staff and water supply requirements (refer Table 9). If water is sourced from the Marulan water supply network or Sewage Treatment Plant, the haulage route used would be from Portland Avenue (within Marulan Village) to the project site via Brayton and Canyonleigh Roads. Should water be sourced from the Moss Vale Sewage Treatment Plant, water would be transported via Kennedy Close and Creek Street in Moss Vale, though Illawarra Highway and the Hume Highway to Marulan. From the Hume Highway, haulage trucks can either travel to the site through the village of Marulan via Brayton Road and Canyonleigh Road or bypass the village altogether by travelling via Red Hills Road and joining Brayton Road to the north of the village and proceeding to the site via Canyonleigh Road. The option of using Red Hills Road for water haulage and other operational traffic would depend on whether this road has been upgraded and connected on to Brayton Road by the Proponent of the Gunlake Quarry at the time of the operation of the Marulan power stations. Access to the gas pipeline for operational maintenance is expected to be via Canyonleigh Road to the north and/ or via Red Hills Road and Wollumbi Road to the south.

**Table 9: Operational Traffic Associated with the Proposal**

| Operational Stage | Period | Personnel (vehicles per day) | Water Transport (trucks per day) | Total Vehicles Per day | Total Vehicle Trips Per day |
|---|---|---|---|---|---|
| EnergyAustralia + Delta Electricity Stage 1 | A maximum of 10% of the year | 8 | 12 (10 for EA + 2 for DE) | 20 | 40 |
| EnergyAustralia + Delta Electricity Stage 2 | Approximately 330 days of the year | 24 | 17 (10 for EA + 7 for DE) | 41 | 82 |

To determine impacts to the local road network, the Proponent has undertaken a quantitative assessment of potential level of service impacts to Canyonleigh Road and Brayton Road, focusing on the worst case scenario of haulage through the Marulan village (without the use of the upgraded Red Hills Road). Furthermore, as with the construction scenario, the assessment has taken into account cumulative traffic impacts associated with the Gunlake Quarry along Brayton Road. A qualitative assessment was undertaken of potential impacts to the Hume Highway, Illawarra Highway, Kennedy Close and Creek Street whilst impacts on Portland Avenue, Red Hills Road and Wollumbi Road were not assessed.

Based on its assessment, the Proponent has determined that a level of service of "A" would be maintained along Canyonleigh Road and Brayton Road (north of and within Marulan village) and that there would be negligible impacts on the level of service of Illawarra Highway, Kennedy Close and Creek Street.

## Submissions

Submissions from the public and from Goulburn-Mulwaree Council raised significant concerns regarding the potential construction and operational traffic impacts of the project on the local road network, as well as general amenity impacts of increased heavy vehicle traffic through the village of Marulan. Submissions from the public also raised concerns that the Proponents' Environmental Assessment had overestimated the existing volumes of traffic along local roads.

## Consideration

In response to concerns raised in public submissions, the Proponents' Preferred Project Report presented updated modelling of potential construction and operational traffic impacts associated with the project. The Department is satisfied that the traffic volumes used in the revised modelling are conservative and representative noting that traffic volumes along Brayton Road have been based on actual traffic counts and the traffic volumes

along the remaining roads have been estimated in accordance with the AUSTROADS guideline *Guide to Traffic Engineering Practice, Part 2: Roadway Capacity (1994)*. It is noted that the RTA has not raised any concerns regarding the modelling undertaken for the project.

*Construction*

The Department is satisfied that the Proponents have presented a robust and conservative construction traffic assessment taking into account a worst case construction scenario that is unlikely to occur in reality (i.e. the simultaneous construction of the EnergyAustralia and Delta Electricity Facility). Notwithstanding, the worst case assessment indicates that the level of service of the local road network would not be significantly affected by construction traffic associated with the project. In particular, the Department notes that the level of service along Brayton Road (within Marulan village), the focus of most public submissions, is not expected to change from its existing service level of "A". Furthermore, the Department recognises that the worst case impacts would be limited to the relatively short peak construction periods (3 months) when traffic volumes are expected to be at their worst. This means that for the vast majority of the construction period traffic volumes would be approximately half the volume of the peak periods and would be expected to have fewer impacts on the road network than predicted under worst case conditions. Under no circumstances are any of the roads proposed to reach levels of service (C, D and E) approaching restricted or unstable flow conditions.

The Department notes that the additional traffic associated with the construction of the gas-pipeline have not been factored into the worst case modelling for the facilities site for Canyonleigh Road. However, given the relatively minor additional traffic (60 additional vehicles per day at Canyonleigh Road assuming the southern access roads cannot be used), the Department is satisfied that this would have no material effect on the conclusions of the traffic assessment. The Department notes that even with the additional 60 vehicles, peak construction traffic volumes along Canyonleigh Road would remain within the traffic volume threshold (1,600 vehicles per day on level terrain) for a level of service of "A". Similarly, whilst a formal traffic assessment of Wollumbi Road and Red Hills Road has not been completed, the Department is satisfied that the low level of traffic proposed to be generated on these roads (if used) during gas pipeline construction (i.e. 30 vehicles per day) is unlikely to result in a significant impact on these roads. Furthermore, the Department notes that construction impacts to these roads would be limited to a short period only (6 months) and would not be subject to cumulative traffic volumes from the construction of the remainder of the project. It is unlikely that the upgrade of Red Hills Road as part of the Gunlake Quarry would coincide with the construction period for the project. However, should this occur detailed consideration of the potential impacts of any additional construction traffic that may use Red Hills Road (as an alternate access to the facilities site to avoid traversing through Marulan Village) would be required. The Department has recommended conditions of approval requiring confirmation of traffic volumes on all construction access roads and analysis of potential traffic impacts prior the commencement of construction as part of the construction environmental management plans for the projects.

To mitigate the construction traffic impacts of the project the Department has recommended stringent conditions of approval requiring the Proponents to:

- assess the condition of all local roads where over-dimensional haulage is proposed and upgrade these roads as necessary to accommodate such haulage, prior to the commencement of construction;
- undertake pre- and post-construction dilapidation surveys of all local roads proposed to be used by construction traffic and restore any damage caused to the roads by the project; and
- prepare and implement a construction traffic management plan to identify measures of minimising traffic and access related impacts on the local road network and road side receivers.

The Department is satisfied that with the implementation of these measures the construction traffic impacts of the proposal can be appropriately managed.

*Operation*

The Department notes that the operational traffic volumes associated with the project would be a fraction of those expected during construction and is therefore expected to be well within the capacity of the existing road local network at Marulan. This is reflected in the Proponents' assessment which indicates that a level of service of "A" would be maintained along Canyonleigh Road and Brayton Road both north of and within Marulan village. Should the option of a water supply pipeline be pursued it is expected that operational traffic volumes would further reduce, with water haulage requirements limited to minimal potable and demineralised water supplies (refer

Section 5.4). Notwithstanding, in recognition of community concerns raised regarding the long-term amenity impacts of trucks traversing through the village of Marulan, the Department has recommended a condition of approval requiring the Proponent to use the upgraded Red Hills Road for operational traffic wherever possible, where this would avoid the need to travel through Marulan Village. The Department considers that the operational traffic associated with the project would be within the capacity of Red Hills Road following its upgrade as part of the Gunlake Quarry. Furthermore given the infrequent nature and negligible volumes of operational traffic expected to be generated during the operation/ maintenance of the gas pipeline, the Department is satisfied that the use of Wollumbi Road and Red Hills Road (with or without upgrade as part of the Gunlake quarry development) for gas pipeline access during operation would not significantly impact on the level of service of these roads.

The operational traffic volumes at Portland Avenue, Kennedy Close and Creek Street would be limited to those required for water haulage (17 tankers per day at worst case). This is not considered to be an introduction of heavy vehicle traffic to local streets, as water tankers would already be in use in these streets to access the respective sewage/ water treatment plants. On this basis and in consideration of the low overall volume of traffic to be generated, the Department is satisfied that the operational traffic impacts of the project are unlikely to significantly affect the level of service and functioning of these roads. The Illawarra Highway and Hume Highway are also expected to be mainly used for operational water haulage although may also be traversed by a certain percentage of personnel traffic. Notwithstanding, the operational traffic associated with the project is considered to be negligible compared to the traffic volumes on these roads, and able to be easily accommodated by these roads. Consequently, the Department is satisfied that the proposal would not significantly impact on the level of service of these roads.

## 5.6 Aviation Safety

### Issue

Exhaust plumes from combustion sources (such as stack emissions from power stations) have the potential to impact on aviation safety by causing turbulence and affecting aircraft handling. Consequently, the Proponents have undertaken a plume rise assessment in accordance with the Commonwealth Civil Aviation Authority's (CASA) *Advisory Circular Guidelines for Conduction Plume Rise Assessments* (June 2004) to consider potential impacts of the proposal on aviation safety in air space above the facilities. The CASA guideline requires that the plume rise associated with a combustion source should not exceed a critical vertical velocity of 4.3 metres per second (i.e. the velocity that is likely to affect aircraft) at the heights which are frequented by aircraft (i.e. the obstacle limitation surface of aerodromes or at approximately 110 metres above ground level outside of an aerodrome OLS).

The open-cycle configuration has the potential to result in greater plume rise impacts than the combined-cycle configuration because under open-cycle the hot gas is released from stacks at a higher temperature than under combined-cycle configuration where the hot gases are diverted through an additional steam generation process and ultimately released at lower temperatures. To represent impacts across all operating conditions, the Proponents have modelled the plume rise impacts of the project under three scenarios: simultaneous operation of the EnergyAustralia and Delta Electricity open-cycle facilities assuming plume merge (Scenario 1- worst case); simultaneous operation of the EnergyAustralia and Delta Electricity open-cycle facilities assuming no plume merge (Scenario 2) and operation of the Delta Electricity combined-cycle plant (Scenario 3).

The results of the assessment indicate that under worst case (Scenario 1) the maximum vertical and horizontal extent of the plume associated with the proposal would be 1318 metres above ground level and 435 metres in its horizontal extent. The assessment indicates (refer Table 10) that at a height of 110 metres above ground level, the plume velocity associated with the proposal (at worst case) would exceed the critical criterion of 4.3 metres per second over 90% of the time. The height at which point the critical velocity criteria is exceeded less than 1% of the time is 670 metres (under worst case) and 1012 metres for an exceedance of less than 0.1%

### Submissions

The Department of Defence submission on the proposal advised that the plume rise impacts of the project would not impact on military flights operations and CASA expressed satisfaction that the aviation hazard impacts of the project can be managed through the declaration of a danger area around the air space above the site.

**Table 10: Percentage of time that Critical Vertical Velocity is Exceeded at a Given Height (Proponents' Preferred Project Report, May 2009)**

| Percentage of time, 2006 | Height below which $w$ >4.3m/s (mAGL) | | |
|---|---|---|---|
| | Scenario | | |
| | #1 | #2 | #3 |
| 100% | 76 | 61 | 47 |
| 90% | 122 | 90 | 53 |
| 80% | 141 | 103 | 56 |
| 70% | 158 | 115 | 59 |
| 60% | 174 | 127 | 62 |
| 50% | 191 | 140 | 66 |
| 40% | 208 | 155 | 71 |
| 30% | 227 | 172 | 80 |
| 20% | 249 | 193 | 92 |
| 10% | 309 | 225 | 112 |
| 9% | 321 | 231 | 115 |
| 8% | 333 | 240 | 118 |
| 7% | 353 | 249 | 121 |
| 6% | 374 | 261 | 125 |
| 5% | 397 | 275 | 129 |
| 4% | 428 | 297 | 133 |
| 3% | 468 | 324 | 140 |
| 2% | 540 | 366 | 150 |
| 1% | 670 | 457 | 172 |
| 0.5% | 837 | 584 | 191 |
| 0.3% | 892 | 652 | 215 |
| 0.2% | 941 | 695 | 229 |
| 0.1% | 1012 | 755 | 253 |
| 0.05% | 1080 | 857 | 279 |

**Consideration**

The Department notes that the assessment has been undertaken based on the conservative assumptions of the facilities operating during every hour of the year rather than intermittently for the open-cycle facilities and up to maximum of 90% of the year for the base-load facilities, as well as considering worst case meteorological conditions. This means that the plume rise impacts of the project are likely to be overestimated and may be considerably less than predicted. In particularly, prior to the Delta Electricity base-load plant being constructed, plume emissions from the facilities site would be limited to specific times of the year (and over a few hours of the day) corresponding to peak electricity demand rather than continuous emissions.

Notwithstanding, the Department considers that the proposal is likely to pose a significant hazard to aviation safety (under worst case conditions) unless measures are put in place to enable pilots to avoid the hazard. In this regard, CASA had advised that the air space above the facilities site (covering the maximum vertical and horizontal plume extents at which the critical vertical velocity criterion would be exceeded) can be declared a danger in aviation maps which would warn pilots to avoid flying within the specified heights. The Department is satisfied that with the implementation of this measure the aviation safety risks of the proposal can be appropriately managed. The Department has recommended stringent consultation and liaison requirements with CASA to ensure that appropriate flight safety protocols may be established prior to the commencement of operation of the two facilities.

## 5.7 Aboriginal and European Heritage

### Issue

The Proponents undertook an Aboriginal and European heritage assessment as part of the Environmental Assessment focusing on the facilities site as the gas pipeline routes had not been determined at this stage. As part of the Preferred Project Report, the Proponents undertook additional heritage assessments of each of the gas pipeline routes, subsequently identified. A heritage assessment was not undertaken of the proposed water pipeline route options as this project component is yet to be confirmed.

*Aboriginal Heritage*

The Proponents' Environmental Assessment identified nine aboriginal objects and approximately four general areas of potential subsurface deposits within the facilities site. Further investigations of the facilities site undertaken as part of the Preferred Project Report identified an additional two objects. Of the total 11 objects identified, three would be impacted by the facilities site, whilst a further two have the potential to be impacted by the construction corridor for the transmission line and a further two by the construction corridor for the access road and gas pipeline ("north eastern route"). Of the four areas of potential subsurface deposits identified, two have the potential to be impacted by the facilities footprint (including associated construction lay-down area and where the transmission line would connect to the facilities), whilst one has the potential to be traversed by the construction corridor for the access road and gas pipeline ("north eastern route").

In addition to objects identified within the facilities site, one object was identified within the TransGrid site which has the potential to be impacted by the transmission line corridor. Outside of the facilities site and the TransGrid site, a total of five objects were identified, three of which were associated with areas of potential subsurface deposits. Of these, three have the potential to be impacted by the gas pipeline routes identified by the Proponents including two of the sites with associated areas of potential subsurface deposits. All of the identified objects in the study area (within and outside of the facilities site) comprise isolated finds or artefact scatter. The indigenous heritage impacts of the project are summarised in Table 11.

To minimise impacts, the Proponents have committed to undertaking subsurface investigations of the identified areas of potential subsurface deposits prior to the commencement of construction in consultation with aboriginal stakeholders, and designing the proposal to avoid recorded objects (including items identified as part of proposed sub-surface investigations) wherever possible. Where impacts to objects cannot be avoided, the Proponents have committed to salvaging or otherwise managing these objects in accordance with an Aboriginal Heritage Management Plan, prepared in consultation with relevant stakeholders.

*European Heritage*

No European heritage items were identified within the facilities site or TransGrid site in the Environmental Assessment and this was confirmed in the subsequent surveys as part of the Preferred Project Report. Outside of the facilities site and TransGrid Site, three European heritage items were identified during surveys for the "western" gas pipeline and associated alternatives. The Proponents considered that two of these items are likely to be impacted whilst the remaining site can be avoided as it is a movable item which can be easily moved out of the way. One additional building was identified adjacent to the "western" gas pipeline route, however was not considered a heritage site as it comprised a contemporary, recently built structure. Notwithstanding, this building would not be impacted by the western pipeline route. The European heritage impacts of the project are summarised in Table 12. The Proponents have not identified any specific commitments in relation to European heritage items in its Statement of Commitments.

### Submissions

The DECC expressed preference for all archaeological salvage work to be undertaken prior to a determination on the proposal, however if not possible that this be undertaken prior to the commencement of construction subject to an appropriate Aboriginal Heritage Management Plan. The DECC also raised concerns regarding the adequacy of Aboriginal participation in additional survey work undertaken for the gas pipeline routes.

**Table 11: Potential Aboriginal Heritage Impacts Associated with the Proposal**

| Location within Facilities Site | Object | Description | Scientific Value | Cultural Value | Impact? |
|---|---|---|---|---|---|
| Along the western side of the TransGrid site, between the TransGrid site and the Wollondilly River | BH1 | Single stone artefact | Low | Moderate | Nil |
| Along the western side of the TransGrid site, between the TransGrid site and the Wollondilly River | BH3 | Several stone artefacts | High | Moderate | Nil |
| Along the western side of the TransGrid site, between the TransGrid site and the Wollondilly River | BH4 | Single stone artefact | Moderate | Moderate | Nil |
| Within the transmission line corridor | BH5 | Single stone artefact | Moderate | Moderate | Possible |
| Adjacent to the transmission line corridor | BH6 | High number of stone artefacts | High | Moderate | Possible |
| Within the facilities footprint | BH7 | Single stone artefact | Moderate | Moderate | Yes |
| Within the facilities footprint | BH8 | Three stone artefacts | Moderate | Moderate | Yes |
| Within the facilities footprint | BH9 | Three stone artefacts | Moderate | Moderate | Yes |
| To the west of the facilities footprint | BH10 | Single stone artefact | Low | Moderate | Nil |
| Along the access road corridor and possibly also within the construction corridor of the "north eastern" gas pipeline route | MGPS6 | Two stone artefacts | Low | Unknown | Possible |
| Along the access road corridor and possibly also within the construction corridor of the "north eastern" gas pipeline route | MGPS5 | Isolated Find | Low | Unknown | Possible |
| Within the construction lay-down area and north eastern section of the facilities footprint associated with BH8 and BH9 | PAD | Potential for sub surface artefacts at the top of a moderate hill and ridge line overlooking a drainage line | Subject to Subsurface Investigations | Subject to Subsurface Investigations | Possible |
| Along the western boundary of the facilities footprint where the transmission line meets the facilities footprint and the southern boundary of the facilities footprint | PAD | Potential for sub surface artefacts at the top of a moderate hill overlooking a drainage line and the area between the hill and the Wollondilly River | Subject to Subsurface Investigations | Subject to Subsurface Investigations | Possible |
| Along the eastern boundary of the Marulan site associated with a drainage line. This area would need to be crossed by the access road and "north eastern" gas pipeline route. | PAD | Potential for sub surface artefacts at minor water lines and alluvial rises | Subject to Subsurface Investigations | Subject to Subsurface Investigations | Possible |
| Along the western side of the TransGrid site, between the TransGrid site and the Wollondilly River | PAD | Potential for sub surface artefacts in alluvial rises near the Wollondilly River | Subject to Subsurface Investigations | Subject to Subsurface Investigations | Nil |

| Location within TransGrid Site | Object | Description | Scientific Value | Cultural Value | Impact? |
|---|---|---|---|---|---|
| Within the transmission line corridor | BH2 | Two stone artefacts | Low | Moderate | Possible |
| **Location outside of Facilities site and TransGrid Site** | **Object** | **Description** | **Scientific Value** | **Cultural Value** | **Impact?** |
| South of Canyonleigh Road to the south west of the TransGrid Site | MGPS4 and PAD | Three stone artefacts and potential for sub surface artefacts located along an unnamed creek. | Subject to Subsurface Investigations | Subject to Subsurface Investigations | Nil |
| The point where the "eastern" and "western" routes converge with the "north eastern" route | MGP PAD 1 | Area with potential for sub surface artefacts located at the confluence of two small creek lines | Subject to subsurface investigation | Subject to subsurface investigation | Yes |
| Within the "eastern" and "western" alternative gas pipeline routes | MGPS1 and PAD | Eleven stone artefacts located on crest/slopes between a drainage line and creek with potential for sub surface artefacts | Subject to subsurface investigation | Subject to subsurface investigation | Yes |
| Within the main "eastern" gas pipeline corridor | MGPS2 | Isolated Find | Low | Unknown | Yes |
| Adjacent to the main "eastern" gas pipeline corridor near Wollumbi Road | MGPS3 | Isolated Find | Low | Unknown | Nil |

**Table 12: Potential European Heritage Impacts Associated with the Proposal**

| Location | Object | Description | Heritage Value | Impact |
|---|---|---|---|---|
| Within the main "western" gas pipeline corridor | MGPHS1 | Remnant of two rail fence posts | In poor, incomplete and discontinuous condition. Does not display any features which are distinctive or unusual for the area or have demonstrable links with local persons or events. Does not fulfil criteria for local or State listing. | Likely |
| Within the main "western" gas pipeline corridor | MGPHS2 | Cadastral boundary marker (consisting of linear arrangement of 12 stones) | Some value as a representative example of its type but does not represent rare, unusual or interpretive features of note. Does not fulfil criteria for local or State listing. | Likely |
| Within an alternative "western" gas pipeline corridor | MGPHS3 | Collection of four disused machinery | May have historical value if the items are proven to be of local provenance and history. Further research required to determine owner and provenance of items. | Possible |
| Adjacent to an alternative "western" gas pipeline corridor | Little Bush Chapel | Recently constructed single room religious chapel | Not considered a heritage site. Is a contemporary building. | Nil |

## Consideration

*Aboriginal Heritage*

A key consideration in the Department's assessment of the Proponents' Aboriginal heritage study was whether relevant Aboriginal stakeholders had been provided sufficient opportunity to provide input into the assessments undertaken including in formulating mitigation measures, consistent with the *Interim Guidelines for Aboriginal Cultural Heritage Assessment and Community Consultation* (DECC, July 2005). In this regard, the Department identified deficiencies in the level of stakeholder engagement with regards to determining Aboriginal cultural significance of identified objects and with regards to the lack of stakeholder participation in two of the heritage surveys for gas pipeline routes outside of the facilities site (the "north eastern" route and an alternative of the "western" route). The latter issue was also raised as a matter of concern by the DECC. In response to concerns raised by the Department (and DECC), the Proponent undertook to re-survey the two pipeline routes with representatives of registered stakeholders as well as provide a copy of all Aboriginal heritage reports prepared in relation to the project to the stakeholders so as to provide opportunity for the stakeholders to comment on assessment methodology, findings (including cultural significance) and recommendations. No additional items were recoded in the re-survey and no additional information was provided by the stakeholders in relation to Aboriginal cultural values. One of the registered stakeholders provided a written response expressing support for the recommendations of the heritage reports. On the basis of the additional consultation undertaken by the Proponents, the Department is satisfied that the Aboriginal heritage assessments for the project have been undertaken consistent with DECC guidelines with Aboriginal stakeholders provided due opportunity to provide input into the assessment.

The Department is satisfied that the Proponents' have undertaken an acceptable and representative assessment of the likely impacts of key project elements on Aboriginal heritage values. The Department notes that the impacts of the project would be confined to an object type (stone artefact scatter) which has been identified in the Proponents' specialist assessments as being consistent with the predominant object type recorded and widely represented in the Southern Highlands. On this basis, the Department is satisfied that the cumulative direct impacts of the project on these objects will not result in a significant loss of Aboriginal heritage values through impacts to a site type unique to the area. The Department notes that there would be opportunity to further avoid impacts during detailed design through minor refinements to construction corridors. Specifically, the Department notes that the items predicted to be within the construction corridor of the transmission lines may not in reality be impacted as ground disturbance for this project component would be largely limited to the construction of transmission pole foundations and would not necessity involve disturbance across the entire corridor. Notwithstanding, the Department recognises that each item to be impacted would have cultural significance to the Aboriginal community (notwithstanding their wide representation in the Southern Highlands) and has therefore recommended conditions of approval requiring the preparation of an Aboriginal Heritage Management Plan, in consultation with aboriginal stakeholders to identify strategies to salvage and manage any identified objects consistent with the wishes of the community.

Whilst the impact of the proposal on potential subsurface deposits have not been fully investigated, based on the predictive modelling undertaken as part of the Proponents' assessments, the Department considers it likely that any objects uncovered would be consistent with the predominant object type (stone artefacts) that is widely represented in the region. Where objects are uncovered, the Proponents have committed to refining the proposal during detailed design with the aim of avoiding and/ or minimising impacts as far as possible. The Department has required conditions of approval requiring that the Proponent develop investigation methodology, carry out subsurface investigations, and determine management outcomes for any uncovered objects in consultation with Aboriginal stakeholders. The Department has also recommended conditions requiring the Proponent to specifically develop strategies for dealing with unexpected finds, specifically any objects or remains of high significance which were not anticipated as part of the Proponents' assessment and predictive modelling. This may include consideration of further assessment and/ or consultation requirements. This approach will ensure that the Aboriginal community have adequate input into the management of as yet uncovered objects; and in the case of unexpected finds, ensure their further consideration commensurate with the significance of the object.

The Department has recommended that the western section of the gas pipeline corridor be removed from the concept plan on the basis that the remaining eastern section of the corridor would provide comparatively superior outcomes with respect to biodiversity impacts. With respect to the gas pipeline routes, whilst the Proponents assessment has identified that the "eastern" route would impact on one additional Aboriginal object compared to

the "western" route, the Department notes that this impact would be limited to a single isolated find which in itself does not comprise an item of high significance and can be easily salvaged to avoid impact. On balance, the Department is satisfied that the eastern route is unlikely to result in significant additional Aboriginal heritage impacts as to warrant development in the western section of the gas pipeline corridor in preference to the eastern section.

The Department notes that no assessment information has been provided on the potential impacts of the water pipeline option on heritage values. Notwithstanding, the Department considers the need for the pipeline to be justified and on the basis of the indicative routes identified (which traverse mainly existing or proposed infrastructure corridors) considers that the pipeline is unlikely to result in unacceptable Aboriginal heritage impacts given that it would be largely confined to already disturbed areas where Aboriginal heritage values are expected to be low. On this basis, the Department considers that concept plan approval is warranted for the water pipeline option, but sufficient assessment of the specific impacts of the pipeline has not been undertaken to warrant project approval at this stage. The Department has recommended comprehensive further assessment requirements in relation to heritage impacts as part of the concept plan approval.

In summary, the Department is satisfied that the impacts of the project are likely to be largely confined to objects which are widely represented in the region and therefore unlikely to result in a significant loss of aboriginal heritage values. The Department has recommended a management approach involving a combination of avoidance and salvage with a high degree of emphasis on Aboriginal stakeholder involvement to ensure that impacted objects are managed consistent with the wishes of the community. This approach is consistent with the recommendation of the DECC.

*European Heritage*

The Department notes that the entirety of the project's potential impacts on European heritage would be limited to items located within the western section of the pipeline corridor, which the Department has recommended be removed from the concept plan on the basis of comparatively superior biodiversity outcomes associated with the eastern section of the corridor. On this basis, the remainder of the proposal is expected to have nil impacts on European heritage values.

The Department has formed a similar view of the water pipeline option in relation to potential European heritage impacts as discussed above in relation to Aboriginal heritage. On this basis, the Department considers concept plan approval (rather than full project approval) to be warranted for the water pipeline option and has recommended further assessment requirements in relation to heritage impacts in this regard.

# 6. CONCLUSIONS AND RECOMMENDATIONS

The Department accepts that the Marulan Gas Fired Power Stations proposal, which comprises the construction and operation of two gas-fired power stations and associated infrastructure near Marulan in the Upper Lachlan and Goulburn-Mulwaree local Government areas, would entail significant benefits to the State of New South Wales by helping to secure peak and base-load electricity supply to cater for existing and future inhabitants of the State.

The key environmental impacts associated with the proposal relate to:

- physical disturbance of biodiversity and Aboriginal heritage values from the construction of the facilities site and gas pipeline route;
- the availability of a sustainable water source to supply the power station during its operational life;
- traffic related disruptions during the construction and ongoing operation of the project; and
- the operational performance of the power stations on air quality, noise and aviation safety (from exhaust plumes).

Public submissions on the proposal mainly focused on the local impacts of the project including concerns regarding traffic disruptions associated with heavy vehicle haulage through the village of Marulan, noise and air quality impacts to surrounding receptors, potential water quality impacts to Wollondilly River, visual intrusion of the facilities and objection to intrusion onto private property by the gas pipeline route.

The Department has assessed the Proponents' Environmental Assessments, Preferred Project Report (including Response to Submissions) and Statement of Commitments as well as the submissions received from agencies and the public on the proposal. Based on its assessment, the Department is satisfied that the Proponents have undertaken a robust and conservative assessment of the impacts of the proposal and that the proposal can be managed and mitigated to achieve acceptable environmental standards. In relation to biodiversity impacts, Department considers that the eastern section of the Proponents' identified pipeline corridor would have a superior biodiversity outcome to the western section of the corridor, which traverses mainly vegetated areas.

On balance, the Department considers the proposal as a whole to be justified and in the public's interest and should be approved. The Department has recommended concept plan approval for the proposal as a whole, comprising both power stations and all associated infrastructure including the electricity transmission line, access road and options for a water supply pipeline. In relation to the gas pipeline corridor, Department has recommended that only the eastern section of the gas pipeline corridor be granted concept plan approval as it would provide far superior biodiversity outcomes to the western section of the corridor. In this regard, the Department has recommended that the Minister use her discretion under Section 75O(4) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) to modify the concept plan approval to remove the western section of the gas pipeline corridor which traverses vegetated areas. Concept plan approval does not grant approval to construct, but approves the general scope and scale of the project to provide certainty to the public and surrounding landowners of the general footprint of the proposal and establishes the environmental framework by which further approvals may be progressed.

Based on its assessment, the Department is also satisfied that with the exception of the proposed option of a water supply pipeline, sufficient assessment and design detail has been provided on all other components of the project, to warrant full project approval of these components. This includes the specific gas pipeline routes identified within the larger concept plan gas pipeline corridor that has been recommended approval (i.e. the eastern section). Consequently, the Department has recommended full project approval for all components of the proposal with the exception of the water pipeline, subject to stringent conditions of approval in relation to flora and fauna protection and offsets, aboriginal heritage management in consultation with relevant stakeholders, noise and air quality limits, traffic generation, water quality and visual amenity. Concept plan approval for the broad eastern gas pipeline corridor as well as full project approval for multiple gas pipeline routes within that broader corridor would provide the Proponents maximum flexibility in determining a final preferred route during further detailed design investigations into engineering constraints and constructability as well as easement negotiations.

In the case of the water supply pipeline the Department considers that project approval for this component of the project cannot be supported at this stage as only indicative route options have been identified by the Proponents, with the specific route and design details to be further investigated and confirmed during detailed design as part of final water supply negotiations with relevant supply authorities. To ensure appropriate design development of the water pipeline project, the Department has recommended stringent further assessment requirements in relation to landuse, flora and fauna, heritage and surface water impacts as part of the recommended concept plan approval to inform the future project application process under Part 3A of the EP&A Act.

Richard Pearson
**Deputy Director General**

Sam Haddad
**Director General**

20/10/2009