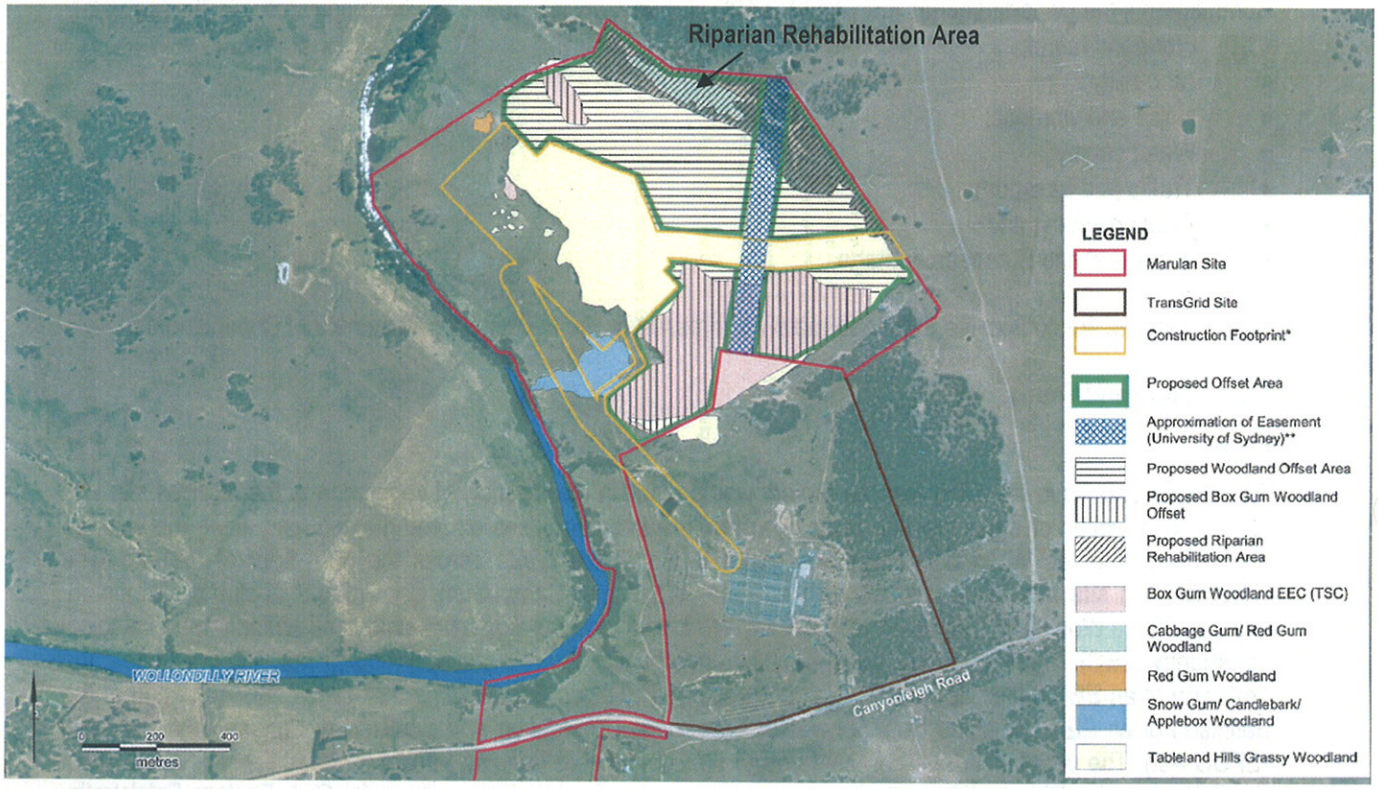
option to the east of the TransGrid site (excluding the portion which traverses the facilities site access road which is already included in the facilities site construction footprint).

Figure 9: Biodiversity Impacts at Facilities Site (Proponents' Preferred Project Report, May 2009)



The Proponents have identified that the "eastern" route would mostly affect exotic vegetation comprising grazing pasture and planted landscape vegetation, as the route would mainly traverse already cleared private properties. To minimise intrusion into private properties, the Proponent has proposed the "western" route which traverses mostly Crown land in the form of an unmade Crown Road situated in an area of intact regenerated native vegetation. The Proponents have mapped the native vegetation communities which have the potential to be impacted by the pipeline routes as comprising: native grassland, Stringybark/ Black Sheoak Forest, Candlebark Gully Forest, Argyle Apple Forest, Cabbage Gum/Stringybark Forest, Scribbly Gum Woodland, Acacia Scrub, Forest Hollow Grassy Woodland, and the Box Gum Woodland EEC which makes up the definition of an EEC under both the TSC and EPBC Acts. The Proponents have clarified that whichever route option is chosen, clearance of any canopy trees associated with the EEC would be avoided as far as practicable. None of the western route options are expected to impact upon native grasslands.

The vegetation clearing associated with the worst case route alignments for the "eastern" and "western" corridors are summarised in Table 2 below. The Proponents have argued that the worst case clearance associated with the pipeline construction would not necessarily constitute the extent of permanent vegetation loss associated with the pipeline. In this regard, the Proponents have suggested that with the exception of a six metre wide corridor directly above the buried pipeline where certain restrictions would apply to the extent of revegetation undertaken (to minimise interaction/damage to the pipeline by deep rooted vegetation), the remainder of the up to 20 metre construction corridor proposed would be subject to revegetation and rehabilitation measures to ensure that the "permanent" loss of vegetation associated with the pipeline is significantly less than the original worst case construction disturbance. Table 2 presents the worst case construction clearing associated with the pipeline and the "permanent" vegetation loss suggested by the Proponents that would result following the implementation of appropriate rehabilitation measures. The specific vegetation communities that would be impacted by the pipeline corridors are presented in Figure 10.

Table 2: Worst Case Native Vegetation Loss associated with Gas Pipeline Route Alternatives

Vegetation (hectares)	*Eastern* route using "north-eastern route alternative A"		*Western* route using "Lot 153 DP750053 with north-eastern route alternative A"	
	Initial Clearing	Permanent Loss Following Rehabilitation	Initial Clearing	Permanent Loss Following Rehabilitation
Box Gum Woodland EEC	0.13	0.04	0.13	0.04
Native Woodland and Forest	2.94	0.96	9.32	2.81
Native Grassland	0.21	0.21	0.00	0.00
Exotic Vegetation	8.87	8.87	7.06	7.06
Total (Native Vegetation)	**3.28**	**1.21**	**9.45**	**2.85**
Total (All Vegetation)	**12.15**	**10.08**	**16.51**	**9.91**

The Proponents' ecology assessment indicates that the vegetation communities to be impacted by the pipeline options are likely to comprise suitable foraging and roosting habitat for up to 24 species listed under the TSC and/ or EPBC Act. The pipeline route options are also expected to cross several ephemeral drainage lines (up to seven in the case of the eastern route and up to six for the western route) which have the potential to impact on riparian and aquatic ecology values. Nil perennial water bodies are expected to be impacted by either route option.

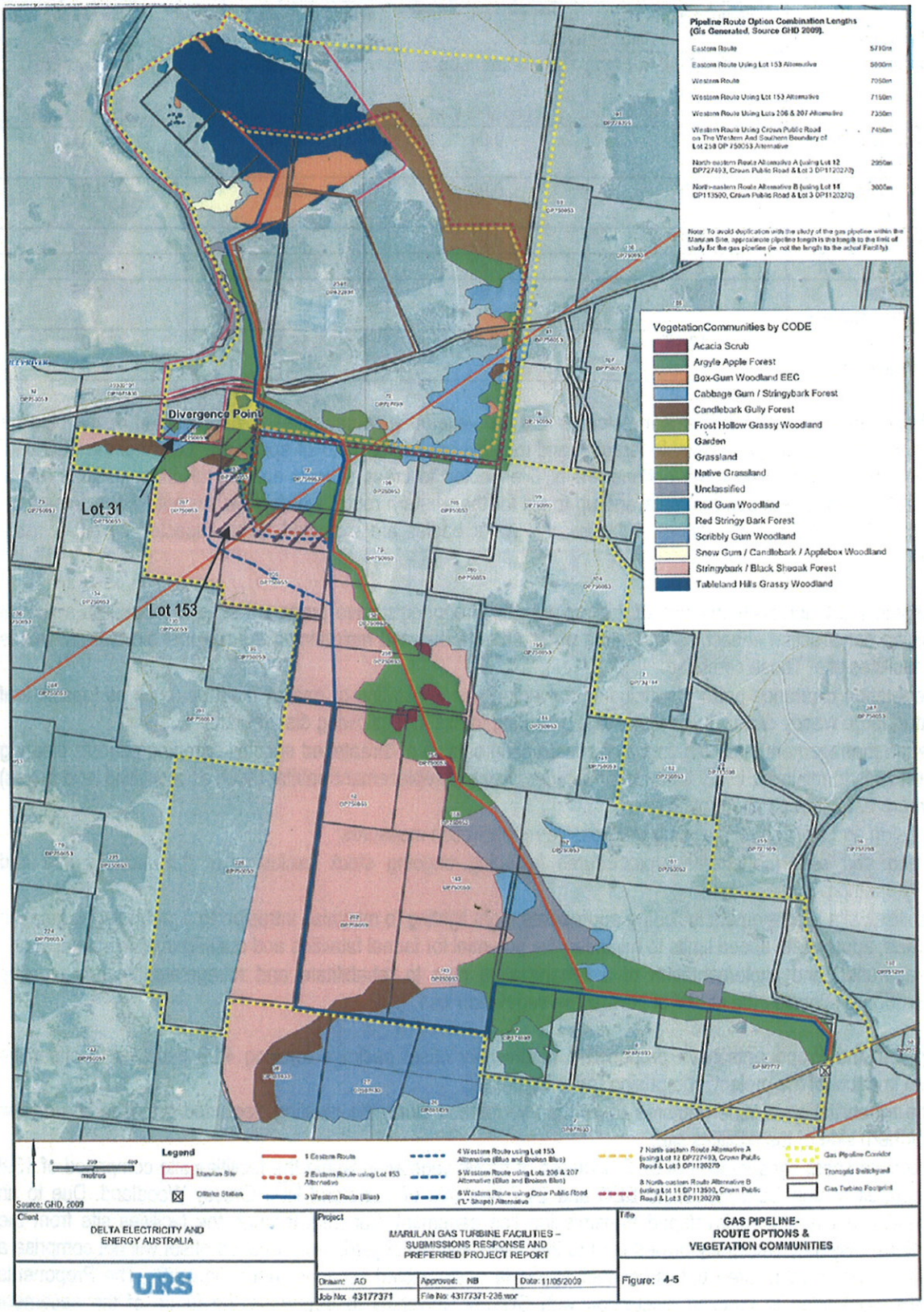
To mitigate the biodiversity impacts of the project, the Proponents have proposed several measures aimed at minimising construction impact, rehabilitation of disturbed areas and maintaining the residual biodiversity values of the facilities site. These comprise:

- vegetation clearance protocols including salvaging and reinstating of habitat features (such as topsoil, leaf litter, large woody debris, bush rock, hollow bearing trunks etc) following disturbance;
- fauna management including timing of construction outside of threatened species breeding periods, clearing protocols to minimise injury to fauna and the provision of replacement habitat (such as roost and nest boxes) where habitat trees are impacted;
- erosion and soil control including progressive rehabilitation measures;
- weed and pest management procedures including ongoing stock exclusion at the facilities site and phytophthora management;
- facilities site management including appropriate night lighting to minimise intrusion to surrounding vegetation areas, appropriate speed limits to minimise the potential for faunal fatalities and bushfire management; and
- preparation and implementation of a rehabilitation plan to rehabilitate and revegetate the gas pipeline corridor to minimise the extent of permanent vegetation loss.

In addition, the Proponents have proposed a biodiversity offset package totalling 44.9 hectares to offset the residual impacts of the project, comprising (refer Figure 9):

- the rehabilitation of nine hectares of riparian vegetation along the existing degraded drainage line on the northern side of the facilities site;
- the permanent conservation of 35.5 hectares of native vegetation within the facilities site comprised of 13.8 hectares of Box Gum Woodland EEC and 21.7 hectares of Tableland Hills Grassy Woodland. Due to an existing but as yet undeveloped transmission line easement that runs through the facilities site from the adjacent Sydney University owned land to the TransGrid switchyard, the proposed offset will not comprise a single consolidated area but rather four separate unconnected sections (refer Figure 9). The Proponents have committed to ongoing discussion with Sydney University to determine the future of the easement including whether this additional land (4.5 hectares of native vegetation) can be incorporated into the Proponents' offset package to reduce fragmentation of the vegetation to be retained on site and increase the extent and the long-term viability of the total offset package; and
- the permanent conservation of 0.4 hectares of Box Gum Woodland EEC within a separate property (also owned by the Proponents) located to the south of Canyonleigh Road (Lot 153 DP750053 – Refer Figure 10).

Figure 10: Vegetation Communities Traversed by the Gas Pipeline Routes with Lot 153 DP750053 Highlighted (Proponents' Preferred Project Report, May 2009)



The Proponents have undertaken a desk top constraints analysis of the water pipeline option which indicates that the pipeline has the potential to traverse a number of environmentally sensitive areas including Hanging Rock Swamp, waterways/ drainage lines associated with the Paddy's River complex and two TSC and/or EPBC Act listed endangered ecological communities (Temperate Highland Peat Swamp and Box Gum Woodland). The

Proponents' analysis also indicates that the areas proposed to be traversed by the pipeline have the potential to comprise suitable habitat for several TSC Act listed species including the Koala, Eastern Bent-wing Bat, Speckled Warbler and the flora species *Pomaderris pallida.*

Submissions

One submission from a specialist interest group (Nature Conservation Council) noted the potential for habitat fragmentation within the facilities site from the proposed ancillary infrastructure including the access road. Submissions from the DECC and the Hawkesbury-Nepean Catchment Management Authority raised concerns regarding the impacts of the project on threatened species habitat, habitat fragmentation, over cleared vegetation landscapes and the adequacy of the proposed offset. The DECC also raised concerns regarding the level of survey effort undertaken for the project and questioned why the project cannot be sited to further avoid biodiversity impacts. One public submission raised concern regarding the impact of the proposed gas supply pipeline on private property, stating preference for the pipeline to be located on Crown land within the adjacent vegetated land.

Consideration

The Department has considered the Proponents' biodiversity assessment and is satisfied that the level of assessment undertaken for the facilities site and the gas pipeline routes (and overall corridor) is sufficient to enable the Department to form a view of the existing biodiversity values on site and likely extent and significance of impacts associated with these project elements. In assessing the acceptability of the biodiversity impacts associated with the facilities site and the gas pipeline corridor, the Department has considered whether the Proponents have demonstrated that the biodiversity values of the site have been avoided wherever possible and where unavoidable whether viable options exist to offset the impacts of the project consistent with "maintain and improve" principles.

Facilities Site

With respect to the facilities site, the Department considers that whilst the existing vegetation on site poses a constraint to development, the site also provides key advantages to development of the project including proximity to the high voltage electricity network, road access, relative isolation from sensitive receptors, suitable land zoning and land availability to meet the requirements of both facilities. In this regard, the Department notes that the Proponents have specifically chosen to site the two power stations together so as to avoid the need for duplication of infrastructure and associated disturbance. On the above basis, the Department considers the location of the facilities site to be justified on the balance of locational criteria.

With respect to avoidance of unnecessary biodiversity impacts within the facilities site, the Department accepts that the configuration presented constitutes what can be reasonably achieved given the constraint of a 150 metre buffer from the Wollondilly River as required by the Sydney Catchment Management Authority (SCA) to avoid potential water quality impacts to Sydney's drinking water catchment as well as the need to minimise flood risk by locating above the 1 in 100 ARI flood level. Furthermore, the Department accepts that the proposed location of ancillary facilities within the facilities site constitute what can be reasonably achieved given the constraints associated with the less vegetated areas of the site including:

- proximity to the TransGrid switchyard making locating the gas pipeline along the western side of the TransGrid switchyard unfeasible due to potential electricity conductivity and associated corrosion risks; and
- inadequate space and unsuitable topography for vehicle transport, flood inundation risk as well as electricity conductivity related construction risks from the proximity to the TransGrid switchyard making locating the access road to the western side of the TransGrid switchyard unfeasible.

The Department notes that the Proponents have made several refinements to the facilities site configuration to minimise impacts to identified EEC onsite. On the above basis, the Department is satisfied the Proponents have given due consideration to avoiding biodiversity impacts within the facilities site, where possible balanced with other existing constraints on site. To ensure that a design principle of biodiversity impact avoidance is maintained during detailed design the Department has recommended conditions of approval requiring the Proponents to minimise the vegetation clearing required for the siting of the project as far as reasonable and feasible (including for the construction lay-down areas).

Notwithstanding the opportunity for further reducing vegetation impacts during detailed design, the Department accepts that the configuration identified by the Proponents would likely represent the worst case level of clearing that would be required at the facilities site. In this regard, the Department has considered whether the Proponents have demonstrated that reasonable and feasible options exist to offset this impact. The Proponents' offset package largely comprises the retention of vegetation on site that would not otherwise be disturbed by the development of the facilities, as well as the rehabilitation of an additional nine hectares of disturbed riparian vegetation on site and the conservation of a small remnant of Box Gum Woodland EEC within a separate property (Lot 153 – refer Figure 10) to the facilities site. Whilst in simplistic terms the Department accepts that the amount of native vegetation provided in the offset package (44.9 hectares) would be greater than the native vegetation to be cleared on site (16.1 hectares), the Department does not consider that the package would offset the biodiversity values of the facilities site consistent with the principles of "improve and maintain" for the following reasons:

- the vegetation to be impacted whilst not comprising EECs in all cases, nevertheless constitute vegetation of high conservation value as it comprises habitat for a number of threatened species and in the case of the Tableland Hills Grassy Woodland community comprises an "over-cleared" vegetation type in the region (i.e. 99% cleared);
- the offset land within the facilities site would comprise up to four fragmented remnants rather than a consolidated area and would be subject to degradation of biodiversity values through edge effects; and
- the small area of EEC provided in a separate block (Lot 153) is unlikely to maintain its biodiversity values if it is to be managed in isolation to the remainder of the block which may be subject to future development.

In response to the Department's concerns, the Proponents have proposed the inclusion of additional vegetated areas within Lot 153 (13 hectares in total including the EEC) into the offset package as a buffer to the 0.4 hectares of Box Gum Woodland EEC already proposed as part of the package. The Proponents have proposed Lot 153 as an alternative across which the western/eastern pipeline routes could traverse (refer Figure 10). Should this pipeline alternative be progressed, the Proponents have proposed the inclusion of an additional 2.75 hectares of vegetation (including 0.5 hectares of Box Gum Woodland EEC) located on a separate block also owned by the Proponents (Lot 31) into the offset package to compensate for any associated fragmentation impact that may result within Lot 153. The Department considers that the additional 13 to 15.75 hectares of land would provide a suitable offset, noting that the land includes vegetation of high conservation value including listed EEC which would be protected in perpetuity.

The Department is satisfied that the addition of these lots in conjunction with the measures to be implemented by the Proponent to minimise and mitigate flora and fauna impacts, would be sufficient to ensure that the biodiversity impacts of the facilities site are offset consistent with the principles of "maintain or improve". On this basis, the Department is satisfied that viable options exist to offset the impacts of the facilities site under worst case and that suitable mechanisms (such as voluntary conservation agreements) exist to secure the conservation values of the offset land in perpetuity. The Department has recommended a condition of approval requiring the Proponents to secure the offsets as proposed prior to the commencement of construction of the facilities site.

Further to the above, the Department has recommended conditions of approval requiring the Proponents undertake the following measures to further strengthen the Proponents' offset and rehabilitation requirements:

- offset each hollow bearing tree impacted by the projects on a 1:1 basis;
- rehabilitate any waterways and associated riparian vegetation disturbed during construction to a standard equal to or better than existing' and
- rehabilitate any vegetated areas within the power station site cleared for temporary construction lay-down to a standard equal to or better than existing.

Gas Pipeline

With respect to the gas pipeline, the Proponents have sought approval for a broad concept plan corridor as well as for two specific route alignments within the corridor ("western" and "eastern") to provide maximum flexibility in developing the final option as part of detailed design and easement negotiation. Both route options have been identified by the Proponents as being technically feasible (based on constructability investigations to date), however pose different environmental and landuse constraints. The key constraint associated with the western route is biodiversity impacts, whilst with the eastern route is greater encroachment onto private properties. One

public submission raised significant concerns regarding the potential encroachment of his property by the pipeline and requested that it traverse public land in preference to private property.

The Department agrees that all effort should be made to minimise intrusion of private property where a reasonable and feasible public land alternative exits. In this case, the alternative of using public land (i.e. crown roads as part of the western route) has the potential to result in significant biodiversity impacts if extensive offsets are not provided as it would involve traversing a large area of intact and well established regenerated native vegetation. The Department in this case has had to consider whether the landuse advantages of the western route to private property would outweigh its potential impacts with respect to biodiversity values and therefore whether it would in fact constitute a "reasonable and feasible" alternative to the eastern route.

With respect to impact to private properties, the Department notes that the pipeline would be buried and as such would not pose an ongoing constraint to existing landuse (which comprises rural grazing land) following rehabilitation. Whilst some disruption would occur during construction, this would be short term and finite in nature and would be subject to stringent rehabilitation requirements consistent with existing landuse in consultation with the landowner. The only potential for ongoing constraint to rural agricultural activities would be in relation to the planting of deep rooted vegetation which have the potential to interact with and damage the pipeline. However, restrictions to such planting would be limited to the approximately six wide metre corridor directly above the buried pipeline within the pipeline easement and is not considered to be significant. Furthermore, the Proponents' Preliminary Hazards Analysis indicates that the pipeline would pose a low safety risk to existing landuse and would meet the most stringent risk criteria set out in the *NSW Hazardous Industry Advisory Paper No. 4 Risk Criteria for Landuse Planning.*

The public submission on the project raised concerns that the pipeline would impact on the future development potential of private properties particularly constraining the potential for future residential subdivision and development. 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. Consequently, the Department does not consider that the pipeline is likely to pose a significant constraint on future development potential. Notwithstanding, the Department notes that any direct impacts to private land would be subject to appropriate compensation as part of easement negotiations. In consideration of the above, the Department is satisfied that on balance, the gas pipeline is unlikely to result in unacceptable impacts to existing or future landuse on private land.

With respect to biodiversity impacts, the Department considers that the western route has the potential to have significant impacts if not adequately offset. The Department considers that a high ratio of offset is likely to be required to ensure that the disturbance is adequately compensated consistent with the principles of "maintain or improve" given:

- the nature of vegetation to be cleared which comprises listed EEC and suitable foraging and/ or roosting habitat for up to 24 listed species;
- the nature of proposed clearing which would involve the bisecting and fragmentation of a large area of existing, well established, regenerated vegetation with the potential for ongoing degradation and edge effect impacts (even after rehabilitation) through operational maintenance activities along the pipeline corridor; and
- the extent of vegetation clearing comprising at worst case up to 9.45 hectares of native vegetation.

Whilst the Department accepts that the biodiversity impacts of the western route could in principle be offset to ensure no net loss of biodiversity values in the long term, the Department considers that where a feasible alternative exists which would enable the impact to be avoided rather than offset this alternative should be pursued in the first instance. In this regard, the Department considers that the pursuance of development options within the western section of the gas pipeline route would only be warranted where all reasonable and feasible route options within the eastern section have been exhausted. In the current case, the Department considers that the route options identified in the eastern section provide just as technically feasible options as the western routes whilst posing clear advantages with respect to biodiversity impacts and not posing any significant constraints in other respects such as landuse. On this basis the Department has recommended that the Minister use her discretion under Section 75O(4) of the *Environmental Planning and Assessment Act 1979* to modify the concept

plan approval to remove the western part of the gas pipeline corridor which traverses vegetated areas, whilst providing concept plan approval for the eastern section of the corridor. This approval regime means that development could only be pursued within the western sections of the pipeline corridor through a modification to the Minister's concept plan approval and only should the Proponents be able to demonstrate that all reasonable and feasible options within the eastern section (aimed at avoiding biodiversity impacts) have been exhausted and that viable options exist to offset the biodiversity impacts of a western route option.

With respect to the specific biodiversity impacts of the eastern gas pipeline route, the Department considers that even under worst case, the biodiversity impacts of this route (i.e. 3.28 hectares) are unlikely to be significant as it would be largely confined to scattered stands of vegetation within already cleared (pasture) areas or at the edge of the adjacent intact area of vegetation. The Department is satisfied that the offset measures proposed as part of the facilities site in conjunction with the pipeline rehabilitation measures proposed by the Proponents would be sufficient to offset the biodiversity impacts of this route. In this regard the Department notes that the total offset (57.5 to 60.25 hectares) for the native vegetation to be impacted by project (19.38 hectares comprising the facilities site + the pipeline) would be in the order of three hectares to each hectare impacted (3:1 ratio). The Department is satisfied that the minor waterway crossings associated with the pipeline would not result in a significant impact to aquatic or riparian values as all of the waterways to be crossed comprise ephemeral drainage line that do not support any water or aquatic vegetation and which have in most cases been highly modified and eroded from surrounding agricultural practices including grazing and weed infestation. Whilst some riparian vegetation may require clearing at up to three drainage lines this would be subject to appropriate rehabilitation to ensure no net loss of ecology values. In this regard, the Department has recommended a condition of approval requiring all watercourses disturbed during construction to be rehabilitated to a standard equal to or better than the existing condition in consultation with relevant agencies.

On the above basis, the Department is satisfied that there are no biodiversity constraints to recommending full project approval for each of the eastern pipeline route alternatives identified. Full project approval for each of eastern route alternatives (including north eastern options) within the broader (eastern) concept plan corridor would provide the Proponents with maximum flexibility in determining a final preferred route as part of detailed design and easement negotiations.

Water Pipeline

With respect to the option for a water pipeline, the Proponents' desktop analysis indicates that there would be some biodiversity constraints to the development of this project component. 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 that would already be subject to vegetation disturbance) considers that the pipeline is unlikely to result in unacceptable biodiversity impacts. On this basis, the Department considers that concept plan approval is warranted for the water pipeline option, however considered that 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 biodiversity impacts of the pipeline as part of the concept plan approval.

5.2 Air Quality

Issue

The Proponents have assessed the air quality impacts of the proposal in accordance with the *Approved Methods and Guidelines for the Modelling and Assessment of Air Pollutants in New South Wales* (DECC, 2005), considering key pollutants typically associated with gas-fired power stations (such as particulates, nitrogen oxides sulphur dioxides and carbon monoxides). Two worst case stack-emission scenarios have been modelled considering the combined start-up of the EnergyAustralia peaking facility and the Delta Electricity Stage 1 (peaking) facility and the operation of the Delta Electricity Stage 2 (base load) facility combined with the start-up of the EnergyAustralia facility. The assessment of nitrogen oxides has focused on the species nitrogen dioxide, which is of principal concern in terms of health effects and which is regulated by the DECC. In this regard, the 'Jansen Equation' in the Approved Methods has been used to estimate how much of the nitrogen generated by the facilities is likely to be converted to nitrogen dioxide in the atmosphere (noting that the assumption of 100% conversion of nitrogen into nitrogen dioxide would be unrealistically conservative).

The results of the worst case assessment are summarised in Table 3 and indicate that the worst case emission concentration levels predicted to result from both facilities operating simultaneously would not exceed relevant ground-level concentration limits at surrounding receivers for any of the pollutants modelled.

The Proponents assessment has also considered stack emissions standards against the requirements of the *Protection of the Environment Operations (Clean Air) Regulation 2002* (the POEO Regulation) and concluded that based on the use of an 'E Class' gas turbine, nitrogen oxide emission levels at each of the facility stacks can be limited to approximately 51 mg/ m^3 which would easily comply with the POEO Regulatory limit of 70mg/ m^3 (for gas fired turbine with a generation capacity of greater than 30 megawatts and which would operate after 1 September 2005). In relation to construction dust emissions, the Proponents have indicated that these can be managed through the implementation of standard mitigation measures such as wetting of disturbed surfaces and covering of loads.

Table 3: Worst Case Ground Level Pollutant Concentrations Associated with the Facilities (Proponents' Environmental Assessment August, 2008)

Species	Averaging Period	Frequency	Background Concentration	Scenario Modelled[A]		Maximum Cumulative Impact	Air Quality Criteria	Compliance with Air Quality Criteria
			µg/m^3	1- Combined	2 - Combined	µg/m^3	µg/m^3	YES/NO
NO_x (as NO_2)	1 hour	100%	116.9	113.0[B]	71.2[B]	229.9[B]	246	YES
	Annual	100%	13.7	0.67	0.60	14.4	62	YES
PM_{10}	24 hour	100%	40.0	0.93	1.29	41.3	50	YES
	Annual	100%	14.0	0.04	0.08	14.1	30	YES
SO_2	10 minute	100%	36.8	12.7	36.0	72.8	712	YES
	1 hour	100%	25.7	8.85	25.14	50.8	570	YES
	24 hour	100%	5.7	0.740	1.304	7.0	228	YES
	Annual	100%	1.2	0.0256	0.080	1.3	60	YES
CO	15 minute	100%	3299	1795.2	1218	5094	100,000	YES
	1 hour	100%	2500	1360.5	923.1	3861	30,000	YES
	8 hour	100%	2250	329.5	166.2	2580	10,000	YES
Acetaldehyde	1 hour	99.9%	-	0.563	0.034	0.563	42	YES
Acrolein	1 hour	99.9%	-	0.090	0.006	0.090	0.42	YES
Benzene	1 hour	99.9%	-	0.169	0.010	0.169	290	YES
Ethylbenzene	1 hour	99.9%	-	0.450	0.028	0.450	8000	YES
Formaldehyde	1 hour	99.9%	-	9.990	0.610	9.990	20	YES
Toluene	1 hour	99.9%	-	1.829	0.112	1.829	360	YES
Total (PAH)	1 hour	99.9%	-	0.031	0.002	0.031	0.4	YES
Xylenes	1 hour	99.9%	-	0.901	0.055	0.901	190	YES

Notes:
[A]: Worst case concentrations are shaded
[B]: For Scenarios 1 and 2 Combined, peak NO_2 impacts showed that a more refined assessment was required in accordance with the *Approved Methods*. The concentrations of NO_2 were estimated using an equation for estimating the conversion of NO_X emitted from the Facility to NO_2 (Janssen Equation).

Submissions

A number of public submissions raised concerns that the air quality modelling undertaken for the project was not representative of local conditions. In addition, several submissions raised concerns regarding the potential dust impacts associated with the construction and operation of the project particularly in relation to traffic generated dust.

Consideration

Air Quality Emissions from Facilities

A number of submissions queried the accuracy of the air-quality (pollutant concentration) modelling, noting that the modelling had used offsite rather than site-specific background emission data. The Department is satisfied that the background air quality monitoring data used for the modelling is acceptable, noting that the data were sourced from rural monitoring stations (Bargo and Oakdale) which would be expected to have comparable ambient air quality conditions as the rural project site. The monitoring station (Macarthur) from which background carbon monoxide data was sourced, is located adjacent to the heavily trafficked Hume Highway and Narrellan and Menangle Roads. The Department notes that the use of background data sourced from this more built up location provides a conservative basis for the assessment as it is likely to overestimate pollutant levels within the local air shed as part of the assessment than occurs in reality. This means that the real impact (when considering background levels plus the emissions generation by the proposal) is likely to be lower than expressed in the assessment. Considering the above, the Department is satisfied that the background emissions data used as part of the study are acceptable for the purposes of assessment. The DECC has not raised any concerns regarding the Proponents' air quality modelling.

The Department is satisfied that the emissions generated by the facilities are unlikely to significantly affect ambient air quality in the area, noting that the pollutant concentrations predicted to be generated by the proposal are by in large only a small fraction of the relevant DECC concentration limits (i.e. less than 8% for all but three pollutants). This indicates that the facilities' contribution to ambient pollution levels would be small and would not pose a significant risk to air quality in the local area. The highest incremental change in air quality associated with the proposal relates to Acrolein (1-hour averaging period) constituting 21% of the DECC concentration limit, nitrogen dioxide (1-hour averaging period) constituting 46% of the DECC concentration limit and formaldehyde (1-hour averaging period) constituting 49% of the DECC concentration limit. Notwithstanding, the Department notes that the worst case short-term (1 hour) predictions have been based on the conservative assumption of the simultaneous operation of the facilities every hour of the year rather than the low operating hours associated with the peaking facilities and only intermittent coincidence of concurrent operations between the facilities.

Consequently, the Department considers that the modelling is likely to have considerably overestimated impacts with the real impact expected to be less than predicted. The Department further notes that the Proponents' assessment has taken a grid-based approach to modelling whereby pollutant concentrations have been predicted every 500 metres across a 30 by 30 kilometre grid. The modelling indicates that air quality limits would be achieved at each of the grid points modelled indicating that acceptable air quality standards would be achieved at all nearest surrounding residents and undeveloped land in the surrounding area. This means that the proposal is unlikely to pose an impediment to future development in the area on air quality grounds.

The proposal is unlikely to result in cumulative air quality impacts as there are no existing industrial facilities in the vicinity of the site, which generate similar emission species. There is expected to be little interaction between particulate matter generated by the Power station and surrounding quarries as emissions from gas turbine emissions are buoyant and affected more by upper air meteorology, whilst quarry emissions are not buoyant and likely to be contained close to site. Furthermore, given the very small contribution of particulate matter expected to be generated by the proposal at worst case (< 3% of the 24-hour and <0.5% of the annual DECC concentration limit) and the considerable distance to the nearest quarry operations (Johnniefelds Quarry approximately 11 kilometres to the south), the Department considers that the facilities are unlikely to pose a significant risk of cumulative PM_{10} impacts to nearest sensitive receivers.

To ensure the facilities are designed and operated to meet best practice quality standards, the Department has recommended a range of conditions including the establishment of strict emission limits at the exhaust stacks, requirements for operational monitoring and performance verification and the preparation and implementation of operational air quality management plans. The Department's recommended conditions provide cumulative performance standards which must be met by the simultaneous operation of the facilities, as well as the requirement for an integrated approach to air quality monitoring, verification and complaints management as required. The Department is satisfied that with the implementation of these controls the air quality impacts of the site as a whole can be managed in compliance with regulatory and best practice standards.

Other Fugitive Emissions

Several submissions raised concerns regarding potential dust emissions generated during construction and operation particularly through traffic travelling on unsealed sections of road such as Canyonleigh Road. The Proponents have committed to sealing the unsealed sections of Canyonleigh Road from Brayton Road to the site access prior to the commencement of construction to ensure that minimal fugitive emissions are generated by traffic associated with the project during construction or operation. The Department is satisfied with this approach, noting that with the exception of some intermittent traffic generated along the Wollombi Road/ Red Hills Road during the construction, and to a much smaller extent, operation of the gas pipeline, the main roads trafficked by the project would be confined to Canyonleigh/ Brayton Roads. The Proponents commitment will ensure that the overwhelming majority of traffic associated with the project only traverses sealed roads, therefore ensuring minimal generation of fugitive emissions during construction and operation.

The Department is satisfied that fugitive emissions generated during the construction of the proposal can be adequately managed through standard on-site measures (such as the wetting down of disturbed areas, progressive rehabilitation and limiting earthworks during windy conditions) so as to not result in significant impacts to surrounding receivers. The Department has recommended conditions of approval requiring the proponent to ensure that the proposal is constructed in a manner which minimises dust emissions from the site, including wind-blown and traffic-generated dust.

5.3 Noise and Vibration

Issue

Facilities Site – Operational Noise

The Proponents have undertaken an operational noise assessment of the power station facilities in accordance with the *NSW Industrial Noise Policy* (DECC, 1999) (noting that the other components of the project including the transmission line, gas and water pipelines would not pose any significant issues with respect to operational noise). The assessment has considered worst case meteorological conditions and operational scenarios involving the simultaneous operation of the EnergyAustralia and Delta Electricity Stage 1 facilities (scenario 1) and the simultaneous operation of the EnergyAustralia and Delta Electricity Stage 2 facilities (scenario 2). The predicted noise levels are based on the facilities being designed to include noise attenuation including air intake silencers, generator transformer walls and air exhaust silencers for the open-cycle facilities and low noise heat recovery steam generators and condenser fans (with barriers or silencers) for conversion to the base-load facility.

The results of this assessment are summarised in Tables 4 and 5 and indicate that the cumulative noise generated by the simultaneous operation of the EnergyAustralia open-cycle facility and the Delta Stage 2 facility would generally be greater than the simultaneous operation of the two open-cycle facilities. Under scenario 1 (the two open-cycle facilities), cumulative noise generated by the facilities are expected to exceed INP intrusive noise criteria of 35 dBA by between 1 and 6 dBA at three receivers (R23, R24, R26), with the greatest exceedance predicted at R23 (up to 4 dBA) and at R24 (up to 6 dBA). A maximum exceedance of 2 dBA is predicted at R26, with noise levels predicted to achieve noise criteria at all remaining receivers.

Under scenario 2 (EnergyAustralia open-cycle and Delta Electricity Stage 2 base-load), the cumulative noise generated by the facilities is expected to result in an increased impact at those receivers predicted to be noise affected under scenario 1 (R23, R24, R26) as well as result in noise exceedance above criteria at one additional receiver (R25). Predicted exceedances under scenario 2 are between 1 and 8 dBA above INP criteria with the worst impacts again predicted at R23 (up to 6 dBA) and at R24 (up to 8 dBA). A maximum exceedance of 3 dBA is predicted at R26 and of 1 dBA at the additional receiver R25 with noise limits predicted to be achieved at all remaining receivers.

The Proponents have advised that it has purchased the two receivers (R23 and R24) which are predicted to experience the worst noise exceedances. The Proponents have also advised that it has commenced negotiations with receivers R26 and R25 with the aim of coming to a negotiated agreement in relation to the noise exceedances predicted at these residences. Receiver locations are identified in Figure 11.

The Proponents' operational noise assessment has also considered the potential for the proposal to result in sleep disturbance impacts through peak noise events and for low-frequency noise generation. The Proponents

have indicated that the open-cycle plants would pose a low risk of peak noise events and that the risk of sleep disturbance from the base load plant would be limited to emergency steam valve release on rare occasions. The Proponents sleep disturbance modelling indicates that the facilities site would be able to comfortably achieve DECC criteria of 45 dBA $_{LA1,\ 1\ minute}$ at all surrounding receivers.

The Proponents have applied new methodology developed in the United Kingdom to conclude that the proposal is unlikely to generate low frequency noise impacts at nearest sensitive receivers.

Table 4: Operational Noise Impacts associated with the EnergyAustralia and Delta Electricity Stage 1 Facilities (Scenario 1) (Proponents' Environmental Assessment August, 2008)

Residence No.	Time Period	Calculated 10% $L_{Aeq,15min}$ Noise Level (dBA)			Noise Criteria $L_{Aeq,15min}$(dBA)
		EnergyAustralia Facility	Delta Electricity Facility Stage 1	Total	
R15	Day	21	26	27	35
	Evening	23	28	29	
	Night	22	27	28	
R16	Day	24	28	29	35
	Evening	25	30	31	
	Night	25	29	30	
R17	Day	23	28	29	35
	Evening	26	30	31	
	Night	25	30	31	
R18	Day	21	26	27	35
	Evening	23	28	29	
	Night	22	27	28	
R19	Day	26	27	30	35
	Evening	26	28	30	
	Night	26	28	30	
R20	Day	29	29	32	35
	Evening	31	31	34	
	Night	31	31	34	
R21	Day	29	29	32	35
	Evening	31	31	34	
	Night	31	31	34	
R22	Day	22	27	28	35
	Evening	25	31	32	
	Night	24	29	30	
R23	Day	34	33	37	35
	Evening	36	35	39	
	Night	35	35	38	
R24	Day	36	36	39	35
	Evening	38	38	41	
	Night	38	38	41	
R25	Day	23	23	26	35
	Evening	31	32	35	
	Night	30	30	33	
R26	Day	33	32	36	35
	Evening	34	33	37	
	Night	34	33	37	

Table 5: Operational Noise Impacts associated with the EnergyAustralia and Delta Electricity Stage 2 Facilities (Scenario 2) (Proponents' Environmental Assessment August, 2008)

Residence No.	Time Period	Calculated 10% $L_{Aeq,15min}$ Noise Level (dBA)			Noise Criteria $L_{Aeq,15min}$(dBA)
		EnergyAustralia Facility	Delta Electricity Facility - Stage 2 (with mitigation)	Total	
R15	Day	21	29	30	35
	Evening	23	31	32	
	Night	22	30	31	
R16	Day	24	30	31	35
	Evening	25	32	33	
	Night	25	31	32	
R17	Day	23	30	31	35
	Evening	26	33	34	
	Night	25	31	32	
R18	Day	21	29	30	35
	Evening	23	31	32	
	Night	22	30	31	
R19	Day	26	29	31	35
	Evening	26	31	32	
	Night	26	31	32	
R20	Day	29	31	33	35
	Evening	31	33	35	
	Night	31	33	35	
R21	Day	29	31	33	35
	Evening	31	33	35	
	Night	31	33	35	
R22	Day	22	29	30	35
	Evening	25	33	34	
	Night	24	31	32	
R23	Day	34	37	39	35
	Evening	36	39	41	
	Night	35	39	40	
R24	Day	36	38	40	35
	Evening	38	41	43	
	Night	38	40	42	
R25	Day	23	25	27	35
	Evening	31	34	36	
	Night	30	31	34	
R26	Day	33	34	37	35
	Evening	34	35	38	
	Night	34	35	38	