EnergyAustralia

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Appendix H
Facility Site – Additional Ecology Assessment

MARULAN GAS TURBINE FACILITIES

SUBMISSIONS RESPONSE & PREFERRED PROJECT REPORT

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URS

R E P O R T

Marulan Gas Turbines Facilities

Mapping of Endangered Ecological Communities

Prepared for

Delta Electricity and EnergyAustralia

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URS

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Background Section 1

In January 2009 Delta Electricity and EnergyAustralia engaged URS to gather additional information to support a possible referral to the Commonwealth regarding potential impacts upon the endangered ecological community (EEC) white box, yellow box, Blakely's red gum woodland and derived native grassland, at the proposed Gas Turbine Facilities site in Marulan (Site).

Aims of the survey were to:

- conduct detailed vegetation surveys of areas mapped as Box-Gum Woodland to confirm the condition and hence, level of listing of the EEC (State – NSW *Threatened Species Conservation Act* 1995 (TSC Act), or Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act));
- identify vegetation to species level where possible; and
- define the potential impacts of the project on the EEC within the study area, throughout the site and within the footprint area.

1.1.1 Study Area

The Marulan Site is located on Canyonleigh Road, Brayton, approximately 12km northeast of the village of Marulan within the Upper Lachlan local government area (LGA). Delta Electricity and EnergyAustralia own the land, which is known as Lot 2 DP 1120270.

The study area is located within the South Eastern Highlands bioregion as defined in the *Interim Biogeographic Regionalisation for Australia* (Thackway & Creswell 1995).

1.1.2 Site Description

The Marulan Site occupies 117.6ha of dry eucalypt woodland and grazing land adjacent to the Wollondilly River (refer to **Figure 1**).

The topography, geology and soils of the Site are summarised below.

Topography

The Site contains a number of mostly dry channel-confined drainage lines which drain directly to the Wollondilly River. Drainage lines feature moderate gully erosion through woodland and serious gully erosion through cleared pasture. The Site contains a cleared area approximately 300m wide, bordering a tree covered area which continues on high ground to the east of the Wollondilly River. The Site slopes gently west from 626m AHD to the Wollondilly River corridor at around 590m AHD.

The Gas Pipeline Corridor ranges in height from 590 m AHD to 670 m AHD and is bordered on the east by Paddy's River. Uringalla Creek also runs through the south-eastern part of the proposed Gas Pipeline Corridor. Tributaries for both of these waterways traverse the proposed Gas Pipeline Corridor.

Geology

The 1:250,000 Wollongong geological map indicates that the locality of the Site and surrounding land is underlain by granite, granodionite or porphyry of Devonian age. Observations on Site during preliminary investigations supported this general geological setting with granite rock outcrops and granite-derived soils observed along watercourses and large granite boulders on the surface in some locations.

Section 1 Background

The depth to the top of the granite bedrock was found in preliminary investigations to vary across the Site, but was generally in the range of 1.5 to 5.5 m, being shallower to the east of the Site (typically 1.5 to 2.5 m). The granite is typically medium to coarse grained, and was found to be of extremely low strength within the upper weathered profile, progressively grading to high strength with depth.

Soils

The Site and the proposed Gas Pipeline Corridor fall within the Marulan Soil Landscape (Hazelton and Tille, 1990). The soils within this landscape are dominated by colluvial processes. Mass movement is the principal agent of parent material accumulation. Cliffs, scarps, and steep slopes are dominant features in upper parts of the landscapes with undulating hills and broad benches in lower catchment areas. Alluvial processes are likely to dominate in downslope areas adjacent to the Wollondilly River.

Red Podzolic Soils occur on hillcrests and upper slopes, grading into Yellow Podzolic soils on the lower slopes. Gleyed Podzolic soils are found in drainage depressions (Hazelton and Tille, 1990).

The preliminary investigations encountered granite derived colluvium / slopewash and residual soils overlying granite bedrock across the investigation areas.

Climate

The study area is located within the Goulburn meteorological region and has a dry, continental climate. It experiences mean annual rainfall of 665mm, and a mean daily temperature range of 7.3 to 20.1 degrees (BOM, 2007. The region was experiencing a prolonged, severe drought at the time of the October 2006 survey, though experienced average conditions through 2007 and received rainfall in the weeks preceding the November 2007 survey.

Methods Section 2

URS Ecologists visited the Marulan site on the 14th and 15th of January, 2009.

Using existing vegetation mapping of the area[1] URS ecologists traversed the site to confirm the community composition and boundaries of woodland vegetation communities. Boundaries of woodland communities were based on vegetation associations including dominant and associated species.

To determine the quality and potential listing of box gum woodland under Commonwealth legislation random quadrats (20 m x 20 m) were established in areas mapped as box gum woodland. Flora species within each quadrat were identified to species level. Where species were unable to be identified samples were sent to the Royal Botanical Gardens in Sydney for verification.

[1]This included broad scale vegetation mapping by Keith (2004) and previous mapping by URS and GHD.

Section 3 Results

Surveys confirmed the presence of 16.92 ha of white box, yellow box, Blakely's red gum woodland (box gum woodland) as listed under the TSC Act (**Figure 1**). To determine the quality and potential listing of this community under Commonwealth legislation nine quadrats were established in box gum woodland across the site (**Figure 2**). **Table 3.1** gives the species list for each quadrat.

Table 3-1 Box gum woodland species list outlining the occurrence of species within each quadrat

Scientific Name	Common Name	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9
Acacia paradoxa	Kangaroo Thorn			√						
Acetosella vulgaris	Sheep Sorrel	√	√							
Acrotriche serrulata	Honeypots			√						
Anagallis arvensis	Scarlet Pimpernel			√			√		√	
Aristida vagans	Threeawn Speargrass		√	√			√			√
Austrodanthonia caespitosa	Ringed Wallaby Grass					√	√	√		
Austrostipa scabra	Speargrass	√				√		√		
Briza minor	Shivery Grass				√					
Bromus catharticus	Prairie Grass				√					
Capsella bursa-pastoris	Shepherd's Purse								√	
Cassinia arcuata	Drooping Cassinia	√			√					√
Centaurium erythraea	Common Centaury			√			√	√		
Cheilanthes distans	Bristly Cloak Fern			√				√		√
Chrysocephalum	Common			√						√

Scientific Name	Common Name	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9
apiculatum	Everlasting									
Cirsium vulgare	Thistle									√
Conyza bonariensis	Flaxleaf Fleabane			√			√	√		√
Echinopogon ovatus	Forest Hedgehog Grass	√				√		√		√
Eucalyptus amplifolia	Cabbage Gum	√	√		√	√	√	√		
Eucalyptus bridgesiana	Apple Box	√	√			√				
Eucalyptus cinerea	Argyle Apple	√	√	√					√	√
Eucalyptus eugenioides	Thin-leaved Stringybark	√	√	√	√	√	√			√
Eucalyptus melliodora	Yellow Box				√	√	√		√	√
Gamochaeta americana	Cudweed						√			
Geranium solanderi	Native Geranium	√								
Glycine tabacina				√						
Goodenia hederacea	Forest Goodenia	√	√	√			√	√		√
Hydrocotyle laxiflora	Stinking Pennywort	√			√		√	√		
Hypericum perforatum	St. Johns Wort						√			√
Hypochaeris radicata	Catsear	√		√	√		√	√	√	√

Section 3 Results

Scientific Name	Common Name	Quad 1	Quad 2	Quad 3	Quad 4	Quad 5	Quad 6	Quad 7	Quad 8	Quad 9
Juncus usitatus	Juncus								√	√
Lomandra filiformis	Wattle Mat-rush	√		√	√	√		√		√
Melichrus urceolatus	Urn Heath		√	√			√	√		
Microlaena stipoides	Weeping Grass	√	√		√	√		√	√	√
Micromyrtus ciliata	Fringed Heath-myrtle						√			
Nassella trichotoma	Serrated Tussock			√	√	√		√	√	√
Oxalis perennans			√						√	√
Plantago lanceolata	Plantain								√	
Rubus fruiticosus	Blackberry									√
Solanum nigrum	Blackberry Nightshade								√	
Sonchus oleraceus	Common Sowthistle		√	√			√		√	√
Themeda australis	Kangaroo Grass			√			√			
Vicia sativa subsp. sativa	Common Vetch								√	
Wahlenbergia gracilis	Sprawling Bluebell	√								√
Wahlenbergia stricta	Australian Bluebell		√					√		√

Community composition in relation to both State and Commonwealth legislation is discussed for the three separated patches of box gum woodland identified in **Figure 1** below.

3.1.1 EEC Definitions

3.1.1.1 TSC listed EEC

The TSC Act definition of Box-Gum Woodland EEC states:

"White Box Yellow Box Blakely's Red Gum Woodland includes those woodlands where the characteristic tree species include one or more of the following species in varying proportions and combinations - *Eucalyptus albens* (White Box), *Eucalyptus melliodora* (Yellow Box) or *Eucalyptus blakelyi* (Blakely's Red Gum)" (DECC 2008).

3.1.1.2 EPBC Listed EEC

The EPBC criteria for the Box Gum Woodland EEC follow the flowchart included below:

Section 3 Results

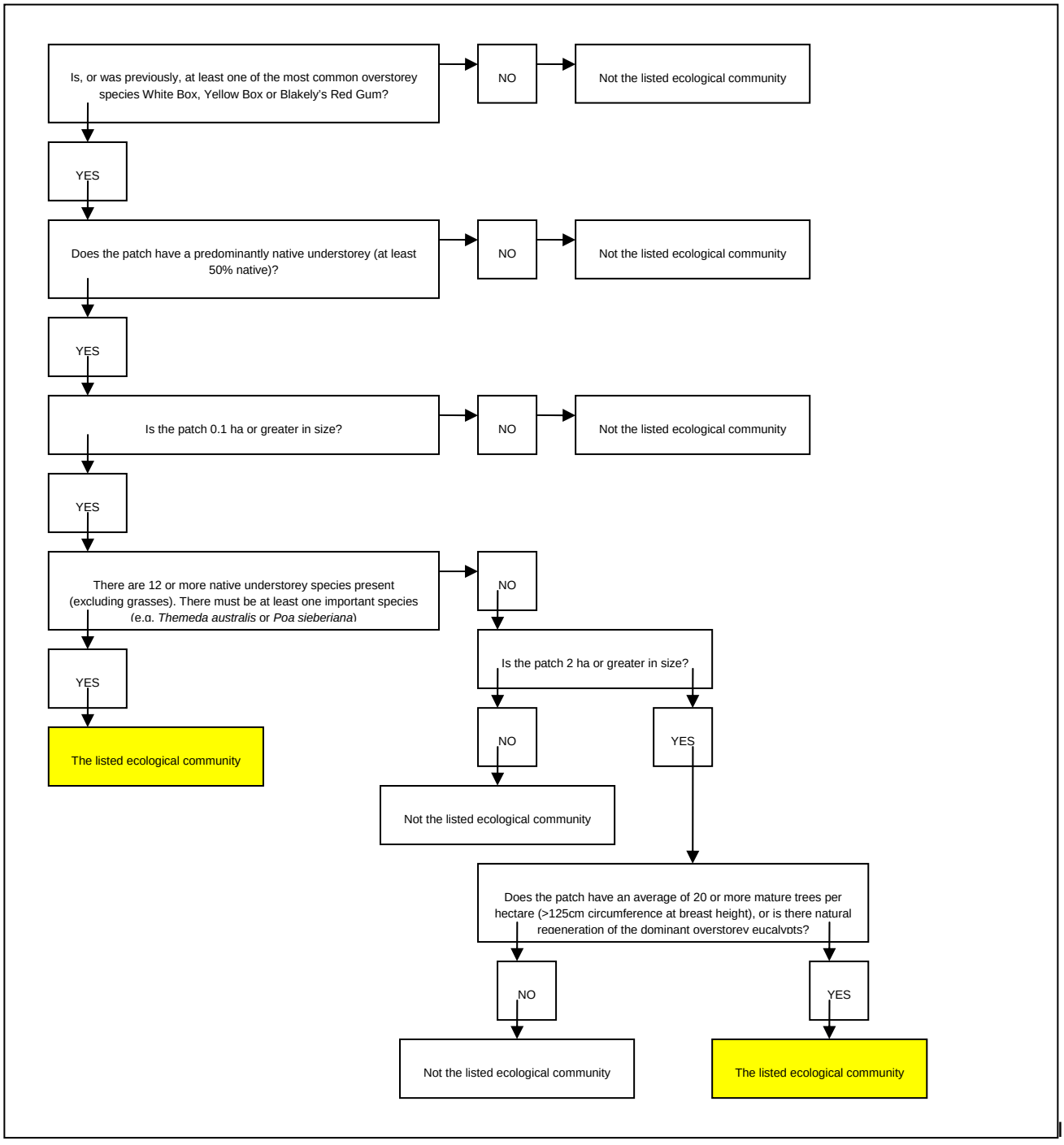

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Figure 2-1 EPBC EEC requirements for Box-Gum Woodland (from DEH, 2006)

3.1.2 Area 1

Based on assemblage composition the woodland community in Area 1 (15.81 ha) is comprised of two sub communities, mapped as Area 1a (11.39 ha) and 1b (4.42 ha) (**Figure 1**).

The woodland community in Area 1a is dominated by thin-leaved stringybark *Eucalyptus eugenioides* and Argyle apple *Eucalyptus cinerea* subsp*. cinerea* and co-dominated by cabbage gum *Eucalyptus amplifolia* subsp*. amplifolia* and apple box *Eucalyptus bridgesiana* with very few scattered inderviduals of immature yellow box *Eucalyptus melliodorai,* with a predominantly native grassland understorey*.*

The woodland community in Area 1b is dominated by thin-leaved stringybark*,* cabbage gum and immature yellow box*,* with an understorey dominated by the noxious weed serrated tussock *Nassella trichotoma.*

TSC Correlation

The presence of Yellow Box at varying densities in Areas 1a and b and the co-occurrence of *E. bridgesiana* within Area 1a (listed as a characteristic Box-Gum Woodland species by the NSW Scientific Committee in the final determination (DECC 2008) indicates the presence of TSC Box-Gum Woodland EEC.

Therefore Area 1a and 1b is considered to meet the TSC Box Gum EEC definition.

EPBC Correlation

The vegetation community mapped as Area 1a contains very few scattered individuals of yellow box, and occurs at a slightly higher elevation than Area 1b. It is considered unlikely that yellow box were ever one of the dominant canopy species in this community. Therefore the area does not meet the EPBC requirement that at least one of the most common overstorey species is or was white box, yellow box or Blakely's red gum.

Area 1a is therefore not white box, yellow box, Blakely's red gum grassy woodland and derived native grassland as listed under the Commonwealth EPBC Act.

Within the community mapped as Area 1b yellow box is likely to have once been a dominant canopy species, meeting the first EPBC criteria in the flow chart above. However, the understorey of this community is dominated by the declared noxious weed serrated tussock, with an increased number of exotic herbaceous species and fewer native species occurring. Therefore it does not meet the requirement to have a predominantly native understorey.

Area 1b is therefore not white box, yellow box, Blakely's red gum grassy woodland and derived native grassland as listed under the Commonwealth EPBC Act.

3.1.3 Area 2

The vegetation community in Area 2 (0.13 ha) was dominated by yellow box and argyle apple, with an exotic understorey of serrated tussock.

TSC Correlation

Area 2 was confirmed as meeting the condition requirements for box gum woodland under the TSC because of the presence of Yellow Box.

Therefore Area 2 is considered box gum woodland under the TSC Act.

Section 3 Results

EPBC Correlation

Yellow box is a dominant canopy species in this area, meeting the first EPBC criteria in the flow chart. However, the understorey is dominated by the declared noxious weed serrated tussock. Therefore it does not meet the requirement to have a predominantly native understorey.

Area 2 is therefore not white box, yellow box, Blakely's red gum grassy woodland and derived native grassland as listed under the Commonwealth EPBC Act.

3.1.4 Area 3

The box gum woodland mapped as Area 3 was dominated by argyle apple and thin-leaved stringybark, with scattered immature yellow box. The understorey was dominated by the noxious weed serrated tussock.

TSC Correlation

Area 3 contained scattered individuals of yellow box and it is possible that yellow box was once a dominant canopy species within this community.

Therefore the northern Box Gum Woodland area is considered to meet the TSC Box Gum EEC definition.

EPBC Correlation

Yellow box was possibly once a dominant canopy species within this area, meeting the first EPBC criteria in the flow chart. However, the understorey of this site is dominated by the declared noxious weed serrated tussock. Therefore it does not meet the requirement to have a predominantly native understorey.

Area 3 is therefore not white box, yellow box, Blakely's red gum grassy woodland and derived native grassland as listed under the Commonwealth EPBC Act.

Where possible Delta Electricity and EnergyAustralia have avoided impacts on the EEC, these are outlined below.

4.1 Site Infrastructure Alterations

4.1.1 Facilities' southern boundary

Based on the need to avoid this EEC, Delta Electricity and EnergyAustralia have committed to moving the southern boundary of the Facilities' footprint northward to avoid the Box-Gum Woodland TSC EEC. The proposed southern boundary does not intersect the mapped Box-Gum Woodland TSC EEC.

Area 2 in the north western portion of the Facilities' footprint cannot be avoided by moving the Facilities' footprint based on the other constraints within the Site.

4.1.2 Access Road

Based on the need to avoid this EEC, further assessment was undertaken to refine the access road alignment within the Site to avoid this EEC as far as possible and hence reduce the impact of the Facilities. Based on this assessment, the revised access road options are presented in **Figure 3**.

This option now avoids clearing of the EEC. This option is presented as the preferred alignment for the access road on the basis that while it requires clearing of Tableland Hills Grassy Woodland, it avoids the need for clearing of the Box-Gum Woodland EEC. The final alignment would be refined during detailed design but would remain to the north of the area mapped in **Figure 1** as Box-Gum Woodland EEC.

4.1.3 Gas Pipeline

The gas pipeline options within the Marulan Site presented in the Joint Concept Environmental Assessment considered the potential that the gas pipeline may be located on either the eastern or western side of the proposed gas pipeline corridor. Therefore a western (Option 1) and eastern (Option 2) option within the Marulan Site were presented in the Joint Concept Environmental Assessment.

Based on the refinement of the gas pipeline options, the eastern pipeline option (Option 2) within Marulan Site is no longer required. In addition, removal of this option also reduces the potential impact on the dominant area of Box-Gum Woodland identified within the Site.

The western pipeline option within the Site has also been realigned to be contained wholly within the Marulan Site and not traversing the adjacent TransGrid property as presented originally.

In addition, the alignment of the gas pipeline within the Marulan Site has been moved west to avoid clearing of the EEC. The proposed alignment avoids the EEC.

4.1.4 Transmission Line

The transmission line has been realigned to the south-west to avoid clearing of the EEC. The proposed alignment avoids the EEC.

Section 4 Potential Impacts

4.2 Existing Easement

An existing easement is located within the Marulan Site benefitting the University of Sydney for the purposes of a potential future transmission line. The total area of the easement within the Marulan Site is approximately 4.5 ha. The terms of the easement do not currently allow this easement to be included in the proposed Offset Area. This easement covers an area within the Marulan Site of 1.2 ha of Box Gum Woodland TSC EEC, 2.1 ha of Tableland Hills Grassy Woodland 1.3 ha of cleared grassland. Further discussions may be undertaken between with the Proponent and the University of Sydney regarding this easement.

4.3 Resultant Impacts

Given the avoidance measures outlined above, recognising the constraints of the existing easement, the proposed Project will require the permanent removal of approximately 0.13 ha (Area 2) of EEC in the north western portion of the Site.

These impacts are considered minimal given that the under storey of these areas is dominated by the noxious weed serrated tussock, significantly reducing the quality of the EEC.

Further discussions may be undertaken between with the Proponent and the University of Sydney regarding the easement.

Conclusion Section 5

TSC Act listed box gum occurs in three locations on the proposed Gas Turbine Facilities site at Marulan. None of these vegetation communities meet the criteria for the Commonwealth EPBC Act listed EEC.

It is considered that impacts associated with the proposed works will not have a significant effect on box gum woodland within the site as it will only require the removal of small immature patches of low quality vegetation, with an understorey that is largely dominated by a noxious weed.

Section 6 References

DECC (2008) *White box yellow box Blakely's red gum woodland - endangered ecological community listing.* <http://www.environment.nsw.gov.au/determinations/BoxgumWoodlandEndComListing.htm>
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DEH (2006) White Box - Yellow Box - Blakely's Red Gum Grassy Woodlands and Derived Native Grasslands <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/Box Gum.pdf>
Department of the Environment, Water, Heritage and the Arts, Canberra.
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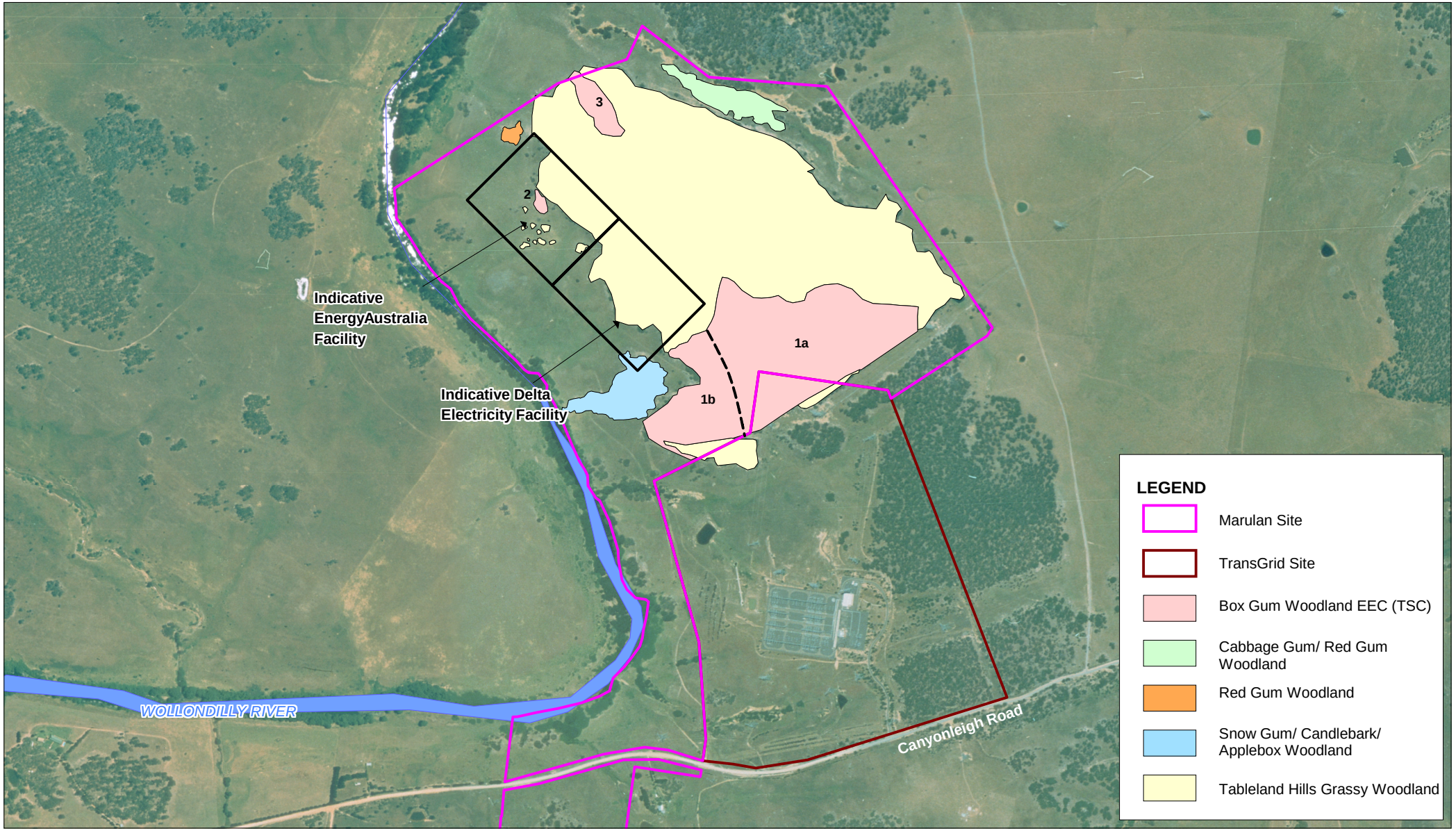
Threatened Species Scientific Committee (2006).*Commonwealth Listing Advice on White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland*.
<http://www.environment.gov.au/biodiversity/threatened/communities/pubs/box-gum.pdf>
Accessed 16/01/2009

Figures



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Source: Delta Electricity, EnergyAustralia

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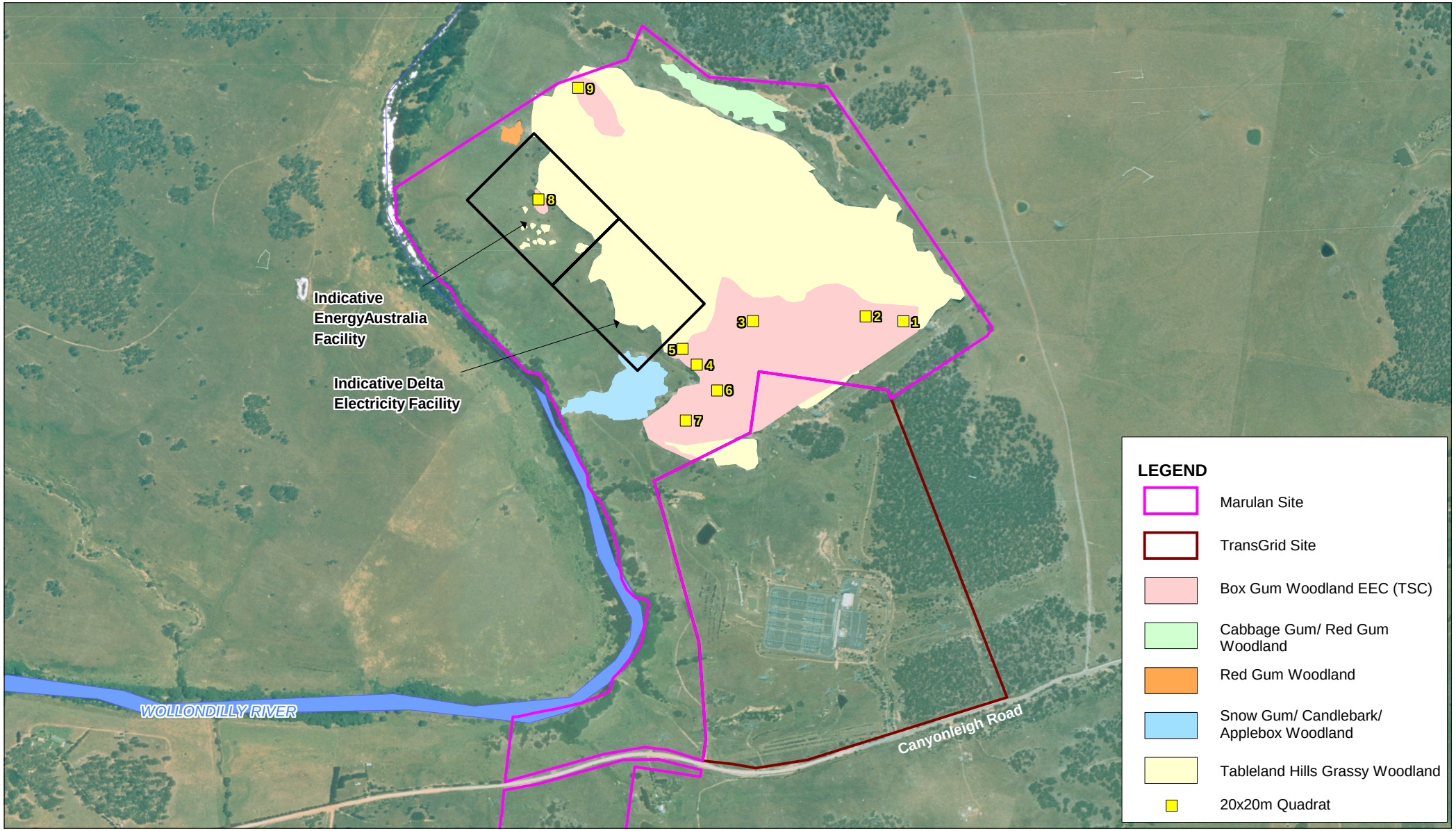
Project	MARULAN GAS TURBINE FACILITIES
Title	**VEGETATION COMMUNITIES**
Drawn: AJW	Approved: NB	Date: 16/01/09
Job No: **43177371**	File No: 43177371-222.wor
Figure: **1**	



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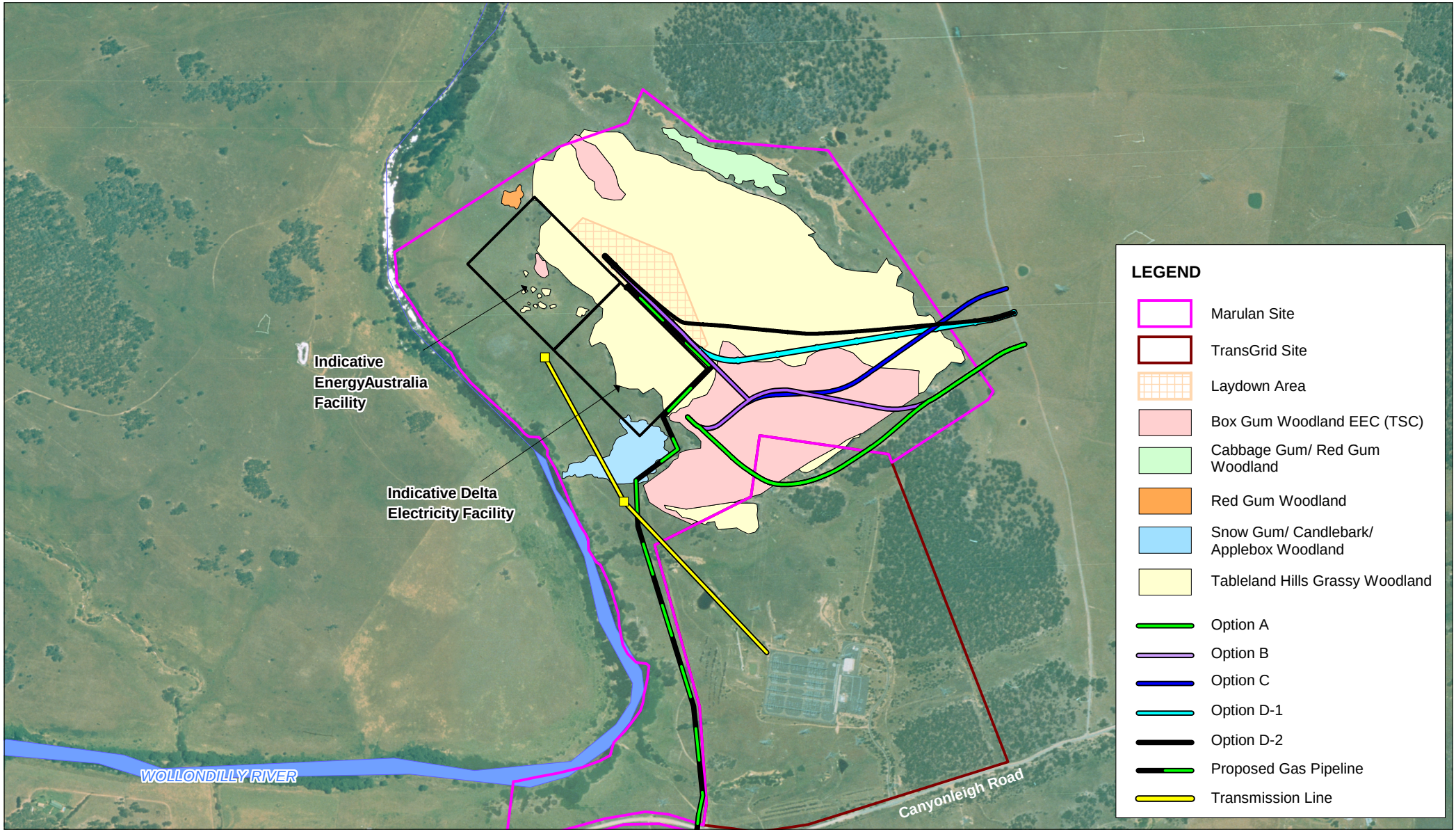
URS	Drawn: AJW	Approved: NB	Date: 16/01/09
	Job No: **43177371**	File No: 43177371-223.wor	Figure: **2**



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URS	Drawn: AO · Approved: NB · Date: 04/03/2009	Figure: **3**
	Job No: **43177371** · File No: 43177371-240.wor	