16.1 Introduction

The Marulan Site is identified as bush fire prone within the Goulburn Mulwaree Bush Fire Prone Land Map. A bush fire assessment was undertaken by URS and a brief summary of the assessment is presented in this chapter. A more detailed assessment is presented in the respective *Project Application* documents.

16.2 Methodology

16.2.1 Desktop Review

The bush fire assessment involved a desktop review of planning and hazard management requirements contained in the Rural Fire Service (RFS) document *Planning for Bush Fire Protection* (PBP) and a review of relevant standards under the Building Code of Australia. Bush fire prone land mapping for the Goulburn Mulwaree LGA was obtained from Council and reviewed.

16.2.2 Field Survey

The following were either determined during the site inspections survey or by assessing the data recorded on the Site and the surrounding land:

- the potential bush fire hazard;
- vegetation type, condition and class (as per PBP);
- slope; and
- fuel load on the ground within vegetated areas.

16.3 Existing Environment

16.3.1 Surrounding Land Use

The Marulan Site prior to being jointly owned by Delta Electricity and EnergyAustralia was primarily used for grazing cattle. Land surrounding the Site comprises Grassy Woodland to the north, east and south and Cleared Grassland to the north-west and south-west. The Wollondilly River runs along the west and north of the Site.

16.3.2 Vegetation Assessment

The vegetation type, condition and class within the area surrounding the Facilities footprint was assessed. The predominant vegetation formation was determined for 140 m in all directions from the footprint.

The vegetation formation surrounding the eastern boundaries of the Facilities footprint is ‘grassy woodland’, which represents the main fire hazard of relevance to the proposal. Woodland vegetation occupies the terrain upslope of the footprint and in a gully to the south. The canopy cover of the eucalypts comprising the woodland is of a well developed foliage protective cover. The ground layer is densely covered in exotic and native grasses, with moderate levels of leaf litter and organic matter and scattered logs and fallen branches. Hence, fuel loads in the ground layer are moderate.

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16.3.3 Bushfire Prone Land

The Site is located in the Upper Lachlan Shire local government area (LGA); however the Site and surrounding land is mapped as 'bush fire prone land' by Goulburn Mulwaree Council. Areas of woodland on the Site are classified as 'Category 1 Vegetation' and the surrounding grassland is classified as 'Category 2 Vegetation and buffers'.

16.3.4 Slope

Using topographic data and on-site inspections, the slope of the Facilities footprint and surrounding land was assessed over a distance of 100 m, measured from the proposed footprint towards the adjoining bushland in all directions. These measurements were used to calculate 'effective slope', which is 'that slope within the hazard which most significantly affects fire behaviour' on the Site.

Effective slopes within and around the Facilities footprint are either upslope or between 0 - 5°.

16.4 Assessment of Impacts – Common Shared Works

16.4.1 Construction

During construction of the Common Shared Works, a Bush Fire Management Plan would be developed and implemented as part of the CEMP. It would address measures such as access and egress during construction and liaison with the RFS.

16.4.2 Operation

The Facilities pad is addressed further in the assessment of the Facilities in **Section 16.5**.

The operation of the access road and transmission line would require the following mitigation measures to be incorporated into design and during operation.

Access/Egress

The proposed Facilities would be connected to the public road system via an access road from Canyonleigh Road. Where practicable, the access road will be constructed according to RFS guidelines, in order allow fire fighting vehicles to safely access the site.

The key access and egress issues of relevance to planning for bush fire protection during operation of the Facilities relate to:

- adequate access for fire fighting vehicles using public roads to a defendable space between an approaching bush fire and the Facilities;
- safe evacuation egress for fire fighting vehicles and staff vehicles; and
- allowance for a defendable space, which would include a cleared area located between the hazard and the Facilities that can accommodate fire fighting vehicles safely and provide a staging place for fire fighting.

Transmission Line Management

Vegetation within and adjacent to the proposed electricity transmission line would be managed according to the EnergyAustralia (2007) *Tree Safety Management Plan*.

16.5 Assessment of Impacts – Facilities

16.5.1 Construction

During construction of the Facilities, a Bush Fire Management Plan would be developed and implemented as part of the CEMP. If appropriate, this Bush Fire Management Plan would be the same plan as for the Common Shared Works. It would address measures such as access and egress during construction and liaison with the RFS.

16.5.2 Operation

As areas of woodland on the Site are classified as 'Category 1 Vegetation' and the surrounding grassland is classified as 'Category 2 Vegetation and buffers', these woodland areas and nearby stands of grassland constitute a bush fire hazard to the Facilities. However the majority of the hazard would be located upslope of the Facilities, thereby lowering the risk of bush fire attack on the Site.

For operation of the Facilities, the following mitigation measures are required to be developed during the detailed design or during operation in addition to the measures addressed in **Section 16.4.2**.

Setbacks and Asset Protection Zones (APZ)

Appendix 2 of PBP was used to determine what APZ would apply if the proposal was considered as a residential subdivision. This involved considerations of the vegetation formations and effective slope and determining the 'fire (weather) area' of the site. The Asset Protection Zones (APZ) required by the PBP required are shown in **Table 16-1**.

The Marulan Site lies within the 'Southern Tablelands' NSW Fire Area, which is associated with a general Fire Danger Index (FDI) of 100. The FDI is a relative number (1 to 100) which provides a measure of probability of fire within a given region.

Table 16-1 Recommended APZs for the Marulan Gas Turbine Facilities

Site Boundary	Vegetation Formation	Effective Slope	Recommended APZ (m)
North-eastern	Grassy Woodland	upslope	10
South-eastern	Grassy Woodland	0-5°	15
Southern corner	Grassy Woodland	0-5°	15
North-western and South-western (excluding southern corner)	Cleared Grassland	0-5°	10

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As shown in **Table 16-1**, PBP indicates that woodland vegetation upslope of the Facilities requires an APZ of 10 m and woodland vegetation downslope of the Facilities (where slopes are 0-5°), requires an APZ of 15 m. Where grassland occurs downslope of the Facilities, a 10 m APZ is required.

Indicative APZs, slope and access arrangements are shown in **Figure 16-1**. The APZ would be measured outward from the edge of structures and buildings towards the hazard.

Bush Fire Attack Assessment

PBP also prescribes minimum building standards or level of construction, according to the Building Code of Australia (BCA), for buildings in bush fire prone areas. The assessment found that Class 8 buildings proposed as part of the Facilities, such as the workshop, control building, warehouse and administration building, will be within the category of bush fire attack of 'High', requiring construction standards to Level 2 of AS3959.

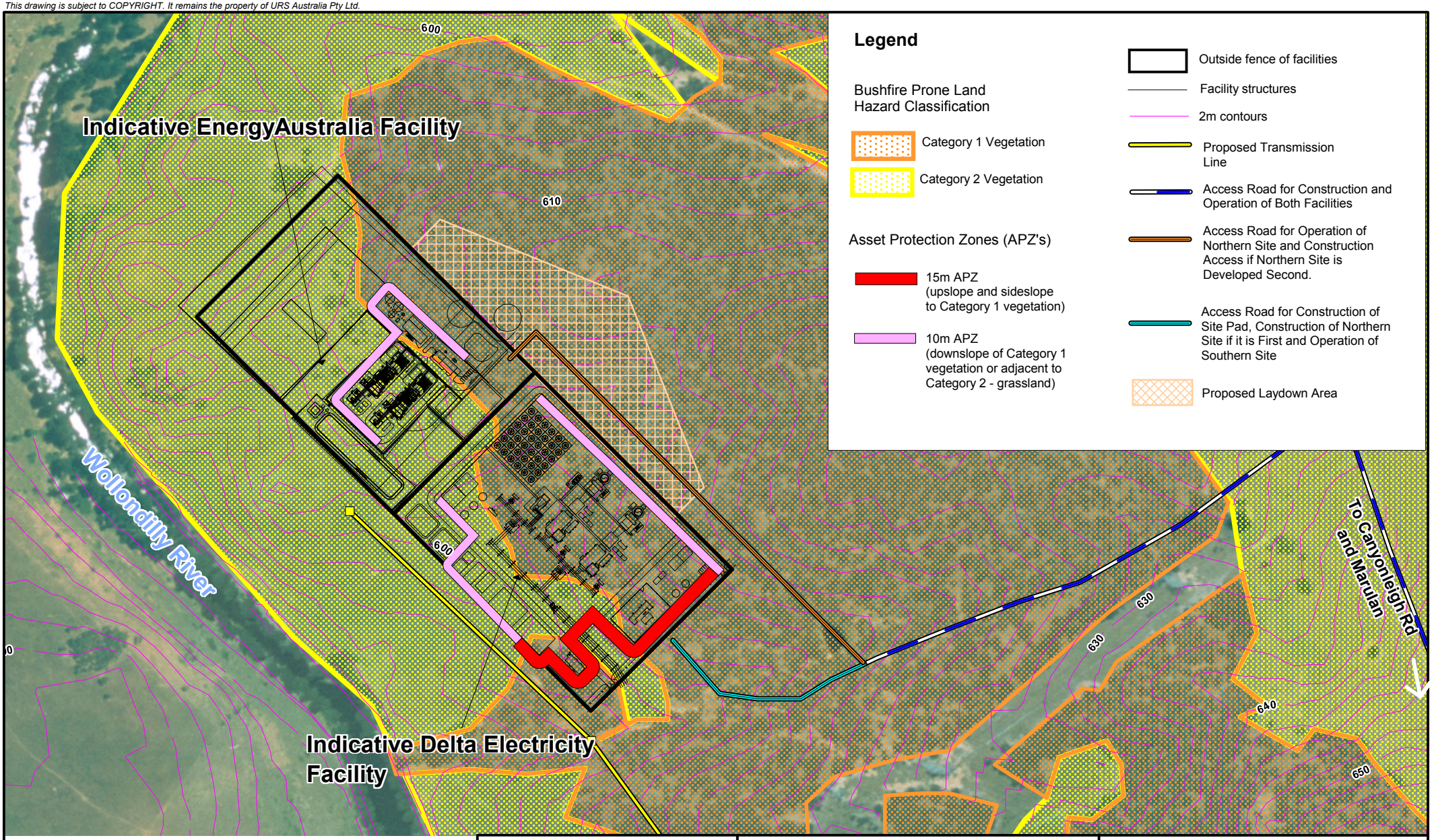
All other items of plant (i.e. the water treatment plant, water tanks, turbines, transformers, interceptor pit and liquids off-load area) within the Site are Class 10 structures. The Building Code of Australia does not provide for bush fire specific performance measures for Class 10 buildings. However, the aims of PBP apply in relation to matters such as access, water and services, emergency planning and landscaping. For developments such as the current proposal, the RFS would assess the project on a merits basis, taking into consideration proposed APZs, water supply, access and egress and defendable space.

Active Mitigation/Suppression

Increased protection for site assets will be achieved though a holistic approach to fire mitigation and management with the incorporation of active suppression devices, appropriate management and planning. This would significantly reduce fire risk to the Site and surrounding areas. Fire detection protection and containment concepts within the Site could include measures such as the following:

- installation of water tanks that could be used for fire fighting purposes, with RFS compatible fittings;
- water sprinkler or gaseous (e.g. CO_2) systems to be installed where appropriate
- where appropriate, heat detectors and smoke alarms on built assets to enable automatic commencement of fire suppression;
- 24-hour remote monitoring of the Site;
- where practicable, transportable foam mixing equipment and distillate powered fire pump within the Site, to provide additional fire fighting capability.

An emergency response plan may also be implemented, following liaison with relevant local authorities and appropriate personnel.



0 100 200m

Scale

Source: Delta Electricity, EnergyAustralia, Southern Cross Consulting Surveyors, Goulburn Mulwaree Council Bushfire Prone Land Map

Client
DELTA ELECTRICITY AND ENERGYAUSTRALIA

URS

Project
MARULAN GAS TURBINE FACILITIES

Title
INDICATIVE PLANT LAYOUT WITH INDICATIVE APZ

Drawn: TE	Approved: NB	Date: 02/04/2008
Job No: **43177371**	File No: 43177371-122.wor	

Figure: **16.1**

Water Supply

Where practicable, water tanks constructed for water supply within the Facilities would be designed to be suitable for fire fighting purposes, with RFS compatible (i.e. Storz) fittings. Additionally, plant process water in storage tanks could be made available during a bush fire if required. Water supply infrastructure of relevance to fire fighting within the proposed Facilities could include measures such as the installation of water sprinkler or gaseous (e.g. CO_2) systems.

Vegetation Management

Implementation of the measures recommended below (during the operation of the Facilities) would reduce the risk of bush fire attack on the Site.

APZ Management

Where practicable, vegetation surrounding the Site and within the APZ would be managed to provide:

- clearly defined on ground APZ management boundaries, e.g. logs placed on the ground, tagged star pickets or boundary fence;
- tree canopy separation (by at least 2 m where possible);
- discontinuous shrub layer;
- vertical separation between vegetation strata;
- retention of low native groundcovers, including grasses and shrubs (where no connection exists between shrubs and between shrubs and trees); and
- maintenance of fuel loads through mowing/slashing during the spring/early summer months, as necessary.

Landscaping

With regard to the species selected for landscape plantings the following is recommended:

- use of ‘fire retardant’ species where possible;
- use of local provenance stock, preferably representative of the vegetation communities recorded on the Site;
- placement of plantings to ensuring tree canopies do not overhang structures; and
- use of non-combustible mulch, such as stones, where possible.

16.6 Assessment of Impacts – Gas Pipeline

A Bush Fire Assessment for the proposed Gas Pipeline would be undertaken as part of a separate Project Application, if required.

16.7 Summary of Mitigation Measures

Table 16-2 presents the mitigation measures to address the bush fire risk for the proposed Facilities. The phase of implementation is indicated in the table by *Cons* – Construction *Ops* – Operation and *Design.*

Table 16-2 Summary of Bush Fire Mitigation Measures

Mitigation Measures	Implementation of measures		
	Common Shared Works	Facilities	Gas Pipeline
Bush Fire Planning Prepare Bush Fire Management Plan within the CEMP.	✓ (Cons)	✓ (Cons)	
Bush Fire Planning Prepare Bush Fire Management Plan within the OEMP, which could include measures such as management and maintenance of Asset Protection Zone(s), landscaping and vegetation management, water supply, access and other bush fire protection measures for the Site.	✓ (Ops)	✓ (Ops)	
Include emergency response provisions for bush fire in a site emergency response plan. The plan would include evacuation arrangements, drills and nominated control staff for bush fire events.		✓ (Ops)	
Where practicable, provide an Asset Protection Zone approximately 10 m to 15 m wide around the Site boundaries.	✓ (Design & Ops)	✓ (Design & Ops)	
Where practicable, the Asset Protection Zone would be managed as follows: • according to the *Standards for Asset Protection Zones* (RFS 2007); • groundcover and understorey strata should be managed to avoid accumulations of dense grass, weeds or shrubs; • dense swards of grass should be slashed prior to summer or as required; • shrubs should be thinned only as required to ensure no connection to canopy stratum; and • maintain fuel loads through mowing/slashing during the spring/early summer months, as required.	✓ (Design & Ops)	✓ (Design & Ops)	
Water Supply Where practicable, provision of water tank(s) at appropriate locations (in consultation with RFS) within the Facilities, fitted with Storz valves compatible with RFS hoses.	✓ (Design & Ops)	✓ (Design & Ops)	
Access/Egress Provide access for fire fighting vehicles to all parts of the Site.		✓ (Design)	

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Mitigation Measures	Implementation of measures		
	Common Shared Works	Facilities	Gas Pipeline
Where practicable, landscaping should include the following features: • tree canopy separation by at least 2 m; • discontinuous shrub layer (clumps or islands of shrubs where possible; not rows); • vertical separation between canopy and shrub layer; • tree canopies not overhanging structures; • no landscaping trees within 2 m of any building; • use of non-combustible mulch, e.g. stones; and • use of 'fire retardant' species of local provenance.	✓ (Design & Ops)	✓ (Design & Ops)	
Transmission Line Vegetation near transmission lines should be managed in accordance with EnergyAustralia (2007) *Tree Safety Management Plan*.	✓ (Design & Ops)	✓ (Design & Ops)	