4.1 Overview

The Marulan Site would be subdivided into two lots with one owned by EnergyAustralia and the other by Delta Electricity. Delta Electricity and EnergyAustralia are seeking approval to construct two separate Gas Turbine Facilities on this Site. The two Facilities would be constructed side by side but owned and operated independently.

The proposed Facilities would consist of a Gas Turbine Facility to be constructed by Delta Electricity in two stages and a Gas Turbine Facility constructed by EnergyAustralia. Both the EnergyAustralia proposal and the first stage of the Delta Electricity facility are known as "peaking facilities" as they supply power to the electricity grid during times of peak electricity demand such as very hot days or cold nights.

EnergyAustralia Facility

EnergyAustralia's Facility would be developed in one stage. The Facility would comprise two open cycle gas turbines each of approximately 175 MW capacity, producing a total nominal facility output of 350 MW designed to supply power to the main electricity grid during times of peak electricity demand.

Other relevant components

The following elements are relevant to the EnergyAustralia Facility although Project Approval is not being sought for these elements in this assessment:

- Delta Electricity Facility implemented in two stages, Stage 1 being two open cycle gas turbines with a total capacity in the range of 250 to 320 MW and Stage 2 being the conversion to combined cycle Facility to generate electricity for intermediate / base load electricity demand. The proposed capacity of the Stage 2 combined cycle Facility is in the range of 400 to 450 MW. Depending on the electricity demand growth, Delta Electricity may progress with the construction and operation of the combined cycle Facility directly (addressed in Delta Electricity's respective *Project Application*).
- Gas Pipeline - underground lateral pipeline from the Moomba to Sydney natural gas pipeline to be located within an identified corridor (addressed in the *Concept Application)*.
- Common Shared Works - bulk earthworks on the Site; access road (comprising access to each Facility for construction and operational purposes); and transmission line (addressed in the *Concept Application*).

4.2 Site Location

4.2.1 Marulan Site

The Marulan Site is located on Canyonleigh Road, Brayton, approximately 12 km north of the village of Marulan. The site is 19.6 km from the Marulan Highway turnoff and 10.3 km from the Canyonleigh-Brayton Road turnoff (refer to **Figure 1-2**). The Site is described by land parcel Lot 2 DP1120270. The other land parcel, which would be affected by the Facilities is Lot 2341 DP 62834 (TransGrid switchyard).

Chapter 4 Project Description

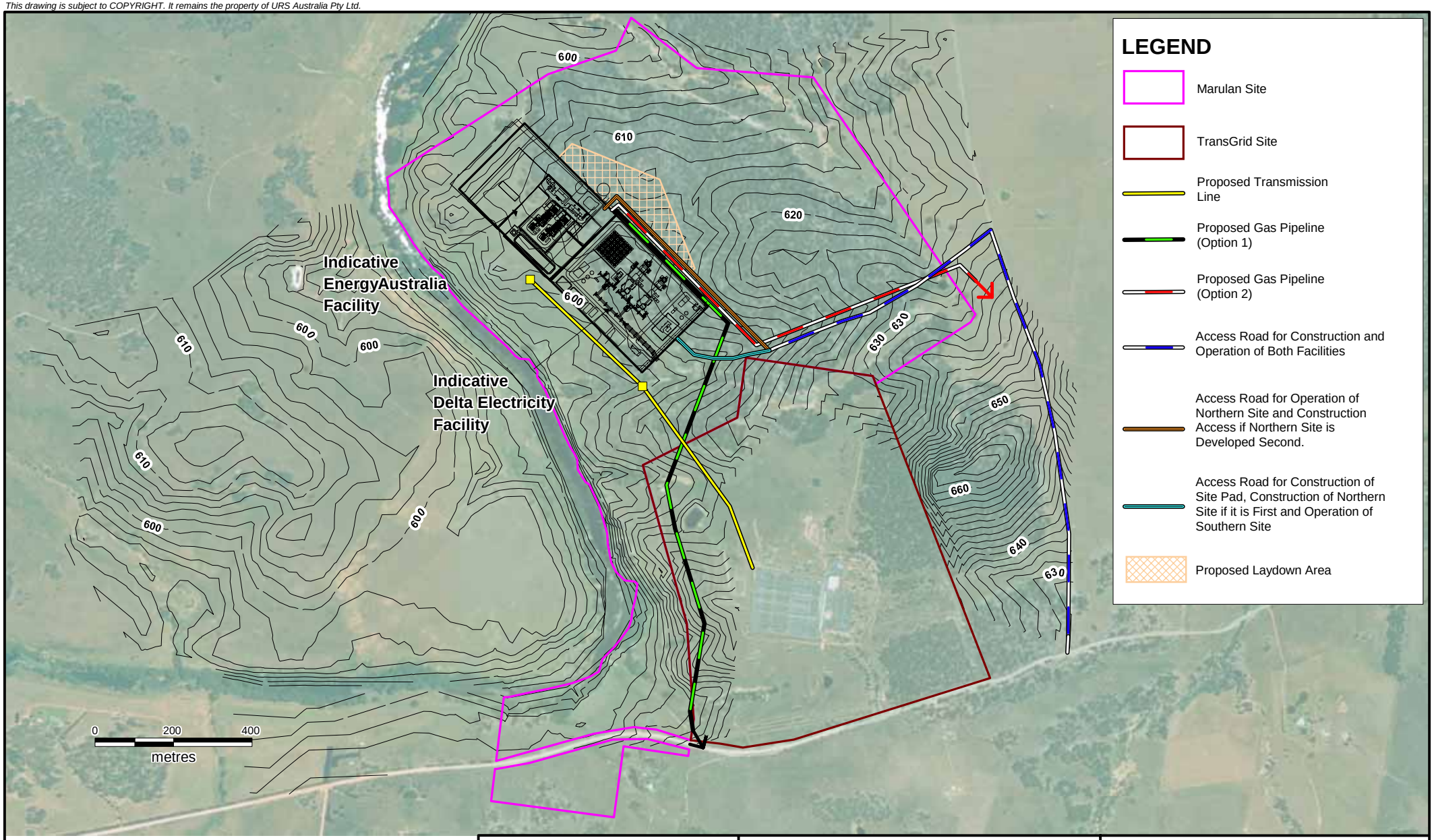
The Site (refer to **Figure 4-1**) comprises approximately 116 ha of pasture land and woodland. Overall the Site slopes gently west towards the river. The Site is located in the Upper Lachlan Shire local government area.

Figure 4-2 presents the closest residences to the Site.

The Site will be further subdivided such that Delta Electricity and EnergyAustralia are the registered owners of the land on which their respective Facilities would be situated. Approval for the further subdivision will be progressed separately through Council.

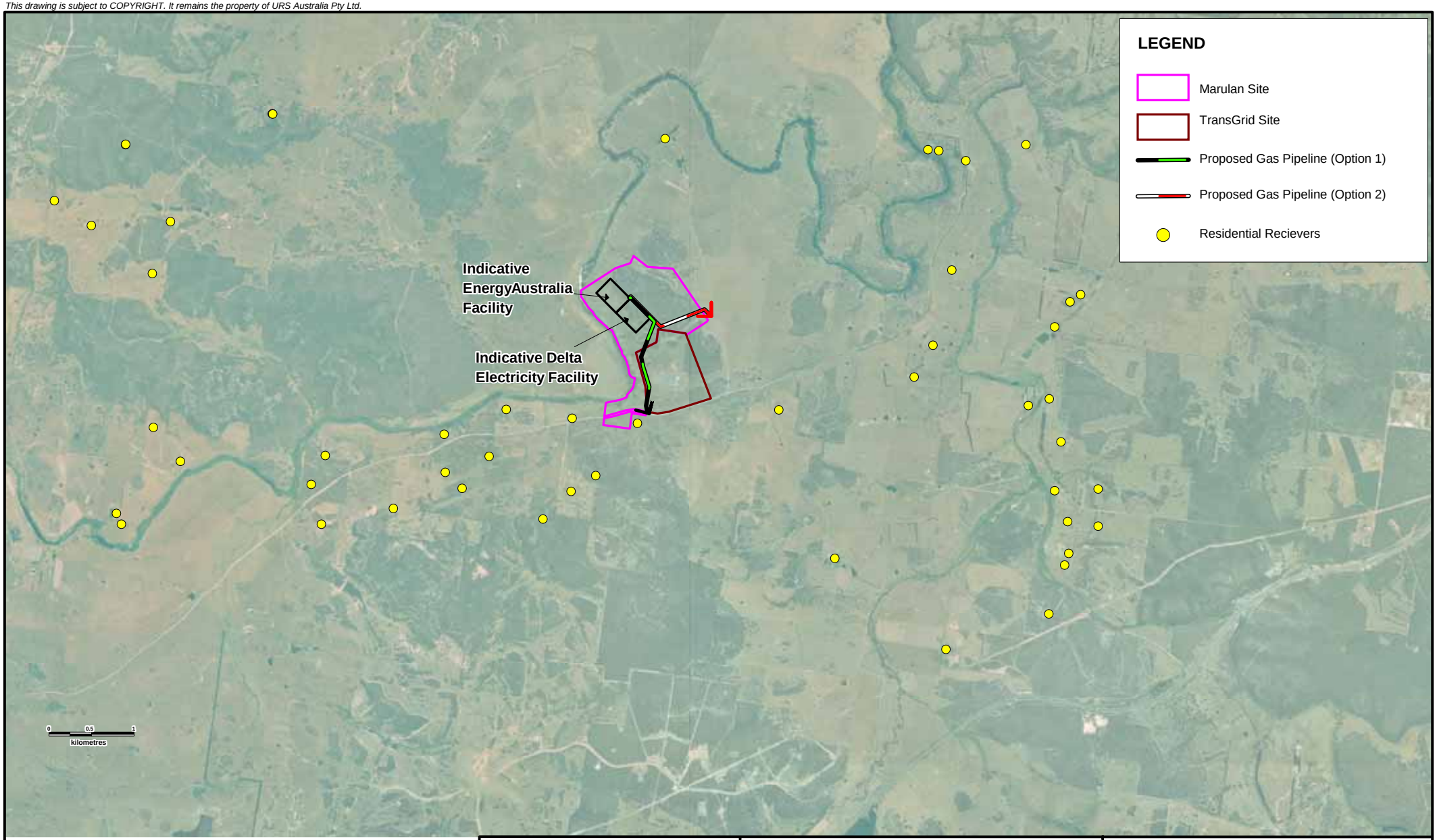
This application seeks Project Approval for the EnergyAustralia Facility. The following components are relevant to the assessment either as infrastructure required for the project or from the perspective of cumulative impact on the Marulan Site:

- Delta Electricity Facility implemented in two stages, Stage 1 being two open cycle gas turbines with a total capacity in the range of 250 to 320 MW and Stage 2 being the conversion to combined cycle Facility to generate electricity for intermediate / base load electricity demand. The proposed capacity of the Stage 2 combined cycle Facility is in the range of 400 to 450 MW. Depending on the electricity demand growth, Delta Electricity may progress with the construction and operation of the combined cycle Facility directly (addressed in Delta Electricity's respective *Project Application*).
- Gas Pipeline - underground lateral pipeline from the Moomba to Sydney natural gas pipeline to be located within an identified corridor identified in **Figure 4-3** (addressed in the *Concept Application)*.
- Common Shared Works - bulk earthworks on the Site; access road (comprising access to each Facility for construction and operational purposes); and transmission line (addressed in the *Concept Application*).

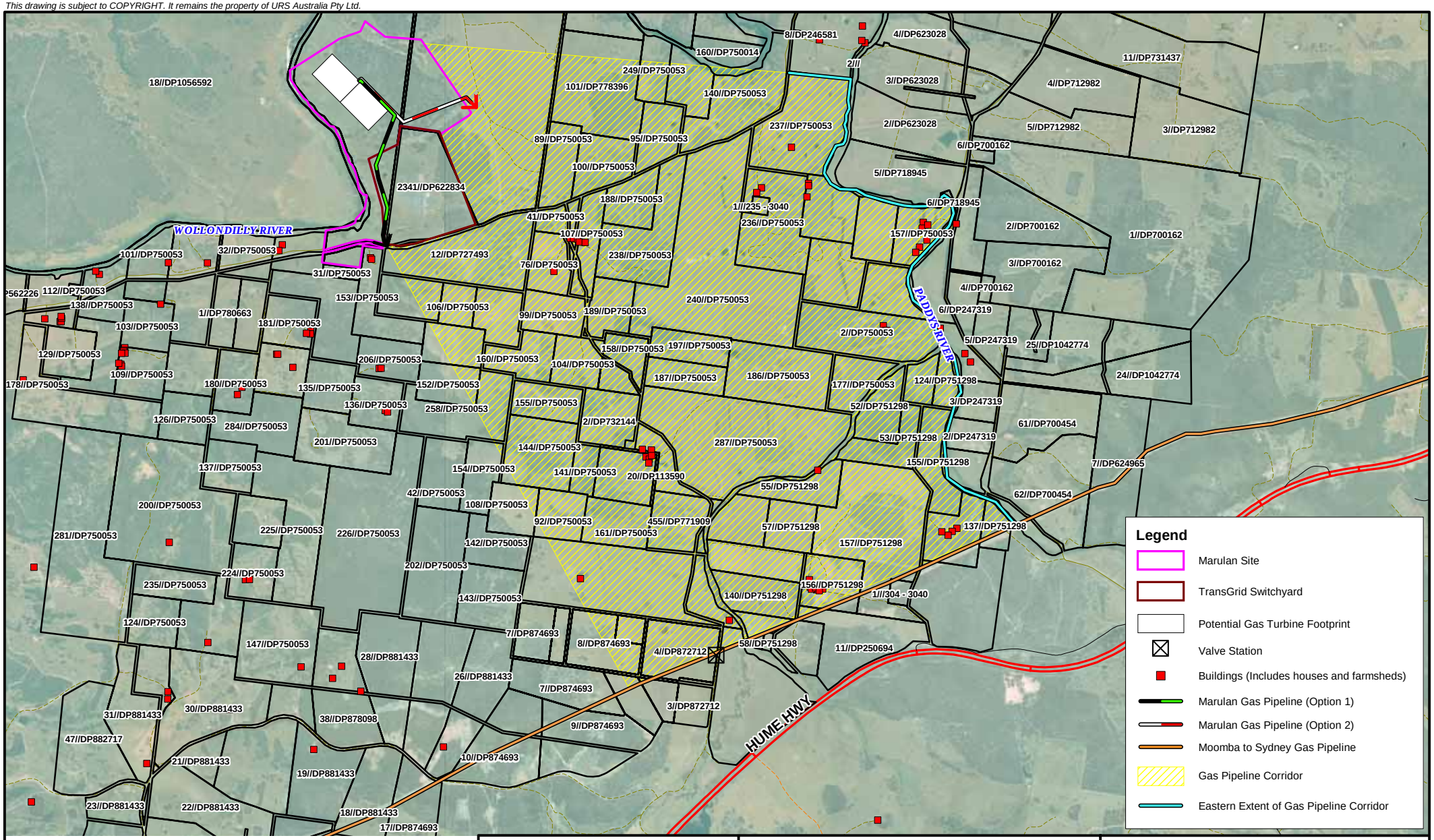


Source: Delta Electricity, EnergyAustralia, Southern Cross Consulting Surveyors

Client	ENERGYAUSTRALIA
Project	MARULAN GAS TURBINE FACILITY
Title	**INDICATIVE LOCATION AND LAYOUT**
Drawn: AJW	Approved: NB	Date: 02/09/2008
Job No: **43177371**	File No: 43177371-154.wor
Figure: **4-1**	



Client: ENERGYAUSTRALIA	Project: MARULAN GAS TURBINE FACILITY		Title: **RESIDENTIAL RECEIVERS SURROUNDING MARULAN SITE**
URS	Drawn: AJW	Approved: NB	Date: 02/09/2008
	Job No: **43177371**	File No: 43177371-177.wor	Figure: **4-2**



0 1 2
kilometres

Source: Delta Electricity

Client: ENERGYAUSTRALIA

Project: MARULAN GAS TURBINE FACILITY

Title: **PROPOSED GAS PIPELINE CORRIDOR**

Drawn: AJW	Approved: NB	Date: 02/09/2008
Job No: **43177371**	File No: 43177371-182.wor	

Figure: **4-3**

Chapter 4 Project Description

4.3 EnergyAustralia Facility

The proposed EnergyAustralia Facility would be developed in one stage.

The EnergyAustralia Facility would comprise two open cycle gas turbines each of approximately 175 MW capacity, producing a total nominal facility output of 350 MW designed to supply power to the main electricity grid during times of peak electricity demand.

The development of EnergyAustralia's Facility would comprise the following main elements:

- two gas turbine generators together with associated, ancillary equipment and water, fuel and control systems;
- roads, drainage, and a workshop, control and administration facilities; and
- external infrastructure connections associated with electricity import and export, gas supply, road access and telecommunications.

Construction would be undertaken in a single stage.

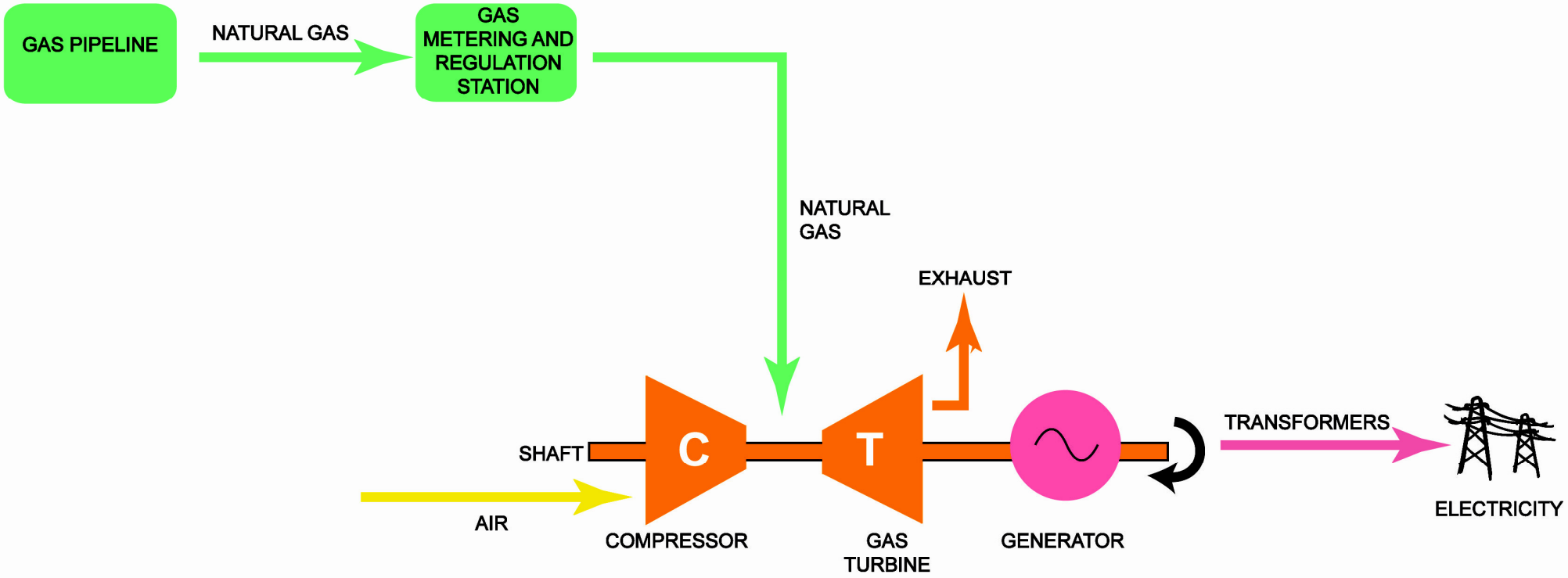
The EnergyAustralia Facility would comprise two open cycle gas turbines, each with a capacity in the order of 175 MW, producing a total nominal facility output of 350 MW. Except for emergencies as allowed in its operating licence, the facility would operate on an as-required, intermittent basis.

The open cycle gas turbine draws in cool filtered air, through a compressor, where it is mixed with natural gas and injected at high pressure into the combustion chamber of the gas turbine for combustion. The hot exhaust gas is used to drive the turbine which is connected to the electrical generator to produce electricity. The exhaust gases are vented to the atmosphere through the stacks.

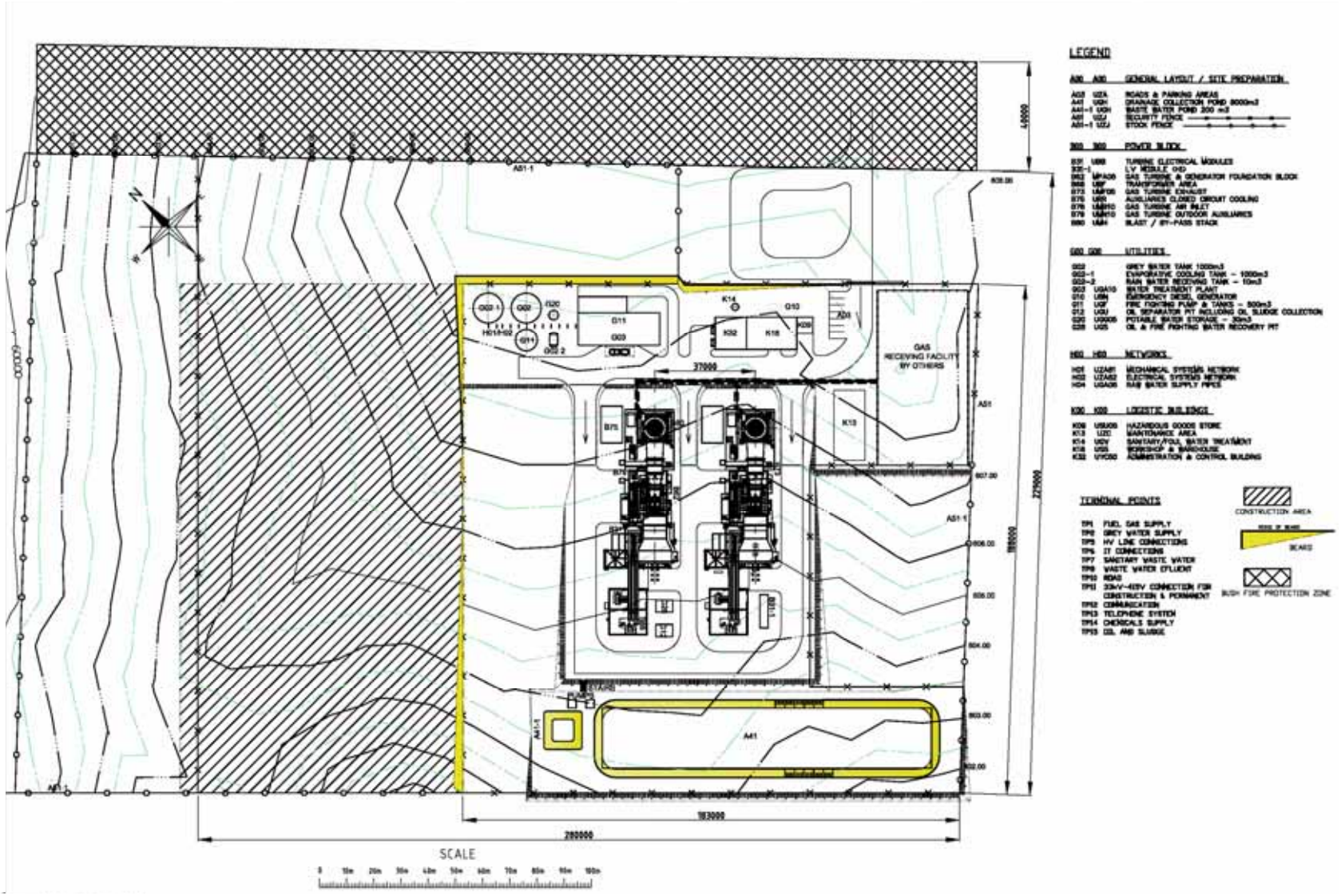
The Facility would operate as a peaking Facility. It is assumed in this assessment that the Facility would use E Class turbines. A typical indicative layout of the EnergyAustralia site is included in **Figure 4-4** and a process diagram is provided in **Figure 4-5**.

The main components of the Facility would be:

- two open cycle gas turbine units, each comprising compressor, combustion (featuring dry low NO_x burners) and turbine stages housed in sound attenuating enclosures approximately 8 m high;
- air inlet structures and ducting for each unit, approximately 24 m high;
- gas turbine exhaust stacks for each unit, 30 m high;
- water receiving, treatment and storage facilities;
- waste water storage and treatment facilities;
- workshop, electrical, control and administration facilities;
- monitoring and controls systems associated with fuel, water, waste, fire fighting and all other primary and ancillary systems;
- "step-up" transformers and connection to the 330 kV transmission grid;
- a gas receiving station associated with gas supply, pre-conditioning and metering; and
- external infrastructure interfaces associated with back-up electricity supplies, road access and telecommunications.



Client: ENERGYAUSTRALIA	Project: MARULAN GAS TURBINE FACILITY	Title: **PROCESS DIAGRAM - OPEN CYCLE (ENERGYAUSTRALIA)**
URS	Drawn: AJW | Approved: NB | Date: 22/05/2008 Job No: **43177371** | File No: 43177371-155.wor	Figure: **4-4**



NOT FOR CONSTRUCTION

Source:Alstom MRN00MA00-GA002 Supplied by EnergyAustralia 5-12-07

Client: ENERGYAUSTRALIA	Project: MARULAN GAS TURBINE FACILITY	Title: **ENERGYAUSTRALIA INDICATIVE SITE LAYOUT**
URS	Drawn: AJW | Approved: NB | Date: 02/09/2008 Job No: **43177371** | File No: 43177371-156.wor	Figure: **4-5**

4.3.1 Water Requirements

Construction Stage Water Requirements

The construction phase (approximately 12 to 18 months for each Facility) water requirement is estimated to be 6-8 kL per day.

These requirements take into account the following assumptions:

- personnel levels;
- minor allowances for wet trades during construction (eg. bricklaying / blocklaying), rendering to small areas only (for example, control rooms);
- all concrete mixing off-site (i.e. not allowed for in estimates);
- no on-site construction camp or canteen facility (i.e., mess rooms, showers/toilet facilities only);
- no consumption for fire fighting purposes considered; and
- no allowance for water sprays for dust control.

It is noted that water sprays for dust control could be considerable, depending on a number of aspects such as the condition of the road network and prevailing weather conditions. Water requirements for the construction of the Facilities could be up to 100 kL per day during hot dusty windy weather.

EnergyAustralia Facility Indicative Operational Water Requirements

The EnergyAustralia Facility and Delta Electricity Facility have differing operational water demands. The process water demand, based on an assumption of the EnergyAustralia Facility operating for 10% of the year (i.e., operating intermittently but up to a total of approximately 40 days per year) is approximately 12 ML per annum.

To meet the construction and operational water requirements for the EnergyAustralia Facility, a number of current and potential water sources, including potable, recycled and stormwater have been identified to provide water quantities which can meet and in fact exceed the requirements of the proposed Facility. These would be the primary sources of “raw water” for process and other water needs.

The EnergyAustralia Facility requires process or service water for various purposes including wash down, irrigation and water washing of gas turbines as well as for supply to the water treatment plant for process water as required by the evaporative cooler. Demineralised water may also be required within the process although the quantities required would be minor top-up quantities only.

Water is required to be stored onsite for fire fighting purposes. This would consist of a storage tank but storage may be in conjunction with process water requirements. The volume of the tank would be confirmed at the detailed design stage and in consultation with relevant authorities. **Table 4-1** provides a summary of indicative water demands.

Table 4-1 EnergyAustralia Facility - Summary of Indicative Water Demands

Staging	Indicative Water Requirements EnergyAustralia Facility (ML pa)
Potable	0.04
Demineralised	0.0012
Non-Potable	12.0
	(+ 7.4 EA startup[1])
Total Water Demand[1]	12.0

Source: GHD, 2008.

Notes: 1 . Startup volumes not included in total water demand (one off demand only). They will be required during startup of the EnergyAustralia Facility.

4.3.2 Potential Water Resources

The design of the Facility would aim for zero water discharge (other than natural flows) to the environment and to maximise on-site water recycling. The water management plan for the Facility is discussed in **Chapter 14**.

Based on an average operation of 10 % per annum, the operational water requirements for the EnergyAustralia Facility would be approximately 12 ML per annum.

Subject to further negotiations and detailed design investigations, it is intended that water would be sourced from a local water treatment plant, sewage water treatment and/ / or water captured from the Facilities hard stand areas. The potential sources for water have been considered for the combined requirements of both the Delta Electricity and EnergyAustralia Facilities.

Water source options would include:

- Marulan water supply network;
- Marulan sewage treatment plant;
- Moss Vale sewage treatment plant; and
- Site stormwater runoff

Water would be trucked to the Site to meet the operational requirements for the EnergyAustralia Facility.

4.3.3 Disposal of Wastewater, Sludge and Brine

Rainwater runoff from part of the landscaped areas would be directed to stormwater cut-off drains. The outlets of these drains would be designed to maximise the dispersion of these high flows and thereby minimise their potential to cause erosion downstream. Detention would be provided so that nominated peak flows from the Site do not exceed existing flows. Accumulated water in bunds would be directed to the stormwater pond after passing through the interceptor. Stormwater from the Site would pass through a sedimentation basin / storage pond before discharge from the Site.

Both the stormwater and wastewater storage ponds would be lined with an appropriate impermeable liner to minimise the risk of the water escaping into the natural groundwater system. When required the accumulated sediments / waste sludge collected in the storage ponds would be disposed of by a licensed contractor.

Wastewater volumes have been estimated and management strategies would be developed to maintain a zero discharge from the Site except as part of the natural surface flows.

A summary of EnergyAustralia's Facility waste disposal is presented in **Table 4-2**.

Table 4-2 Indicative Waste Disposal for EnergyAustralia's Facility

Process	Waste	Treatment and Disposal
Raw water treatment (filtering, softening, reverse osmosis, micro filtration, etc depending on quality	Liquid sludge	Treated onsite by a water treatment plant (having a reverse osmosis capability)
Domestic Sewage	Sewage	Proprietary septic-type system and periodically disposed of offsite by a licensed contractor
Contaminated Drains Oil/Water Separation	Oil/Oily Water	Oil recovery pit
Dirty Water Drains	Water with dust, oil, chemical contamination	Wastewater Pond
Clean Water Drains	Water	Stormwater ponds

4.3.4 Fuel

As described previously, the turbines would be fuelled solely by natural gas. No contingency has been made for the use of any other type of fuel, as a back up source or otherwise.

Natural gas would be supplied from the existing Moomba to Sydney gas pipeline.

4.3.5 NO_x Emission Control

Dry Low NO_x emission technology is proposed for the EnergyAustralia Facility and all gas turbine manufactures can guarantee emissions of 25 ppm at full load (average period 1 hour).

4.3.6 Noise Control

Chapter 8 provides detailed information on measures to manage noise however, subject to detailed design, the noise control features incorporated in the EnergyAustralia Facility would inherently include:

- air intake silencers;
- generator transformer walls on three sides; and
- exhaust air silencers.

4.3.7 Project Employment

The anticipated employment generated during construction and operation of EnergyAustralia's Facility is presented in **Table 4-3**. The employment levels during construction are shown as a proportion of full time jobs over a full year.

Table 4-3 Estimated Employment Generated – EnergyAustralia's Facility

Phase	Employment Generation	
Construction	*Annual Full Time Equivalent - Maximum*	*Annual Full Time Equivalent - Average*
	150 construction jobs	50 – 60 at any one time
Operation		
	2 full time onsite staff Up to 8 full time staff most located off-site (approximate 2 full time equivalent) Up to 2 full time equivalent contract staff for various support services	
Scheduled maintenance Minor Inspection	4 to 5 contractors for a period of 4-5 days every 6 to 7 years	
Major Scheduled maintenance:	40 personnel for a period of approximately 35-40 days every 36,000 equivalent operating hours for each unit	

4.3.8 Project Timetable

As noted above, at this time the expected sequencing of the construction of the two Facilities is that EnergyAustralia would progress before Delta Electricity. Key project dates are listed in **Table 4-4**.

Table 4-4 Project Timetable - EnergyAustralia Facility

Item	Date *(tentative)**
Common Shared Works commence	Early 2009*
EnergyAustralia commences construction	Early 2009*
EnergyAustralia commences operation	June 2010 (or earlier)

*Date assumes Conditions of Approval granted by the Minister for Planning by the end of 2008. Refer to **Section 4.4.3** for description of Common Shared Works.

4.3.9 Project Cost Estimate

EnergyAustralia estimates that the total estimated capital cost of its project is $266 million.

4.4 Other Relevant Components

The Marulan Site would be subdivided into two lots with one owned by Delta Electricity and the other by EnergyAustralia. Delta Electricity and EnergyAustralia are seeking approval to construct two separate Gas Turbine Facilities on this Site. The two Facilities would be constructed side by side but owned and operated independently.

This application seeks Project Approval for the EnergyAustralia Facility. The following components are relevant to the assessment either as infrastructure required for the Project or from the perspective of cumulative impact on the Marulan Site:

- Delta Electricity Facility;
- Gas Pipeline - underground lateral pipeline from the Moomba to Sydney natural gas pipeline; and
- Common Shared Works - bulk earthworks on the Site; access road (comprising access to each Facility for construction and operational purposes); and transmission line.

An overview of each of these elements is provided below for the purpose of providing context to the approval.

4.4.1 Delta Electricity – Overview

The implementation of the proposed Delta Electricity Facility would be carried out in two stages:

Stage 1: Two open cycle gas turbines with a total capacity in the range of 250 to 320 MW. Each turbine could have a capacity in the order of 125 to 160 MW depending on final equipment selected.

Stage 2: Conversion to combined cycle Facility to generate electricity for intermediate / base load electricity demand. The proposed capacity of the Stage 2 combined cycle Facility is in the range of 400 to 450 MW.

This Environmental Assessment is seeking Concept Approval for Stage 1 and Stage 2 of the Delta Electricity Facility. Project Approval for Stage 1 is being sought in the Delta Electricity *Project Application*. Project Approval for Stage 2 would be sought through a separate *Project Application.*

The main components of the Facility would be:

- two open cycle gas turbines comprising compressor, combustion and turbine stages (including low NO_x burners) and exhaust stacks (approximately 40 m high). Turbines would be connected to air cooled generators. The turbines would be converted to combined cycle during Stage 2 by inclusion of two heat recovery steam generators, steam turbine, generator and an air cooled condenser;
- ancillary equipment including power transformers, demineralised water storage and safety equipment;
- process control and monitoring systems; and
- administration, amenities and control building (approximately 10m high).

Chapter 4 Project Description

At this time the expected sequencing of the construction of the two Facilities is that EnergyAustralia would progress before Delta Electricity. Key project dates are listed in **Table 4-5**.

Table 4-5 Key Project Dates for Delta Electricity

Item	Date *(tentative)**
Common Shared Works commences	Early 2009*
Delta Electricity commences construction	2011/12 Actual timing to be determined (depending on electricity demand growth and other developments)
Delta Electricity Stage 1 or Stage 2 Operation	2013/14 (latest date dependent on electricity demand and other developments)

*Date assumes Conditions of Approval granted by the Minister for Planning by the end of 2008
Note: Delta Electricity may seek Minister's approval and progress with the construction and operation of combined cycle plant directly. Refer to **Section 4.4.3** for description of Common Shared Works.

4.4.2 Gas pipeline

At this stage, the location of the connection to the Moomba to Sydney Gas Pipeline and the preferred route for the gas delivery pipeline has not been determined. However, the corridor for the pipeline route is included as part of this Environmental Assessment. Delta Electricity and EnergyAustralia are seeking Concept Approval for the Gas Pipeline Corridor (refer to **Figure 4-3**) and determination that further assessment to decide the preferred location for the gas main connection and the pipeline routes would occur at a later date.

Project Timetable

At this time the expected sequencing of the construction of the two Facilities is that EnergyAustralia would progress before Delta Electricity. Key project dates are listed in **Table 4-6**.

Table 4-6 Project Timetable – Gas Pipeline

Item	Date *(tentative)*
Gas Pipeline Construction commences	February 2009
Gas Pipeline Operation	June 2010 (or earlier)

4.4.3 Common Shared Works

Common Shared Works refers to the following components of the Project:

- bulk earthworks on the Site (comprising benching out and creation of a lay down area);
- access road (comprising access to each Facility for construction and operational purposes; and
- transmission lines (comprising high voltage transmission lines and connection to the TransGrid switchyard).

These Common Shared Works are addressed in the *Concept Application*.

Bulk Earthworks

Bulk earthworks for the Site would be undertaken for the two Facilities, either in a staged manner or at the same time. For the purposes of the assessment it has been assumed that the earthworks are conducted in a single stage.

This assessment seeks Project Approval for the Delta Electricity Facility beyond the bulk earthworks.

Laydown Area

The laydown area is a designated area within the Marulan Site to be used during construction for storage of construction materials and Facility components until they are installed at the Facility. The location of the laydown area is shown in **Figure 1-3**. It may be used by either Proponent. The laydown area is approximately 4 ha and the pad for the laydown area may be created at differing levels to the rest of the Facility pads and may be graded.

Access Road

Access to the Marulan Site would be via Canyonleigh Road. Internal roads would be constructed on the Site to facilitate the movement of construction and operation traffic to the Marulan Gas Turbine Facilities (refer to **Figure 4-2**).

Transmission lines

The development of the Facilities would require the construction of a transmission line to the nearby TransGrid switchyard.

The operation of the Facilities may also require the construction of new 330kV switchyard(s) and electrical plant. This may incorporate a single switchyard for both Facilities or separate switchyard for each Facility. These switchyard(s) would be incorporated into the footprint of the Facilities. The details of the 330kV switchyard(s) and electrical plant layout would be finalised at the detailed design stage.