NSW GOVERNMENT
**Department of Planning**

# *MAJOR PROJECT ASSESSMENT: Marulan Gas-Fired Power Stations*

Director-General's
Environmental Assessment Report
Section 75I of the
*Environmental Planning and Assessment Act 1979*

August 2009

Published August 2009
NSW Department of Planning
www.planning.nsw.gov.au

# EXECUTIVE SUMMARY

EnergyAustralia and Delta Electricity (the Proponents) have sought approval to develop two gas-fired power stations and associated infrastructure at a site near Marulan in the Upper Lachlan and Goulburn-Mulwaree local Government areas. The two power station facilities are proposed to be constructed and operated independently by the respective Proponents, whilst associated infrastructure that would be required by both facilities (such as the gas pipeline, transmission line connection to the electricity grid and access roads) would be jointly constructed and operated.

The EnergyAustralia facility would comprise an up to 350 megawatt open-cycle power station for peak electricity generation. The Delta Electricity facility would be developed in two stages, with the first stage comprising an up to 250 to 350 megawatt open-cycle plant for peak electricity generation and the second stage comprising the potential conversion of the open-cycle plant to an up to 400 to 450 MW capacity combined-cycle plant for intermediate/ base load electricity generation. Depending on market conditions, Delta Electricity may choose to develop its power station in a staged manner (i.e. construct and operate the Stage 1 open-cycle facility and then convert to a combined-cycle facility at a future date) or proceed directly to the Stage 2 combined-cycle facility. The power stations would entail significant benefits to the State of New South Wales by helping to secure peak and base-load electricity supply to cater for existing and future inhabitants of the State.

The Department received a total of 12 public submissions on the proposal. Three of these comprised form letter petitions with a total of 87 signatures attached. Of these public submissions, nine objected to the proposal (including the three form letter petitions), one objected to the location of the gas supply pipeline within the submitter's property and the remainder did not state a position. Eight submissions were received from public authorities: the Commonwealth Department of Defence; Commonwealth Aviation Safety Authority; the former NSW Department of Environment and Climate Change (now the Department of Environment, Climate Change and Water); the former NSW Department of Water and Energy (now the Department of Environment, Climate Change and Water); Sydney Catchment Authority, Hawkesbury-Nepean Catchment Management Authority, Goulburn-Mulwaree Council and Upper Lachlan Council. Six of the agencies raised no objections to the proposal, however raised issues for the Department's consideration. The former Department of Environment and Climate Change objected to the location of the proposal (particularly the western pipeline route) on the grounds of biodiversity impacts. Goulburn-Mulwaree Council objected to the proposal on the grounds of amenity and traffic impacts.

The Department has assessed the Proponents' Environmental Assessments, Preferred Project Report (including Response to Submissions) and Statement of Commitments as well as the submissions received from agencies and the public on the proposal and considers the key issues associated with the proposal are flora and fauna, air quality, noise and vibration, traffic and transport, water supply, aviation safety and heritage.

Based on its assessment, the Department is satisfied that the Proponents have undertaken a robust and conservative assessment of the impacts of the proposal and that the proposal can be managed and mitigated to achieve acceptable environmental standards. In relation to biodiversity impacts, Department considers that the eastern section of the Proponents' identified pipeline corridor would have a superior biodiversity outcome to the western section of the corridor, which traverses mainly vegetated areas.

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

and surrounding landowners of the general footprint of the proposal and establishes the environmental framework by which further approvals may be progressed.

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

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

# CONTENTS

# 1. BACKGROUND

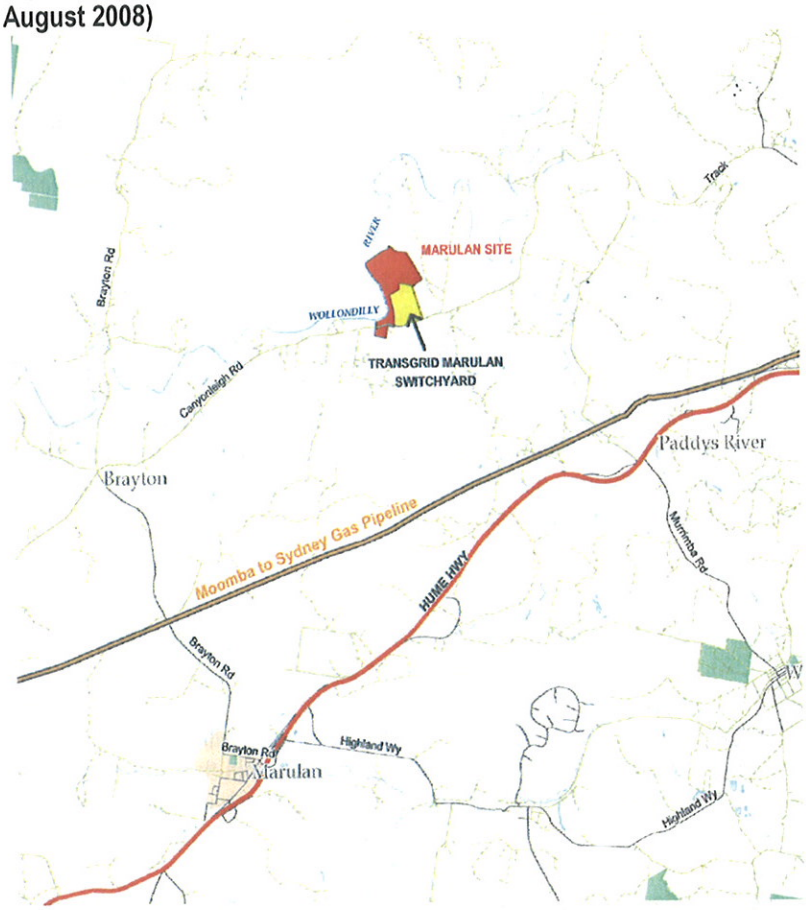
EnergyAustralia and Delta Electricity (the Proponents) have sought joint concept plan approval and concurrent project approval to develop two gas-fired power stations and associated infrastructure at a site near Marulan. The two power station facilities are proposed to be constructed and operated independently by the respective Proponents, whilst associated infrastructure that would be required by both facilities (such as the gas pipeline, transmission line connection to the electricity grid and access roads) would be jointly constructed and operated.

## 1.1 Location

Power Stations

The two power stations would be located on an approximately 116 hectare site off Canyonleigh Road, Brayton, approximately 12 kilometres north of the village of Marulan and approximately 25 kilometres east of Goulburn (refer Figure 1). The site is situated approximately 19.6 kilometres from the Hume Highway turnoff to Marulan and approximately 9.8 kilometres from the Brayton-Canyonleigh Road turnoff, immediately adjacent to an existing TransGrid 330 kilovolt high voltage switch yard and transmission line network. The Moomba to Sydney gas pipeline runs east-west approximately six kilometres to the south of the site.

**Figure 1: Site Location (Proponents' Environmental Assessment, August 2008)**




The site sits on the south eastern bank of the Wollondilly River, benched approximately 20 metres above water level. Elevation within the site slopes west towards the river from approximately 620 metres Australian Height Datum (AHD) to 590 metres AHD at the point above the river's edge. The site comprises a mix of cleared pasture and remnant woodland with cleared areas located closer to the river edge and vegetated areas in higher elevations to the east of the river.

The site has been jointly purchased by EnergyAustralia and Delta Electricity and is proposed to be subdivided to accommodate the Proponent's respective facilities to be located immediately adjacent to each other. Each of the power stations is expected to require six to eight hectares of land for development, with additional land required for construction lay-down, road access, the gas pipeline and transmission line route.

The Proponents have chosen the site on the basis of its closeness to the high voltage transmission network, (which would facilitate easy connection to the electricity grid without high transmission losses) and to the Moomba-Sydney Gas Pipeline (which would provide the source of fuel to operate the power stations). The site also provides easy road access and available land to accommodate the requirements of both facilities. At the same time by co-locating facilities, the total potential footprint of the development has been reduced by avoiding the need to duplicate infrastructure such as the gas pipeline, transmission line and access roads which would be required for both facilities.

Ancillary Infrastructure

The proposed transmission line for the proposal would be limited to largely cleared areas within the Marulan facilities site and the adjacent TransGrid transmission switch yard. The proposed access road would connect from the facilities site east onto University Road, an existing internal access road, located on the adjacent rural property owned by the University of Sydney. University Road connects onto Canyonleigh Road to the south.

A preferred gas pipeline route is yet to be determined however, the Proponents have identified a broad gas pipeline corridor wherein the pipeline routes would be located, generally comprising the area south of the facilities site up to the Sydney-Moomba Gas Pipeline covering existing cleared rural grazing land to the east and an area of well established regenerated vegetation to the west. Within this broad corridor, two specific route alignments have been identified between approximately 200 metres south of Canyonleigh Road and the Moomba to Sydney Pipeline, which comprises (refer Figure 3):

- the "eastern" (red) route which traverses mainly cleared, privately owned rural land and existing Crown Public Road (Wollombi Road); and
- the "western" (blue) route which traverses mainly vegetated land using existing (Wollombi Road) or unmade Crown roads.

At approximately 200 metres south of Canyonleigh Road both route options converge and would traverse north to the facilities site (crossing Canyonleigh Road), along the eastern side of the TransGrid switchyard through mainly cleared, privately owned rural land. This section of the route has been identified by the Proponents as the "north-eastern" option and comprises two minor route refinements (purple and orange routes).

The Proponents have also proposed the option of a water pipeline to transport the operational water requirements of the project directly onto to the site from the water supply source chosen for the project, to replace/supplement water trucking requirements onto the site. The source of water will be subject to commercial arrangement however is expected to be sourced from the Marulan Water Treatment Plant, the Marulan Sewage Treatment Plant and/ or the Moss Vale Sewage Treatment Plant.

A final decision on whether to progress the option of a water pipeline will be determined once water supply arrangements have been finalised, however the Proponents have identified indicative route options for the pipeline which generally follow existing/ proposed infrastructure corridors. The indicative pipeline corridor to the Marulan Water Treatment Plant and/ or Marulan Sewage Treatment Plant would follow the road reserves of Canyonleigh Road, Brayton Road and Portland Avenue, Marulan. The indicative pipeline corridor to the Moss Vale Sewage Treatment Plant would follow the finalised gas pipeline route from the facilities site to the Moomba-Sydney gas pipeline and then east along the Moomba-Sydney gas pipeline easement, and finally along the road easements of the Illawarra Highway, Creek Street and Kennedy Close.

## 1.2 Surrounding Land Use

The facilities site (including transmission line, access road and part of the gas pipeline) would be located within the Upper Lachlan local government area (LGA), whilst the remainder of the gas pipeline would be located in the Goulburn-Mulwaree local government area (LGA). Of the indicative water pipeline routes, the route to the Marulan Water Treatment Plant and/ or Marulan Sewage Treatment Plant would be located within the Goulburn-Mulwaree LGA (apart from the sections within the facilities site which should be located within the Upper Lachlan LGA), whilst the route to the Moss Vale Sewage Treatment Plant would extend from the Goulburn-Mulwaree LGA to the Wingecarribee LGA.

The immediate surrounds of the proposal site consists of a mixture of cleared rural land and tracts of remnant and regrowth vegetation on surrounding properties. In addition, several conservation areas and State Forest occur within 20 kilometres of the facilities site including the Tarlo River National Park approximately 7 kilometres to the northwest, Morton National Park and Wingello State Forest approximately 15 kilometres to the south, Penrose and Belanglo State Forests approximately 10 kilometres to the east and Bangadilly National Park approximately 18 kilometres to the northeast.

Major water courses comprise the Wollondilly River directly adjacent to the facilities site on the western side and Paddy's River approximately three kilometres to the east. A drainage line is located along the north eastern corner of facilities site draining west into the Wollondilly River. The facilities site would not affect any waterways, however, the gas pipeline routes and indicative water pipeline routes are expected to cross a number of minor

tributaries or ephemeral drainage lines of the Wollondilly River and/or Paddy's River. The proposal is located within the drinking water catchment area for Warragamba Dam and comprises part of the Wollondilly and (in the case of the water pipeline route to Moss Vale) the Wingecarribee sub-catchments of the Hawkesbury-Nepean Catchment Management Area.

Nearest urban settlements to the facilities site comprise the village of Marulan and the township of Goulburn. Approximately 10 rural residential receivers are located within three kilometres of the facilities site, the nearest being approximately one kilometre from the facilities site. Residential receivers are located approximately one kilometre from all gas pipeline routes with the exception of the north-eastern route which is located approximately 350 metres from the nearest receiver. The Hume Highway and the Sydney to Canberra main southern rail line forms the major transport corridors to the south of the site. The nearest major airports to the site are at Goulburn (37 kilometres to the south west) and Mittagong (45 kilometres to the north east). There are approximately seven small airfields within a 10 kilometre radius of the site, the closest being five kilometres to the east.

Several existing or recently approved quarrying operations occur within approximately 20 kilometres of the facilities site including the existing operational Johnniefelds Quarry (approximately 11 kilometres to the south) and the Marulan Limestone Mine (approximately 20 kilometres to the south) and the approved but yet to be operational Gunlake Quarry (approximately 14 kilometres to the south west), Lynwood Quarry (approximately 15 kilometres to the south west) and Marulan South Quarry (approximately 18 kilometres to the south). The existing Johnniefelds Quarry and the approved but yet to be developed Gunlake Quarry are located off Brayton Road between the village of Marulan and the Brayton-Canyonleigh Road turnoff. The approved Lynwood Quarry would be located to the east of the village of Marulan with direct access to the Hume Highway. The remaining two quarry operations are located to the south of the Hume Highway.

# 2. PROPOSED DEVELOPMENT

## 2.1 Project Description

The proposal comprises elements to be developed separately by EnergyAustralia and Delta Electricity respectively and elements to be jointly developed and operated. Each of these elements is described below. The Proponents have lodged a joint concept plan application for the proposal as a whole and have sought separate project approval for their respective facilities. Delta Electricity has only sought project approval for its Stage 1 project at this stage, however, has provided an assessment of the impacts of both its Stage 1 and Stage 2 facilities.

EnergyAustralia

EnergyAustralia proposes to construct and operate an up to 350 megawatt (MW) open-cycle gas-fired power station for the generation of peak electricity meaning that the plant would only operate for up to 10% of any year (emergencies excluded), typically very hot summer days and cold winter nights. The power station would comprise two gas turbines with a capacity of 175 MW each. The open-cycle plant would operate by drawing in cool air through a compressor, where the air would be mixed with natural gas and injected at high pressure into a combustion chamber. The combustion reaction would then produce hot exhaust gases which would be used to drive an electrical generator to produce electricity, with the hot gases being vented to the atmosphere through stacks. The main components of the facility would comprise: two open-cycle gas turbine units featuring low-nitrogen producing burners, air-inlet structure for each gas turbine unit approximately 24 metres high, gas turbine exhaust stacks approximately 30 metres high, natural gas receiving and metering unit, connection to the 330 kV transmission line and administration buildings and workshop.

The total water operational water requirements of the facility, for domestic use, servicing the plant and for fire fighting are expected to be around 12 mega litres per annum. Water is expected to be sourced from on site rainwater/ stormwater capture and from local water treatment/ sewage treatment plants which would be trucked and/or piped onto site. Water treatment facilities may be provided for the pre-treatment of this water prior to its use within the power station. Further treatment facilities may also be provided to enable the treatment and reuse of wastewater generated on site. Wastes generated at the plant and by the water treatment facilities (i.e. oil/ waste sludge) would be collected and disposed offsite. The final layout and arrangements for water/ wastewater treatment and storage, stormwater detention and water for fire fighting will be finalised during detailed design. The site is proposed to be designed as a nil discharge site (apart from natural flows).

Delta Electricity

Delta Electricity proposes to construct and operate a gas-fired power station in two stages. The first stage comprising an up to 250 to 350 megawatt (MW) open-cycle plant, comprising two gas turbines each with a capacity of 125 to 175 MW for peak electricity generation. The open-cycle plant is expected to operate (emergencies excluded) up to a maximum of 5% of any year and function generally as described for the EnergyAustralia open-cycle plant. The main elements of the Stage 1 facility would comprise: two open-cycle gas turbine units featuring low nitrogen producing burners, air-inlet structure for each gas turbine unit approximately 8 metres high, gas turbine exhaust stacks approximately 40 metres high, natural gas receiving and metering unit, connection to the 330 kV transmission line and administration buildings and workshop.

The second stage comprises the potential conversion of the open-cycle plant to an up to 400 to 450 MW capacity combined-cycle plant for intermediate/ base load electricity generation, which would operate continuously for up to 90% of any year depending on demand. The combined cycle configuration would take advantage of the waste heat gases produced from the open-cycle process, using the heat and additional water to produce steam to drive a generator to produce electricity. A condenser would then be used to convert the steam back to water for re-use in the combined-cycle process. Depending on market demand, Delta Electricity may chose to construct Stage 1 first and convert to Stage 2 later, or proceed directly to the Stage 2 (combined cycle) configuration. The conversion of the open-cycle to the combined cycle would involve the inclusion of the following elements into the open-cycle infrastructure: two heat recovery steam generators approximately 25 metres high with the exhaust stacks from the gas turbines relocated to the exhausts of the heat recovery generators; one steam turbine approximately 5 metres high; and an air cooled condenser, approximately 32 metres high.

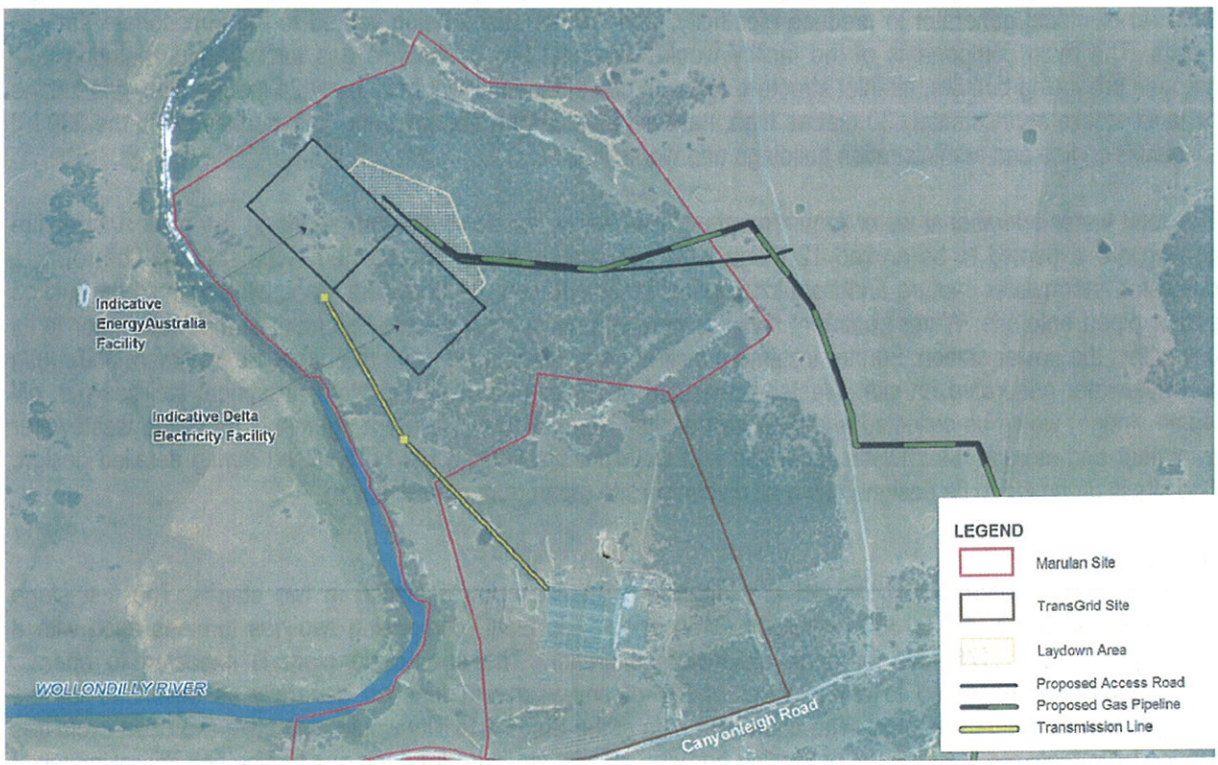
Delta Electricity has indicated that assuming reuse of wastewater on site, the operational water requirements of the (Stage 1) open-cycle plant can be limited to approximately 2.3 megalitres per annum. Due to the significantly higher water requirements of the combined-cycle configuration, the operational water requirement of the Stage 2 plant would rise to approximately 64 megalitres per annum. To minimise potential operational water use requirements, Delta Electricity has proposed the use of air-cooled condensers as part of the Stage 2 combined cycle facility rather than the more water intensive option of 'wet cooled' condensing.

As with the EnergyAustralia facility, the Delta Electricity facilities would incorporate water and wastewater treatment and storage facilities, water supplies for fire fighting and stormwater detention, with the Stage 2 facility likely to require more extensive water and wastewater treatment/ storage facilities due to its higher operational water requirements. Both the Stage 1 and 2 facilities would be designed as nil discharge sites (apart from natural flows). As with the EnergyAustralia facility, water is expected to be sourced from on site rainwater/ stormwater capture and from local water treatment/ sewage treatment plants, which would be trucked and/or piped on to site.

Combined Infrastructure

The Proponents propose to jointly develop the transmission line, access road, gas pipeline and (if required) water pipeline infrastructure that would service both facilities (refer Figures 2, 3 and 4).

**Figure 2: Proposed Project Components (Proponents' Preferred Project Report, May 2009)**




*Transmission Line*

The proposed transmission line would be up to 35 metres in height and require an approximately 1200 metre long and 70 metre wide corridor between the facilities site and the adjacent TransGrid switchyard (refer Figure 2). To maintain appropriate safety clearances, it is expected that the majority of the corridor would be kept clear of vegetation during operation.

*Site Access*

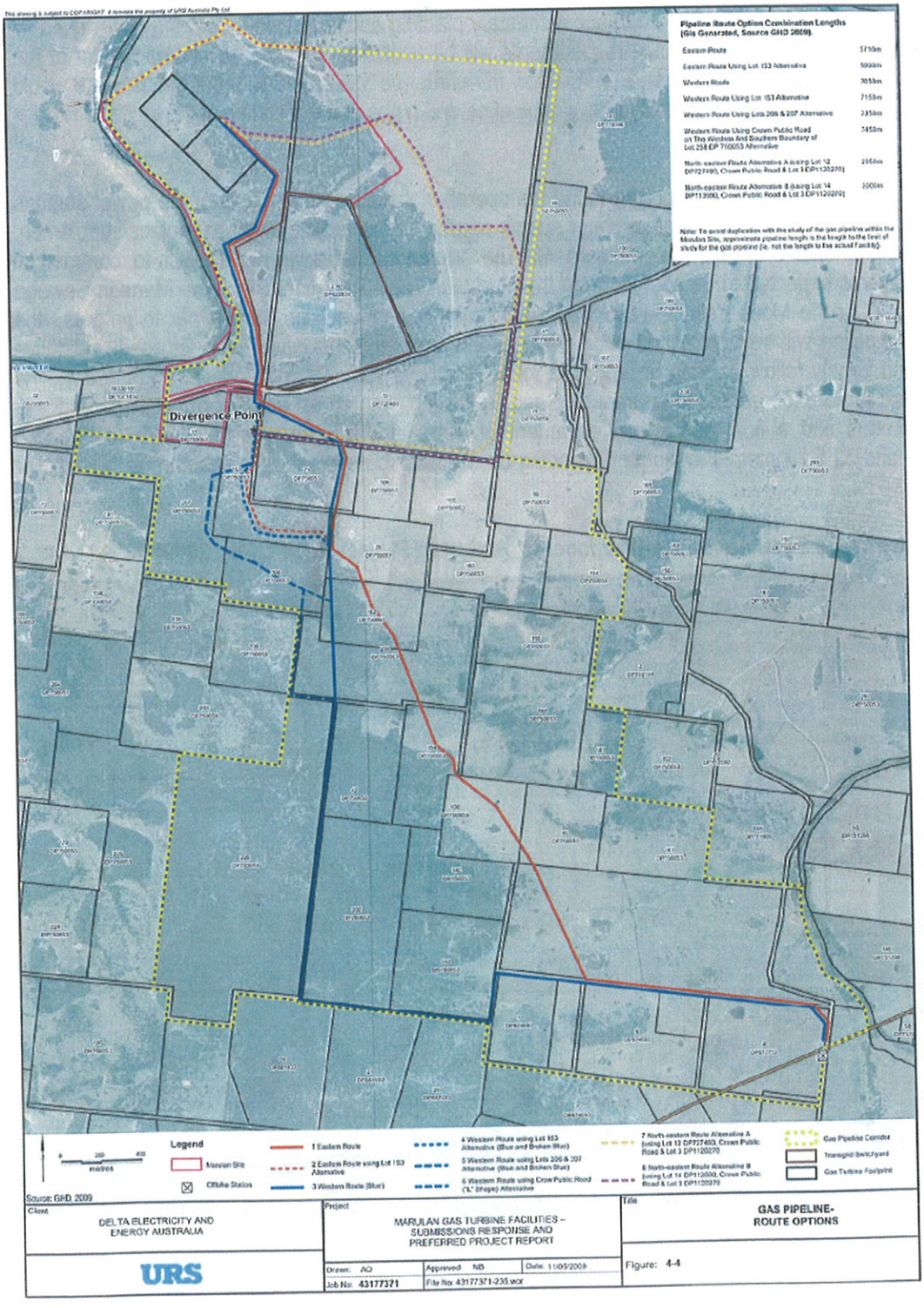
The site access road (refer Figure 2) comprises an approximately 800 metre long and 70 metre wide corridor between the facilities site and University Road, the existing access road on the adjacent property. Some selective upgrade of University Road including grading and widening may be required to accommodate traffic associated with the project during construction (particularly over-dimensional traffic) and operation. The Proponents will be responsible for the ongoing operational maintenance of the site access road and University Road.

*Gas Pipeline*

A preferred gas pipeline route is yet to be determined however, the Proponents have identified a broad gas pipeline corridor wherein the pipeline routes would be located generally comprising the area south of the facilities site up to the Sydney-Moomba Gas Pipeline covering existing cleared rural grazing land to the east and an area of well established regenerated vegetation to the west (refer yellow hatched boundary in Figure 3). Within this broad corridor, two specific route alignments have been identified between approximately 200 metres south of Canyonleigh Road and the Moomba to Sydney Pipeline, which comprises (refer Figure 3):

- the "eastern" (red) route which traverses mainly cleared, privately owned rural land and existing Crown Public Road (Wollombi Road); and
- the "western" (blue) route which traverses mainly vegetated land using existing (Wollombi Road) or unmade Crown roads.

**Figure 3: Gas Pipeline Options (Proponents' Preferred Project Report, May 2009)**



At approximately 200 metres south of Canyonleigh Road both route options converge and would traverse north to the facilities site (crossing Canyonleigh Road), along the eastern side of the TransGrid switchyard through mainly cleared, privately owned rural land. This section of the route has been identified by the Proponents as the "north-eastern" option and comprises two minor route refinements (purple and orange routes) (refer Figure 3). A final alignment between the identified routes would be determined at detailed design, however the Proponents have also sought concept plan approval for the board corridor to provide maximum flexibility of refinements to final alignment where necessary as part of detailed design and easement negotiations.

Depending on the final route option chosen the gas pipeline route would be between approximately seven and 10 kilometres in length and involve a 20 metre wide construction corridor (limited to 10 metres through ecologically sensitive areas wherever possible). The pipeline would be undergrounded though trenching and backfilling (or boring where required). Apart from restrictions to deep rooted vegetation (e.g. canopy trees) within the six metres directly above the buried pipeline, vegetation would be allowed to naturally regenerate across the construction corridor consistent with the existing landuse with supplementary planting and/or pasture re-sowing undertaken as required. Operational vegetation maintenance requirements will be limited to ensuring no encroachment of the final six metre corridor by deep rooted vegetation. Ancillary infrastructure associated with the gas pipeline would involve a gas offtake station at the Moomba-Sydney gas pipeline and a gas delivery station at the facilities site.

*Water Pipeline*

The Proponents have identified the option of providing the operational water requirements of the power stations via a direct water pipeline from the proposed water supply source to the facilities site, to replace/supplement water trucking requirements onto site (refer Figure 4). The source of water will be subject to commercial arrangement however is expected to be sourced from the Marulan Water Treatment Plant, the Marulan Sewage Treatment Plant and/ or the Moss Vale Sewage Treatment Plant. A final decision on whether to progress the option of a water pipeline will be determined once water supply arrangements have been finalised. Indicative route options which largely follow existing or proposed infrastructure easements are identified in Figure 4. The pipeline is expected to be undergrounded by trenching and backfilling, with an expected construction corridor of between 10-12 metres and a final operational easement of three metres. The pipeline would be between approximately 19 and 32.5 kilometres in length depending on the final route chosen (i.e. whether to Marulan or Moss Vale).

**Figure 4: Indicative Water Pipeline Routes (Proponents' Preferred Project Report, May 2009)**