EnergyAustralia

Delta electricity

Appendix E
Traffic Assessment – Site Preparation

MARULAN GAS TURBINE FACILITIES

ENVIRONMENTAL ASSESSMENT

JOINT CONCEPT APPLICATION

VOLUME 2 | APPENDICES | August 2008

URS

REPORT

Marulan Gas Turbine Facilities - Traffic Assessment of Common Shared Works

Prepared for

Delta Electricity and Energy Australia

May 2008

43177585

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Contents

Executive Summary

Delta Electricity and EnergyAustralia (the Proponents) are proposing to develop two separate gas turbine Facilities at the Marulan Site (referred herein as the "Project"). A gas pipeline and other shared infrastructure servicing both Facilities would also be constructed along with high voltage transmission lines connecting each Facility to the nearby TransGrid 330kV Marulan Switchyard.

URS was commissioned by Delta Electricity and EnergyAustralia to prepare a traffic impact assessment of the Common Shared Works for the proposed Marulan Gas Turbine Facilities.

The assessment concluded that for the Common Shared Works (bulk earthworks) phase, peak construction traffic for earthworks is approximately 25% higher than without the development for the worst case where earthworks for the two Facilities are undertaken at the same time;

In the peak periods the level of service will be LoS A, which is the same case as the scenario without the development, therefore acceptable levels of service are maintained along Canyonleigh and Brayton Roads during these periods.

A summary of mitigation measures include the following:

- undertake further assessments to identify and cater for any necessary remedial treatments to facilitate passage to Site along Canyonleigh and Brayton Roads once the actual weight and dimensions of the proposed plant are known. The assessment would review what works may be required to bridges, causeways, traffic islands, intersections and drainage culverts to facilitate the construction and operation of the Facilities. This would be done in consultation with Goulburn Mulwaree and Upper Lachlan Shire Councils;
- pre construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken;
- post construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken to determine remedial action required following passage of oversized vehicles;
- transport of over-mass and over- dimensional loads to be undertaken under RTA and NSW Police permit conditions and approved routes; and
- new access road to be constructed within the Site.

Section 1 Introduction

1.1 Background

Delta Electricity and EnergyAustralia (the Proponents) are proposing to develop two separate gas turbine Facilities at the Marulan Site (referred herein as the "Project"). A gas pipeline and other shared infrastructure servicing both facilities would also be constructed along with high voltage transmission lines connecting each facility to the nearby TransGrid 330kV Marulan Switchyard.

URS was commissioned by Delta Electricity and EnergyAustralia to prepare a traffic impact assessment of the Common Shared Works phase of their proposed Marulan Gas Turbine Facilities.

1.1.1 Context of Assessment

The Environmental Assessment for the Marulan Gas Turbine Facilities is divided into three parts:

1) **Marulan Gas Turbine Facilities** jointly proposed by Delta Electricity and EnergyAustralia seeking Concept Approval for the project as a whole and concurrent approval for the site preparation works;

2) **Delta Electricity Marulan Gas Turbine Facility** Environmental Assessment seeking Project Approval for Stage 1 (Open Cycle Plant) and Concept Approval for Stage 2 (Combined Cycle Plant); and

3) **EnergyAustralia Marulan Gas Turbine Facility** Environmental Assessment seeking Project Approval for an Open Cycle Plant.

1.1.2 Scope of assessment

This document addresses the assessment for **Application 1** above for the Common Shared Works (as defined in the *Concept Application*) being the:

- bulk earthworks for preparation of the site pad for the two facilities; and
- construction of access road into the site from University Road.

The assessment of the construction (following bulk earthworks) and operation of the Facilities is addressed respectively in **Applications 2** and **3**.

1.2 Site Location

1.2.1 Marulan Site

The Marulan site is located on Canyonleigh Road, Brayton, approximately 12 kilometres northeast of the village of Marulan. The site is 19.6 kilometres from the Marulan Highway turnoff and 10 kilometres from the Canyonleigh-Brayton Road turnoff (refer to **Figure 1-1** and **Figure 1-2**).

1.3 Project Overview

1.3.1 Delta Electricity Facility

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

- gas turbine Facility including ancillary equipment, process control system and administration facilities; and
- associated infrastructure within the Site i.e., connection to the electricity transmission line, connection to the gas inlet receiver, internal roads and water storage.

The implementation of the proposed gas turbine Facility would be carried out in two stages:

Section 1 Introduction

Stage 1 Two open cycle gas turbines with a total capacity in the range of 250 to 350 MW. Each turbine could have a capacity in the order of 125 to 175 MW depending on final equipment selected.

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

1.3.2 EnergyAustralia's Facility

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 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 proposed gas turbine facility for EnergyAustralia would comprise two open cycle gas turbines. Each turbine could have a capacity in the order of 175MW, producing a total nominal Facility output of 350MW.

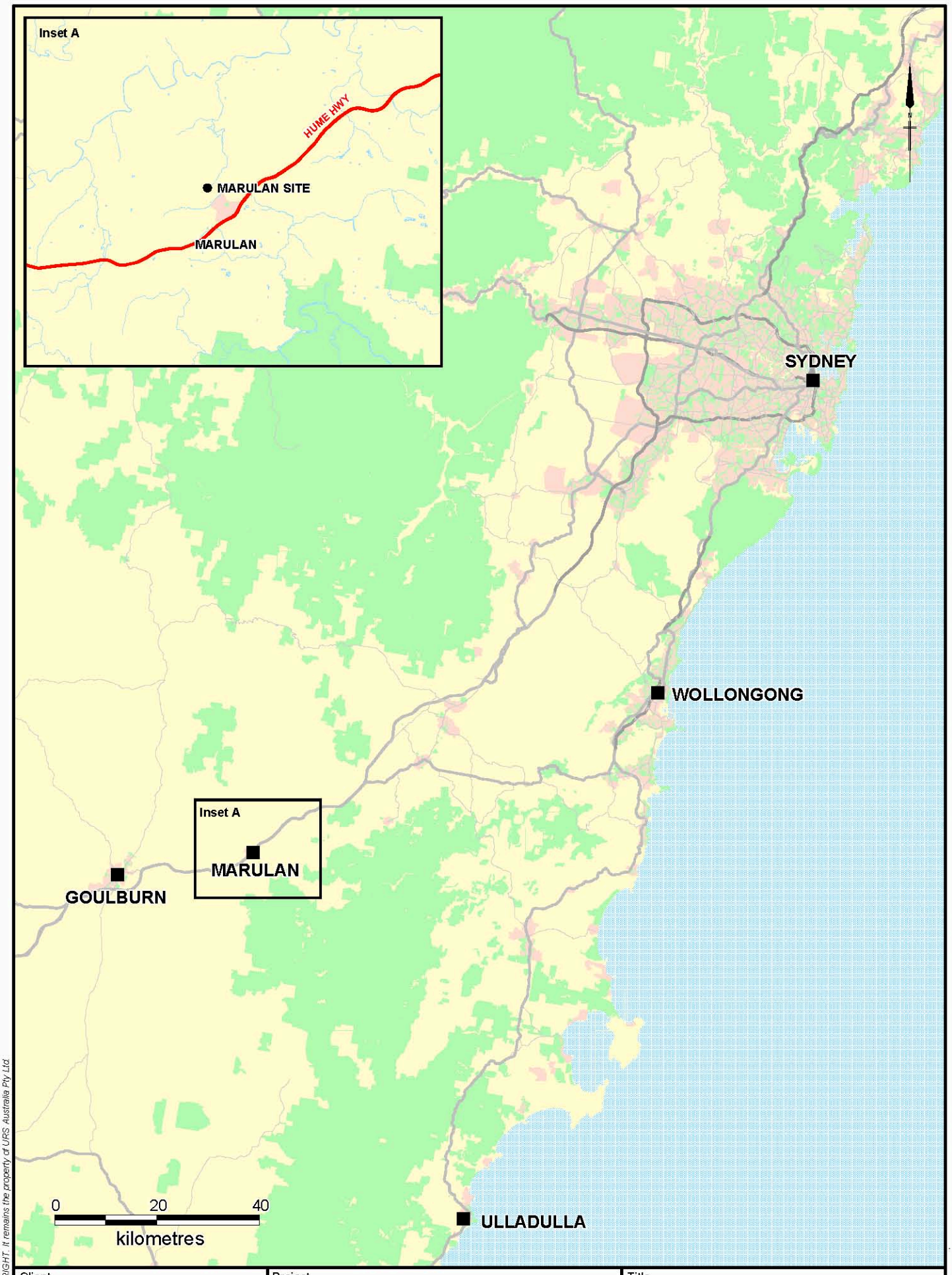
1.3.3 Joint / Shared Infrastructure

The Project includes the construction of linear infrastructure, including:

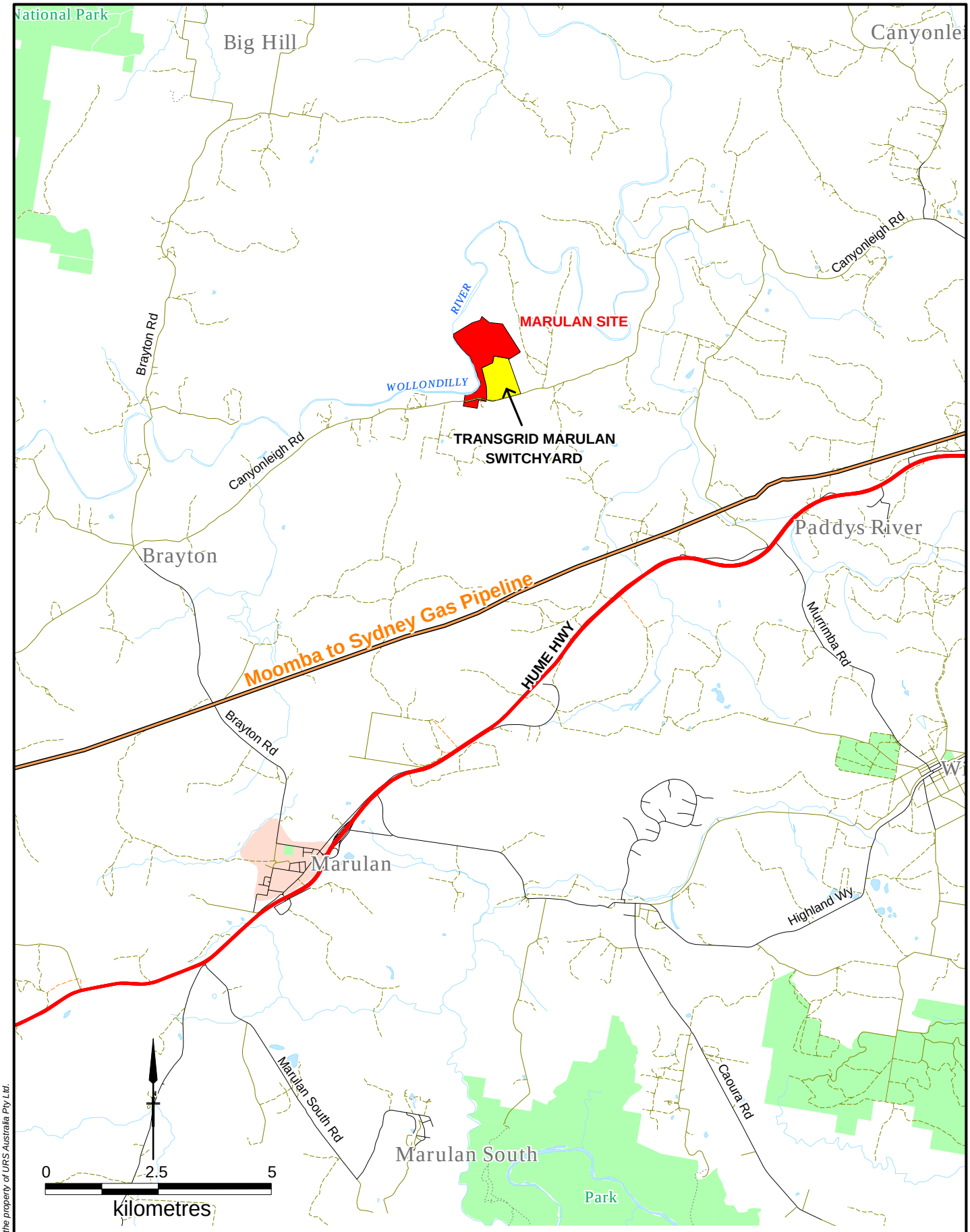
- a gas pipe line;
- access roads; and
- transmission lines.

An indicative route for the transmission lines and access road on the Marulan site is shown in **Figure 1-1**, the exact layout and position will be finalised during the detailed design stage.

The exact location of the gas pipe line will be finalised at the detailed design stage and, subject to the Minister's determination, will be subject to a future, separate project application. Delta Electricity and EnergyAustralia are currently considering route options for the gas pipe line within an identified corridor of land, with further studies and assessment underway. When identified route options for the gas pipeline have been considered, easements or other appropriate rights of tenure will be negotiated.



Client: DELTA ELECTRICITY AND ENERGYAUSTRALIA	Project: MARULAN GAS TURBINE FACILITIES	Title: REGIONAL LOCATION MAP
URS	Drawn: AJW | Approved: NB | Date: 09/01/2008 Job No: 43177371 | File No: 43177371-001J.wor	Figure: 1-1



Client	Project	Title
DELTA ELECTRICITY AND ENERGYAUSTRALIA	MARULAN GAS TURBINE FACILITIES	**LOCAL CONTEXT MAP**
URS	Drawn: AJW | Approved: NB | Date: 26/03/2008	Figure: **1-2**
	Job No: **43177371** | File No: 43177371-001k.wor	

Section 2 Existing Environment

2.1 Existing context

The regional road network is dominated by the Hume Highway (State Highway 31) which runs between Sydney and Melbourne. The town of Marulan is located some 130 kilometres south west of Sydney and 20 kilometres east of the regional centre of Goulburn. Both Facility sites would be accessed from Brayton Road that leaves Marulan and heads to the north west.

Approximately four kilometres north of Marulan, Canyonleigh Road branches to the east off Brayton Road and passes the TransGrid Switchyard site. A further two kilometres along Canyonleigh Road beyond the TransGrid Switchyard is the entry road to the Site initially utilising an easement over the entry road to the University of Sydney property (refer to Figure 1-1 and 1-2).

2.2 Existing road environs

Brayton Road is a 6.5 metre wide sealed road from Marulan to the junction with Canyonleigh Road. There are overhead transmission lines and a pedestrian pavement alongside the road at this location.

Two kilometres from the Hume Highway junction there is a narrow two lane bridge. The load capacity of the bridge is currently unknown. There are several other narrow points that are located at approximately five and nine kilometres along the route on Brayton Road and Canyonleigh Road.

Approximately 3.5 kilometres west of Marulan overhead power lines cross Brayton Road. Culverts along this section of Brayton Road are generally narrow, extending approximately only one metre beyond the sealed width of the roadway. The majority of these structures are faulty and shallow.

At approximately five kilometres along the route from Marulan, the road further narrows to five metres in some sections.

The route to the Marulan Site leaves Brayton Road at Canyonleigh Road. Initially Canyonleigh Road is a 5.5 metre wide sealed road but as the distance away from Brayton Road increases the road changes to a gravel surface.

A traffic island separates the two traffic directions along Canyonleigh Road at the junction.

The grade along this route is generally less than 3 % to 5 %. Other features along the route include drainage culverts, cattle grids and as the route approaches the switchyard, there are several overhead high voltage wires and towers.

Brayton Road spans two local government areas: Upper Lachlan Shire Council and Goulburn Mulwaree Council.

Section 2 Existing Environment

Figure 2-1 Brayton Road narrowing over bridge culvert

Figure 2-2 Brayton and Canyonleigh Roads intersection

Section 2 Existing Environment

Figure 2-3 Brayton Road overhead powerlines

Figure 2-4 Canyonleigh Road faulty pipe culverts

Section 2 Existing Environment

2.3 Traffic

Historical Average Annual Daily Traffic (AADT) is not available for either Canyonleigh Road or Brayton Road in the relevant locations for the Project. However, analysing data from adjacent stations within the network shows a clear and consistent trend that indicates the number of vehicles using these roads in the relevant locations. This analysis show a growth of 4.0 % which has been used to estimate the traffic over a 10 year period, from 2008 to 2018.

Site works for the two Sites is assumed to occurring at the same time over a period of approximately six months as a worst case scenario and assumed for the purposes of this assessment to be completed by end of 2008.

The years in which the traffic growth is calculated are estimated within these timeframes and shown in **Table 2-1**. These represent the base traffic growth without either Facility being present. By the year 2018 the estimated traffic will be 1064 vehicles per day, which represents an operational Level of Service 'B', that is, between 900 and 2300 vehicles per day.

Table 2-1 Predicted Weekday Base Traffic Growth in Canyonleigh and Brayton Roads – No Development

YEAR	2008	2009	2010	2011	2012	2013	2018
No Development							
Daily Traffic Flow	719	747	777	808	841	874	1064
Midblock Level of Service (LoS)	A	A	A	B	B	B	B

Section 3 Construction Traffic Generation - Site Preparation

3.1 Traffic Generation

The traffic generated by bulk earthworks for the Facilities is summarised in the **Table 3.1**.

Table 3-1 Earthworks Traffic Generation Predicted Average

	Duration (Months)	Per Month		Per Week		Per Day	
		HV	LV	HV	LV	HV	LV
Average	6	660	1320	165	330	30	60
Peak	3	1320	2640	330	660	60	120

HV=Heavy vehicles
LV= Light vehicles

The table shows that the traffic volumes that are expected to occur in the peak three month period are double the expected monthly average over a six month period. For the purposes of this assessment, the peak traffic volumes have been adopted as this represents the worst case. The peak daily construction traffic including heavy vehicles (HV) and light vehicles (LV) totals 180 vehicles per day (i.e. 60+120 = 180).

4.1 Road infrastructure issues and constraints

4.1.1 Beyond Site boundary

Further assessments would be undertaken to identify and cater for any necessary remedial treatments to facilitate passage to Site once the actual weight and dimensions of the proposed plant are known. The assessment would review what works may be required to bridges, causeways, traffic islands, intersections and drainage culverts to facilitate the construction and operation of the Facilities. This would be done in consultation with Goulburn Mulwaree and Upper Lachlan Shire Councils.

Pre construction evaluation would be undertaken of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) would be undertaken.

Post construction evaluation would be undertaken of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) to be undertaken to determine remedial action required following passage of oversized vehicles.

Transport of over-mass and over- dimensional loads to be undertaken under RTA and NSW Police permit conditions and approved routes.

Section 4 Assessment of Potential Impacts

4.1.2 Within Site boundary

Three alignment options were developed for the access road within the site. The alignment options all connect to University Road at the same point adjacent to the high voltage transmission line easement. A preferred alignment was determined and is shown in **Figure 10-2** (Option B). The preferred route optimises the cost of construction and the impact on existing vegetation within the site. Option C is also presented in **Figure 10-2**. It is noted that for the purposes of other environmental assessment studies Option C has been used as it is the worst case scenario in terms of vegetation clearing. Detailed design will refine the alignment.

The new access road within the Site would be constructed prior to earthworks commencing.

4.2 Construction phase

The main impacts from construction (bulk earthworks) generated traffic includes:

- during the morning 7.00 to 8.00 AM peak hour when construction staff and early delivery vehicles coincides with the Brayton Road peak; and
- regular daily traffic generated by delivery trucks for equipment, plant.

The impacts of the construction traffic have been reviewed with respect to:

- traffic capacity on Brayton Road and Canyonleigh Road;
- safety; and
- oversize vehicles.

4.3 Local road network performance

For the bulk earthworks phase (Common Shared Works) the predicted increase in traffic volume is shown in Table 4-1.

Assumptions

The data in **Table 4-1** is developed based on the following assumptions:

- bulk earthworks construction traffic is the same for each Facility and as a worst case assumed to occur at the same time;
- bulk earthworks are assumed to occur over approximately 6 months with approximately 3 month peak traffic; and
- bulk earthworks are complete by end of 2008.

Table 4-1 Predicted Weekday Traffic Flow in Canyonleigh and Brayton Roads – Bulk Earthworks

YEAR	2008
No Development	
Daily Traffic Flow	719

Section 4 Assessment of Potential Impacts

Midblock Level of Service (LoS)	A
With Development	
Daily Construction Traffic Flow during peak construction month	180
Daily Total Traffic Flow during peak construction month	**899**
Percentage Change (from No Development)	25%
Midblock Level of Service (LoS)	A

Analysis of Table 4-1 for the Common Shared Works (bulk earthworks) phase shows the following:

- peak construction traffic for earthworks is approximately 25% higher than without the development for the worst case where earthworks for the two Facilities are undertaken at the same time;
- in the peak periods the level of service will be LoS A, which is the same case as the scenario without the development, therefore acceptable levels of service are maintained along Canyonleigh and Brayton Roads during these periods.

Section 5 Management measures

A summary of mitigation measures include the following:

- undertake further assessments to identify and cater for any necessary remedial treatments to facilitate passage to Site along Canyonleigh and Brayton Roads once the actual weight and dimensions of the proposed plant are known. The assessment would review what works may be required to bridges, causeways, traffic islands, intersections and drainage culverts to facilitate the construction and operation of the Facilities. This would be done in consultation with Goulburn Mulwaree and Upper Lachlan Shire Councils;
- pre construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken;
- post construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken to determine remedial action required following passage of oversized vehicles;
- transport of over-mass and over- dimensional loads to be undertaken under RTA and NSW Police permit conditions and approved routes; and
- new access road to be constructed within the Site.

Table 5-1 presents a summary of the traffic mitigation measures for the Common Shared Works.

Section 5 Management measures

Table 5-1 Summary of Mitigation Measures

Mitigation Measure	Implementation
	Construction
Undertake further assessments to identify and cater for any necessary remedial treatments to facilitate passage to Site along Canyonleigh and Brayton Roads once the actual weight and dimensions of the proposed plant are known. The assessment would review what works may be required to bridges, causeways, traffic islands, intersections and drainage culverts to facilitate the construction and operation of the Facilities. This would be done in consultation with Goulburn Mulwaree and Upper Lachlan Shire Councils.	✓
Pre construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken.	✓ (prior to Cons)
Post construction evaluation of pavement condition of Brayton Road (between George Street intersection and Canyonleigh Road intersection) and Canyonleigh Road (from intersection of Brayton Road to the Site) to be undertaken to determine remedial action required following passage of oversized vehicles.	✓ (post Facility Cons)
Transport of over-mass and over- dimensional loads to be undertaken under RTA and NSW Police permit conditions and approved routes.	✓
Construct new access road within the Site.	✓

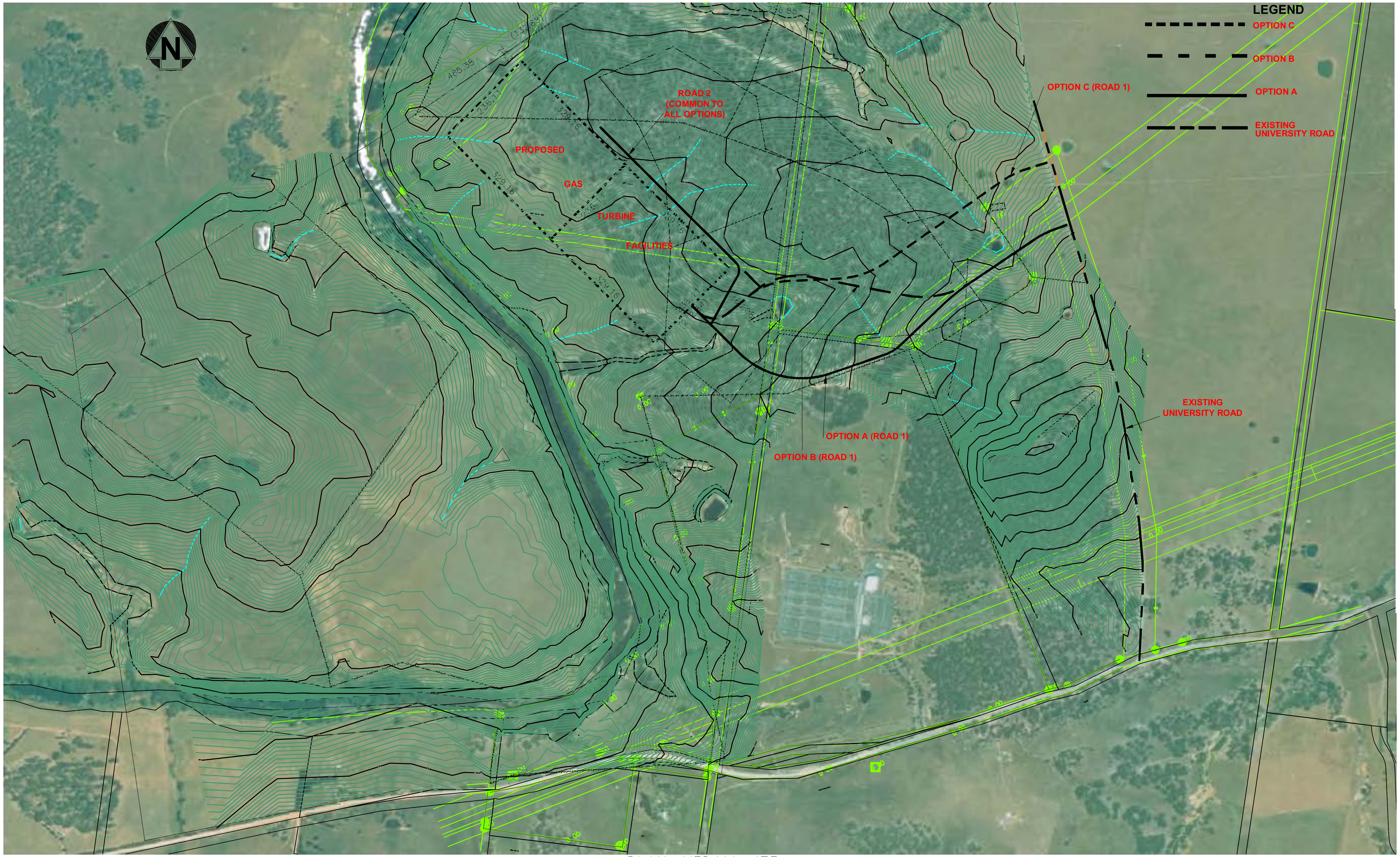
Section 6 Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Delta Electricity and EnergyAustralia and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 14/2/08.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

This report was prepared between December 2007 and March 2008 and is based on the conditions encountered and information reviewed at the time of preparation. URS disclaims responsibility for any changes that may have occurred after this time.

This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.



PLAN OVERALL SITE

SCALE 1:4000 (A1 SIZE)

Rev	Date	By	App	Amendment Details
A	07.02.2008	N.A.	B.S.	ISSUED FOR REVIEW

Design	D.J.	07.02.2008
Drawn	S.R.	07.02.2008
Design Check	B.S.	11.02.2008
Drafting Check		
Final Approval		
Azimuth: ISG	Datum: AHD	

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Client: DELTA ELECTRICITY

Project: MARULAN GAS POWER GENERATION FACILITY

Drawing Title: MARULAN GAS TURBINE PLANT PLAN - OVERALL

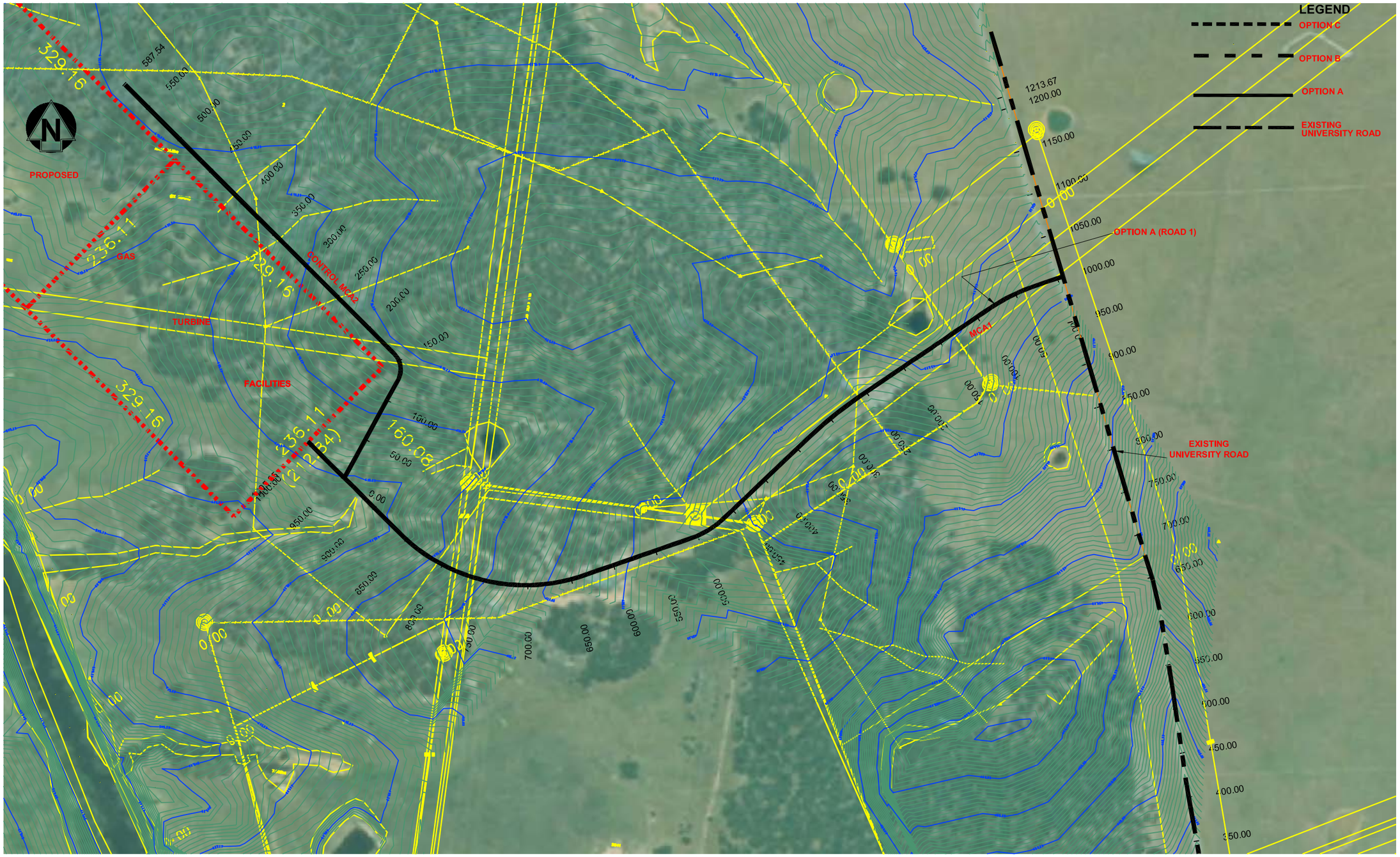
Project No. 43177371

Drawing No. RD-104

Status: PRELIMINARY

Scale (A1): 1:4000

Rev: A



PLAN - ALIGNMENT OPTION A

SCALE 1:2000 (A1 SIZE)

Rev	Date	By	App	Amendment Details
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Design	D.J.	07.02.2008
Drawn	S.R.	07.02.2008
Design Check	B.S.	11.02.2008
Drafting Check		
Final Approval		
Azimuth	ISG	Datum AHD

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Project: MARULAN GAS POWER GENERATION FACILITY

Drawing Title: MARULAN GAS TURBINE PLANT PLAN OPTION 'A'

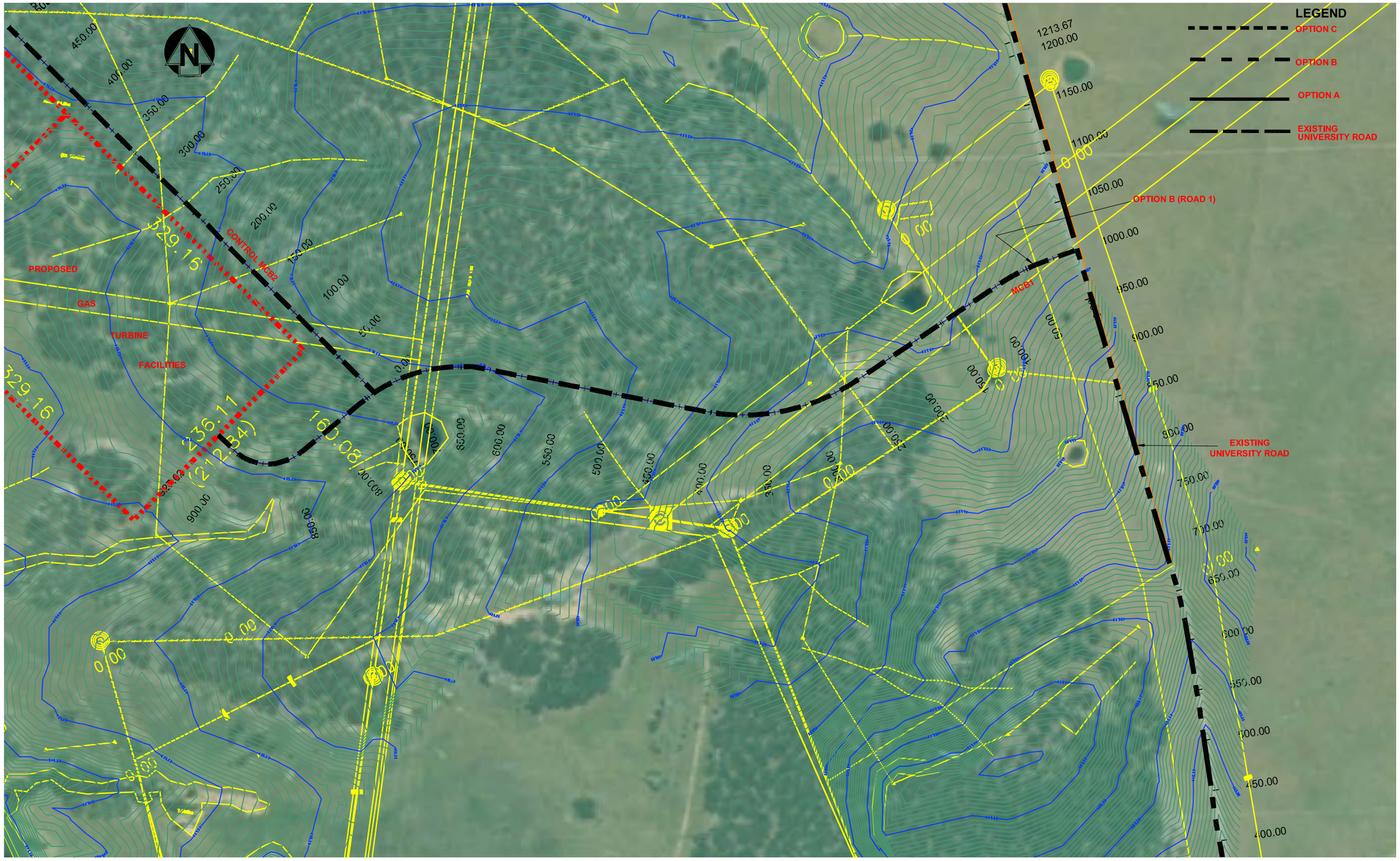
Status: PRELIMINARY

Project No.: 43177371

Drawing No.: RD-105

Scale (A1): 1:2000

Rev: A



PLAN - ALIGNMENT OPTION B

SCALE 1:2000 (A1 SIZE)

Rev	Date	By	App	Amendment Details
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Design	D.J.	07.02.2008
Drawn	S.R.	07.02.2008
Design Check	B.S.	11.02.2008
Drafting Check		
Final Approval		
Azimuth: ISG	Datum: AHD	

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Client: DELTA ELECTRICITY

Project: MARULAN GAS POWER GENERATION FACILITY

Drawing Title: MARULAN GAS TURBINE PLANT PLAN OPTION 'B'

Project No.: 43177371

Drawing No.: RD-106

Status: PRELIMINARY

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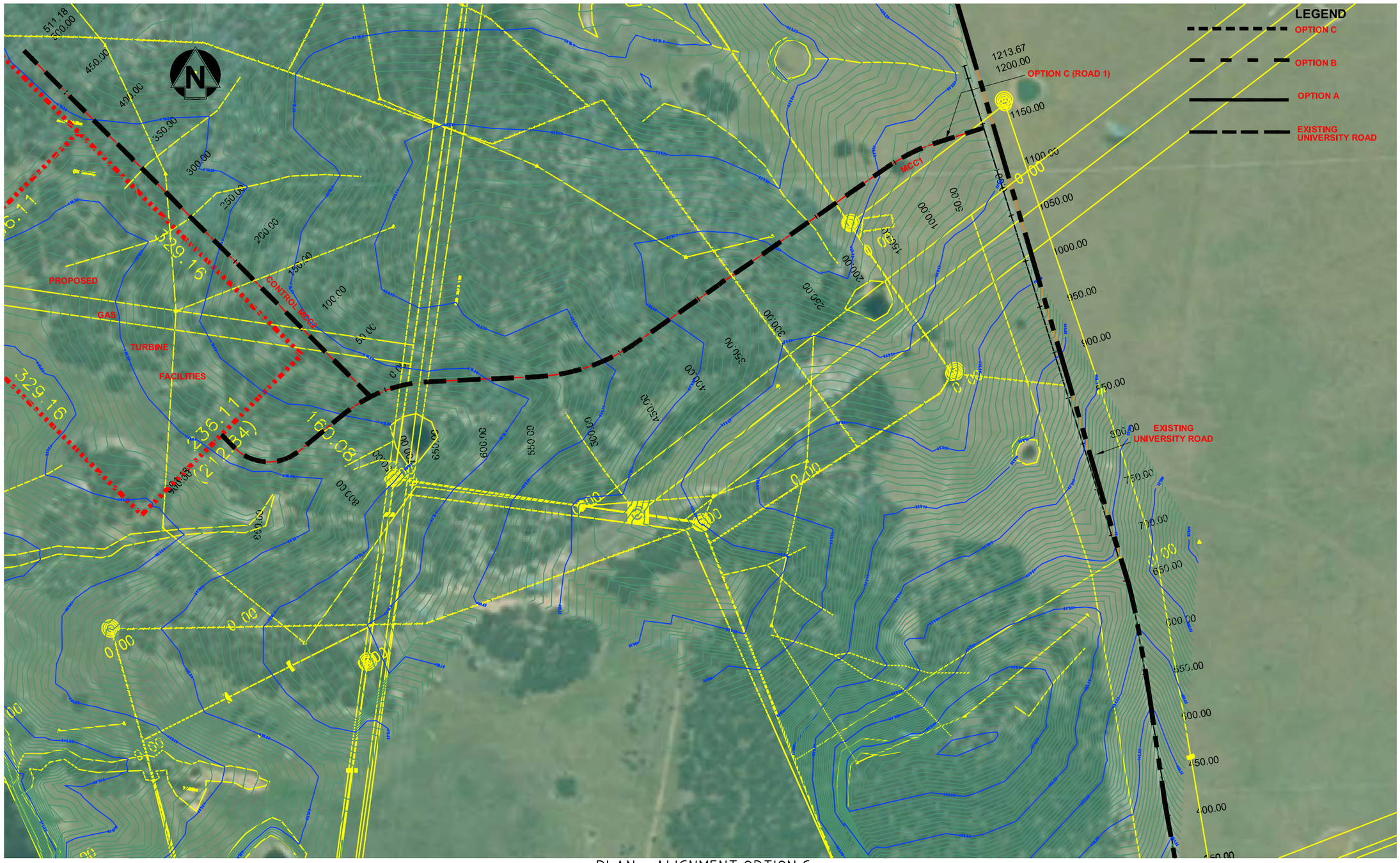
Rev: A



PLAN - ALIGNMENT OPTION C

SCALE 1:2000 (A1 SIZE)

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Design	D.J.	07.02.2008
Drawn	S.R.	07.02.2008
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Drafting Check		
Final Approval		
Azimuth	ISG	
Datum	AHD	

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Project: MARULAN GAS POWER GENERATION FACILITY

Drawing Title: MARULAN GAS TURBINE PLANT PLAN OPTION 'C'

Status: PRELIMINARY

Project No.: 43177371

Drawing No.: RD-107

Scale (A1): 1:2000

Rev: A