Section 4 Assessment of Delta Electricity Facility

4.4.3 Operational phase

During the operational phase of Stage 1 staff levels are expected to average some two full time staff on site and two contract staff for support services in Stage 1. This will generate eight vehicle trips per day (i.e.4 x 2). Stage 2 operational staff levels are expected to be up to 18 full time staff with two full time contract staff generating some 40 vehicle trips per day (i.e. 20 x 2) which is significantly lower than levels of construction traffic generation, and can be readily accepted by the road network.

It is estimated that for a 40 day operational period per year approximately 2 trucks per day (i.e. 4 vehicle trips per day) would be required to provide the water volume necessary for the operation of Delta Electricity Stage 1 Facility.

It is estimated that for a 330 day operational period per year approximately 6.5 trucks per day (i.e. 13 vehicle trips per day) would be required to provide the water volume necessary for operation of Delta Electricity Stage 2 Facility.

Parking would be catered for on site for Facility employees and business vehicles in accordance with the RTA's Guide to Traffic Generating Developments, Australian Standards and council requirements.

4.4.4 Major facility maintenance phase

Major maintenance events are likely to occur once every six years and would require up to 60 contractors on site for a three to six week period. This activity would generate some 120 vehicle trips per day.

4.4.5 Local road network performance

The analysis presented in **Table 4-2** includes the construction traffic, operational traffic and maintenance traffic for the period commencing with construction of the Facilities in 2009 -2011, operation in 2012 and 2013, and maintenance in 2018. The analysis indicates that with a 36% increase in traffic on the peak periods the level of service will be Level of Service (LoS) B, in which drivers would be able to select their desired speed and manoeuvre within the traffic stream, although the level of comfort is less than LoS A.

Assumptions

The data in **Table 4-2** is developed based on the following assumptions:

- construction traffic is the same for each Facility;
- bulk earthworks are complete by end of 2008;
- Delta Electricity construction commences in 2009 and is complete during 2011. This matches the Scenario 1 development timing. For Scenario 2 Delta Energy construction would shift by 12 months;
- 2012 and 2013 are typical operating years;
- maintenance commences following construction completion;
- major maintenance is nominally assumed to occur in 2018 and there would be no operational traffic (staff or water deliveries); and
- water delivery based on 30,000 L truck capacity.

Section 4 Assessment of Delta Electricity Facility

Table 4-2 Predicted Weekday Traffic Flow in Canyonleigh and Brayton Roads – Delta Electricity Facility

YEAR	2009	2010	2011	2012	2013	2018
No Development						
Daily Traffic Flow	747	777	808	841	874	1064
Midblock Level of Service (LoS)	A	A	B	B	B	B
With Development, Scenario 1						
Daily Construction Traffic Flow during peak construction month	240	240	240	0	0	0
Major Facility Maintenance after 6 years						120
Water Delivery	0	4	13	13	13	0
Operational Traffic	0	8	8	40	40	0
Daily Total Traffic Flow during peak construction month	987	1029	1101	894	927	1184
Percentage Change (from No Development)	32%	32%	36%	6%	6%	11%
Midblock Level of Service (LoS)	B	B	B	B	B	B

Analysis of **Table 4-2** for the Delta Electricity Facility shows the following:

- peak traffic during construction is approximately 32% higher than without the development;
- peak traffic during normal operations is approximately 6% higher than without the development;
- peak traffic during times of major Facility maintenance (expected approximately every six years for a period of up to 6 weeks) is approximately 11% higher than without the development.

In the peak periods the level of service will be LoS B, which is still acceptable for the standard of road under consideration therefore acceptable levels of service are maintained along Canyonleigh and Brayton Roads during these periods.

It is noted that the assessment, particularly for construction, is conservative as the traffic volumes for the peak three months of construction were assumed to continue for the entire year.

Section 5 Cumulative Assessment

5.1 Traffic generation – Facility construction

Construction works for the two Facilities undertaken simultaneously or consecutively would represent different scenarios. For this particular study, two scenarios are adopted as described in **Section 3** and described below.

5.1.1 Construction Scenario 1

This scenario assumes that the two Facilities are constructed at the same time. Stage 1 data included in **Table 5-1** includes construction of both the EnergyAustralia Facility and Stage 1 of the Delta Electricity Facility. It is assumed that traffic generated for each of the Facilities would be very similar throughout the construction phase. Stage 2 shown in **Table 5-1** includes only the Stage 2 of the Delta Electricity Facility. That is conversion from open cycle to combined cycle.

Table 5-1 Construction Traffic Generation - Scenario 1

Stage	Duration (Months)	Per Month		Per Week		Per Day	
		HV	LV	HV	LV	HV	LV
EnergyAustralia + Delta Electricity Stage 1							
Average	12	1056	4224	264	1056	48	192
Peak	3	2112	8448	528	2112	96	384
Delta Electricity Stage 2							
Average	12	528	2112	132	528	24	96
Peak	3	1056	4224	264	1056	48	192

Note: Peak traffic over the busiest three month period is twice the average over the year.

The table shows that the traffic volumes that are expected to occur in the peak 3 month period are double the expected monthly average over a twelve 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 **480** vehicles per day (i.e. 96 + 384 = 480) for Scenario 1 (being the EnergyAustralia **and** Delta Electricity Stage 1 Facilities being constructed at the same time).

The peak daily construction traffic including heavy vehicles (HV) and light vehicles (LV) totals **240** vehicles per day (i.e. 48 + 192 = 240) for the Delta Electricity Stage 2.

5.1.2 Construction Scenario 2

The assumption for this scenario is that that the two Facilities are constructed consecutively, that is, one Facility is completed then the other one starts, with some time lag. **Table 5-2** shows the traffic generated by this scenario. The local network will be affected by lower peak construction traffic than the Scenario 1 but construction will occur over a longer term, as Delta Electricity Stage 2 would require an additional 18 months to finalise the works for a total construction period of up to 51 months (4.25 years).

Section 5 Cumulative Assessment

Table 5-2 Construction Traffic Generation - Scenario 2

Stage	Duration (Months)	Per Month		Per Week		Per Day	
		HV	LV	HV	LV	HV	LV
EnergyAustralia / Delta Stage 1							
Average	12	528	2112	132	528	24	96
Peak	3	1056	4224	264	1056	48	192
Delta Stage 2							
Average	12	528	2112	132	528	24	96
Peak	3	1056	4224	264	1056	48	192

Note: Peak traffic over the busiest three month period is twice the average over the year.

The table shows that the traffic volumes that are expected to occur in the peak 3 month period are double the expected monthly average over a twelve 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 **240** vehicles per day (i.e. 48 + 192 = 240) for Scenario 2 (being the EnergyAustralia **or** Delta Electricity Stage 1 Facilities being constructed sequentially).

The peak daily construction traffic for Delta Electricity Stage 2 remains that same as Scenario 1: **240** vehicles per day.

5.2 Traffic generation – operational phase

During the operational phase of EnergyAustralia Facility and Delta Electricity Stage 1 Facility staff levels are expected to average some four full time staff on site and four contract staff for support services. This will generate 16 vehicle trips per day (i.e. 8 x 2).

During the operational phase of the EnergyAustralia Facility and Delta Electricity Stage 2 Facility operational staff levels are expected to be up to 20 full time staff with four full time contract staff generating some 48 vehicle trips per day (i.e. 24 x 2).

To meet the operational water requirements for both the EnergyAustralia Facility and Delta Electricity Facility, a number of current and potential water sources, including potable, recycled and stormwater have been identified. The potential sources for water have been considered for the combined requirements of both the Delta Electricity and EnergyAustralia Facilities. Water source options include:

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

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

For the purpose of this traffic assessment the following assumptions have been made:

- regular daily vehicle movements for operations staff of some 16 to 48 vehicle trips per day which is significantly lower than estimated levels of construction traffic generation, and can readily be accepted by the road network;

Section 5 Cumulative Assessment

- **EnergyAustralia Facility:** It is estimated that for a 40 day operational period per year approximately 10 trucks per day (i.e. 20 vehicle trips per day) would be required to provide the water volume necessary for the operation;
- **Delta Electricity Stage 1 Facility:** It is estimated that for a 40 day operational period per year approximately 2 trucks per day (i.e. 4 vehicle trips per day) would be required to provide the water volume necessary for the operation;
- **Delta Electricity Stage 2 Facility:** It is estimated that for a 330 day operational period per year approximately 6.5 trucks per day (i.e. 13 vehicle trips per day) would be required to provide the water volume necessary for operation;
- traffic generated for water delivery at the water source is likely to be low compared to existing traffic volumes and unlikely to have significant impacts at the water source locations and therefore have not been considered further; and
- although additional water trucks may be required to initially charge the system (to fill the raw water storage tank), it has been assumed that this would be an infrequent occurrence and would be spread over a nominal time period and therefore has not been included in this assessment.

Estimations of the water delivery requirements are based on the following assumptions:

- the water requirement for the EnergyAustralia Facility is 12 ML per annum, Delta Electricity Stage 1 Facility is 2.3 ML per annum; and Delta Electricity Stage 2 Facility is 63.5 ML per annum; and
- water is delivered to Site in 30,000 L tankers.

5.3 Over-dimensional and over-mass transport

As both power stations are being constructed either simultaneously or consecutively the number of over dimensional vehicles would be double that for a single power station. The timing of these vehicles would vary with each construction scenario. The number of over-dimensional vehicles would be 12 and these would occur within a peak period of up to 6 months for Scenario 1 or spread over eighteen months for Scenario 2.

5.4 Traffic Generation – Major Facility Maintenance Phase

Major maintenance is expected to generate some 20 to 60 vehicle trips in the peak hour and 25 to 120 vehicle trips over the day. Such activities would occur relatively infrequently, say every six years or more, and would last approximately three to six weeks. This assumes that maintenance occurs on one facility only at any one time. It would be unlikely that both facilities would be off-line for maintenance together.

5.5 Assessment of potential impacts – cumulative

5.5.1 Road infrastructure issues and constraints

Regardless of the construction scenario adopted infrastructure issues and constraints would be the same as documented in **Section 4.4.1**. The increase in traffic if two power stations are constructed simultaneously would still require the same modifications.

5.5.2 Construction of facilities

The main impacts from construction traffic are likely to occur:

- during the morning 7.00 to 8.00 AM peak hour when construction staff and early delivery vehicles coincide with the Brayton Road peak;

- through regular daily traffic generated by delivery trucks for equipment, plant and materials with intermittent peaks associated with concrete pours; and
- occasionally, outside of peak periods, through the delivery of large equipment (turbines, generators, transformers) from Port to the site.

The impact of construction traffic has been reviewed with respect to:

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

The gas turbine, generator and high voltage transformer components are to be imported into Australia and then transported to site by road. Typically the components might be up to 14 metres long, 5.0 metres wide, 5.5 metres high and weigh up to 300 tonnes.

The number of over-dimensional trips is uncertain at this time but is likely to be six trips for each construction stage for each Facility. During the detailed design phase, the number of trips would be quantified and the necessary actions undertaken to ensure the safe and efficient passage along the route.

All over-dimensional and/or over-mass road transport convoys are required to operate under RTA and NSW Police permit conditions. The transport contractor would submit a '*Transport Plan*' for approval. The '*Transport Plan'* is to identify the transportation dates, the route, load statistics and make-up of the convoy (number of escorts, transport loader and tow vehicles proposed). This 'Transport Plan' would take into account height restrictions at locations such as bridges etc, which can limit the height of the loads that can be transported.

5.5.3 Operational phase

The operational phase for the combined Facilities construction has been assumed to include traffic from both Facilities. This would generate regular daily vehicle trips of some 16 to 48 vehicle trips per day which is significantly lower than levels of construction traffic generation, and can readily be accepted by the road network.

Provision of water supply for the plant cooling and process water would be by truck. It is estimated that for a 40 day operational period per year up to 13.5 trucks per day (i.e. 27 vehicle trips per day) would be required to provide the water volume necessary for operation of the EnergyAustralia and Delta Electricity Stage 1 Facilities and up to 18 trucks per day (i.e. 36 vehicle trips per day) would be required to provide the water volume necessary for operation of the EnergyAustralia and Delta Electricity Stage 2 Facilities.

Parking would be catered for on site for plant employees and business vehicles in accordance with the RTA's Guide to Traffic Generating Developments, Australian Standards and council requirements.

5.5.4 Major facility maintenance phase

Major maintenance is expected to generate additional traffic of up to 60 vehicles per day peak. Such activities would occur relatively infrequently, say every six years or more, and would last approximately three to six weeks. For traffic analysis purposes a peak daily value of 120 vehicles per day per station has been adopted which follows the construction traffic paradigm of peak volume being twice the average value.

5.5.5 Local road network performance

The analysis presented in **Table 5-3** includes the construction traffic, operational traffic and maintenance traffic for the period commencing with construction of the Facilities in 2009 through to maintenance in 2018. The analysis on the **Table 5-3** indicates that an increase in traffic of 64 % over the existing traffic in 2009 represents the greatest increase in volumes due to construction traffic. In the peak periods the level

Section 5 Cumulative Assessment

of service will be LoS B, which is still acceptable for the standard of road under consideration. The difference between the two scenarios adopted for evaluation can be seen in the spread of traffic volumes over time. Scenario 1 provides the greatest peak increase in traffic volumes while Scenario 2 spreads the increases over a longer time period, albeit at lower volumes. Operational traffic is similar for both scenarios as it is assumed that once operating the maintenance regime for each Facility is similar.

Assumptions

The data in **Table 5-3** is developed based on the following assumptions:

- construction traffic is the same for each Facility;
- Scenario 1 has twice the construction traffic during Stage 1 as two Facilities are under construction;
- Scenario 2 has only one Facility under construction at any time;
- construction complete in 2011 for Scenario 1;
- construction complete in 2012 for Scenario 2;
- 2012/2013 assumed years of typical operation;
- 2018 nominally assumed year of maintenance;
- only one Facility undergoes major Facility maintenance at any one time with operation of the other Facility assumed at the same time (assumed maintenance for EnergyAustralia with operation of Delta Electricity Stage 2 being the worst case):
- major maintenance occurs after 6 years from construction completion assumed to occur in a year sometime after commencement of operation (nominally assumed in this assessment to be 2018); and
- water delivery based on 30, 000 L truck capacity.

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Table 5-3 Predicted Weekday Traffic Flow in Canyonleigh and Brayton Roads

YEAR	2009	2010	2011	2012	2013	2018
					Nominal year of Operation	Nominal year of major maintenance
No Development						
Daily Traffic Flow	747	777	808	841	874	1064
Midblock Level of Service (LoS)	A	A	B	B	B	B
With Development, Scenario 1						
Daily Construction Traffic Flow during peak construction month	480	240	240	0	0	0
Major Facility Maintenance after 6 years	0	0	0	0	0	120
Operational Traffic	0	16	48	48	48	40
Water Delivery	0	24	24	33	33	33
Daily Total Traffic Flow during peak construction month	1227	1057	1120	922	955	1257
Percentage Change (from No Development)	64%	36%	39%	10%	9%	18%
Midblock Level of Service (LoS)	B	B	B	B	B	B
With Development, Scenario 2						
Daily Construction Traffic Flow during peak construction month	240	240	240	240	0	0
Major Facility Maintenance after 6 years						120
Operational Traffic	0	8	16	48	48	40
Water Delivery	0	20	24	33	33	33
Daily Total Traffic Flow during peak construction month	987	1045	1088	1162	955	1257
Percentage Change (from No Development)	32%	34%	35%	38%	9%	18%
Midblock Level of Service (LoS)	B	B	B	B	B	B

Analysis of **Table 5-3** for the two Facilities shows the following:

- peak traffic during construction is approximately 64% higher than without the development for the worst case Scenario 1 where the two Facilities are constructed at the same time;
- peak traffic during normal operations is approximately 10% higher than without the development; and
- peak traffic during times of major Facility maintenance (expected approximately every 6 years for a period of up to 6 weeks) is approximately 18% higher than without the development.

Section 5 Cumulative Assessment

In the peak periods the level of service will be LoS B, which is still acceptable for the standard of road under consideration, therefore acceptable levels of service are maintained along Canyonleigh and Brayton Roads during these periods.

While the worst case scenario (Scenario 1) is for construction of the two Facilities occurring at the same time, it is noted that the assessment is very conservative for the following reasons:

- traffic volumes for the peak three months of construction traffic were assumed to continue for the whole construction period of 12 months; and
- peak three months of construction traffic were assumed to occur at the same time for both Facilities however, construction of the EnergyAustralia Facility is likely to occur before the construction of the Delta Electricity Facility and therefore it is unlikely that the peak three months for the two Facilities will coincide.

Section 6 Management Measures

6.1 Management measures

A summary of mitigation measures include the following:

- 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 along Canyonleigh and Brayton Roads to facilitate the construction and operation of the Facilities;
  - identify and cater for any necessary remedial treatments to facilitate passage to the Site along Canyonleigh and Brayton Roads once the actual weight and dimensions of the proposed plant are known; and
  - be undertaken 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

These measures have been identified in the assessment of site preparation works and therefore would have been implemented for that stage. No further upgrades, other than those identified in the Common Shared Works assessment are required for the construction and operation of the two Facilities.

Table 6-1 presents a summary of the traffic mitigation measures.

Section 6 Management Measures

Table 6-1 Summary of Mitigation Measures

Mitigation Measure	Implementation		
	Design	Construction	Operation
Further traffic assessments undertaken: – to review what works may be required to bridges, causeways, traffic islands, intersections and drainage culverts along Canyonleigh and Brayton Roads to facilitate the construction and operation of the Facilities; – to identify and cater for any necessary remedial treatments to facilitate passage to the Site along Canyonleigh and Brayton Roads once the actual weight and dimensions of the proposed plant are known. – 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.		✓	
Construct new access road within the Site.	✓	✓	

Section 7 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 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 May 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.

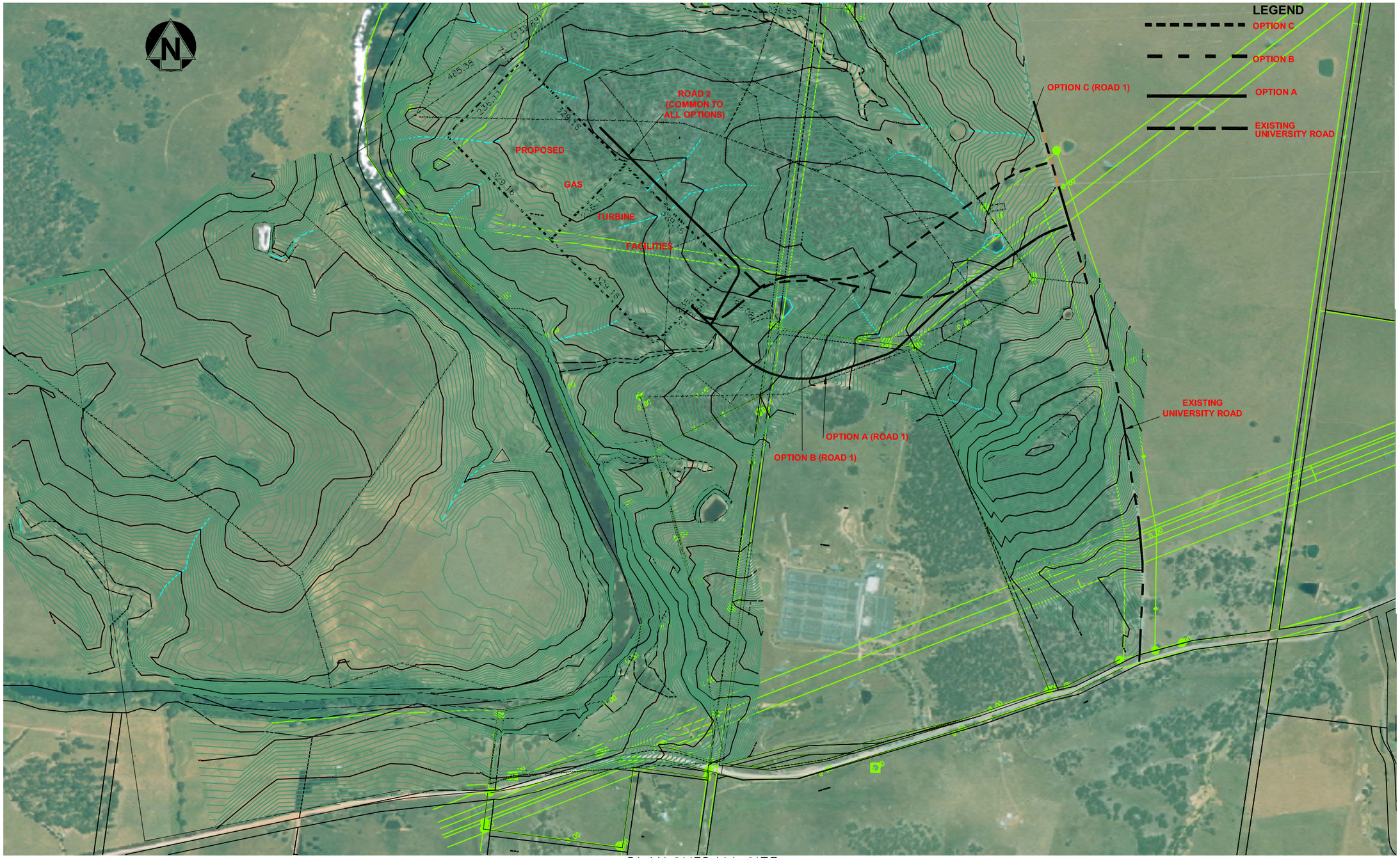
Appendix A - Road Plans

Drawing RD – 104

Drawing RD – 105

Drawing RD – 106

Drawing RD – 107



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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TEL: (02) 8925 5500
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Client: DELTA ELECTRICITY

Project: MARULAN GAS POWER GENERATION FACILITY

Drawing Title: MARULAN GAS TURBINE PLANT PLAN - OVERALL

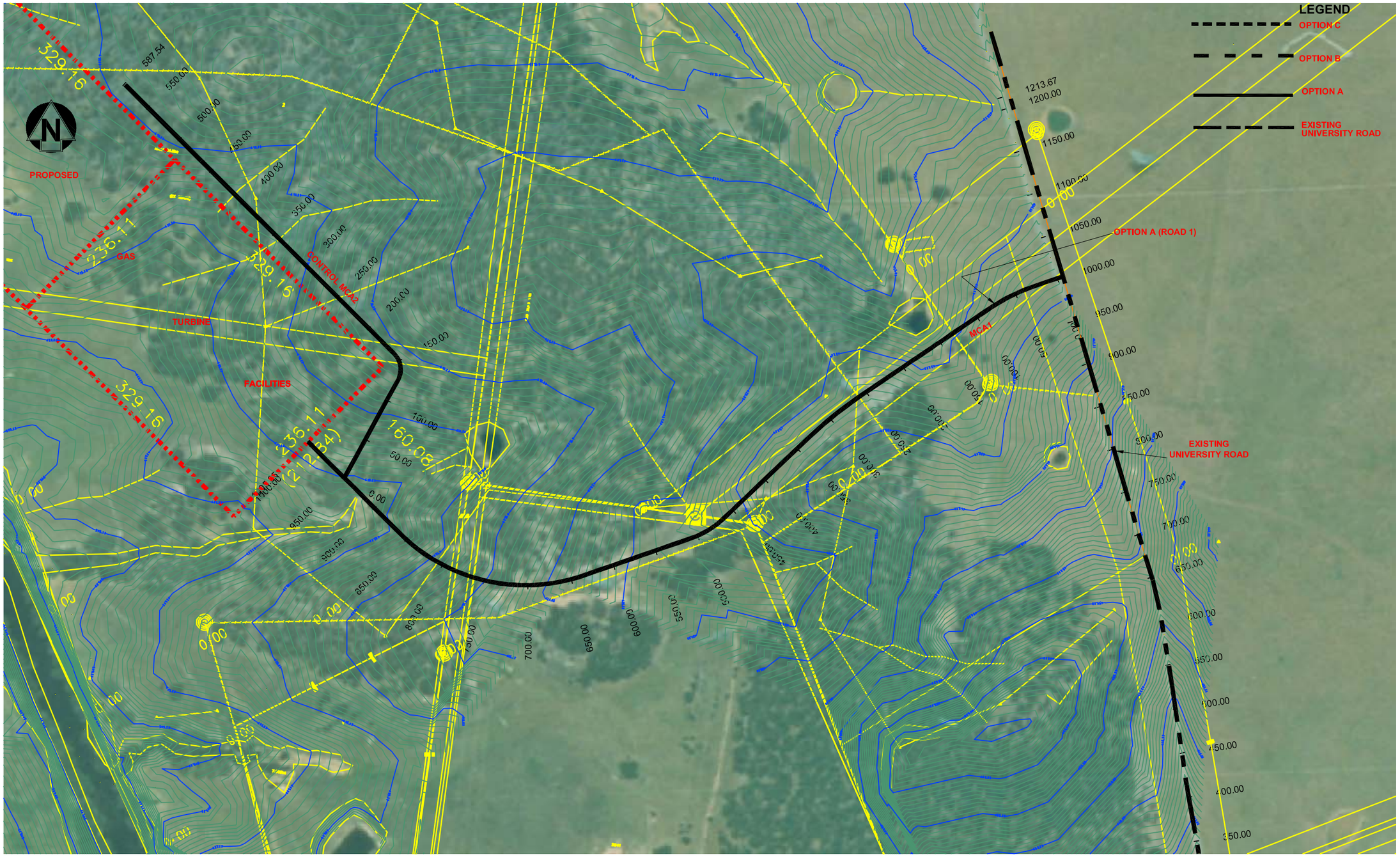
Status: PRELIMINARY

Project No.: 43177371

Drawing No.: RD-104

Scale (A1): 1:4000

Rev: A



PLAN - ALIGNMENT OPTION A

SCALE 1:2000 (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 OPTION 'A'

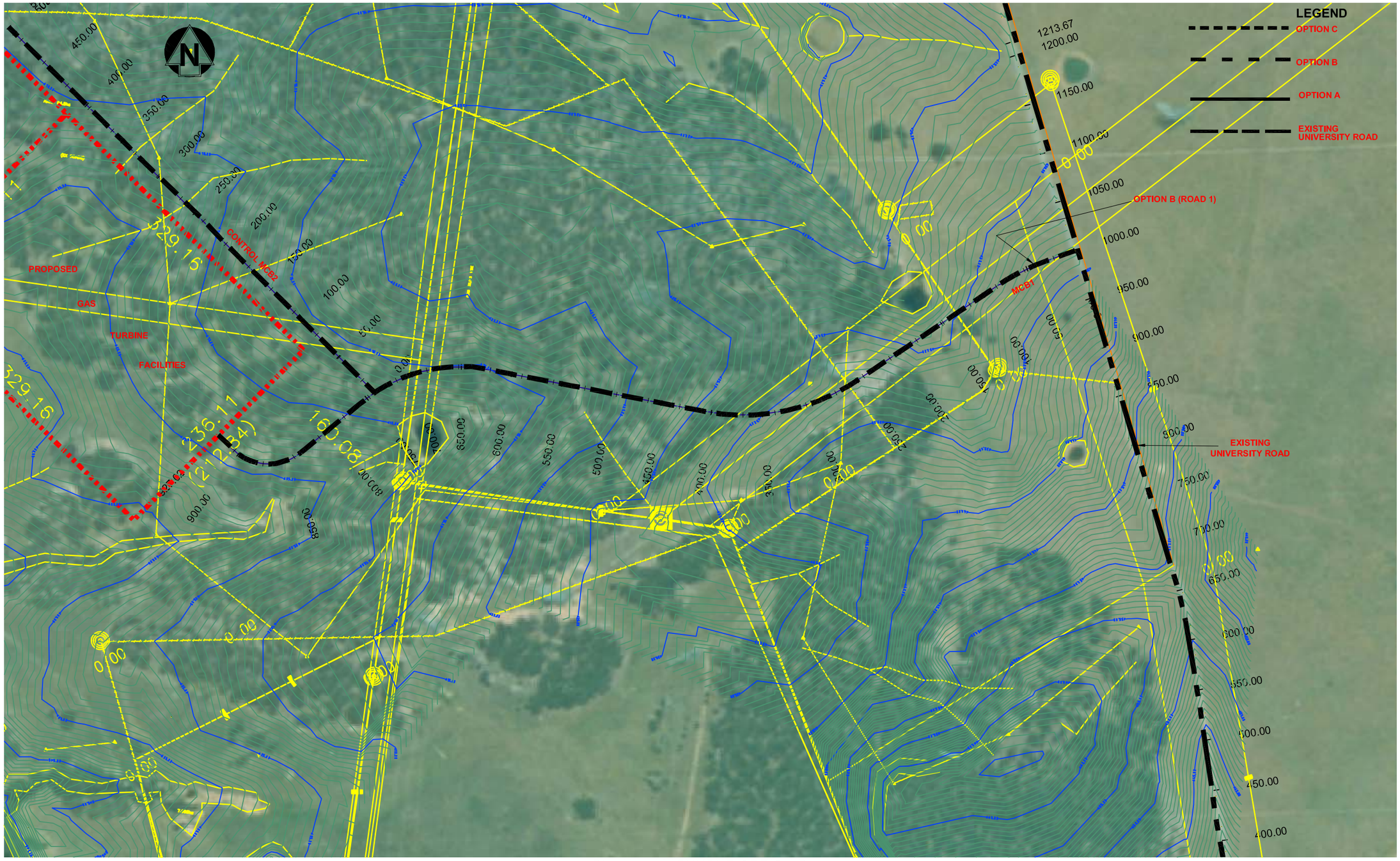
Status: PRELIMINARY

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
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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Project: MARULAN GAS POWER GENERATION FACILITY

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

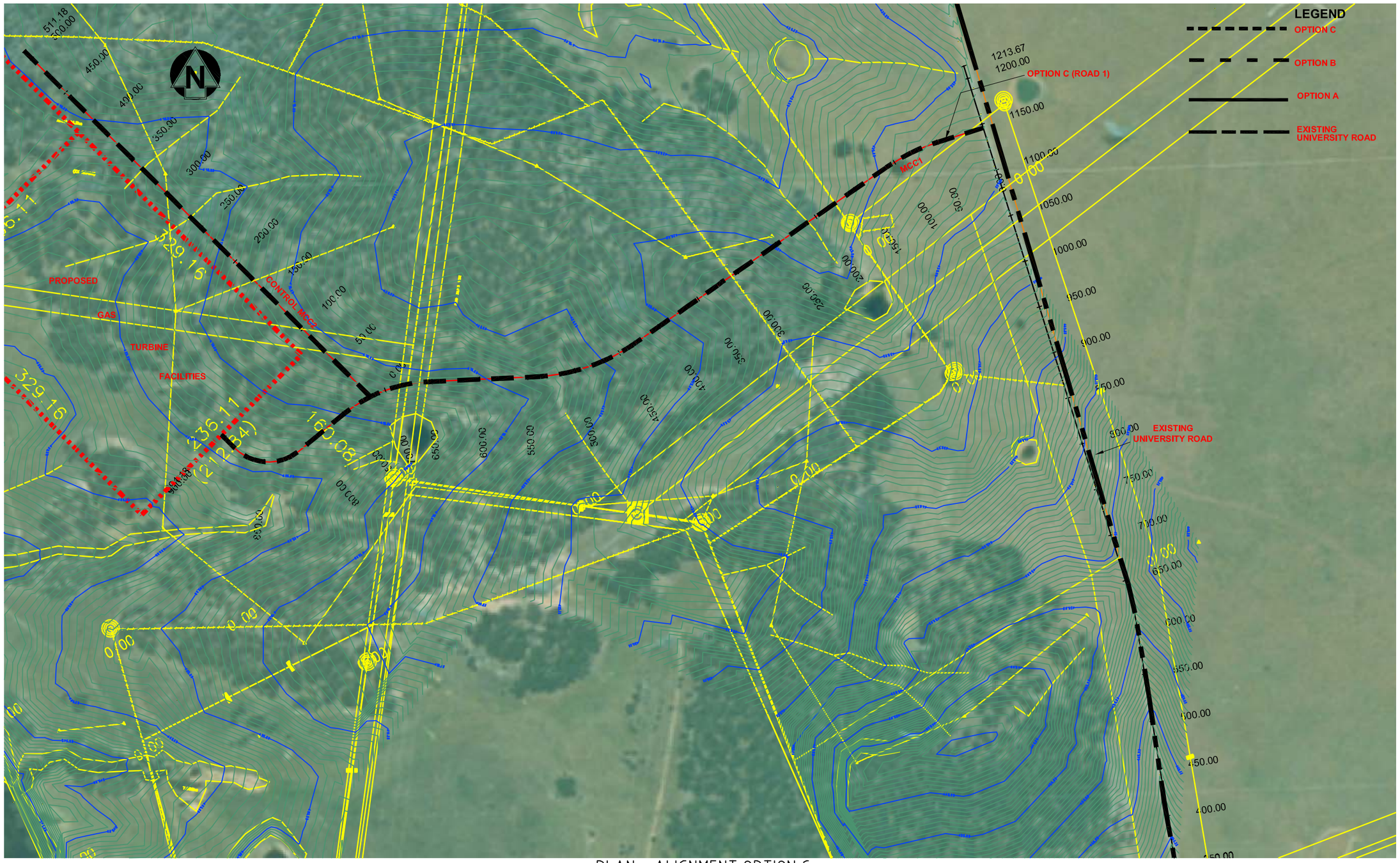
Project No.: 43177371

Drawing No.: RD-106

Status: PRELIMINARY

Scale (A1): 1:2000

Rev: A



PLAN - ALIGNMENT OPTION C

SCALE 1:2000 (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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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