Traffic and Transport – Summary of Key Outcomes

The Dalton Power Project is located to the east of Walshs Road, approximately 3 km north of the town of Dalton. Access to the Site would be via a new access road to be developed from Walshs Road where the road takes a 90 degree turn to the west. The access road, approximately 1.9 km in length, would extend from Walshs Road in a north east direction to the Site, and would be a shared easement with the northern portion of the proposed gas pipeline. AGL proposes to construct the new access road in compliance with applicable standards for the purposes of constructing and operating the Dalton Power Project.

The traffic and transport assessment found that the arterial road network can satisfactorily and safely accept the additional traffic generated by the development during the construction, operational and maintenance phases. Over-mass and over-dimensional loads such as the gas turbines, generators and transformers would be transported to Site under RTA and NSW Police permit conditions and along approved routes. Temporary works may be required along approved routes for these over-mass and over-dimensional loads and would be defined in further consultation with the RTA and relevant Councils.

Chapter 11 Traffic and Transport

11.1 Introduction

This traffic and transport assessment addresses the traffic related impacts associated with the construction and operation of the proposed Dalton Power Project. The assessment was conducted by URS and is presented in full in **Appendix F**.

11.2 Existing Context

11.2.1 Regional and local context

The regional road network is dominated by the Hume Highway (State Highway 31), which provides a connection between Sydney and Melbourne. Dalton is approximately 205 km (by road / travelling distance) south west of Sydney and 48 km from Goulburn, which is the nearest regional centre. The Site would therefore be accessed from the Hume Highway via Collector Road, Yass Street, Warrataw Street, Dalton Road, Walshs Road, and a new access road extending approximately 1.9 km in a north east direction from Walshs Road property to the Facility.

The Site is approximately 18.1 km from the Hume Highway. The regional and local road context is illustrated in **Figure 11-1 and Figure 11-2.**

From Gunning, Dalton Road travels in a north-west direction. Approximately 3.4 km along Dalton Road, Walshs Road intersects Dalton Road travelling in a northern direction. Following a 90-degree turn west, Walshs Road continues north and adjoins the Site as the western boundary to the former “Holmes” property.

A preliminary route survey report for the haulage of over-mass and over-dimensional equipment associated with the Project indicated that the preferred route to Walshs Road and the site would be via the Hume Highway, Hume Street, Grovenor Street and Dalton Road.

11.2.2 Level of Service

Rural Roads - Two-Lane, Two-Way

In accordance with the *Guide to Traffic Engineering Practice, Part 2: Roadway Capacity*, the Levels of Service relevant to rural local roads are summarised in **Table 11-1**. The threshold volumes for the vehicles per day (vpd) associated with each Level of Service, are based on the combined counts for both directions. These traffic volumes account for total vehicle movements.

Table 11-1 Levels of Service Rural Two-Way, Two-Lane Roads

Level of Service	Traffic Volume Threshold (Rolling Terrain)	Traffic Volume Threshold (Level Terrain)	Definition
A	700 vpd	1,600 vpd	Free-flow conditions with a high degree of freedom for motorists to select speed and manoeuvre within traffic flow
B	1,800 vpd	3,200 vpd	Stable flow conditions, reasonable freedom to select speed and manoeuvre within traffic flow
C	3,500 vpd	5,300 vpd	Stable flow conditions, restricted freedom to select speed and manoeuvre within traffic flow
D	5,300 vpd	9,000 vpd	Approaching unstable flow conditions, severely restricted to select speed and manoeuvre within traffic flow
E	9,900 vpd	15,200 vpd	Close to capacity, virtually no freedom to select speed and manoeuvre within traffic flow. Small increases in traffic volume would generally cause operational problems.

Roads operating at a Level of Service of C or better are generally considered to have acceptable flow conditions.

11.2.3 Road Environs

Walshs Road

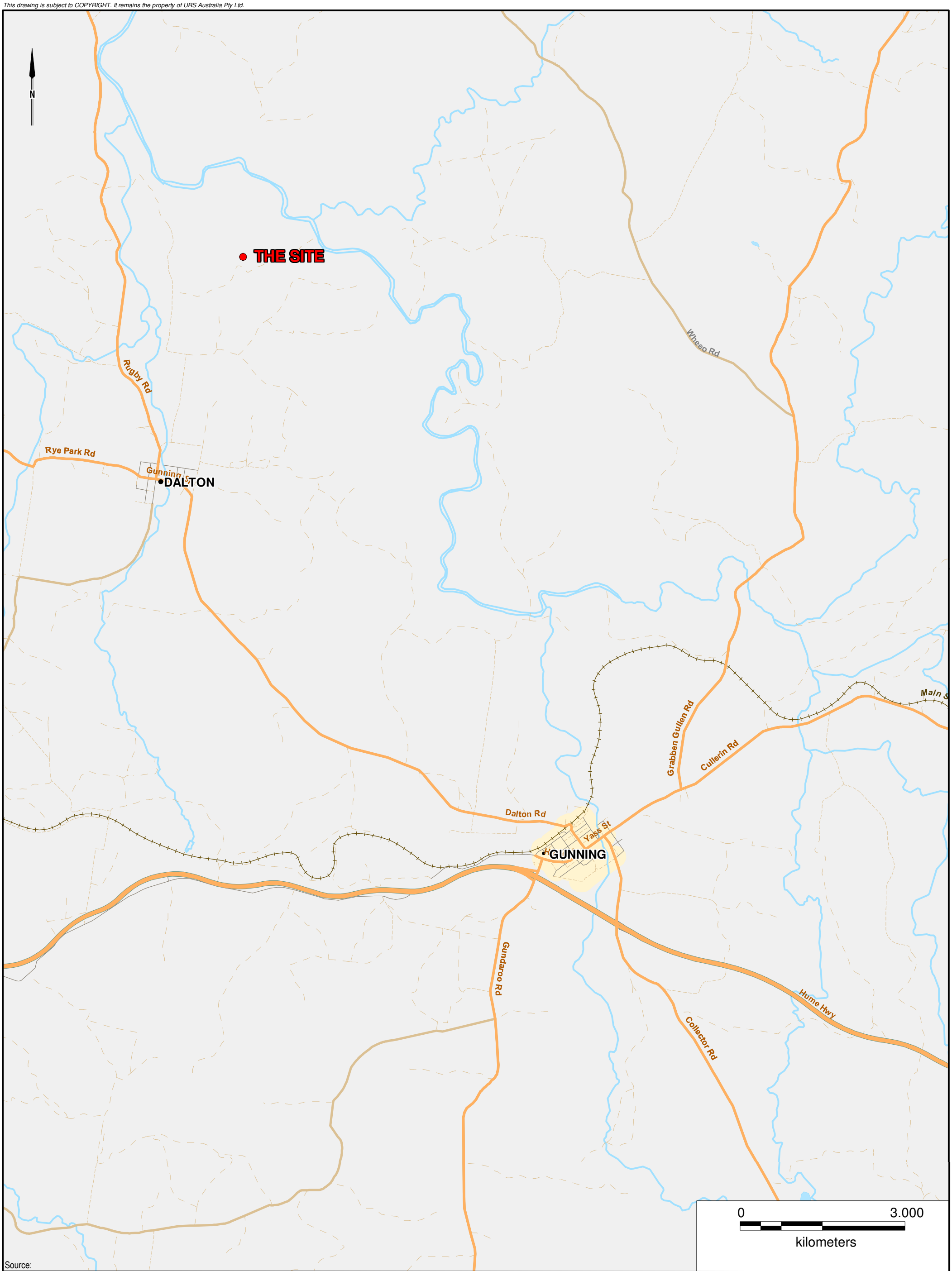
Walshs Road is a two-way unsealed access road, with a width of approximately 6 m along the majority of its length. There are two 90-degree bends in Walshs Road adjacent to the “Springwood” property (Lot 201) and at Darby’s Road. Walshs Road has a posted speed limit of 50 km/ hour. A truck warning sign is posted near the point where the road makes a 90-degree turn west. The condition of the gravel is poor in some locations with potholing including in the vicinity of this bend in the road.

There are a number of large trees within the clearzone of the trafficable lanes along the length of Walshs Road.

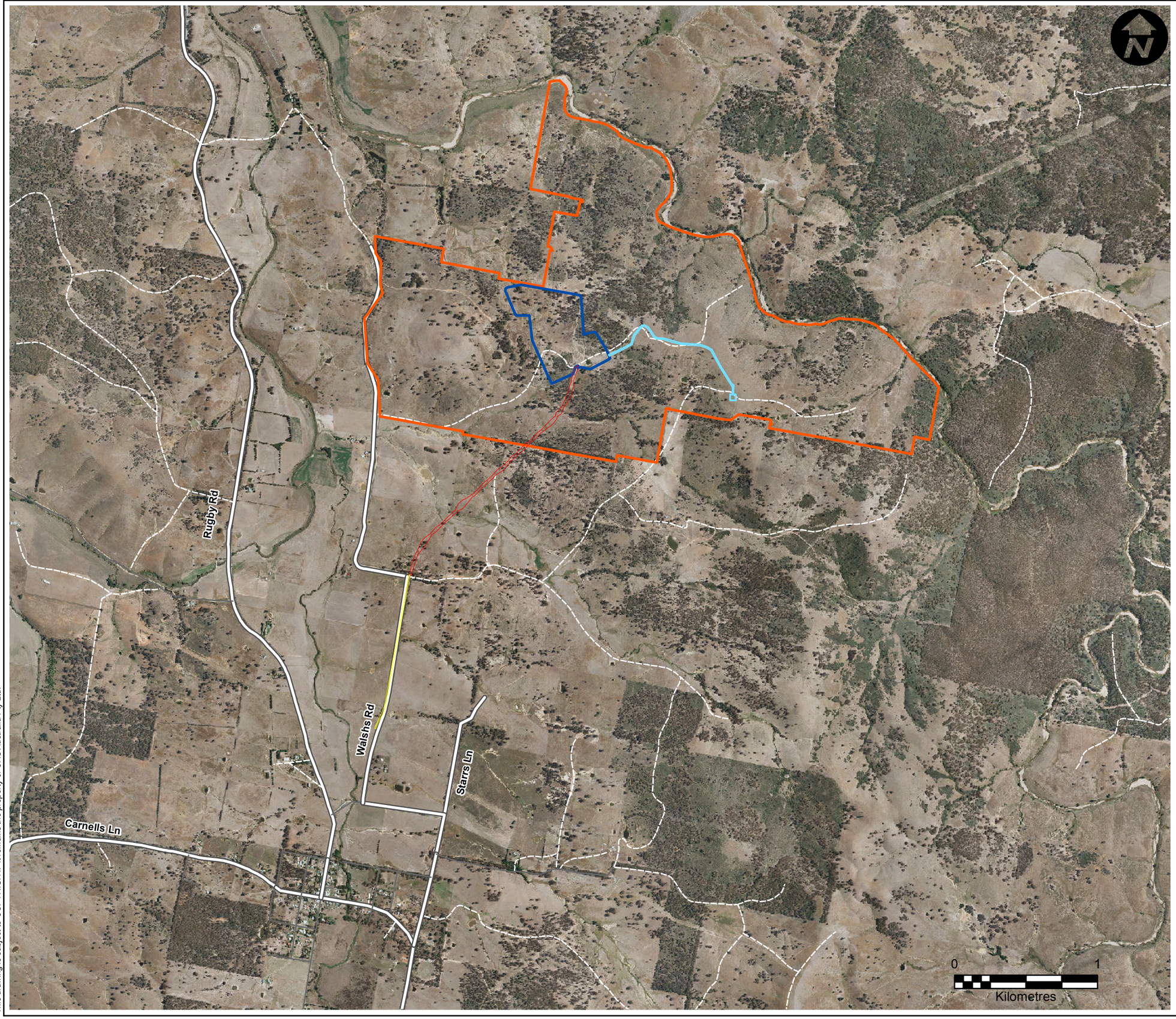
There is a culvert located approximately 80 m east of the access to the “Wilmont” property (Lot 343). A flood / causeway across Walshs Road, consists of relatively steep grades on both approaches and the carriageway narrows at this location.

The southern portion of Walshs Road, which is signposted as a Loop Road, is a two-way unsealed access road with a width of approximately 6 m along the majority of its length. There are two 90-degree bends in this road.

Traffic counters were installed on the southern portion of Walshs Road, north of Dalton Road for a period of one week. Based on the traffic surveys conducted, Walshs Road is likely to be currently operating at Level of Service A.



Client: AGL	Project: DALTON POWER PROJECT		Title: **REGIONAL TRAFFIC NETWORK**
URS	Drawn: AO	Approved: KT	Date: 24/02/2011
	Job No: **43177661**	File No: 43177661.003.wor	Figure: **11-1**



Legend

- AGL Site Boundary
- Plant Footprint
- Gas Pipeline (northern) and Access Road
- Gas Pipeline (southern)
- Communications Tower and Hut Footprint
- Communication Tower Services and Access Track
- Main Connecting Roads

0 1
Kilometres

Source: Aerial Image from AGL

Drawn: SB/AY	Approved: KT	Date: 15/02/2011
Job No.: 43177661	File No.: 43177661.051.mxd	

Client

AGL

Project

DALTON POWER PROJECT

Title

MAIN CONNECTING ROADS TO SITE

Figure: 11-2

URS

Dalton Road

Dalton Road is a two-lane, two-way configuration approximately 6.5 to 7 m in width, with a shoulder along its entire length of between 0.5 and 1 m. The posted speed limit is 100 km / hour. There are overtaking opportunities in both directions for the majority of its length.

Dalton Road consists of an undulating terrain and is tree-lined, with some large trees within the clear zone. There are a limited number of accesses to rural properties from Dalton Road.

Based on the traffic surveys conducted east of Medways Lane, Dalton Road is currently operating at Level of Service A.

Warrataw Street

Warrataw Street, Gunning consists of a two-lane, two-way configuration, with a posted speed limit of 50 km / hr. The railway overpass on Warrataw Street is very narrow, with tight bends and poor sight distances for opposing vehicles and traffic turning from Grovenor Street. Potential safety issues associated with this would be further investigated by AGL during the detailed design phase, and may involve establishing specific traffic management measures particularly during over-mass and over-dimensional load transport

Based on the traffic surveys conducted, Warrataw Street is currently operating at Level of Service A.

Hume Street (Yass Street)

Hume Street, Gunning, is a two-lane, two-way configuration, with a wide carriageway and approximately 2 m shoulder along the majority of its length. There are a number of overhead powerlines located across Hume Street. A school zone and pedestrian crossing is located on Hume Street, southwest of its intersection with Warrataw Street.

Based on the traffic surveys conducted, Hume Street is currently operating at Level of Service A.

Collector Road

Collector Road, Gunning, is a two-lane, two-way configuration, with a lane width of approximately 3.5 m. Collector Road provides access to the on and off-ramps for the Hume Highway.

Based on the traffic surveys conducted, Collector Road is currently operating at Level of Service A.

Hume Highway

The Hume Highway is classified National Highway 31 and State Highway 2. The Hume Highway is part of the Auslink National Network and is a vital link for road freight transport between Sydney and Melbourne. For approximately 92 % of its length in NSW and in close proximity to Gunning, the Hume Highway consists of a dual carriageway (two lanes in each direction) with a posted speed limit of 110 km / hr.

The RTA sample count station nearest to the Project site, 1 km west of Gundaroo Road (MR52), records the latest Annual Average Daily Traffic (AADT) two-way volume of 13,094 vehicles per day (RTA, 2006).

11.2.4 Key Intersections

SIDRA Intersection, version 3.2 was used to analyse the existing operation of the Warrataw Street, Grovenor Street and Dalton Road intersection.

The following key intersections were analysed:

- Warrataw Street / Grovenor Street / Dalton Road, Gunning;
- Grovenor Street / Hume Street, Gunning; and
- Gundaroo Street / Hume Street, Gunning.

All the above intersections are give-way controlled. The results of the analysis is presented in **Appendix F**. These key intersections all currently operate at Level of Service A.

Operational traffic is not likely to have a significant impact on the key intersections, accounting for up to five vehicle trips within the peak hours. This increase in traffic volume is likely to be dissipated in normal traffic fluctuations.

As discussed in **Chapter 4** *Project Description*, post construction maintenance would occur once every 3 years at the most. Ongoing maintenance activity would therefore not be expected to have a significant impact on the surrounding road network.

11.3 Traffic Generation

11.3.1 Construction Traffic Generation

The Dalton Power Project would be constructed in two stages, and would involve the installation of up to a total of six gas turbine units. The Stage 1 of the project would involve the majority of site preparation works and road construction, as well as the installation of up to four turbine units and ancillary works. The construction program for Stage 2 would involve installing the residual generating capacity for a completed maximum of six turbines on site.

Although it is assumed that the construction activities would be generally similar to the first stage, the intensity is likely to be lower for Stage 2 as the majority of site preparation works and infrastructure would be already established. For the purposes of this assessment, discussion of the 'construction phase' impact may apply to either Stage 1 or 2 project phases.

The number of vehicle movements is summarised in **Table 11-2** and has been based upon usual construction practices and activities and the anticipated level of staffing that is expected for the construction of the Facility. Operating hours, staffing details and information on construction vehicles is presented in **Chapter 4.**

Table 11-2 Construction Traffic Generation Predicted Average

Stage	Duration (Months)	Per Month		Per Week		Per Day	
		HV	LV	HV	LV	HV	LV
Construction	24	271	694	68	173	12	28

HV=Heavy vehicle
LV= Light vehicle

11.3.2 Over-dimensional, Over-mass Transport

The large gas turbines, generator and high voltage transformer components are to be imported into Australia and transported to site by special road convoy. A total of 24 over-dimensional and / or over-mass escorted truck convoys of pre-assembled gas turbine, generator and transformer units would occur for the gas turbine facility. These over-dimensional and / or over-mass deliveries assumes six convoys of up to four over-mass / over-size vehicles towing one multi-wheel transport unit as the maximum for either Stage 1 or 2. The cumulative total does not need to be considered as construction for Stage 1 would not coincide with Stage 2.

It is anticipated the majority of heavy plant items would be transported from Port Kembla (Wollongong) during the construction stage. A preliminary route survey by a haulage contractor was commissioned by AGL to determine the preferred route for the haulage of equipment, and the preliminary route selection for the transportation of large items to the Site is discussed in more detail in Section 3.2 of **Appendix F**.

When assessing the route to carry the heavy plant items, the following issues must be addressed:

- grade along each route;
- width of cross-section;
- degree of works required to accommodate over-mass, over-dimension vehicles;
- cost; and
- directness of route.

No improvements or temporary upgrades of the state road network are envisaged at this time between Port Kembla and Gunning. However, works may be required between Gunning and the Site to accommodate over-mass and over-dimensional loads. The preliminary haulage study identified the following potential constraints and requirements:

- Hume Highway crossing of Paddy's River at Marulan: bridge constraints require a temporary alternate low level crossing over River at this point;
- Gunning Rail Bridge: bridge constraints require either replacement of the bridge or identifying alternate route via a temporary low level crossing;
- Walshs Road (south, as known locally as Cowper St), Dalton: 90 degree corners and floodway constrain access potentially requiring upgrades.

Further assessment and planning is required during the detailed design phase to identify and cater for any necessary temporary remedial treatments to facilitate passage of over-mass and over-dimensional loads once the actual weight and dimensions of the proposed plant equipment is known.

Management by experienced haulage contractors and liaison with the permit section of the RTA, NSW Police and local governments will be undertaken to ensure the safety and amenity of the greater community. AGL would continue liaison and engagement with the RTA and relevant Councils responsible for the infrastructure that may require upgrade. AGL would support the remedial treatments required through some mechanism of financial approval pending Project Approval.

11.3.3 Operational Phase

During the operational phase of the development, staff numbers are expected to average seven full-time staff per day, which equates to twelve to fourteen vehicle trips per day with four to five vehicle trips during the peak hours. The peak periods can be defined as the time of day during which the largest number of vehicles populate the road carriageway. Generally, these time periods would coincide with vehicle trips associated with the journey to and from work by power plant employees, work related deliveries and local residents.

11.3.4 Major Facility Maintenance Phase

Major maintenance is likely to occur once every three years at the most, and would be conducted over a period of four to six weeks. Major maintenance is expected to require up to 100 contractors on-site, generating approximately 90 vehicle trips during the peak hour, equating to 180 vehicle trips per day.

11.3.5 Water Supply

AGL is considering a number of options for water supply to the Facility during operation. Water for the Project could be sourced through a number of options. Site water could be sourced from a range of sources including: tankering water (by road) to the Site; groundwater extraction; and via the augmentation of the Dalton or Gunning supply and/or from the Gunning Sewerage Treatment Plant if the water quality is suitable and sufficient water quantities are available. It is assumed that the Facility

would not be supplied entirely by trucking water. For the purposes of the traffic assessment, a maximum of 12.5 ML per annum and no more than 10 truck deliveries per day for each of Stage 1 and Stage 2 of the project (25 ML per annum in total) is assumed. Assuming a standard road tanker of 20 kL, up to approximately 400 kL/d, or 20 truck deliveries per day, could be supplied to the site in any single day. This equates to 40 vehicle movements per day of which it is assumed that 10 % of these movements would occur during the AM peak hour. For the purposes of the traffic assessment, it is assumed that the reminder of water supply is provided by on-site groundwater or via the augmentation of the Dalton or Gunning supply.

Feed tankage would need to be provided to accommodate variable demand.

11.4 Assessment of Potential Impacts

11.4.1 Road Environs

Walshs Road South

Access to the Site would be via a new access road to be developed from Walshs Road where the road takes a 90 degree turn to the west. The 1.9 km access road would extend from Walshs Road in a north east direction to the Site, and would be a shared easement with the northern portion of the proposed gas pipeline.

The impact on Walshs Road with respect to increased traffic volumes is summarised in **Table 11-3**. All traffic volumes account for total vehicle movements.

Table 11-3 Estimated Weekday Traffic Flow Impacts - Walshs Road (sth)

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow	23	23	23
Level of Service	A	A	A
With Development			
Construction Traffic (Peak Construction)	160	0	0
Major Maintenance	0	0	180
Water Supply for Operation of Facility[4]		40	
Operational Traffic	0	10	10
Total Traffic Flow	183[1]	73[2]	213[3]
Percentage Change (from No Development)	+696%	+217%	+826%
Midblock Level of Service	A	A	A

Notes:
1. Approximately 11 percent heavy vehicle component;
2. Approximately 55 percent heavy vehicle component;
3. Less than one percent heavy vehicle component; and
4. Worst case assuming water supply is by truck delivery and peak summer requirement for Stage 2 (1500 MW).

Despite this significant increase in traffic volumes, the Level of Service for Walshs Road (south) remains unchanged at Level of Service A. Level of Service A is considered acceptable for Walshs Road (south) during the periods indicated.

Dalton Road

The impact on Dalton Road with respect to increased traffic volumes is summarised in **Table 11-4**. All traffic volumes account for total vehicle movements.

Table 11-4 Estimated Weekday Traffic Flow Impacts - Dalton Road

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow	287	287	287
Level of Service	A	A	A
With Development			
Construction Traffic (Peak Construction)	160	0	0
Major Maintenance	0	0	180
Operational Traffic	0	10	10
Water Supply for Operation of Facility[4]		40	
Total Traffic Flow	447[1]	337[2]	477[3]
Percentage Change (from No Development)	+56%	+17%	+66%
Midblock Level of Service	A	A	A

Notes:
1. Approximately four percent heavy vehicle component;
2. Approximately 12 percent heavy vehicle component;
3. Less than one percent heavy vehicle component; and
4. Worst case assuming water supply is by truck delivery and peak summer requirement for Stage 2 (1500 MW).

In the peak traffic periods the Level of Service is maintained at Level of Service A, which is acceptable for Dalton Road during the periods indicated.

Warrataw Street

The impact on Warrataw Street with respect to increased traffic volumes is summarised in **Table 11-5**. All traffic volumes account for total vehicle movements.

Table 11-5 Estimated Weekday Traffic Flow Impacts - Warrataw Street

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow	230	230	230
Level of Service	A	A	A
With Development			
Construction Traffic (Peak Construction)	160	0	0
Major Maintenance	0	0	180
Operational Traffic	0	10	10
Water Supply for Operation of Facility[4]		40	
Total Traffic Flow	390[1]	280[2]	420[3]
Percentage Change (from No Development)	+70%	+22%	+83%
Midblock Level of Service	A	A	A

Notes:
1. Approximately five percent heavy vehicle component;
2. Approximately 14 percent heavy vehicle component;
3. Less than one percent heavy vehicle component and
4. Worst case assuming water supply is by truck delivery and peak summer requirement for Stage 2 (1500 MW).

In the peak traffic periods the Level of Service is maintained at Level of Service A, which is acceptable for Warrataw Street during the periods indicated.

Hume Street

The impact on Hume Street with respect to increased traffic volumes is summarised in **Table 11-6**. All traffic volumes account for total vehicle movements.

Table 11-6 Estimated Weekday Traffic Flow Impacts - Hume Street

Activity	Average Daily Traffic (Construction)	Average Daily Traffic (Operation)	Average Daily Traffic (Major Maintenance)
No Development			
Traffic Flow	710	710	710
Level of Service	A	A	A
With Development			
Construction Traffic (Peak Construction)	160	0	0
Major Maintenance	0	0	180
Operational Traffic	0	10	10
Water Supply for Operation of Facility[4]		40	
Total Traffic Flow	870[1]	760[2]	900[3]
Percentage Change (from No Development)	+23%	+7%	+27%
Midblock Level of Service	A	A	A

Notes:
1. Approximately two percent heavy vehicle component;
2. Approximately five percent heavy vehicle component;
3. Less than one percent heavy vehicle component;
4. Worst case assuming water supply is by truck delivery and peak summer requirement for Stage 2 (1500 MW).

In conclusion, despite increases in peak traffic on all of the affected roads, the Level of Service is maintained at Level of Service A, which is acceptable for these roads during the periods indicated.

11.4.2 Key Intersections

The key intersections have been analysed for impacts associated with construction traffic. **Table 11-7** summarises the results of this analysis.

Table 11-7 Analysis of Key Intersections - Peak Construction Traffic (AM Peak Hour)

Intersection	Scenario	Degree of Saturation (vehicle / capacity)	Average Delay (seconds)	Level of Service	95% Back of Queue Length (metres)
Dalton Road / Grovenor Road / Warrataw Street	No Development	0.02	4	A	1
	With Development	0.67	6	A	2
Grovenor Road / Hume Street	No Development	0.02	8	A	1
	With Development	0.53	7	A	2
Gundaroo Road / Hume Street	No Development	0.03	8	A	0
	With Development	0.56	8	A	0

Source: URS, September 2009, using SIDRA Intersection, version 3.2

Operational traffic is not likely to have a significant impact on the key intersections as the total number of vehicles generated during the operational phase peak hours is less than those experienced in the construction phase peak hours. The intersection analysis for the construction phase AM Peak Hour indicates no impact in each intersection's Level of Service and therefore this would also apply to the operation phase AM peak hour.

Major maintenance is expected to occur relatively infrequently, once every three years at the most. Ongoing maintenance requirements would therefore not be expected to have a significant impact on the key intersections.

11.4.3 Over-dimensional, Over-mass Transportation

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 m in length and 5 m in width, 5 m in height and weigh nominally up to 350 tonnes.

A total of 24 over-dimensional and / or over-mass escorted truck convoys of pre-assembled gas turbine, generator and transformer units would occur for the gas turbine facility. These over-dimensional and / or over-mass deliveries assumes six convoys of up to four over-mass / over-size vehicles towing one multi-wheel transport unit as the maximum for either Stage 1 or 2. The cumulative total does not need to be considered as construction for Stage 1 would not coincide with Stage 2.

Chapter 11 Traffic and Transport

As described in **Chapter 4** ***Project Description***, the Project would also encompass the construction of one or two additional transmission structures to be located at the southern end of the facility footprint within the existing transmission line easement, and a communication tower to be constructed approximately 1.5km to the east of the power station. The tower components would be prefabricated sections delivered to site on flat bottom semi-trailers, ready for assembly on site. The estimated number of semi-trailer deliveries to site would be around 9 truck movements for the one or two transmission towers, as well as the communications tower required for the Project.

An estimate of the number of vehicles required to deliver the gas turbine, communications tower components and equipment for construction is summarised in **Table 11-8**. The traffic generated by equipment transportation is assumed to occur during site establishment in off-peak periods. These estimates have not been considered in the estimates associated with construction traffic generation.

Table 11-8 Turbine Components and Equipment Delivery Traffic Estimates

Component	Purpose	Traffic Generation		
		Semi-Trailer	Over-Size	Over-Mass
Cranes	Assembling fabricated building items and positioning plant equipment	9		
Bulldozers	Clearing of vegetation, removal of topsoil, development of internal roads and drainage swales		1	
Scrapers	Removal of topsoil, development of internal roads and drainage swales and basins		2	
Graders	Site levelling		2	
Excavators	Excavation of soil, grading and levelling the site		5	
Backhoe Excavators	Trenching		3	
Compactor, Rollers	Earth, road base, foundation and pad compaction		5	
Turbine Components	Facility			24[1]
Tower Components	Transmission line connection and Communications Tower	9		
Total		**18**	**18**	**24**

Notes:
1. Assumed six convoys of up to four over-mass / over-size vehicles towing one multi-wheel transport unit.

11.4.4 Operational Phase

Although operational activities would increase traffic levels, all roads assessed maintained a Level of Service A. It is anticipated that the operational traffic would be readily accepted by the surrounding road network.

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. No impact or treatment is necessary to facilitate parking on the state road network, with the exception of any temporary stop locations identified during the haulage of over-dimensional plant equipment.

11.5 Mitigation Measures

The main impacts from construction traffic are likely to occur:

- during the morning peak between 7.00 to 9.00 AM when construction staff and early delivery vehicles coincides with the peak periods on the surrounding road network;
- 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 and transformers) from Port to the site.

Table 11-9 presents a summary of the traffic mitigation measures.

Table 11-9 Summary of Traffic Mitigation Measures

Mitigation Measure	Implementation		
	Design	Construction	Operation
AGL would continue liaison with the relevant regulatory authorities about over-mass, over-dimension transport requirements throughout the detailed design phase.	✓		
Once details are confirmed about widening and re-grading works required to facilitate the movement of over-mass, over-dimension vehicles, AGL would implement or pay for required temporary improvements, pending project approval.	✓	✓	
Development of detailed Transport Plan (including obtaining approvals) for the transportation of turbine and tower components and equipment.	✓	✓	
Development of detailed Traffic Management Plan for the construction phase.	✓		
Undertake a detailed pavement and structure analysis on all affected sections of road prior to, and following construction. Provide Upper Lachlan Shire Council with a copy of the assessment.		✓	
Undertake an analysis of the horizontal and vertical alignment to determine the adequacy of the affected public road network for all expect traffic types prior to construction. Provide Upper Lachlan Shire Council with a copy of the assessment.		✓	
Development of a Traffic Management Plan for the operational phase if required.			✓
Transport of over-mass and over- dimensional loads to be undertaken under RTA and NSW Police permit conditions and approved routes.		✓	