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ENVIRONMENTAL ASSESSMENT

Newcastle Gas Storage Facility Project

Major Project Application Number 10-0133

Volume 4: Appendices 8 – 13

May 2011

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CR 6023_8_v3

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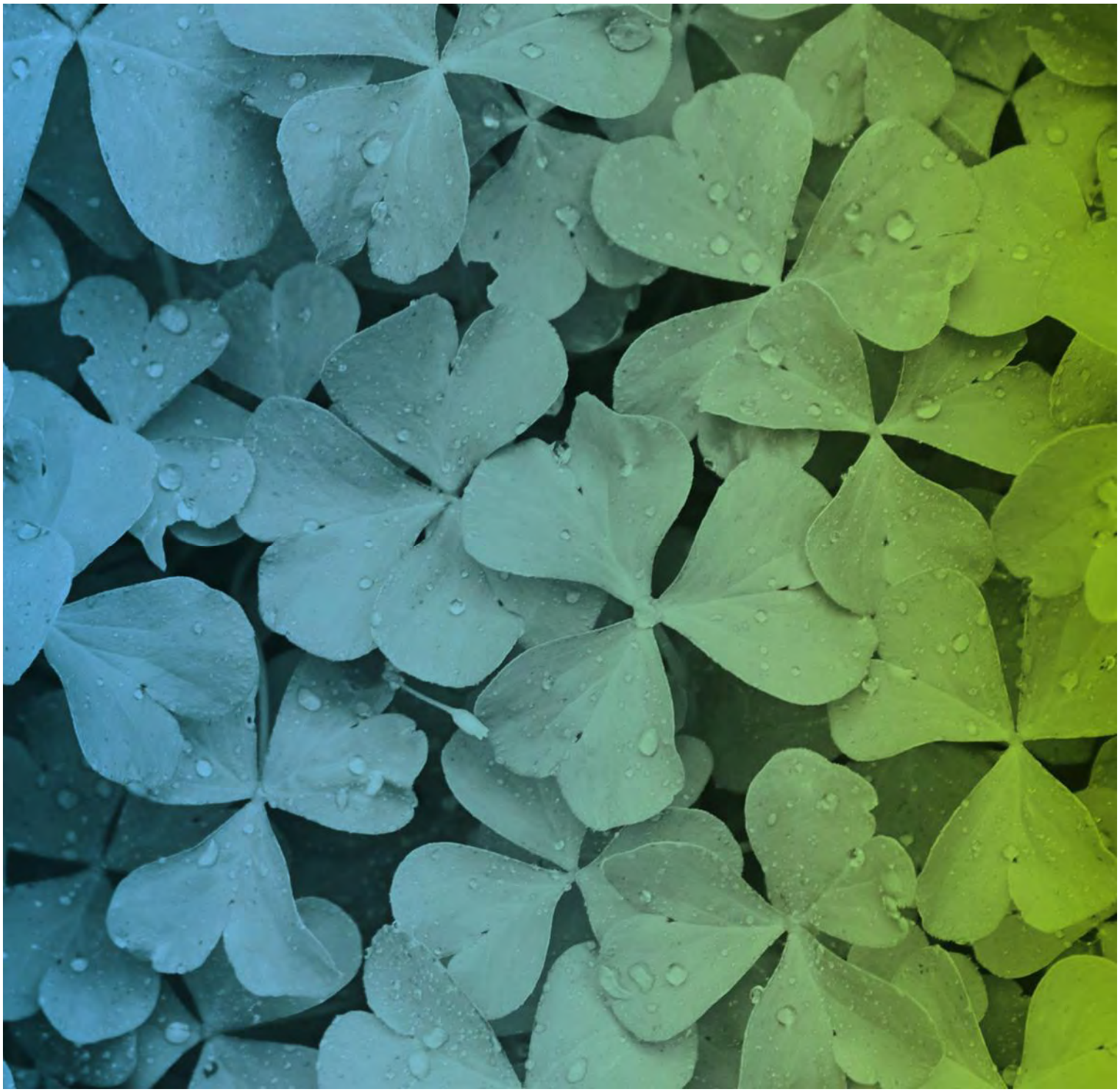
Version:	**Details:**	**Approved:**	**Date:**
CR 6023_8_v1	Initial draft to client	CB	14/02/2011
CR 6023_8_v2	Second draft to client and Department of Planning	CB	24/02/2011
CR 6023_8_v3	Final to client	CB	23/05/2011

Appendix 12

Traffic Study

Newcastle Gas Storage Facility Project

Traffic Study



Newcastle Gas Storage Facility Project

Traffic Study

Prepared for

Coffey Natural Systems

Prepared by

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13 April 2011

60161233

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Quality Information

Document Newcastle Gas Storage Facility Project

Ref 60161233

Date 13 April 2011

Prepared by Isla Robertson

Reviewed by Nick Bernard

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	10-Sep-2010	Draft report	Dan Bright Associate Director	Original signed
B	16-Nov-2010	Draft final report	Dan Bright Associate Director	Original signed
C	21-Jan-2011	Final report	Dan Bright Associate Director	Original signed
D	13-Apr-2011	Updated Final Report	Dan Bright Associate Director	

Table of Contents

Executive Summary

AGL Energy Limited (AGL) is proposing the construction and operation of the Newcastle Gas Storage Facility (the Project) at Tomago, NSW. The Project consists of:

- a processing plant capable of processing up to 66,500 tonnes of liquefied natural gas (LNG) per year;
- a storage tank capable of containing up to 30,000 tonnes of LNG;
- a truck loading facility to allow the dispatch of up to 1,000 tankers of LNG per year;
- a new road to connect the gas plant site to the TAC northern access road and an emergency access road; and
- a natural gas pipeline which connects the gas plant site to a receiving station in Hexham, NSW.

The Project has been declared a major project to which Part 3A of the *Environmental Planning and Assessment (EP&A) Act 1979* applies and therefore AGL is seeking approval under this act. This Traffic Impact Assessment (TIA) serves as input to an Environmental Assessment (EA) of the Project.

The focus of the TIA is the impact of construction and operations traffic on the strategic road network, particularly the impact on the Pacific Highway. The intersection of Old Punt Road / Pacific Highway has been assessed under three scenarios to determine the impact of Project construction and operations generated traffic on the local road network, namely:

- Existing conditions (2010);
- Future conditions without Project generated traffic (2011 - 2014); and
- Future conditions with Project generated traffic:
  - Construction – 2011, 2012 and 2013
  - Operations – 2014.

Through the analysis undertaken in this TIA, the Project construction traffic for the gas plant is considered to have a small impact on the intersection of Old Punt Road / Pacific Highway and the local road network in the vicinity of the Project sites during the Project construction years. Therefore, no infrastructure works will be required. However, it is recommended that a Construction Traffic Management Plan (CTMP) be put in place to manage the traffic generated during all Project construction.

Project operations are considered to have a negligible impact on the intersection of Old Punt Road / Pacific Highway and the local road network in the vicinity of the Project sites and therefore no mitigation works will be required.

Two options for a new road to connect the gas plant site to the Tomago Aluminium Company (TAC) northern access road have been assessed. Both options for a priority controlled T-junction meet the RTA design standards for Safe Intersection Sight Distance. Detailed geometric design of the selected intersection would be required, to ensure the intersection can accommodate heavy goods vehicles / tankers proposed for use at the gas plant.

1.0 Introduction

1.1 Background

AECOM has been engaged by Coffey Natural Systems Pty Ltd (Coffey) on behalf of AGL Energy Limited (AGL) to produce a Traffic Impact Assessment (TIA) as input to an Environmental Assessment (EA) for the proposed Newcastle Gas Storage Facility Project (the Project) at Tomago, NSW.

The Project consists of construction and operation of a gas plant site which includes; a processing plant capable of processing up to 66,500 tonnes of liquefied natural gas (LNG) per year, a storage tank capable of containing up to 30,000 tonnes of LNG, a truck loading facility to allow the dispatch of up to 1,000 tankers of LNG per year, a new road to connect the gas plant site to the TAC northern access road and an emergency access road. The Project also consists of a natural gas pipeline which connects the gas plant site to a receiving station in Hexham, NSW.

The Project has been declared a major project to which Part 3A of the *Environmental Planning and Assessment (EP&A) Act 1979* applies and therefore AGL is seeking approval under this act.

1.2 Objectives of Report

This report presents a traffic impact assessment of the construction and operation of the Project to support the EA submission. The assessment involves determining the level of trip generation associated with the construction and operation of the Project, its impact on the local road network and provides recommendations for mitigation measures to minimise any impacts, if required.

1.3 Scope of Report

The scope of the TIA includes:

- Review of relevant policy, legislation, standards and guidelines regarding Project-related traffic and transport;
- Assessment of the existing road network conditions (2010);
- Assessment of the future road network conditions (2011 - 2014) without the Project;
- Evaluation of the potential impacts associated with the Project for both construction and operations at the Old Punt Road / Pacific Highway intersection; and
- Consideration of measures to mitigate Project associated impacts (for both construction and operations).

The impact of employee movements associated with both construction and operations will also form part of the traffic impact assessment.

1.4 Structure of Report

The report is structured as follows:

- **Section 2** reviews the relevant policy, legislation, standards and guidelines regarding Project-related traffic and transport;
- **Section 3** summarises the existing transport conditions in the area surrounding the proposed gas plant site;
- **Section 4** considers the likely future transport conditions in the area without the Project;
- **Section 5** provides a description of the Project in terms of its operations and construction, as well as proposed access and parking arrangements;
- **Section 6** provides an assessment of the trip generation and distribution associated with the Project for both construction and operations, together with a review of their impacts on the local road network;
- **Section 7** presents the authority consultation;
- **Section 8** describes the recommended works required to mitigate any potential impacts of both construction and operations; and
- **Section 9** summarises the findings and recommendations for the transport requirements of the Project.

A list of references is provided in **Section 10**.

2.0 Review of Relevant Policy, Legislation, Standards and Guidelines

2.1 State and Regional Strategic Planning Policies

2.1.1 State Infrastructure Strategy

Document	State Infrastructure Strategy
Organisation	NSW Government (Treasury)
Date	June 2008
Purpose	The State Infrastructure Strategy links the four year capital Budget contained in the Infrastructure Statement (Budget Paper No. 4) with the 25 year long term planning strategies, like the Metropolitan Strategy.
Content	The State Infrastructure Strategy sets out the infrastructure budget with agency plans for various government departments and agencies and regional infrastructure plans, covering areas such as strategic planning and development and public transport.
Content relating to traffic and relevance to the Project	The Strategy identifies the following major road projects in the Hunter Region: - Intersection improvements at Hexham; and - Pacific Highway, F3 to Raymond Terrace Hexham (State and Federal funding);

2.1.2 Lower Hunter Regional Strategy

Document	Lower Hunter Regional Strategy
Organisation	NSW Government (Department of Planning)
Date	October 2006 (re-endorsed in February 2010)
Purpose	The regional strategy identifies how the expected growth in the Lower Hunter Region will be managed to provide for both economic development and the protection of environmental assets, cultural values and natural resources.
Content relating to traffic and relevance to the Project	The strategy states that an extensive network of roads runs throughout the Lower Hunter. In general the road network copes with traffic demand, with low levels of congestion; however it is recognised that without careful planning a number of key congestion points will arise. Strong residential growth in the Maitland corridor has led to increased congestion on the Maitland Road – New England Highway. A number of specific transport projects have been identified in the State Infrastructure Strategy 2006/07 – 2015/16 and the Regional Strategy identifies the land use and planning objectives associated with these projects. Actions identified in the strategy include: - Continue improvements to the north-south access through the Region, including planning the linkage of the F3 to the Pacific Highway at Raymond Terrace and planning and construction of upgrades to the Pacific Highway.

2.2 Standards and Guidelines

2.2.1 RTA Guide to Traffic Generating Developments

The RTAs Guide to Traffic Generating Developments outlines all aspects of traffic generation considerations relating to developments. The information provided gives background into the likely impacts of traffic from various types of development.

The guide provides a section on various land use traffic generation and a section on interpretation of traffic impacts. The impact on traffic efficiency at intersections is used in this study and intersection performance is based on the level of service criteria for intersections shown in **Table 2.1.**

Table 2.1: Level of Service Criteria for Intersections

Level of Service	Average Delay (secs/veh)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity; requires other control mode
F	>70	Roundabouts require other control mode	At capacity; requires other control mode

Source: Guide to Traffic Generating Developments: Version 2.2, RTA, October 2002

2.2.2 RTA Road Design Guide

The RTA Road Design Guide provides guidelines to ensure that there is a consistent approach to road design by the Authority. The guide provides information on basic design criteria, road geometry, cross sections, intersections at grade, safety barriers for roads and bridges and drainage.

For this study, guidelines on intersections at grade have been consulted. Intersections at grade provides details on the planning and design procedure to be followed, and the details necessary to develop a set of working drawings for an intersection at grade. The location of the access road to the site has been determined in accordance with the appropriate safe intersection sight distance (SISD) as stipulated by the guidelines. The SISD is defined as the distance required for the driver of a vehicle on the non-terminating approach to observe a vehicle entering from a side street, decelerate and stop prior to a point of conflict.

3.0 Existing Conditions

3.1 Site Location and Access

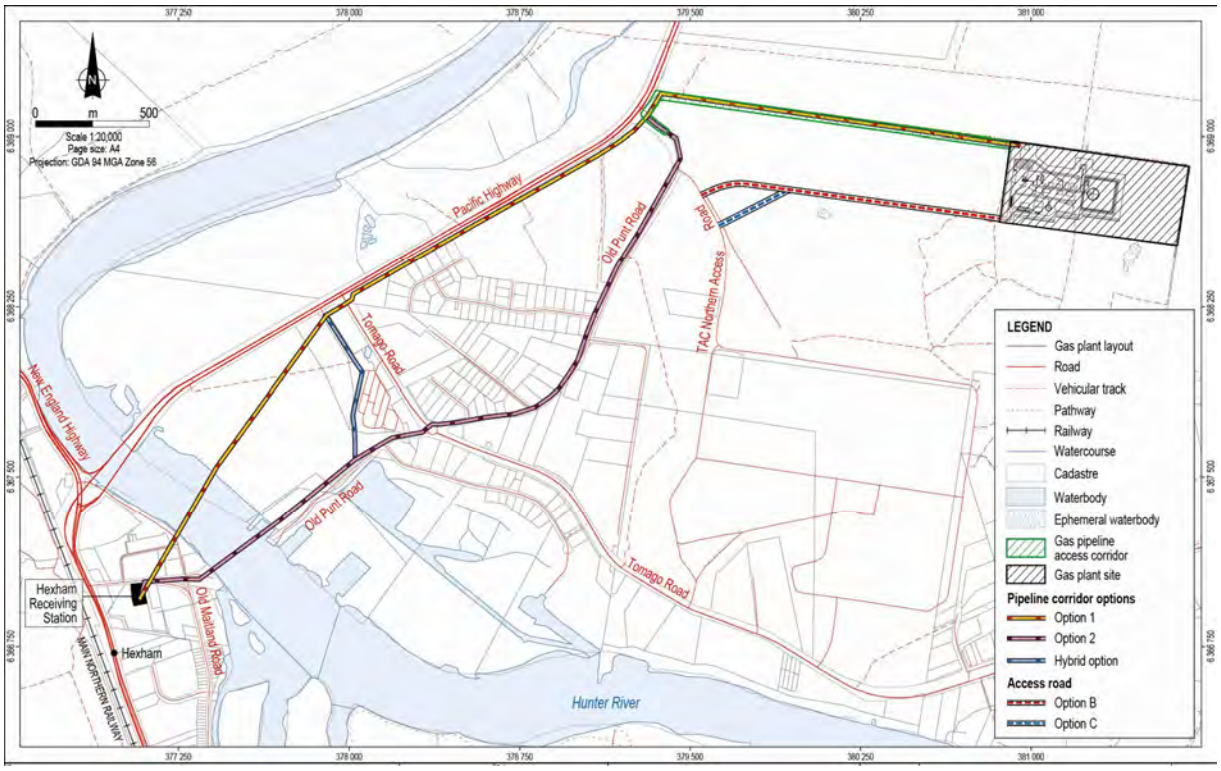
The gas plant will be located in the northeast corner of Lot 105 DP 1125747 in the Port Stephens Local Government Area (LGA). This site is north of the Tomago Aluminium Smelter on land currently owned by Tomago Aluminium Company (TAC). The site is approximately 13km northwest of the Newcastle central business district, 8km south of Raymond Terrace and 4km east of the Hexham industrial area.

The access road and utility corridor will join the gas plant to the TAC northern access road between 130m and 240m south of the intersection of the TAC northern access road and Old Punt Road. The TAC northern access road joins Old Punt Road approximately 200m from the intersection of Old Punt Road and the Pacific Highway. Traffic routing to and from the gas plant will be along the Pacific Highway, Old Punt Road and the TAC northern access road.

The Hexham receiving station will link the Project into the NSW gas network. It is proposed to build the receiving station on a site on Old Maitland Road adjacent to the existing Jemena Gate Station facility.

The Project in its regional context is shown in **Figure 3.1**.

Figure 3.1: Regional Context of Proposed Project



Source: AGL, 2011

3.2 Existing Traffic Conditions

3.2.1 Existing Road Network

3.2.1.1 Pacific Highway

The Pacific Highway is a major transport route which links Sydney and Brisbane along the eastern coast of Australia. The section of the Pacific Highway in the vicinity of the proposed gas plant site has two lanes in each direction and a speed limit that varies from 60km/hr to 80km/hr, as shown in **Figure 3.2**. The Hexham Bridge carries the Pacific Highway over the Hunter River and has two lanes in the southbound direction and three lanes in the northbound direction.

Figure 3.2: Pacific Highway

Heading north on the Pacific Highway	Northbound approach of Pacific Highway / Old Punt Road
	
Source: AECOM, 2010	Source: AECOM, 2010

3.2.1.2 Old Punt Road

Old Punt Road is a two lane road which connects to the Pacific Highway from the east in an all-movements intersection (see **Figure 3.3**). Old Punt Road connects to the TAC northern access road, linking to the Tomago Aluminium Smelter. Old Punt Road continues past this private road and links with Tomago Road at a roundabout.

The intersection of Old Punt Road and the Pacific Highway has recently been upgraded to improve traffic conditions. The upgrades included installing traffic control signals; providing an improved left-turn lane from Old Punt Road to the Pacific Highway; and lengthening the merge lane on the Pacific Highway from Old Punt Road.

Figure 3.3: Old Punt Road

Heading east on Old Punt Road from Pacific Highway	Heading south on Old Punt Road
	
Source: AECOM, 2010	Source: AECOM, 2010

3.2.1.3 TAC northern access road

The TAC northern access road is a private road that provides access to the Tomago Aluminium Smelter. It has one lane in each direction and a speed limit of 60km/hr (see **Figure 3.4)** and is used by trucks bringing raw alumina and coke material to the smelter and carrying the finished aluminium product away. It carries approximately 400 – 450 truck movements per day.

Figure 3.4: TAC northern access road

Heading east on TAC northern access road	Heading east on TAC northern access road
	
Source: AECOM, 2010	Source: AECOM, 2010

3.2.2 Daily Traffic Flows

RTA Traffic Volume Data has been obtained to determine the historical traffic growth and mid-block traffic flows in the surrounding area. **Table 3.1** shows historical Average Annual Daily Traffic (AADT) volumes at stations on the Pacific Highway, in the vicinity of the Project site locations.

Table 3.1: Historical Traffic Volumes and Growth

Station Number	Location	1992	1995	1998	2001	2004	% growth/yr	2010
V05.001	Tomago, 1km N of Hunter River	25,419	28,104	31,688	33,275	37,781	3.4%	46,061
05.052	Hexham, S of New England Hwy	-	45,527	48,397	48,220	52,833	1.7%	58,344

Source: RTA Traffic Volume Data

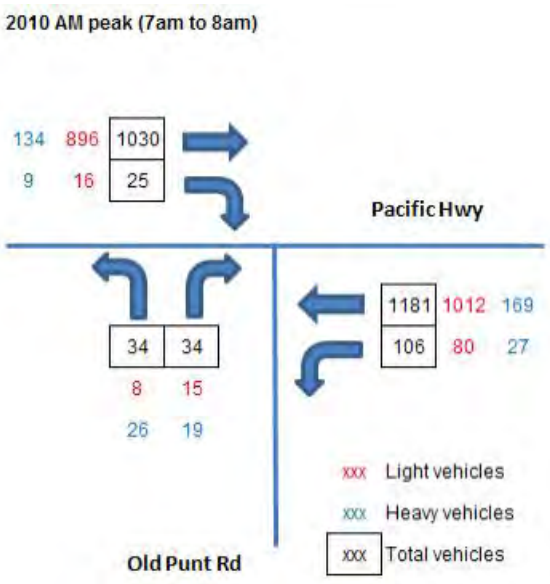
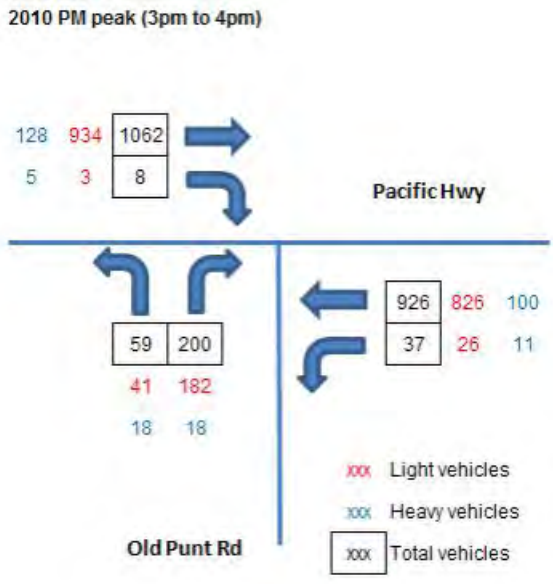
Based on the above data, the average growth in the area is 2.5% per annum.

3.2.3 Intersection Counts

Sydney Coordinated Adaptive Traffic System (SCATS) data was obtained through the RTA at the intersection of Old Punt Road and the Pacific Highway on Wednesday 28 July 2010. Analysis of the data shows that the morning peak hour of the intersection was between 7am and 8am and the evening peak hour was between 3pm and 4pm. Intersection turning movements (split into light and heavy vehicle classifications) for the AM and PM peak hours at this intersection are shown in **Figure 3.5.**

It should be noted that due to the configuration of the intersection, SCATS detectors are not present on the northbound approach of the Pacific Highway, or on the left turn lane on Old Punt Road. Manual traffic counts for the intersection, pre signalisation (2005), have been obtained from the RTA. The proportional relationship between these approaches and their corresponding approaches has been calculated in order to determine existing (2010) traffic flows on these approaches.

Figure 3.5: 2010 Peak Hour Turning Movements

Old Punt Road / Pacific Highway – AM Peak	Old Punt Road / Pacific Highway – PM Peak
	
Source: AECOM, 2010	Source: AECOM, 2010

3.2.4 Existing Intersection Performance

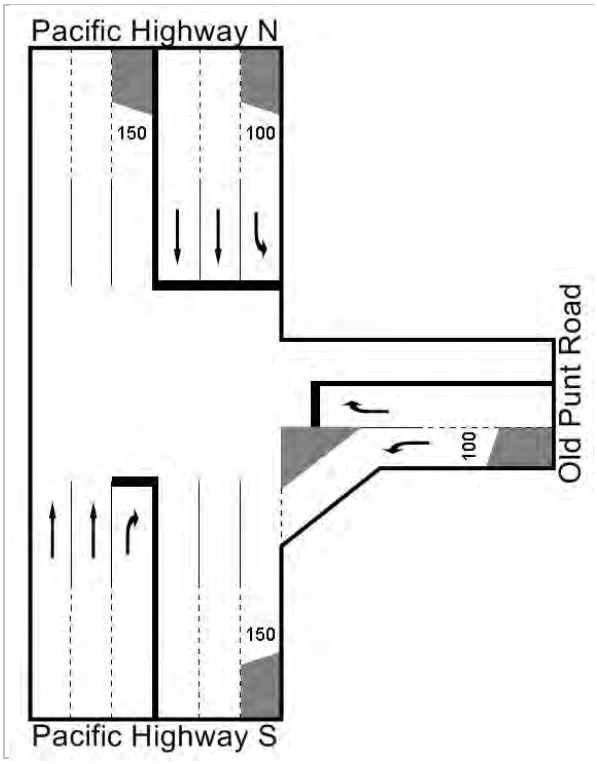
Intersection performances have been evaluated using *SIDRA Intersection 3.2*, a computer based modelling package designed for calculating isolated intersection performance.

The main performance indicators for SIDRA 3.2 include:

- Degree of Saturation (DoS) – a measure of the ratio between traffic volumes and capacity of the intersection is used to measure the performance of isolated intersections. As DoS approaches 1.0, both queue length and delays increase rapidly. Satisfactory operations usually occur with a DoS range between 0.7-0.8 or below;
- Average Delay – duration, in seconds, of the average vehicle waiting at an intersection; and
- Level of Service (LoS) – a measure of the overall performance of the intersection (as explained in **Table 2.1**).

The existing peak hour performance of the Old Punt Road / Pacific Highway intersection has been assessed. The intersection is a signalised intersection with a left turn slip lane from Old Punt Road and a continuous through movement in the northbound direction on the Pacific Highway. The northbound traffic on the Pacific Highway has therefore been modelled as a continuous lane, with the right turning traffic from Old Punt Road merging from a separate exit lane, as shown in **Figure 3.6**.

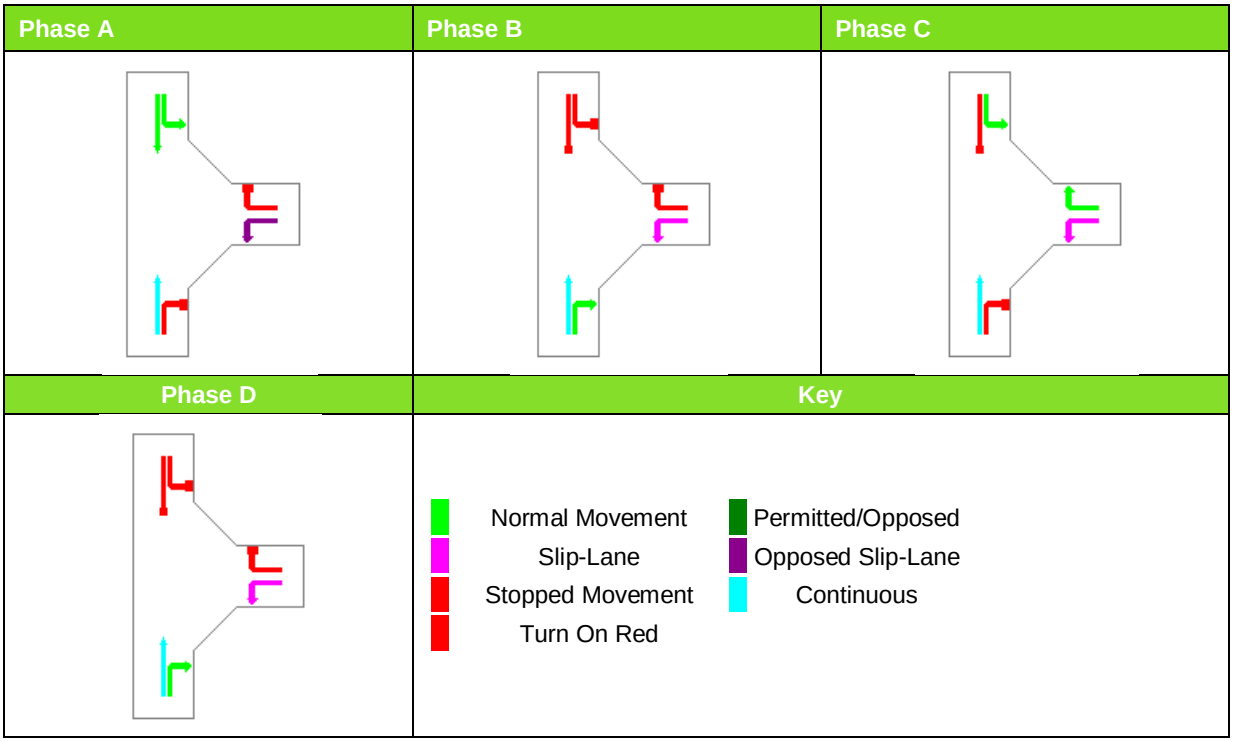
Figure 3.6: Existing Intersection Layout



Source: AECOM, 2010

The existing signal control, as per the SCATS data obtained through the RTA, consists of the following phasing shown in **Figure 3.7**.

Figure 3.7: Existing Phasing for Signalised Intersection



Source: AECOM, 2010

Table 3.2 summarises the intersection performance based on the 2010 traffic flows for the AM and PM peak hour.

Table 3.2: 2010 Intersection Performance, AM and PM Peak Hours

Peak hour	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Ave Delay (sec)	95% Back of Queue (m)	Approach with longest queue
AM peak	2,411	A	0.482	8.4	161	Pacific Highway (N) through movement
PM peak	2,292	A	0.678	13.9	126	Pacific Highway (N) through movement

Source: AECOM, 2010

The table indicates that the intersection of Old Punt Road and the Pacific Highway performs very acceptably at LoS A and with minimal average delays in the AM and PM peak hours under the existing traffic flows and existing signal control. The intersection operates with approximately 52% spare capacity in the 2010 AM peak and approximately 33% spare capacity in the 2010 PM peak.

3.2.5 Traffic Safety

Accident data on the Pacific Highway in the vicinity of the proposed site for the period of 1 October 2004 to August 2010 has been obtained from the RTA.

During this period there have been 67 crashes on the Pacific Highway between the intersection with Old Punt Road and Hexham Bridge (inclusive). Of the 67 crashes, there were two fatal crashes, 26 injury crashes and 39 non casualty crashes. One of the fatal crashes occurred at the intersection of Old Punt Road and Pacific Highway; however, this occurred before the intersection was upgraded to a signalised intersection.

3.2.6 Approved B-Double Routes

All of the major roads in the vicinity of the site are approved for B-Double use, according to the RTA. These include the Pacific Highway and Old Punt Road.

3.2.7 Public Transport, Pedestrian and Cycle Network

Public transport in the vicinity of the site is limited. There are no regular bus services along Old Punt Road.

Off road cycle paths are provided between the Hexham Bridge and Tomago Road, however there are no designated cycle routes in the vicinity of the site along the Pacific Highway or Old Punt Road.

Pedestrian facilities in the form of footpaths are limited in the vicinity of the site.

4.0 Future Conditions (without the Project)

This section considers the ability of the surrounding road network to cope with future traffic volumes, as a result of background traffic growth, regardless of any traffic increases that may be associated with the Project. The purpose is to identify the future performance and capacity of the identified intersection to provide a base case for the impact assessment.

The assessment was undertaken for the future years of 2011, 2012 and 2013, when construction is anticipated to take place and 2014, when the gas plant site is anticipated to be operational. The majority of Project construction generated traffic is expected to occur in the morning, coinciding with the road network AM peak hour. Therefore the assessment of Project construction focuses on the AM peak hour as this is considered to be the worst case scenario in terms of road network and intersection capacity.

The assessment of Project operations focuses on the 2014 morning and afternoon peak hours as both peak hours will be impacted by employee movements during the peak hours.

4.1 Committed Development

Committed development in the vicinity of the site consists of the new Tomago Gas Fired Power Station for which Macquarie Generation has development consent and increased production at the Tomago Aluminium Smelter for which Tomago Aluminium Company Pty Limited (TAC) has development consent.

4.1.1 Tomago Gas Fired Power Station, Macquarie Generation

Macquarie Generation proposes to build and operate a gas fired power station which has a total generating capacity of up to 790 Megawatts and which is to be located on the Pacific Highway, approximately 2km west of the Project site. The power station is projected to have a minimum operating life of 25 years. The EA for the project indicated that the on-going operation of the power station would generate a worst case scenario of 20-25 car trips per hour in peak periods (plus an additional 75 car trips per hour during maintenance periods) and one-two truck deliveries per day[1].

Macquarie Generation has been consulted with regards to the status of the Tomago Power Station project. A Macquarie Generation representative stated that construction of the power station is not in the foreseeable future work pipeline. The future year analysis in **Section 6** of this report allows for an amount of power station construction traffic if it were to go ahead and is therefore considered to be a robust assessment.

4.1.2 Tomago Aluminium Smelter, TAC

TAC has development consent for improvements to operating efficiency and increased production levels at the Tomago Aluminium Smelter and an increase in production from 530,000 to 575,000 tonnes of aluminium metal is proposed. The Tomago Aluminium Smelter is located at 576-638 Tomago Road and is also accessed via Old Punt Road from the Pacific Highway.

The proposed increase in production at the smelter would produce an additional 36 truck movements per day once the production capacity is reached. This is equivalent to approximately 1 truck per peak hour.

4.2 Future Road Upgrades

A major road upgrade is proposed in the vicinity of the site, namely the extension of the F3 Freeway, which currently has a preferred route and concept design. The preferred route commences south of the John Renshaw Drive roundabout and travels in a south-easterly direction. It crosses the New England Highway at Hexham and crosses the Hunter River via a long bridge structure. North of the river, the route closely follows the alignment of the existing highway in the vicinity of the site and will be accessed via a new interchange with Tomago Road.

[1] Tomago Gas Fired Power Station, EIS, Volume 1 Main Report, May 2002

The concept design has two traffic lanes in each direction, with a provision to upgrade to three lanes in each direction in the future. The main carriageway has a design speed of between 100km/hr and 110km/hr.

The project would divert traffic from the existing Pacific Highway leading to improved conditions on the existing route for local trips and a reduction in crash rates.[2]

The Project is currently at a Concept Design stage. Timing of construction and completion of the project is unknown and will depend on funding availability.[3]

4.3 Intersection Performance

As discussed in **Section 3.2.2**, the average annual traffic growth rate on the road network in the vicinity of the site is 2.5%. This growth rate has been applied to the existing traffic flows at the intersection of Old Punt Road and the Pacific Highway to determine the AM peak hour future base traffic flows in 2011, 2012, 2013 and 2014. Traffic generated by the committed development in the area has also been added to the future base traffic flows to provide a robust analysis of the intersection performance in the future years without Project generated traffic.

The intersection has been reassessed using SIDRA 3.2 (traffic intersection modelling software) for the future base year scenarios. The intersection layout was tested unchanged from the base layout.

Table 4.1 summarises the intersection performance in the 2011, 2012 and 2013 AM peak hour and **Table 4.2** summarises the intersection performance in the 2014 AM and PM peak hour.

Table 4.1: Future Years Intersection Performance – AM Peak Hour

Year	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Ave Delay (sec)	95% Back of Queue (m)	Approach with longest queue
2011	2,496	A	0.494	8.9	166	Pacific Highway (N) through movement
2012	2,560	A	0.507	9.0	172	Pacific Highway (N) through movement
2013	2,623	A	0.514	8.8	174	Pacific Highway (N) through movement

Source: AECOM, 2010

Table 4.2: 2014 Intersection Performance – AM and PM Peak Hour

Year	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Ave Delay (sec)	95% Back of Queue (m)	Approach with longest queue
2014 AM	2,689	A	0.528	8.9	181	Pacific Highway (N) through movement
2014 PM	2,564	B	0.688	14.6	148	Pacific Highway (N) through movement

Source: AECOM, 2010

The table indicates that the intersection performs well at LoS A and with minimal average delays in the AM peak hour under the future scenario background traffic flows (2011, 2012 and 2013), existing intersection layout and existing signal control. The intersection will also continue to perform acceptably in the 2014 AM and PM peaks at LoS A and B respectively. The intersection will operate with approximately 48% spare capacity by 2014 in the AM peak and with approximately 32% spare capacity in the 2014 PM peak hour.

[2] Pacific Highway Upgrade – F3 Freeway to Raymond Terrace Concept Design Report June 2008, Maunsell
[3] F3 to Raymond Terrace, Upgrading the Pacific Highway, Concept Design, July 2008, RTA

5.0 Proposed Development

5.1 Nature of Development

AGL proposes to develop the Newcastle Gas Storage Facility Project at Tomago, New South Wales, which will meet AGL's peak gas market requirements over winter and to provide additional security of supply during supply disruption events.

The Project will consist of five main components as shown in **Table 5.1**.

Table 5.1: Project Description

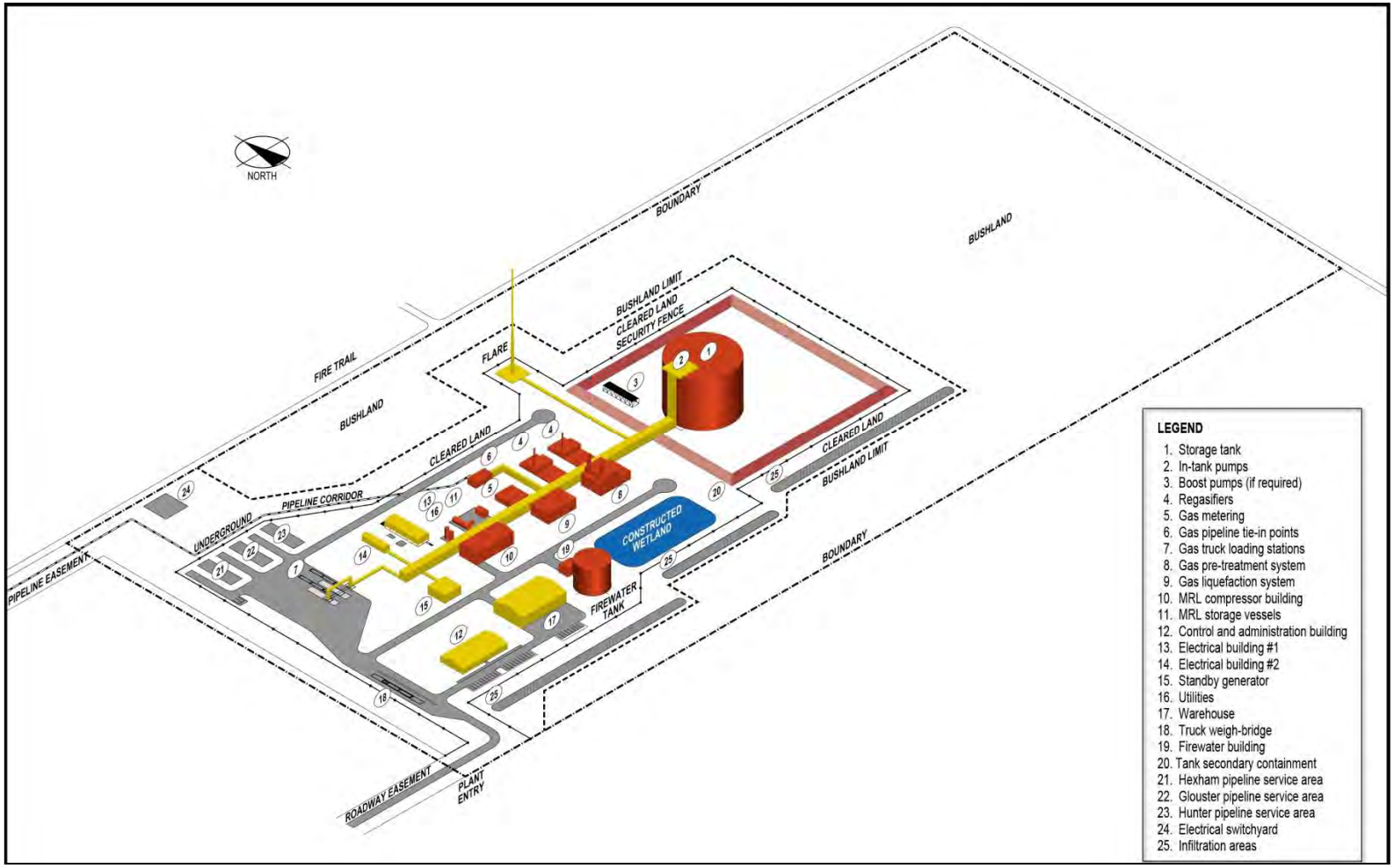
Project Component	Description
Construction and operation of the gas plant site	Includes: - A processing plant capable of processing up to 66,500 tonnes of LNG per year - An insulated non-pressurised LNG storage tank capable of containing 30,000 tonnes of LNG - A truck loading facility to allow the dispatch of up to 1,000 tankers of LNG per year – A waste water collection tank
Access road and utility corridor	Includes: – A new sealed road to connect the gas plant site to the TAC northern access road – Infrastructure and utility connections
Gas pipeline corridor	An emergency access road
A natural gas pipeline	Connects the gas plant site to the receiving station
A receiving station in Hexham	Links the Project into the NSW gas network via the existing Sydney to Newcastle pipeline

Source: Coffey Natural Systems, 2010

AGL is targeting to start Project construction in the second half of 2011 and Project operation in 2014.

Figure 5.1 shows the layout of the proposed gas plant site.

Figure 5.1: Proposed Gas Plant



Source: AGL, 2011

5.2 Site Access

The gas plant will be accessed from the TAC northern access road (via Pacific Highway and Old Punt Road) along a 1.4km long access road. The access road will be sealed prior to operations commencing. The road will be within a corridor approximately 30m wide and an intersection is planned on the TAC northern access road.

The gas plant access road will cross over an EnergyAustralia easement; however is not expected to have a significant impact, as the new road will not restrict the use of the easement. Any gas plant traffic will give way to any EnergyAustralia vehicles.

An emergency access is also planned to run along the north of the site and intersect with Old Punt Road. This would only be used in emergency situations, should access along the main access road be blocked.

5.3 Parking

There are parking spaces proposed at the gas plant site for employee vehicles. They are located opposite the control and administration building at the south western corner of the gas plant site. The 28 parking spaces will be adequate to accommodate the maximum number of up to 15 employees expected at any one time when the gas plant is operational.

5.4 Project Construction and Workforce

Project construction will consist of the following four components:

- Gas plant construction (three years);
- Pipeline construction (up to nine months);
- Access road and utility corridor construction (three months); and
- Hexham receiving station construction (up to nine months).

The gas plant construction will include the following:

- Site preparation;
- Bulk earthworks;
- Structural works;
- Commissioning; and
- Rehabilitation and landscaping.

An assortment of construction equipment will be required throughout construction including; earthmoving equipment mobile cranes, site vehicles, diesel generators and welding machines. Associated workshops will also be constructed. Once heavy construction vehicles are moved on site, they will remain there until the end of their construction period. It is recommended that these heavy construction vehicles are delivered to the site outside of the road network peak periods (7am - 8am and 3pm - 4pm), when local traffic conditions will be at their lowest.

It is envisaged that the construction of the gas plant will take up to three years. Construction of the access road and utility corridor will require the clearing of a strip of native vegetation up to 30m wide. Standard road construction techniques will be employed. The construction site will be fenced. Construction of the Hexham receiving station will use standard light industrial construction techniques and is expected to take up to nine months.

Pipeline construction will be by conventional trenching and burial, horizontal directional drilling (HDD) or horizontal boring. There are two pipeline options – Option 1 and 2, as shown on **Figure 3.1**. If Option 1 is selected as the preferred route, construction along the Pacific Highway will be mainly within the road verge. Construction along this section will take up to eight weeks and may temporarily affect traffic flow on the Pacific Highway. There may be short periods where access to the road shoulder is affected, but the main lanes of the highway will not be directly impacted.

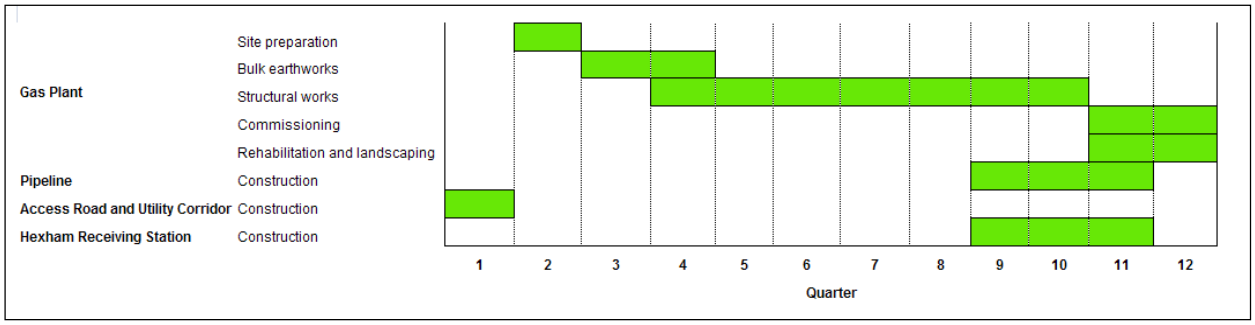
Construction machinery and associated vehicles may also use the Pacific Highway for access to the construction area. Should Option 1 be selected, a construction traffic management plan will be prepared, in consultation with the RTA, to address the Pacific Highway traffic.

If Option 2 is selected, the pipeline will need to cross Tomago Road and potentially Old Punt Road. This will be achieved by HDD or horizontal boring. A construction traffic management plan would also be prepared for this option.

It is anticipated that construction will be undertaken during daylight hours; 7am to 6pm on weekdays and 8am to 1pm on Saturdays. No construction is expected to take place on Sundays or public holidays. In some instances, extended work hours may be required to enable major activities to be completed (e.g. pouring of the foundations).

A summary of the construction program is shown graphically in **Figure 5.2**

Figure 5.2: Construction Program



Source: AGL, 2010

The construction workforce for the Project is expected to peak at approximately 300 people. It is anticipated that the majority of the construction workforce will come from Newcastle and its surrounds and will travel to the site by a combination of light vehicles and buses. It is not intended that a construction camp will be used. Cars transporting construction workers will be parked on site.

5.5 Operation Hours and Workforce

The gas plant site, pipelines and Hexham receiving station will operate continuously.

The operation workforce for the Project is expected to be approximately 15 employees at the gas plant site, with additional contractors for some activities, including maintenance.

Three workforce shifts per day at the gas plant are indicatively proposed, as follows:

- 7am to 3pm;
- 3pm to 11pm; and
- 11pm to 7am.

It is anticipated that the workforce will travel to the site by light vehicles. Depending on the management in charge of the plant during its operation, this could be changed to two 12-hour shifts. As the employee numbers are so low, this change in shift pattern will not have a significant impact on arriving and departing traffic flows.

The Hexham receiving station will be an unmanned site. Therefore, no assessment of operational traffic impacts is required for the Hexham receiving station.

6.0 Impact of Proposed Development

This section provides an assessment of the trip generation and distribution associated with the Project construction and operations. The assessment involves a review of the performance of the Old Punt Road / Pacific Highway intersection once Project generated traffic is added.

6.1 Construction Impact

6.1.1 Traffic Generation

As discussed in Section 4.4, four construction activities are proposed. The number of vehicles, both heavy goods vehicles (HGVs) and light vehicles (LVs) envisaged to be associated with the Project construction are shown in **Table 6.1**.

Table 6.1: Project Construction Generated Traffic

Component	Task	Deliveries per day (HGV)	Workforce per day (LV)
Gas Plant	Site preparation	40-50	20
	Bulk earth works	20	20
	Structural works 1 (2 month period)	20-30	250
	Structural works 2 (remainder of period)	5	250
	Commissioning	3	30
	Rehabilitation and landscaping	4	20
Pipeline	Construction	20	50
Access Road and Utility Corridor	Construction	10	50
Hexham receiving station	Construction	5	25

Note: the total workforce working on construction of all components of the project is likely to peak at 300

Source: AGL, 2010

The table shows that construction of the gas plant will generate the highest number of both light and heavy vehicles. As previously discussed, Project construction will take place over a three year period following the program shown in **Figure 5.2**. The maximum construction traffic per day and per AM peak hour associated with each year and likely to have an impact on the Old Punt Road / Pacific Highway intersection is shown in **Table 6.2**.

In order to determine the construction traffic generated during the AM peak hour, the following assumptions have been made:

- Two thirds of all daily deliveries will occur during the AM peak hour;
- Delivery trucks will enter and exit within the peak hour; and
- All workforce vehicles will arrive during the AM peak hour.

These assumptions will provide a robust assessment of Project generated construction traffic as it is considered to be a worst case scenario.

Table 6.2: Maximum Daily and AM Peak Hour Project Construction Generated Traffic

Year	Deliveries (HGV)			Workforce (LV)	
	Trucks per day	Trucks per AM peak hour	Truck movements per AM peak hour	Per day	AM peak hour
1	50	33	66	270	270
2	5	3	6	250	250
3	29	19	38	300	300

Source: AGL, 2010

The table indicates that the highest number of heavy vehicles associated with Project construction will occur during Year 1 of construction and the highest number of light vehicles will occur during Year 3 of construction.

Construction associated with the Hexham receiving station is likely to generate 5 heavy vehicles and 25 light vehicles and construction of the pipeline is likely to generate 20 heavy vehicles and 50 light vehicles in Year 3 of construction.

A number of temporary construction compounds will be required along the route of the pipeline for its construction. These will be used for HDD drill rigs and stockpiling in material. Traffic movement in and out of these are difficult to predict, but will be controlled by the construction works traffic management plans to ensure the safe traffic operation.

6.1.2 Traffic Distribution and Assignment

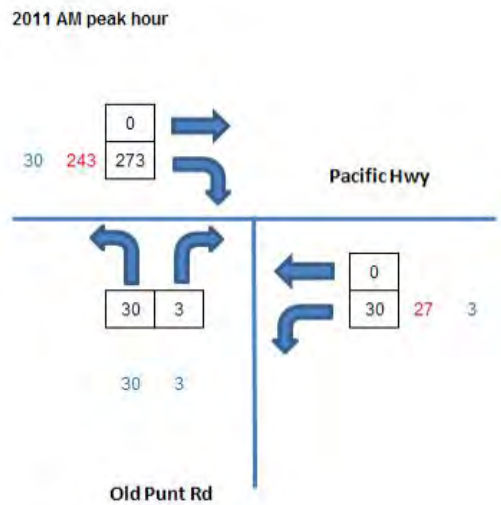
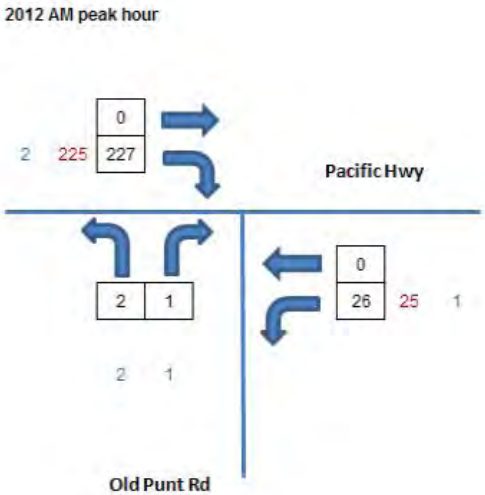
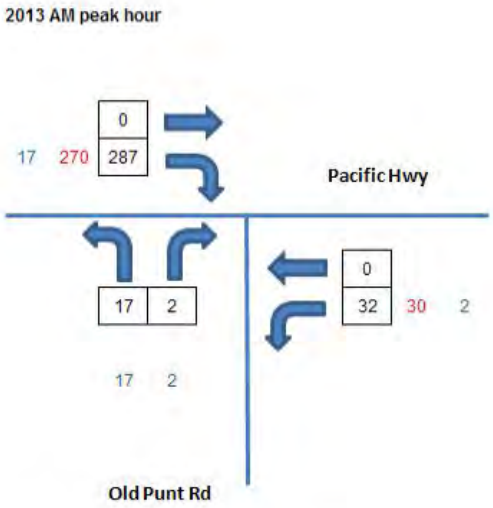
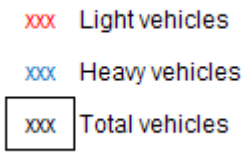
For the AM peak hour construction vehicle movements, it has been assumed that 50% of heavy vehicles will enter the site and 50% of heavy vehicles will exit the site. It has been assumed that all light vehicles will enter the site in the AM peak (and leave the site after the PM peak hour).

The following assumptions have been made with regards to origins and destinations of construction vehicles:

- 90% of construction vehicles will come from / go to the south (Sydney / Newcastle) along the Pacific Highway; and
- 10% of construction vehicles will come from / go to the north (Raymond Terrace / Brisbane) along the Pacific Highway.

Figure 6.1 presents the worst case scenario for the AM peak hour construction traffic movements associated with each year of Project construction.

Figure 6.1: Project Construction Generated Traffic

2011 AM Peak	2012 AM Peak
	
Source: AECOM, 2010	Source: AECOM, 2010
2013 AM Peak	**Key**
	
Source: AECOM, 2010	

6.1.3 Impact of Generated Traffic

Project construction is expected to generate the following light and heavy vehicles in the AM peak hour:

- Year 1 – 33 heavy vehicles, 270 light vehicles;
- Year 2 – 3 heavy vehicles, 250 light vehicles; and
- Year 3 – 19 heavy vehicles, 300 light vehicles.

These traffic movements were added to the 2011, 2012 and 2013 base traffic flows at the intersection of Old Punt Road / Pacific Highway. The intersection has been re-assessed using SIDRA 3.2, using the existing intersection layout and signal controls.

A 1.7% increase was used for the Hexham receiving station analysis, as it is located to the south of the Hunter River, and hence the nearest RTA permanent station (05.052) (located on the Pacific Highway to the west of the

site and likely to be used as a strategic traffic route to the Hexham site) was felt to be the most appropriate. The general growth rate of 2.5% for both north and south of the Hunter River was more appropriate for the construction traffic for the main NGSF site.

A comparison of the results of the assessment for the 2011, 2012 and 2013 AM peak hour with and without the Project construction generated traffic is shown in **Table 6.3**.

Table 6.3: Future AM Peak Hour Intersection Performance Comparison

Year	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Ave Delay (sec)	95% Back of Queue (m)	Approach with longest queue
2011 Base	2,496	A	0.494	8.9	166	Pacific Highway (N) through movement
2011 + Project	2,833	B	0.754	17.2	196	Pacific Highway (N) through movement
2012 Base	2,560	A	0.507	9.0	172	Pacific Highway (N) through movement
2012 + Project	2,816	B	0.725	15.4	192	Pacific Highway (N) through movement
2013 Base	2,623	A	0.514	8.8	174	Pacific Highway (N) through movement
2013 + Project	2,962	B	0.754	17.7	219	Pacific Highway (N) through movement

Source: AECOM, 2010

The results indicate that the Project construction traffic will have a small impact on the intersection in the AM peak hour. The LoS in each future year is likely to drop from A to B; however, this is still considered to be performing acceptably according to RTA level of service standards. The intersection continues to operate with spare capacity in the future years (approximately 25% spare capacity).

Construction associated with the Hexham receiving station is likely to generate five heavy vehicles and 25 light vehicles per day in Year 3 of construction. The RTA permanent station (05.052) located on the Pacific Highway to the west of the site (which is likely to be used as a strategic traffic route to the site) had an AADT volume of approximately 52,800 vehicles in 2004. Applying a 1.7% average annual growth rate equates to an existing (2010) AADT of approximately 58,300 vehicles. The Hexham receiving station construction traffic is considered negligible when compared to AADT on the surrounding road network (less than 0.1%) and is therefore considered to have a minimal impact.

The pipeline construction, which will include conventional trenching and burial, horizontal directional drilling (HDD) or horizontal boring, might necessitate the partial closure of traffic lanes on Old Punt Road during its installation along Old Punt Road (if this option is selected). Temporary decking may be implemented during the trenching works to allow vehicles to traverse the open trench. The pipeline will also need to cross Tomago Road, however horizontal boring under the main roundabout with Old Punt Road, to avoid traffic impact, will be undertaken to achieve this.

If the Pacific Highway option is selected as the preferred route, construction along the Pacific Highway will be mainly within the road verge and not directly impact the main traffic lanes; however, there may be short periods where access to the road shoulder is affected. In terms of indirect impacts, closing of the road shoulder and works within the road verge might result in reduced speeds along the Pacific Highway in the vicinity of the construction works.

A project specific Construction Traffic Management Plan (CTMP) would be applied during the pipeline construction to outline the processes required for pedestrian, cyclist and vehicular management and protection.

6.2 Operations Impact

6.2.1 Traffic Generation

It is envisaged that the transfer of LNG by road tankers (trucks) from the gas plant could result in approximately 1,000 tankers per year, approximately three trucks per day.

In addition to this, waste water will be collected in a waste water collection tank and transported offsite for treatment and disposal. This process will require approximately 180 tanker trips per year (120 tanker trips annually for amenities, and 60 tankers annually for blowdown water), which equates to less than one tanker per day. Due to the low number and the likelihood of these trips occurring outside traffic peak hours, the waste water traffic has not been included in the impact analysis.

The number of light and heavy vehicles associated with Project operations is shown in **Table 6.4**.

Table 6.4: Project Operations Generated Traffic

Facility	Hours (shifts)	HGVs per day	LVs per day
Gas Plant	7am to 3pm	3 (LNG trucks) 5 (other delivery trucks)	15 (workforce) 5 (visitors)
	3pm to 11pm	0	7 (workforce)
	11pm to 7am	0	2 (workforce)

Source: AECOM, 2010

In order to determine a worst case scenario in terms of traffic impacts for the operations traffic generated during the AM and PM peak hours, the following assumptions have been made:

- Trucks per hour are based on 24 hours per day operations;
- Trucks per peak hour are 50% higher than an average hour;
- Trucks will enter and exit within the peak hour; and
- All workforce vehicles will arrive and depart in accordance with the shift timings.

The operations generated traffic per peak hour is shown in **Table 6.5**.

Table 6.5: Peak Hour Project Operations Generated Traffic

Deliveries (HGV)			Workforce and visitors (LV)	
Trucks per day	Trucks per peak hour	Truck movements per peak hour	AM peak hour	PM peak hour
8	2	4	22	27

Source: AECOM, 2010

The table indicates that Project operations will generate four peak hour truck movements. Light vehicles will be in the order of 22 vehicle movements per AM peak hour and 27 vehicle movements per PM peak hour.

6.2.2 Traffic Distribution and Assignment

For the peak hour operations vehicle movements it has been assumed that 50% of heavy vehicles will enter the site and 50% of heavy vehicles will exit the site. It has been assumed that light vehicles will enter and exit the site according to the shift patterns, as shown in **Table 6.6**.

Table 6.6: Peak Hour Vehicle Movements

AM peak hour		PM peak hour	
In	Out	In	Out
20	2	7	20

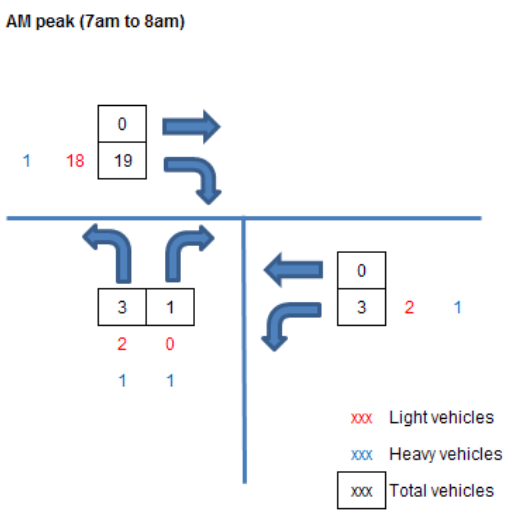
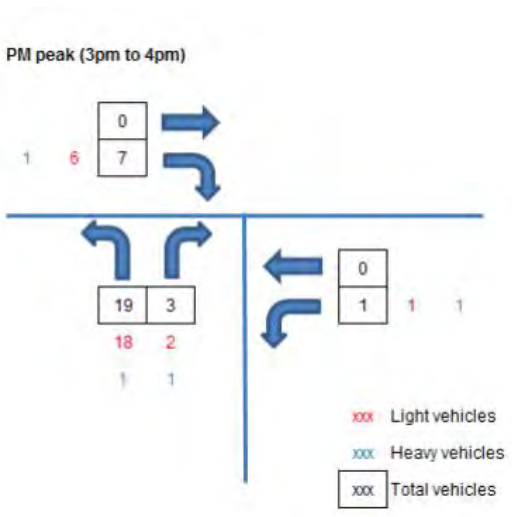
Source: AECOM, 2010

The following assumptions have been made with regards to origins and destinations of operations vehicles:

- 90% of employee vehicles will come from / go to the south along the Pacific Highway;
- 10% of employee vehicles will come from / go to the north along the Pacific Highway;
- 50% of trucks will come from / go to the south along the Pacific Highway; and
- 50% of trucks will come from / go to the north along the Pacific Highway.

Figure 6.2 presents the worst case scenario for the peak hour traffic movements associated with Project operations.

Figure 6.2: Peak Hour Operations Generated Traffic Movements

AM Peak	PM Peak
	
Source: AECOM, 2010	Source: AECOM, 2010

6.2.3 Impact of Generated Traffic

Project operations is expected to generate 22 light vehicle movements and four heavy vehicle movements in the AM peak hour and 27 light vehicle movements and four heavy vehicle movements in the PM peak hour.

These traffic movements were added to the 2014 base traffic flows at the intersection of Old Punt Road / Pacific Highway. The intersection has been re-assessed using SIDRA 3.2, using the existing intersection layout and signal controls.

A comparison of the results of the assessment for the 2014 peak hours with and without the Project operations generated traffic are shown in **Table 6.7**.

Table 6.7: 2014 Peak Hour Intersection Performance Comparison

Year	Demand Flow (veh/h)	Level of Service	Deg of Satn (v/c)	Ave Delay (sec)	95% Back of Queue (m)	Approach with longest queue
2014 Base AM	2,689	A	0.528	8.9	181	Pacific Highway (N) through movement
2014 + Project AM	2,714	A	0.528	9.3	181	Pacific Highway (N) through movement
2014 Base PM	2,564	B	0.688	14.6	148	Pacific Highway (N) through movement
2014 + Project PM	2,592	B	0.694	14.7	148	Pacific Highway (N) through movement

Source: AECOM, 2010

The results indicate that the intersection of Old Punt Road / Pacific Highway will continue to perform at LoS A and B in the AM and PM peak hours respectively once Project operations traffic is present on the road network. The intersection will also continue to operate with minimal average delays and with significant spare capacity in both peak hours. The Project operations generated traffic is therefore considered to have a negligible impact on the intersection.

6.3 Access Arrangements

There is not enough distance along Old Punt Road between the Pacific Highway intersection and the TAC northern access road intersection for the gas plant access road to safely intersect Old Punt Road between the two other intersections.

Therefore, two options for linking the gas plant access road into the existing road network are proposed.

Both options are priority controlled T-junctions with the TAC northern access road, as shown in **Figure 6.3**. Option B is located approximately 130m from the Old Punt Road / TAC access road intersection, while Option C is located approximately 240m from the Old Punt Road / TAC access road intersection.

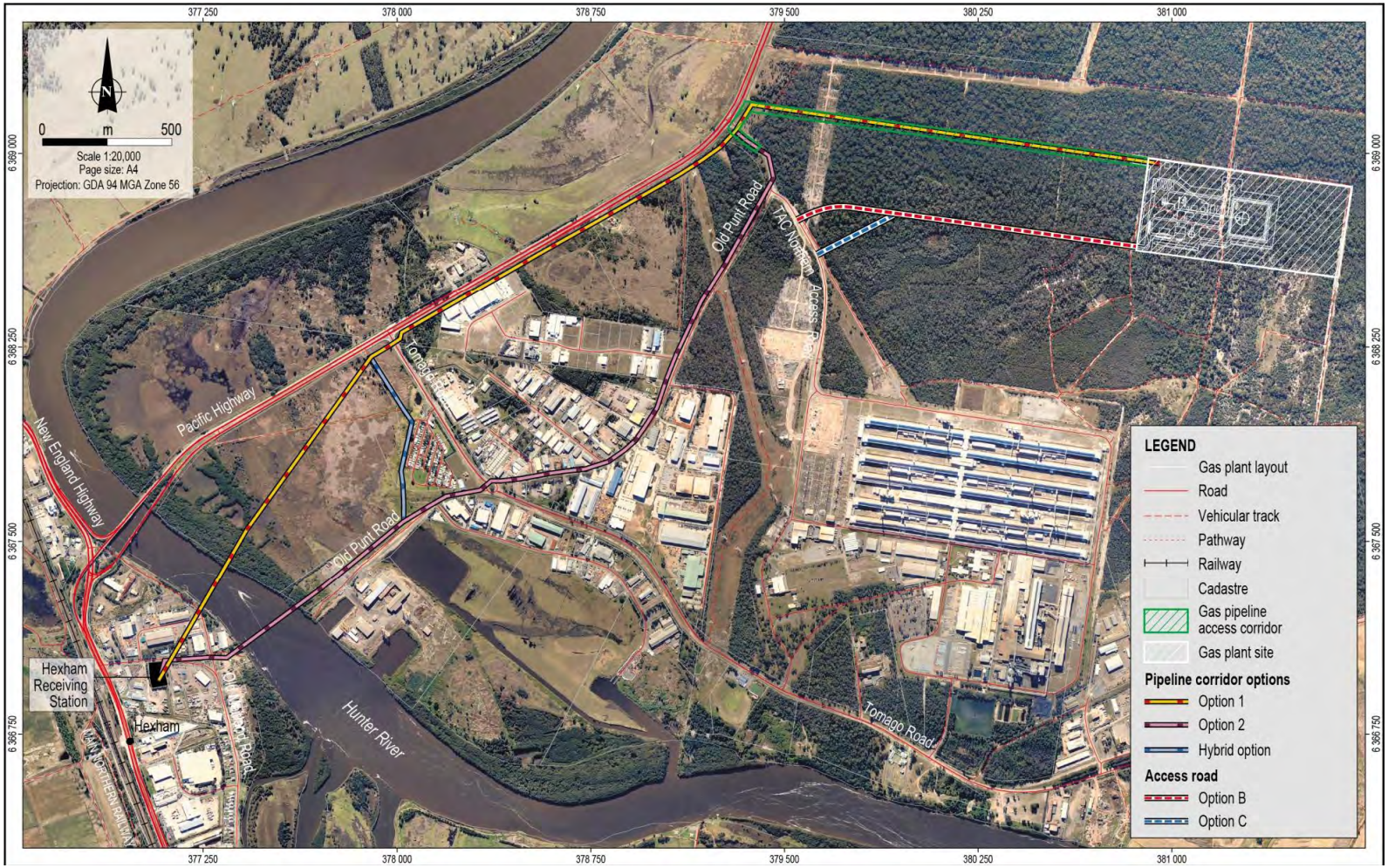
Both of these options comply with the minimum 130m Safe Intersection Sight Distance (SISD) from the Old Punt Road / TAC access road intersection, based on a road design speed of 70km/h[4].

The operations traffic that the Project is expected to generate is minimal, namely two trucks per peak hour. Initial analysis of the T-junction indicates that a simple priority controlled intersection layout is sufficient and turning lanes or storage lanes are not required. Due to the low vehicle numbers, the intersection is expected to have minimal impact on the existing through traffic on the TAC northern access road.

Detailed geometric design of the selected intersection would be required, to ensure the intersection can accommodate heavy goods vehicles / tankers proposed for use at the gas plant.

[4] Road Design Guide, Section 4 Intersections At Grade, RTA, January 2000

Figure 6.3: Access Road Options



Source: AGL, 2011

7.0 Authority Consultation

The Roads and Traffic Authority (RTA), Port Stephens Council and Newcastle City Council were invited to attend Department of Planning's planning focus meeting for the Project on 16 September 2010. The objectives of this were to get a briefing on the project, allow agencies to ask questions and to visit the site. The two councils attended, but the RTA was unable to attend. AGL met with RTA on 23 November 2010 to provide them with a briefing.

The following is summary of their feedback with regard to traffic and transport issues, received as part of the Department of Planning's consultation process. Reference is given to where these are addressed in this report.

7.1 Roads and Traffic Authority (RTA)

Item	Requirement	Reference
1	Identify all relevant vehicular traffic routes and intersections for access to / from the subject area	Routing and intersections described in **Section 3**.
2	Current traffic counts for all of the above traffic routes and intersections	Provided in **Section 3.2**
3	Anticipated additional vehicular traffic generated during construction and operational phases	Provided in **Section 6.1** and **Section 6.2**
4	Number and location of pipeline crossings – impacts on State Road traffic	Provided in **Section 6.1.3**
5	Traffic analysis including - Current traffic counts and 10 year traffic growth projections - With and without development scenarios considered - 95th percentile back of queue lengths - Delays and level of service on all legs for the relevant intersections - Use of SIDRA or similar traffic model - Electronic /output data files for RTA review	Current situation provided in **Section 3**, future without development provided in **Section 4** and future with in **Section 6**. SIDRA has been used and delays, LOS and queues reported. It is not felt that a 10 year traffic growth scenario is appropriate due to the nature of the development, with any significant impact occurring during the three years of construction and minimal impact in the future operational phase.

Source: RTA letter to Department of Planning, dated 21 September 2010

7.2 Newcastle City Council (NCC)

Item	Requirement	Response
1	The main traffic generation associated with the project will occur during construction and an assessment of this should be made in the EA. The required plans are to ensure the provision for safe, continuous movement of traffic and pedestrians within the road reserve. The plan is to be prepared in accordance with AS1742.3-2002.	Traffic generation and impact is provided in **Section 6**. The use of the Australian Standards is noted and will form part of the conditions of consent. *Note: AS1742.3-2002 Traffic Control Devices for Works on Roads has been updated with AS1742.3-2009*

Source: NCC letter to Department of Planning, dated 8 October 2010

7.3 Port Stephens Council (PSC)

Item	Requirement	Response
1	The proposed new access road connection to Old Punt Road appears to be in the same location as the existing access road to the aluminium industrial site. The traffic assessment report (construction and operational traffic assessment) is required to properly assess what intersection treatment will be required. This needs to consider traffic generated by the proposal and the interaction with existing traffic from Tomago Aluminium as well as allowances for future growth.	The location of the proposed access road connection has been changed to a T-junction with the TAC northern access road. Traffic generation and impact is provided in **Section 6**.
2	To ensure safety, PSC advises that the proposed access road should have a width to cater for design vehicles paths determined by AS 2890.2-2002.	Noted. The detailed design phase of work will take this into account.
3	All works located in public roads (including road reserve) are subject to approval under section 138 of the Road s Act 1993. Engineering details in accordance with Council's Design and Construction Specification, Policies and Standards must be submitted with a Roads Act application form and be approved by PSC prior to commencement of the work. The following items are required to be approved by PSC prior to approval being granted to commence work: a) Traffic Control Plans in accordance with RTA Traffic Control at Worksites Manual b) Payment of fees and bonds c) Contractors public liability insurances to a minimum value of $10 million d) Construction Management Plan	Noted. This will form part of the conditions of consent.

Source: PSC letter to Department of Planning, dated 30 September 2010

8.0 Recommended Works

8.1 Construction

Project construction for the gas plant is considered to have a small impact on the intersection of Old Punt Road / Pacific Highway and the local road network in the vicinity of the Project sites during the Project construction years. Therefore, no infrastructure works will be required.

However, it is recommended that a Construction Traffic Management Plan (CTMP) be put in place to manage the traffic generated during construction of the gas plant, even though the traffic generated by construction is temporary in nature. Measures in the CTMP might include:

- where practical, containing heavy vehicle movements to off-peak hours when traffic volumes are typically at a minimum;
- ensuring heavy vehicles engaged in construction meet the Australian Road Rules and RTA standards so that road safety is not compromised;
- notifying the local community by means of public notice publications and advertisements on the progress of the Project and the scheduling of works so as to inform the local community of any additional vehicles added onto the local road network;
- transporting oversized equipment and machinery in accordance with the RTA guidelines for oversized movements; and
- implementing appropriate signage to warn road users of the presence of construction vehicles as well as changes to the normal traffic conditions.

The construction of the Hexham receiving station is expected to generate a small number of truck movements and is considered to have negligible impact on the local road network; therefore no infrastructure works will be required; however a CTMP should be prepared.

Depending on the gas pipeline alignment option selected, construction might necessitate the partial closure of traffic lanes on Old Punt Road during its installation along Old Punt Road, therefore temporary decking is recommended during the trenching works to allow vehicles to traverse the trench. If the Pacific Highway option is selected as the preferred route, construction along the Pacific Highway will be mainly within the road verge and not directly impact the main traffic lanes; however, there may be short periods where access to the road shoulder is affected.

A CTMP should therefore be produced for the construction of the gas pipeline.

8.2 Operations

Project operations are considered to have a negligible impact on the intersection of Old Punt Road / Pacific Highway and the local road network in the vicinity of the Project sites and therefore no mitigation works will be required.

9.0 Summary and Conclusions

9.1 Summary

The Project proposes the construction and operation of a gas plant site, which includes:

- a processing plant capable of processing up to 66,500 tonnes of liquefied natural gas (LNG) per year;
- a storage tank capable of containing 30,000 tonnes of LNG;
- a truck loading facility to allow the dispatch of up to 1,000 tankers of LNG per year;
- a new road to connect the gas plant site to the TAC northern access road and an emergency access road; and
- a natural gas pipeline which connects the gas plant site to a receiving station in Hexham, NSW.

Project construction is expected to last three years (2011 to 2013) and would generate the following vehicles on the local road network AM peak hour:

- Year 1 – 33 heavy vehicles, 270 light vehicles;
- Year 2 – 3 heavy vehicles, 250 light vehicles; and
- Year 3 – 19 heavy vehicles, 300 light vehicles.

The Project is envisaged to be operating by 2014 and would generate the following vehicles on the local road network peak hours:

- AM peak hour – 2 heavy vehicles and 22 light vehicles; and
- PM peak hour – 2 heavy vehicles and 27 light vehicles.

The intersection of Old Punt Road / Pacific Highway has been assessed under three scenarios to determine the impact of Project construction and operations generated traffic on the local road network, namely:

- Existing conditions (2010);
- Future conditions without Project generated traffic (2011 - 2014); and
- Future conditions with Project generated traffic:
  - Construction – 2011, 2012 and 2013
  - Operations – 2014.

9.1.1 Project Construction Impact

The intersection of Old Punt Road / Pacific Highway performs acceptably at LoS B in the future year AM peak hour when construction traffic is present on the local road network. It will also operate with spare capacity in the future years. Even if construction extends into 2014, the intersection is expected to perform acceptably in the future year AM peak hour.

9.1.2 Operations Impact

The intersection of Old Punt Road / Pacific Highway continues to perform at LoS A and B in the 2014 AM and PM peak hours respectively, and with minimal average delays and significant spare capacity.

9.2 Conclusions

The intersection of Old Punt Road / Pacific Highway will perform acceptably when both construction and operations traffic is present on the local road network in the future years. Therefore, the Project generated traffic is considered to have a small impact on the intersection and the local road network. It is also noted that the construction traffic will be of a temporary nature.

No infrastructure upgrades are therefore required; however it is recommended that a CTMP be prepared for all Project construction. This would include measures such as:

- where practical, containing heavy vehicle movements to off-peak hours when traffic volumes are typically at a minimum;
- ensuring heavy vehicles engaged in construction meet the Australian Road Rules and RTA standards so that road safety is not compromised;
- notifying the local community by means of public notice publications and advertisements on the progress of the Project and the scheduling of works so as to inform the local community of any additional vehicles added onto the local road network;
- transporting oversized equipment and machinery in accordance with the RTA guidelines for oversized movements; and
- implementing appropriate signage to warn road users of the presence of construction vehicles as well as changes to the normal traffic conditions.

Both location options for linking the gas plant access road into the TAC northern access road at a priority controlled T-junction meet the RTA design standards for Safe Intersection Sight Distance. Detailed geometric design of the selected intersection would be required, to ensure the intersection can accommodate heavy goods vehicles / tankers proposed for use at the gas plant.

10.0 References

10.1 State and Regional Strategic Planning Policies

- State Infrastructure Strategy, New South Wales 2006-07 to 2015-16, New South Wales Treasury
- Lower Hunter Regional Strategy 2006-31, NSW Government Department of Planning, October 2006

10.2 Standards and Guidelines

- Guide to Traffic Generating Developments, RTA, 2002
- Road Design Guide, Section 4 Intersections At Grade, RTA, January 2000

10.3 Documents and Reports

- Pacific Highway Upgrade – F3 Freeway to Raymond Terrace Concept Design Report June 2008, Maunsell
- F3 to Raymond Terrace, Upgrading the Pacific Highway, Concept Design, July 2008, RTA
- Tomago Gas Fired Power Station, EIS, Volume 1 Main Report, May 2002