

# **Australia Pacific LNG Project**

## **Volume 5: Attachments**

### **Attachment 35: Traffic and Transport**

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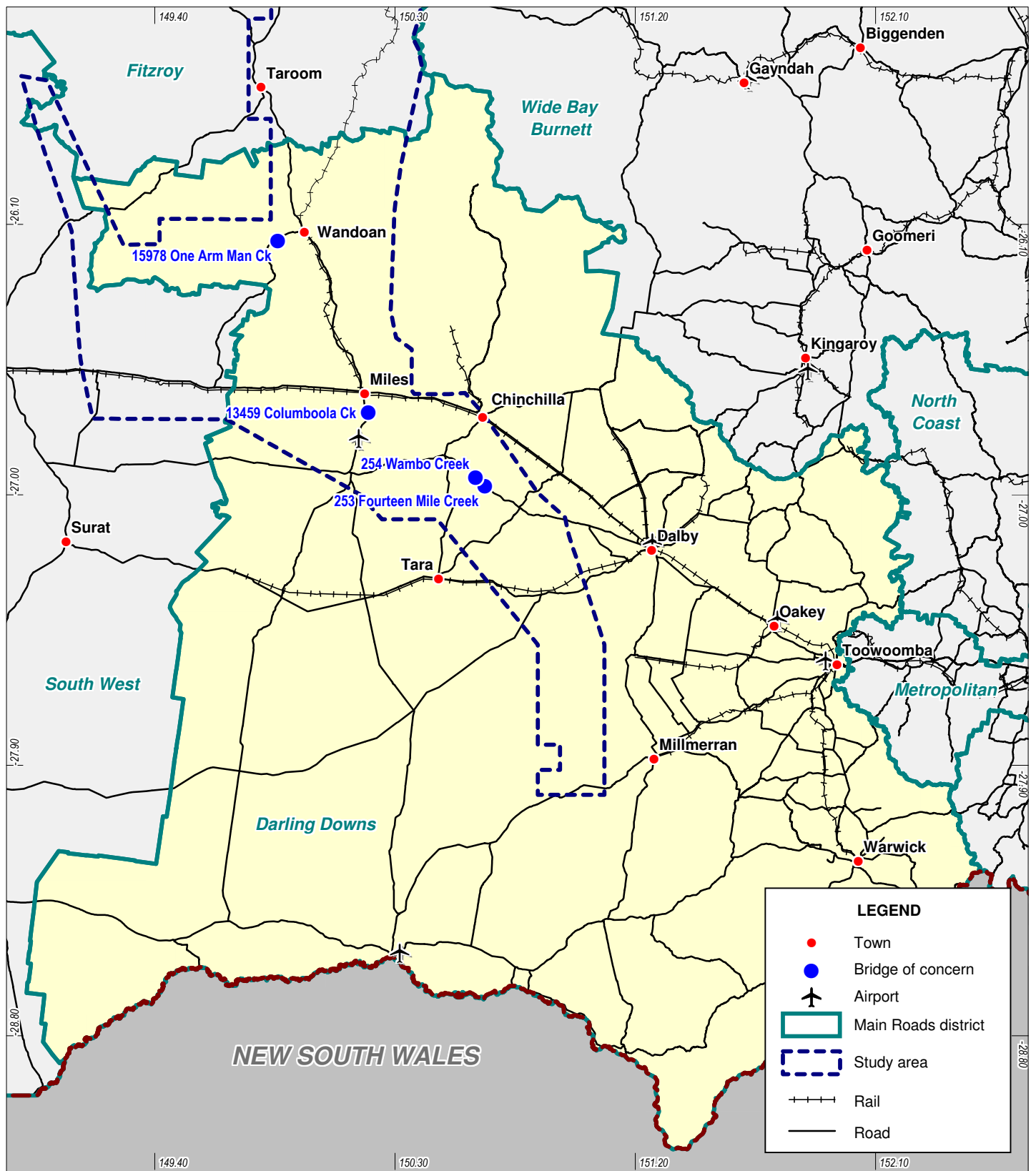
Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.			
Dawson Highway/Aerodrome Road	Four- way signalised	The existing intersection will operate within capacity to 2014 under background traffic only.	The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.
		The Project's traffic will have an impact on the operation of the existing intersection, resulting in the capacity being reached during the first peak construction year of 2013, which corresponds to the first peak year of the development associated with the construction of trains one and two.	
		Alteration works recommended for the intersection include:	Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.
		<ul style="list-style-type: none"><li>• Additional stand-up lanes on both Dawson Highway approaches. This is consistent with the planned mid block alteration between Aerodrome Road and Philip Street to six-lanes.</li></ul>	
Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.			
Dawson Highway/Chapman Road/Harvey Road	Two-lane roundabout	The existing intersection will operate within capacity to 2014 under background traffic only.	The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.
		The Project's traffic will have an impact on the operation of the existing intersection resulting in the capacity being reached during the first peak construction year of 2013.	
		Alteration works recommended for the intersection include:	Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential
		<ul style="list-style-type: none"><li>• Signalisation of the intersection.</li></ul>	



Bridge ID	Road		Structure / Location	Restriction	
	No.	Name / T Dist		Type	Restriction
		Wandoan Road T Dist: 69.27	Creek Bridge – 69.3km north of Jackson		operating under excess mass guidelines or excess mass permits.
15978	4302	Jackson-Wandoan Road T Dist: 70.21	One Arm Man Creek Bridge – 70.2 km north of Jackson	Mass	One Arm Man Creek Bridge is CLOSED to: <ul style="list-style-type: none"> <li>Vehicles operating under excess mass guidelines or excess mass permits.</li> <li>Vehicles with a Gross Vehicle Mass (GVM) greater than 30 tonnes.</li> </ul>

In addition to the above, the following bridges were identified during site inspections as being of concern and are highlighted as possible constraints. The locations of the bridges of concern are shown on Figure 2.18 and include;

- Bridge ID 250 - Kogan Creek Bridge is a narrow timber bridge on Kogan-Condamine Road near Warra Kogan Road
- Bridge ID 253 - Fourteen Mile Creek Bridge on Kogan-Condamine Road is out of commission with a diversion for vehicles in place that is prone to flooding
- Bridge ID 249 – Braemer Creek Bridge is a narrow timber bridge on Dalby-Kogan Road
- Bridge ID unknown (U1) – An additional closed timber bridge on Dalby-Kogan Road between Braemer Creek (249) and Condamine River (247). This bridge has not been identified by DTMR and no ID number or other information has been provided
- Bridge ID unknown (U2) – Ashall Creek Bridge is a closed bridge with a diversion prone to flooding on Dalby-Cecil Plains Road between Oaky Creek Bridge (238) and Condamine River (8674). It is noted that the RIP identifies replacement of the bridge in the period 2009 – 2011.



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**Figure 2.18 Darling Downs bridges of concern**



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 resources & energy



Project No: 301001-00448

Figure: 00448-00-EN-DAL-0361

Rev: 0

## South West Region

There are no bridges of concern within the DTMR South West Region that are within the study area.

### 2.3.5 Traffic incident history

There are many contributing factors to traffic accidents. These include environmental factors such as road condition, lighting and weather, driver error or impediments such as fatigue, alcohol and drugs and vehicle factors such as worn tyres, faults and general un-roadworthiness. Origin Energy and ConocoPhillips consider worker safety as one of their highest priorities and accordingly place a high emphasis on minimising the risk to its workers using the road network.

Information on traffic incident history from April 2003 to March 2008 was obtained from DTMR for the Fitzroy, Darling Downs and South Western Main Roads Regions. The information obtained includes crash details such as:

- Location
- Severity
- Crash type
- DCA codes
- Other contributing factors.

Traffic incident data captured by DTMR provides information on the factors contributing to incidents particularly in relation to environment factors (e.g. weather and lighting conditions, road geometry). Unfortunately, it is generally unable to provide information on driver and vehicle factors. It is therefore important to not only to make the road environment as safe as possible, but also to ensure that Project traffic operates and uses the road network safely by formulating safe driving strategies such as speed limiting, fatigue management and vehicle safety checks.

### *Assessment methodology*

The assessment methodology adopted in assessing traffic incident history on the road network involved the following:

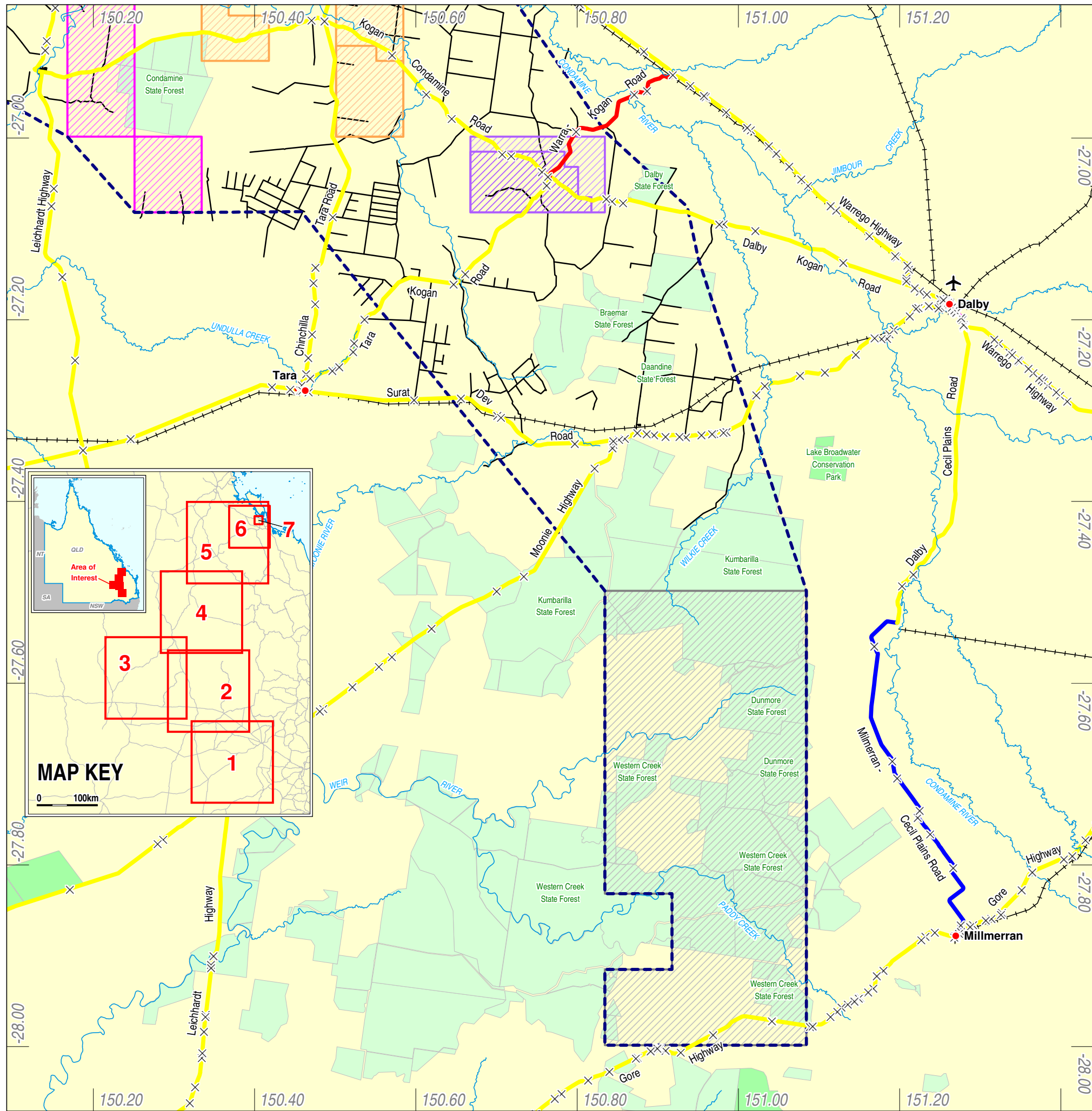
- Calculation of the ratio of number of crashes per million vehicle kilometres travelled (C/MVKT) for each of the road links in the study area
- Interrogation and discussion of the crash data with respect to the definitions for coding accidents (DCA) on particular road links and likely causes/remedies
- Further analysis of the crash data to discover any locations in the network including intersections and road bends, where particular types of accidents, including the potential for driver related errors, are common.

In order to make the assessment, the links were assigned a level of risk according to banded C/MVKT ratios. These are given in Table 2.10 below.

**Table 2.10 Crash risk parameters**

C/MVKT Range	Risk
0 – 0.5	Low risk
0.5 – 1.0	Medium risk
1.0 – 1.5	High risk
> 1.5	Very high risk

A map showing crashes per MVKT is given in Figure 2.19 to Figure 2.25.



### LEGEND

#### Walloons Gasfield Development Areas

- Combabula / Ramyard
- Woleebie
- Carinya
- Condabri
- Talinga / Orana
- Dalwogan
- Kainama
- Gilbert Gully

#### Crash Analysis Results



C/MVKT Range	Risk
0 - 0.5	Low risk
0.5 - 1.0	Medium risk
1.0 - 1.5	High risk
> 1.5	Very high risk

- Town
- Airport
- Railway
- Road
- National park
- State forest
- Study area

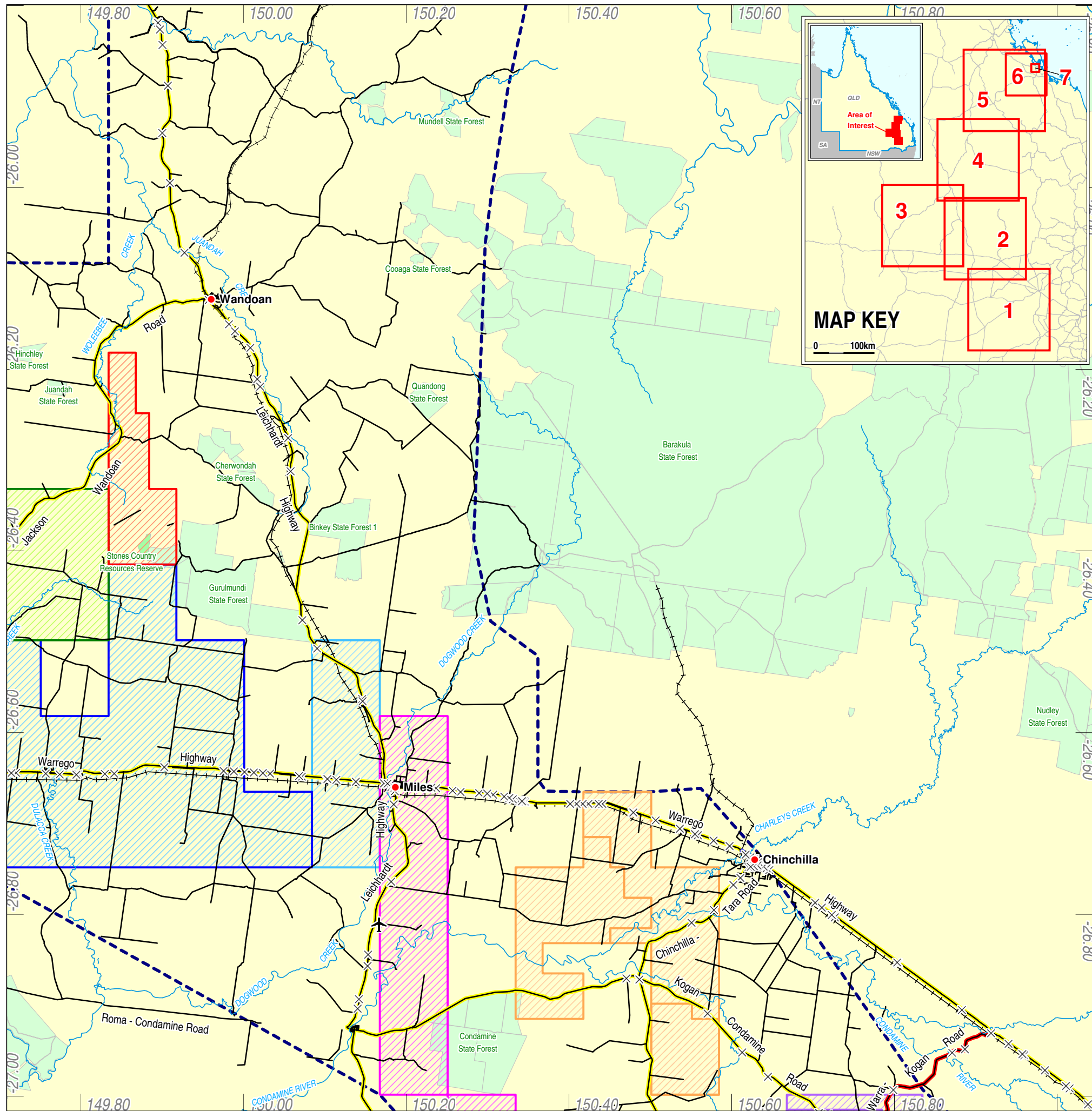
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<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 2.19 Crash Analysis Results (Map 1)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0345			Rev: 0





LEGEND

- Walloons Gasfield Development Areas**



  - Combabula / Ramyard
  - Woleebee
  - Carinya
  - Condabri
  - Talinga / Orana
  - Dalwogan
  - Kainama
  - Gilbert Gully
- Town
  - Airport
  - Railway
  - Road
  - National park
  - State forest
  - Study area

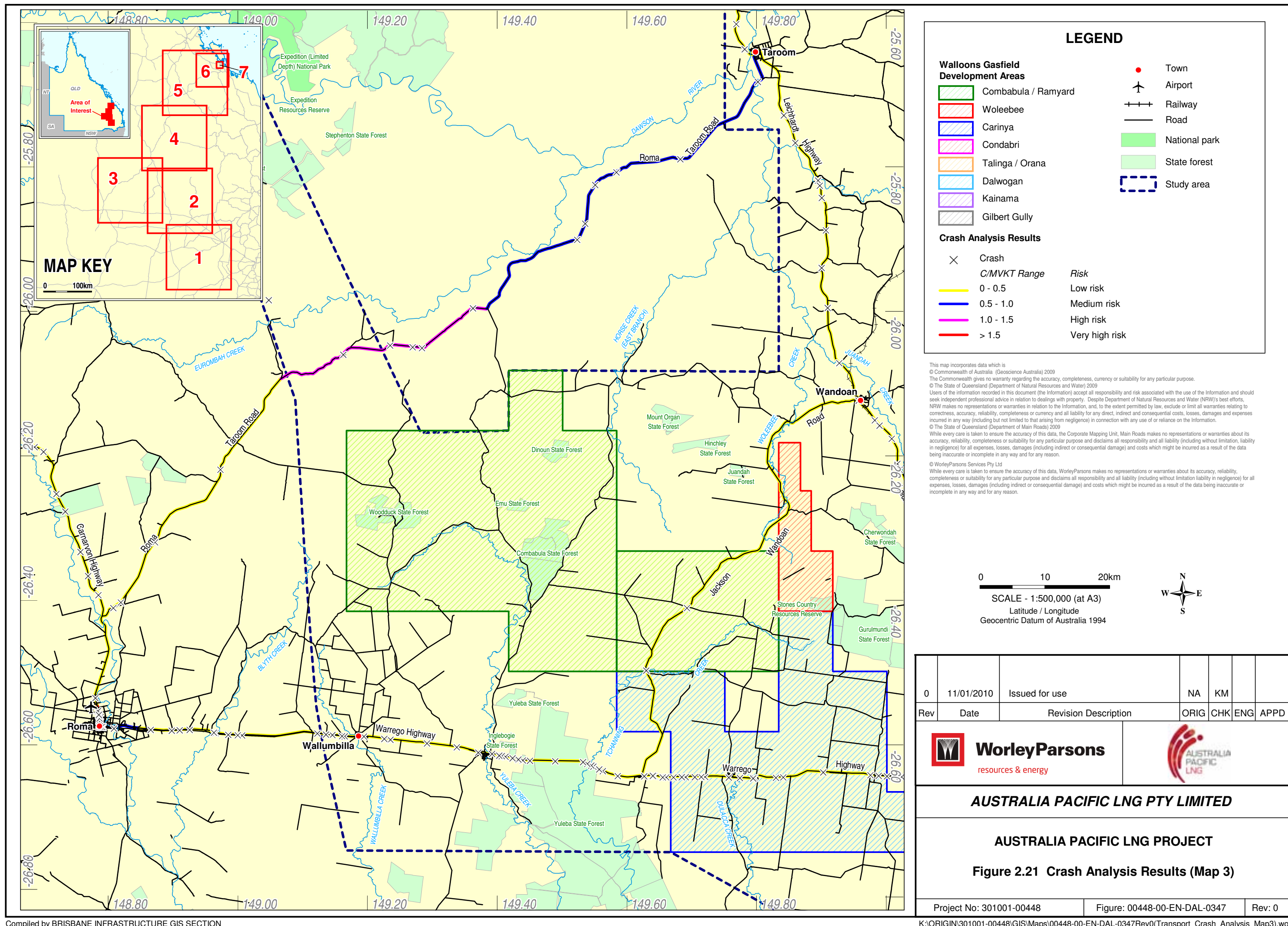
- Crash Analysis Results**
- |              |              |                |
|--------------|--------------|----------------|
| ×            | Crash        |                |
|              | C/MVKT Range | Risk           |
| Yellow line  | 0 - 0.5      | Low risk       |
| Blue line    | 0.5 - 1.0    | Medium risk    |
| Magenta line | 1.0 - 1.5    | High risk      |
| Red line     | > 1.5        | Very high risk |

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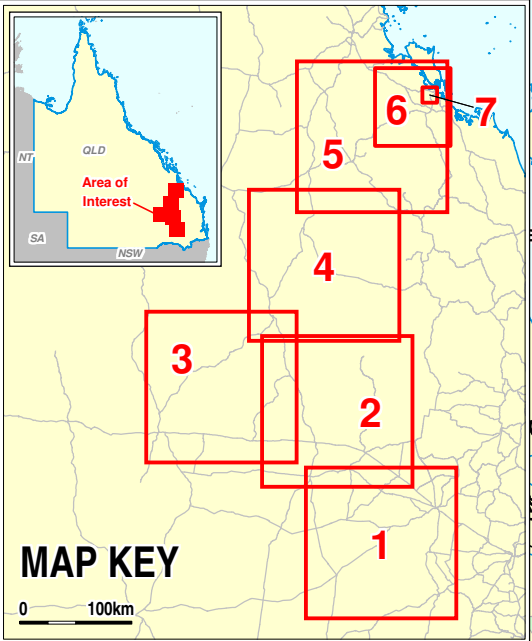
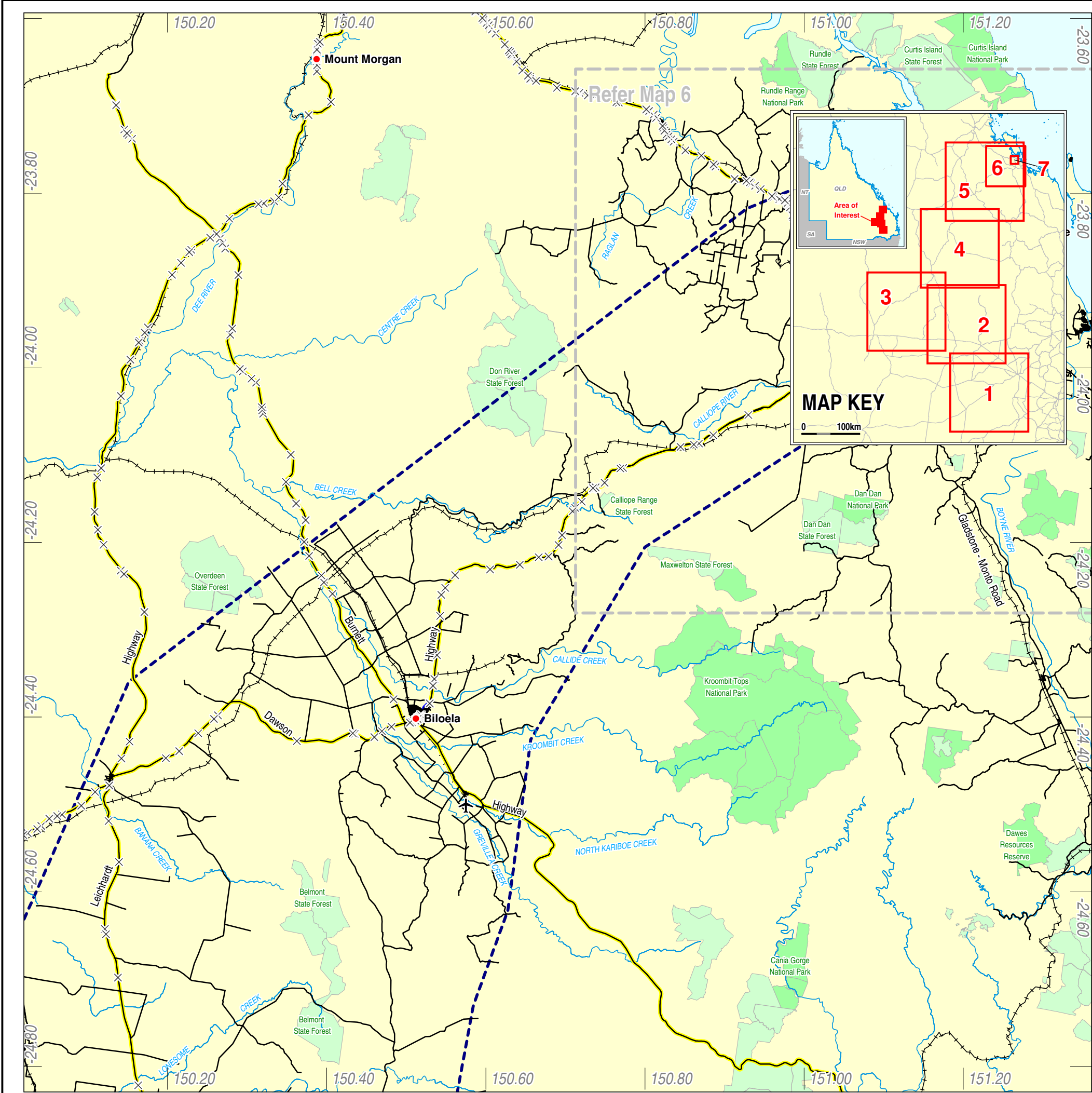


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<b>Figure 2.20 Crash Analysis Results (Map 2)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0346			Rev: 0









### LEGEND

●

Town

✈

Airport

—+—+—

Railway

—

Road

National park

State forest

Study area

### Crash Analysis Results

×

Crash

—

C/MVKT Range

Risk

—

0 - 0.5

—

0.5 - 1.0

—

1.0 - 1.5

—

> 1.5

Low risk

Medium risk



High risk

Very high risk

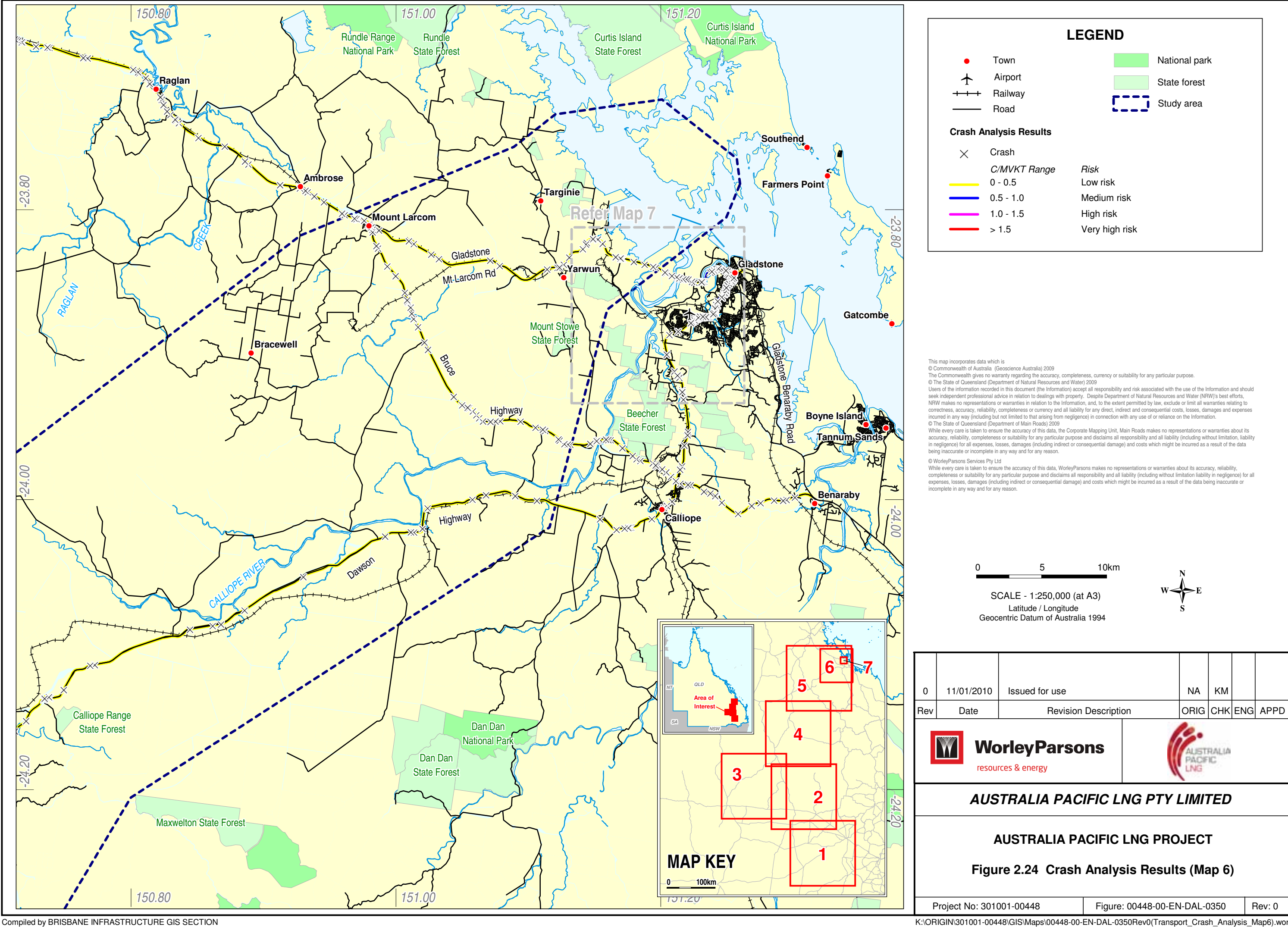
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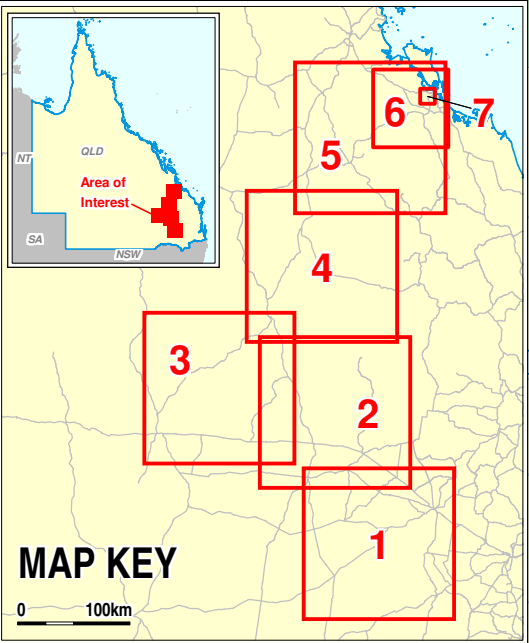
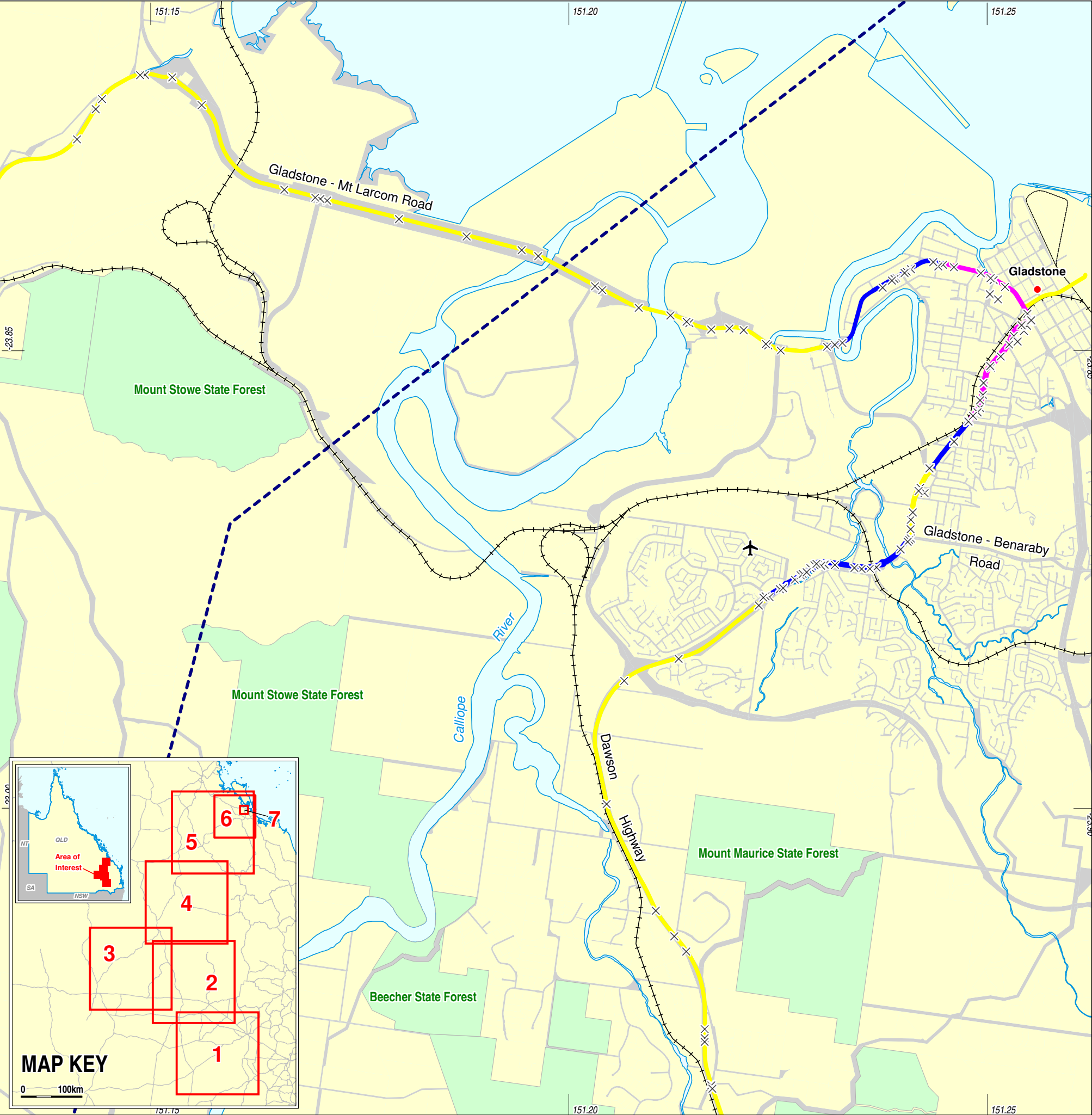


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<b>Figure 2.23 Crash Analysis Results (Map 5)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0349			Rev: 0









LEGEND

- Town
- Airport
- Railway
- Road
- National park
- State forest
- Study area



Crash Analysis Results

- Crash
- C/MVKT Range
- Risk
- 0 - 0.5
- 0.5 - 1.0
- 1.0 - 1.5
- > 1.5
- Low risk
- Medium risk
- High risk
- Very high risk

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<b>Figure 2.25 Crash Analysis Results (Map 7)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0351			Rev: 0



Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Dawson Highway/Don Young Drive	Priority controlled T-intersection	<ul style="list-style-type: none"> <li>Provision of two stand-up lanes on each of the Dawson Highway approaches consistent with the planned mid block alteration to a four-lane road.</li> <li>Free left turn lane all approaches.</li> <li>Dual right turn lanes on Dawson Highway into Chapman Drive and a single right turn lane on Dawson Highway into Harvey Road.</li> </ul>	alterations to meet the increased demands on the intersection..
		Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.	
		The existing intersection will operate within capacity to 2018 under background traffic only.	The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.
		<p>The Project's traffic will have an impact on the operation of the existing intersection resulting in the capacity being reached by 2017.</p> <p>The recommended alteration is signalisation of the existing intersection.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.
Dawson Highway/Kirkwood Road	Priority controlled T-intersection	The existing intersection will operate within capacity for the full planning horizon under background traffic only.	The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.
		The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.	

### ***Traffic incident history - very high risk roads***

Roads segments within the study area with very high risk scores are given in Table 2.11.

**Table 2.11 Very high risk roads - identification**

Road		Chainage (km)		AADT	Accidents	C/MVKT
Name	No.	Start	End			
Surat Developmental Rd	86A	147.51	147.86	2,462	4	2.54
Warra-Kogan Rd	3403	0	22.86	47	4	2.03
Surat Developmental Rd	86A	146.95	147.51	1,618	3	1.81
Gore Hwy	28A	1.05	1.95	14,800	38	1.56

Details on the accidents on road links with very high risk scores are given below in Table 2.12.

**Table 2.12 Very high risk roads - discussion**

Road		Main Roads Region	Discussion
Name	No.		
Surat Developmental Rd	86A	Darling Downs	This section of the Surat Developmental Road is located in the main street of Tara to the west of Chinchilla-Tara Road. There have not been a significant number of accidents in this section of road; however two accidents have occurred at the intersection with Benn Street.
Warra-Kogan Rd	3403	Darling Downs	This road is located between the Condamine Road and the Warrego Highway. There have not been a significant number of accidents and 75% of the accidents in this section have occurred due to hitting objects or animals during daylight hours. This road is a sealed road with an 8m trafficable width. There have been no fatalities on this section of road.
Surat Developmental Rd	86A	Darling Downs	This section of the Surat Developmental Road is located in the main street of Tara to the east of Chinchilla-Tara Road. There has not been a significant amount of accidents on this section of road; however 75% of the accidents have occurred over the weekend.
Gore Hwy	28A	Darling Downs	This section of the Gore Highway is approximately one kilometre south of the Warrego Highway, Toowoomba. 76% of the 38 accidents on this section of road have been at intersections with 71% being at signalised intersections (South Street and Alderley Street). There have been no fatalities on this section of road.

### **Traffic incident history - high risk roads**

Roads segments with high risk scores are given in Table 2.13.

**Table 2.13 High risk roads - identification**

Road		Chainage (km)		AADT	Accidents	MVKT
Name	No.	Start	End			
Roma-Taroom Rd	4397	47.93	84.15	53	5	1.43
Gladstone-Mt Larcom Rd	181	0	1.345	8,312	25	1.22
Dawson Hwy	46A	0	1.5	13,010	43	1.21
Gore Hwy	28A	0	1.05	19,574	45	1.2
Warrego Hwy	18C	0	1.09	7,191	17	1.19

Details on the accidents on road links with very high risk scores are given below in Table 2.14.

**Table 2.14 High risk roads - discussion**

Road		Main Roads Region	Discussion
Name	No.		
Roma-Taroom Rd	4397	Fitzroy	This road provides local access between the township of Taroom and Roma via the Carnarvon Highway, to the southwest. This is a very low trafficked road with unsealed sections that are progressively being sealed. Most of the accidents in this section have occurred on unsealed, horizontal curves during the day. All of the accidents are single vehicle accidents. There have been no fatalities on this section of road.
Gladstone-Mt Larcom Rd	181	Fitzroy	This road runs west from Gladstone and links to the Bruce Highway. It changes its name along this route. This section of the road runs from the Dawson Road (Dawson Highway) intersection to Kingdon Street. It is a two lane divided road providing multiple access to a number of commercial properties. 60% of the accidents in the section of road have been at the intersection with the Dawson Highway. The majority of these are opposing vehicles turning on a right turn movement (DCA 202). Rear end crashes (DCA 302/202) and through vehicle movements (DCA 101) are the most common intersection crash types.
Dawson Hwy	46A	Fitzroy	This section of the Dawson Highway runs between Breslin Drive and Blain Drive within Gladstone. It is a two lane highway with a 60km speed limit. 25% of the 43 accidents were rear end collisions.
Gore Hwy	28A	Darling Downs	This section of the Gore Highway runs south from the intersection with the Warrego Highway in Toowoomba. It is a two lane highway with a 60km/hr speed limit. The majority of

Road		Main Roads Region	Discussion
Name	No.		
			accidents have occurred at the intersections with South Street (16), Stephen Street (11) and O'Quinn Street (3), and are associated with turning movements.
Warrego Hwy	18C	Darling Downs	This section of the Warrego highway heads west out of Dalby. It has a 60km/hr speed limit. There have been no fatal accidents and three of them occurring at intersections (Bunya Highway, Pratten Street and Nicholson Street).

### **Fatal accidents**

Locations in the study area that have recorded fatal accidents are described below in Table 2.15.

**Table 2.15 Fatal crash locations**

Location	No. of Accidents	Description
Gladstone – Mt Larcom 181 Road / Yaroona Street Intersection (ch 0.00 – 1.345)	1	This accident occurred when a vehicle turned into Gladstone Mt Larcom Road from the stop sign at Yaroona Street.
Dawson Highway 46A (ch 25.69 – 101.15)	3	This is a two lane undivided section of road signposted at 100km/hr. Two of the accidents occurred at night, and all three occurred on horizontal curves.
Burnett Highway 41E (ch 0.00 – 35.511)	1	This accident occurred at the intersection of Paynes Road in a 100km/hr speed zone at 6pm. The accident occurred on a right hand turn movement.
Leichhardt Highway 26A (ch 105.22 – 162.34)	1	This accident was a head-on collision in a 100km/hr zone at 4pm that occurred as a result of vehicles overtaking. The accident occurred on a horizontal curve.
Leichhardt Highway 26A (ch 192.23 – 238.958)	1	This accident occurred on a straight section of road at 10pm when a vehicle went out of control and hit an object.
Leichhardt Highway 26A (ch 238.958 – 256.508)	1	This accident occurred on a straight section of road at 11pm when a vehicle went out of control and hit an object.
Leichhardt Highway 26B (ch 0.00 – 60.47)	1	This accident occurred on a straight level section of road at 2am when the vehicle travelled off the carriageway and hit an object.
Leichhardt Highway 26C (ch 0.00 – 32.02)	1	This accident occurred at 5pm on a horizontal curve in a 100km/hr zone when the vehicle travelled off the carriageway and hit an object.
Leichhardt Highway 26C (ch 81.4 – 127.42)	2	One accident occurred at midday when a vehicle rear-ended another in a 100km/hr speed zone. No intersections were recorded at this accident location.



Location	No. of Accidents	Description
		The second occurred at the intersection with the Moonie Highway where another 3 accidents have been recorded. The fatal accident occurred as a result of a vehicle leaving a driveway.
Leichhardt Highway 26C (ch 127.42 – 176.37)	2	Both accidents occurred in daylight hours when the vehicle left the carriageway and hit an object.
Leichhardt Highway 26C (ch 176.37 – 205.21)	2	Both accidents occurred in daylight hours in a 100km/hr speed zone. One accident was due to a vehicle overtaking on a straight, level road and the other was due to a vehicle leaving the carriageway and hitting an object.
Gore Highway 28B (ch 49.92 – 121.55)	2	Both accidents occurred in daylight hours. One accident was a head-on collision in a 100km/hr zone, while the other was at the intersection with the Leichhardt Highway.
Gore Highway 28B (ch 0.00 – 49.92)	1	This accident occurred on a straight section of 100km/hr road when a vehicle left the carriageway and hit an object. The accident occurred during daylight hours.
Dalby – Cecil Plains Road 325 (ch 0.00 – 39.08)	1	This accident occurred at 4pm on a straight section of road when a vehicle left the carriageway and hit an object.
Moonie Highway 35A (ch 11.0 – 50.37)	1	This accident occurred at 1pm on a straight section of road when a vehicle left the carriageway and hit an object.
Dalby – Kogan Road 340 (ch 0.00 – 19.29)	1	This accident occurred at 9pm on a horizontal curve when two vehicles collided head-on in a 100km/hr zone.
Dalby – Kogan Road 340 (ch 19.92 – 47.682)	1	This accident occurred at 4pm on a horizontal curve when two vehicles collided head-on in a 100km/hr zone.
Warrego Highway 18C (ch 25.115- 45.195)	1	This was a head-on collision at 9am on a straight section of road
Gore Highway 28B (ch 5.59 – 35.57)	4	Two of the accidents occurred at night. The accidents involved head-on collisions, crashes at intersections, rear-ending and travelling off road.

### 2.3.6 Road train routes

Queensland Government's Main Roads identifies roads on its state network as suitable and desirable for use by road trains and similar large commercial vehicles generally referred to as a Multi-combination Vehicle (MCV). A MCV is defined as a large vehicle having at least two articulation points between units. Examples include B-Doubles and Road Trains, as well as many new innovative configurations such as B-Triples and AAB-Quads. Rigid vehicles and single-articulated vehicles (prime-mover and semi-trailer, or truck and pig trailer) are not considered to be MCVs, but the same principles apply in assessment of routes suitable for their operation. An Approved Heavy Vehicle Route provided by Queensland Transport is shown in Appendix B.

The MCV route within this study area is identified as on the following roads: Leichhardt Highway, Kogan Condamine Road, Chinchilla Tara Road, Moonie Highway, Warrego Highway, Dawson Highway, Carnarvon Highway, Gladstone Mount Larcom Road/Hanson Road, Glenlyon Road, Port Access Road, Blain Drive, Calliope River Road and Don Young Drive.

### **2.3.7 Roads prone to flooding**

A large proportion of the existing state and local government road infrastructure located within the study area, including proposed gas field facilities access roads will cross a number of water courses and/or are located in a floodplain and as such are susceptible to flooding.

WorleyParsons has undertaken a riverine flooding investigation including modelling of various scenarios. The outcomes of this investigation are reported upon in the EIS Technical report "Gas Field Flooding Investigation" Nov 2009.

This report concluded that most state and local government roads were shown to be inundated at waterway crossings due to the style of the crossings which are dominant throughout the study areas, namely floodways and natural crossings. Some major road corridors including the Warrego Highway and Leichhardt Highway were also shown to suffer from inundation in the 10 year Average Recurrence Interval (ARI) rainfall event at a number of discrete locations. Some of the key roads affected that provide access to the gas fields are discussed below.

The Jackson Wandoan Road runs adjacent to the Woleebee Creek main channel through the study area with several crossings of the creek and flood plain. Large stretches of this road are predicted to be inundated for all rainfall events modelled, particularly in the northern parts of the study area where the road alignment is located in the flood plain. In the upper reaches of the catchment Jackson Wandoan Road crosses well defined channels where inundated sections are considerably shorter in length.

The Warrego Highway crossing of Dogwood Creek at Miles is predicted to be inundated for all rainfall events modelled as part of this investigation. Inundation varies from approximately 150mm to 2.5m during the 10 and 100 year ARI events respectively. Model results predict the Leichhardt Highway to be inundated for all events modelled at a discrete location approximately 1200m south of Miles. This area is adjacent to the Miles golf course and is a marked low point in the surrounding topography.

Further south along the Leichhardt Highway and Kogan-Condamine Road in the vicinity of the township of Condamine the model predicts that significant road inundation could occur at this location. The Dalby Kogan Road/Kogan Condamine Road runs from south east to north west across the study area. The road is inundated at the crossings of various tributaries either side of Kogan, and at the crossing of Kogan Creek at Kogan. The Kogan Tara Road south of Kogan is predicted to experience some inundation during the larger rainfall events modelled as part of this investigation.

### **2.3.8 Public and active transport network**

#### ***Bus passenger services***

Buslink Queensland operates a ten-route urban passenger service within Gladstone and the surrounding region. At present, scheduled services operate in Gladstone City and between Gladstone and Boyne Island, Tannum Sands, Awoonga Dam, Calliope and Benaraby.



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### ***School bus services***

Buslink Queensland provides transport to more than 1500 primary and secondary students twice daily across Gladstone and surrounding regions. Currently, the service extends to a radius of approximately 50km from the centre of Gladstone to 30 schools along 35 routes.

### ***Taxis***

Blue and White Cabs is the only provider of taxis within the Gladstone region and is the only passenger service to operate twenty-four hours per day. Blue and White cabs also provide shuttle services during peak demands to the Gladstone Airport, Gladstone Port and nightclub precincts.

### ***Pedestrian and cycle networks***

Gladstone Regional Council provides maps for existing and future pedestrian and bicycle networks for Gladstone, Boyne Island, Tannum Sands and Calliope. The network comprises a range of formal and informal footpaths and shared pedestrian/cycle paths.

The Gladstone Integrated Regional Transport Plan (GIRTP) Action Plan for walking aims to promote walking by improving existing and future walking networks to enhance and support walking as a viable alternative to private travel over short distances.

The GIRTP recognises Gladstone as having a fairly extensive bicycle network as compared to other regional centres. The existing Gladstone city network provides direct links to a number of major community and shopping facilities, such as the TAFE college and the airport, and a number of major employers such as the Gladstone Power Station and the Hospital.

The GIRTP Action Plan for cycling aims to build upon the existing cycling infrastructure by updating the existing regional cycle plan to enhance bicycle travel as a viable, convenient and safe mode of travel.

## **2.3.9 Stock routes**

Stock routes are pathways for travelling stock on roads, reserves, unallocated state land and pastoral leases. Queensland's stock route network (SRN) provides pastoralists with a means of moving live stock (on the hoof) around the state's main pastoral districts, as an alternative to trucking and other contemporary transport methods.

A stock route may be a route ordinarily used for moving stock on foot or a road that is declared in the Land Protection Regulation 2003 to be a stock route. Most stock routes are on public roads that may also carry traffic and public utilities.

Stock routes are administered by the Department of Environment and Resource Management (DERM). From a period of decline in the 1950 and 1960's where the growth in road transport negated their role, the recent increase in fuel prices and climatic impacts such as drought has meant the SRN has provided a cost-effective alternative for transporting stock.

Queensland Government has prepared the Queensland Stock Route Network Management Strategy 2009–14 under the Land Protection (Pest and Stock Route Management) Act 2002. Section 98 of the Act requires the chief executive of DERM to prepare a state strategy to direct and coordinate management of the SRN.

The strategy has a number of goals;

Goal 1: To enhance strategic direction and coordination

Goal 2: Enhanced approaches to management

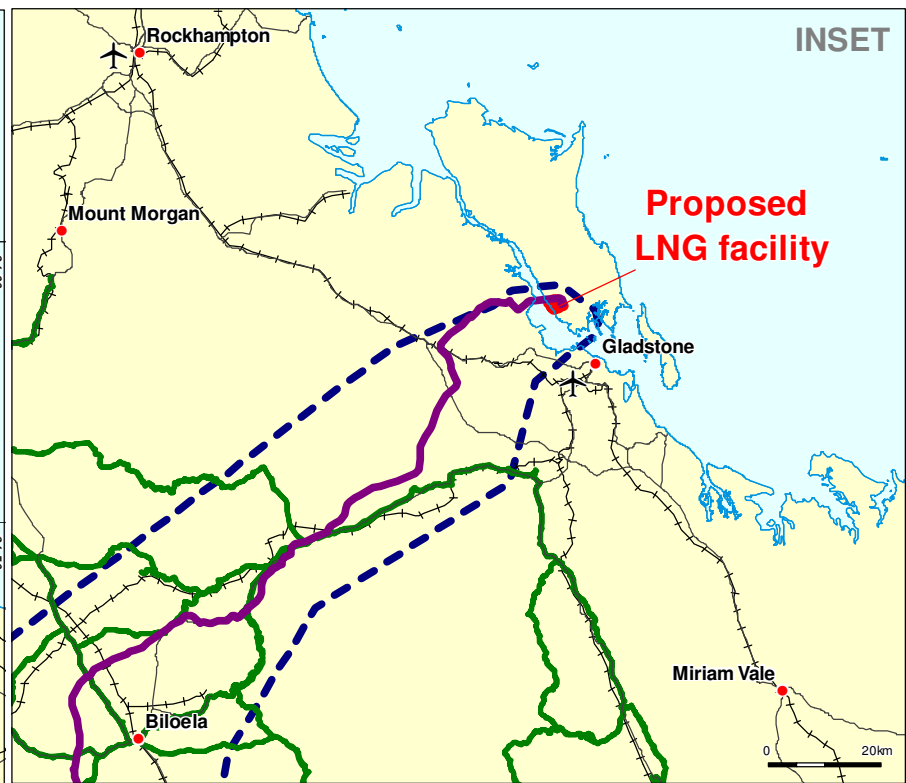
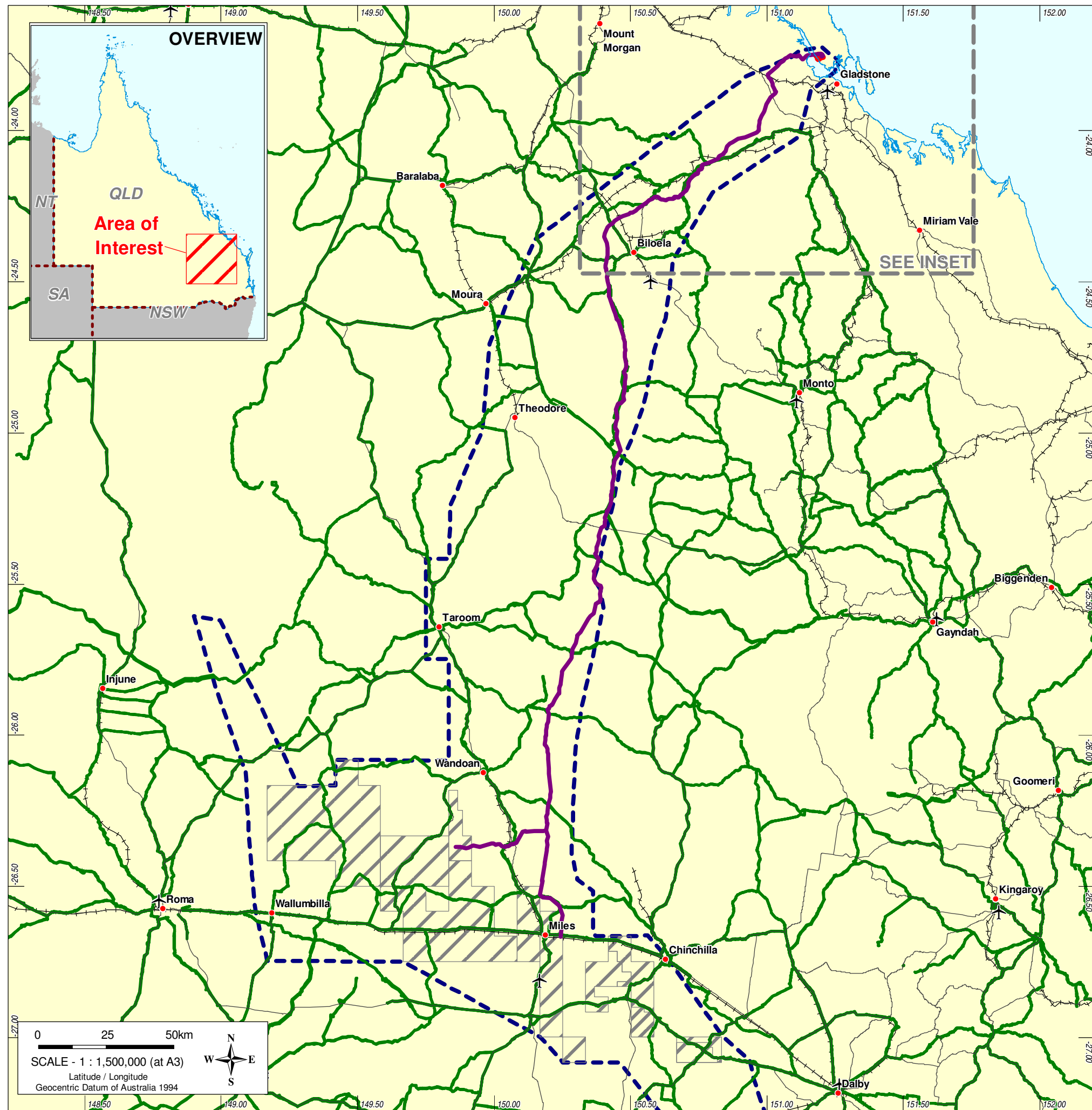
Goal 3: Improved commitment

Stock routes are divided into four classifications for operational and management purposes. The classification is determined by permit data obtained from local governments and is classified by average usage over a five year period (see Table 2.16 below).

**Table 2.16 Thresholds for stock route classifications**

Classification	Cattle equivalent for a five year period
Primary	>9000
Secondary	3000–9000
Minor	<3000
Inactive	local and unrecorded movements



Figure 2.26 below identifies the stocks routes within the study area as recorded by DERM.



#### LEGEND

- Town
- Aircraft facility
- Railway
- Road
- Preferred pipeline alignment
- Stock route
- Walloons gasfield development area
- Study area

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Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 <b>WorleyParsons</b> resources & energy						
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 2.26 Stock Routes</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0333			Rev: A

## 2.3.10 Existing capacity assessment

### *Roadway link capacity*

An assessment of the existing road network within the study area has identified a number of road links that are either currently over capacity or will reach capacity under existing background traffic growth by the commencement of the assessment timeframe i.e. year 2010. These road links are listed in Table 2.17.

**Table 2.17 Existing road links at capacity**

No	Road	Start	End	Capacity	Existing AADT	Year at which capacity was reached
28A	Gore Hwy	0	1.05	16,000	19574	Currently over capacity
28A	Gore Hwy	1.95	3.52	16,000	14652	2010

### *Intersection capacity*

Assessment of the existing intersections within the study area has identified a number of intersections that are either currently over capacity or will reach capacity under existing background traffic growth by the commencement of the assessment timeframe i.e. year 2010. These intersections are listed in Table 2.18.

**Table 2.18 Intersection capacity pre-Project**

Intersection	Intersection Type	Year at which capacity was reached
Hanson Rd/Blain Dr/Alf O'Rourke Dr	Roundabout	2010
Glenlyon St/Bramston St/Dawson Rd	Signals	Currently over capacity

### *Pavement capacity*

Assessment of the existing road pavements within the study area has identified a number of state controlled road pavements that have currently reached their terminal roughness. These road pavements are listed in Table 2.19.

**Table 2.19 Pavements at terminal roughness**

Road Section	Terminal Roughness	Current Roughness Count
<b>Fitzroy Region</b>		
Leichhardt Hwy - 26C: Ch176.37 to Ch205.21	120	116
Leichhardt Hwy - 26C: Ch223.67 to Ch224.14	120	200
Eidsvold - Theodore Rd - 454: Ch77.4 to Ch92.118	175	179
Burnett Hwy - 41D: Ch92.811 to Ch93.811	120	139

Road Section	Terminal Roughness	Current Roughness Count
Burnett Hwy - 41E: Ch101.2 to Ch102.83	120	117
<b>Darling Downs Region</b>		
Warrego Hwy - 18C: Ch0 to Ch1.09	120	122
Warrego Hwy - 18C: Ch25.115 to Ch45.195	120	112
Moonie Hwy - 35A: Ch0 to Ch2.5	120	127
Moonie Hwy - 35A: Ch2.5 to Ch11	120	109
Surat Developmental Rd - 86A: Ch142.67 to Ch146.95	120	137
Surat Developmental Rd - 86A: Ch147.51 to Ch147.86	120	133
Surat Developmental Rd - 86B: Ch0 to Ch0.05	120	174
Surat Developmental Rd - 86B: Ch0.05 to Ch0.6	120	174

### 2.3.11 Road network – summary of existing conditions

The existing road network can largely be divided in two areas, namely the Gladstone region and the road network centred around the proposed gas fields.

The two primary routes that will be used by Project traffic in Gladstone will be the state controlled Dawson Highway and the Gladstone-Mount Larcom/Hanson Road.

The Dawson Highway acts as the primary access route for vehicles entering and leaving Gladstone from the south as well as the recent and planned residential development along this southern corridor. There are a number of intersections that are at or reaching capacity and will need to be altered. The addition of this and the other major Project traffic on this road network will likely bring forward these required alterations.

Similarly the Mount Larcom/Hanson Road acts as the primary access route to the Bruce Highway heading north. This area to the west of Gladstone has been identified by the state and local government for major industrial development that will require improvements to a road that is already experiencing capacity constraints on many of its intersections.

Both roads have been identified by Main Roads in their statement of intent as requiring alterations to accommodate future traffic growth.

Heading south from Gladstone the state highway network generally has more than sufficient capacity to handle existing and projected volumes. One area of concern has been the Dawson Highway as it traverses the Calliope Range. The existing narrow and steep climbs are an accident risk and source of delay for freight traffic. In recognition of this issue the RIP has identified a \$70 million for an alteration of this section of the Highway.

Within the gas fields itself the key issue on existing conditions relate to road bridges and road formations along local government controlled roads. A number of road bridges on state controlled roads that will be utilised by Project traffic have load limits or have already failed and temporary road diversions exist.



Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Dawson Highway/Bruce Highway	Four way priority controlled	<p>The existing intersection will operate within capacity to 2012 under background traffic only.</p> <p>The Project's traffic will have a minor impact upon the operation of the existing intersection and will not result in bringing forward the need for the alteration earlier than 2012.</p> <p>DTMR is planning an alteration to a grade separated interchange.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>
Hanson Road/Blain Drive/Alf O'Rourke Drive	Four-way, single-lane roundabout	<p>The existing intersection currently fails during the AM peak hour under background traffic only.</p> <p>The Project's traffic will have a worsening effect on the intersection performance, particularly during the peak construction years of 2013 and 2019.</p> <p>The recommended alteration works include:</p> <ul style="list-style-type: none"> <li>• Two circulating lanes.</li> <li>• Additional approach lane on Blain Drive.</li> <li>• Hanson Road (W) approach alteration to four-lanes, consistent with mid block alteration planning.</li> </ul> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>
Hanson Road/Red Rover	Three-way	The existing intersection will operate within capacity to 2016 under background	The alteration works described adjacent



A number of local council roads identified as potentially being used by Project traffic experience very low volumes, and as such are unsealed with a trafficable width of less than 5m.

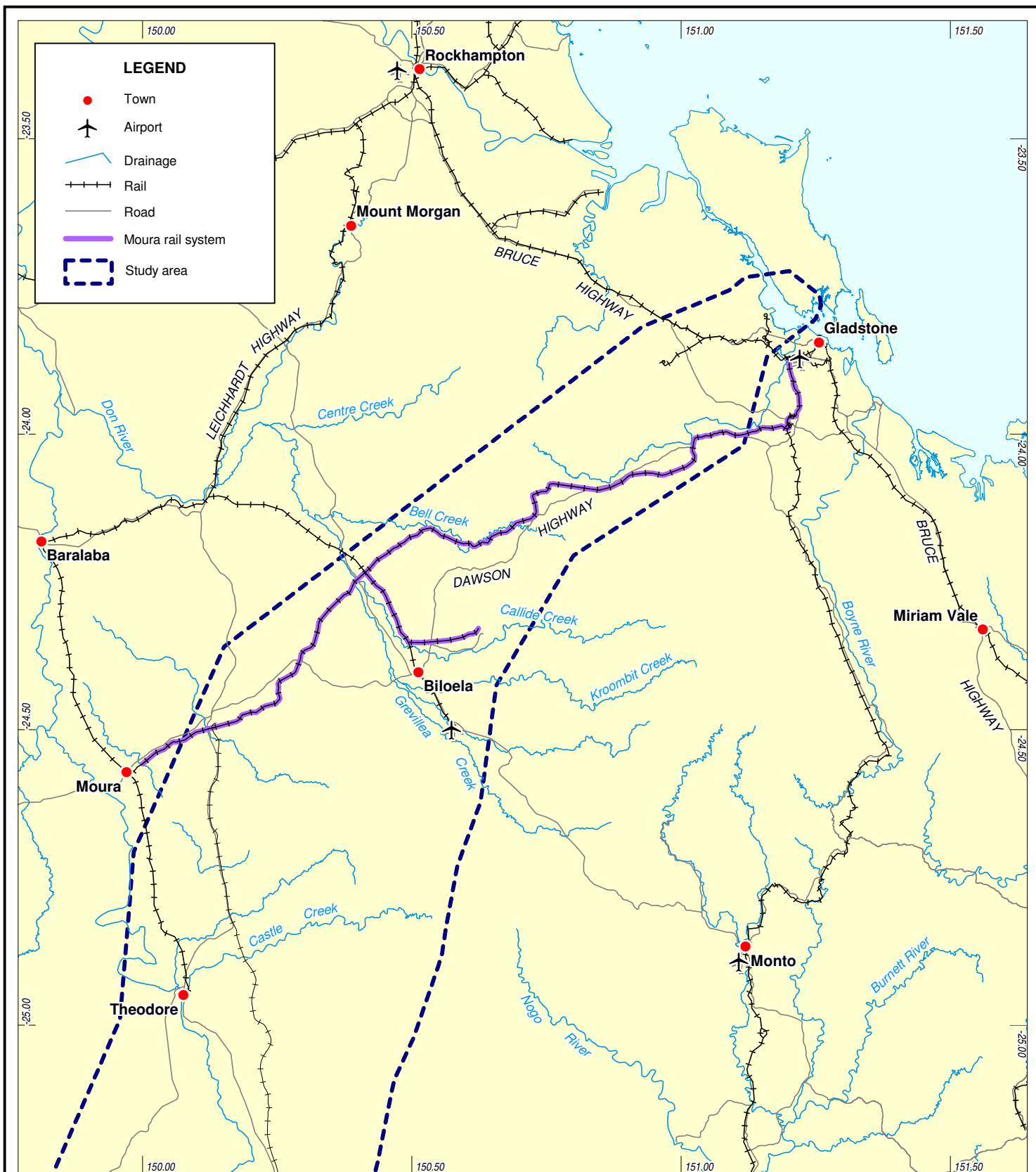
## **2.4 Rail network**

There are two Queensland Rail systems that access the Area of Investigation Study Area. These are:

- The Moura System
- The Western Line (part of the Western System)

### **2.4.1 The Moura System**



The Moura Line is shown in Figure 2.27.



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<b>AUSTRALIA PACIFIC LNG PROJECT</b>		
<b>Figure 2.27 Moura Rail System</b>		
Project No: 301001-00448	Figure: 00448-00-EN-DAL-0334	Rev: 0



The Moura System services the coal mines of Dawson, Baralaba, Boundary Hill and Callide. Coal is transported to Gladstone Power Station, Comalco Aluminium Refinery, Queensland Alumina Limited (QAL) and the Port of Gladstone. The route is a single line with passing loops, which have recently been extended to allow 'Blackwater' size trains to operate in this system.

The Moura Line carried 11.9MT of coal in 2006/7. The infrastructure is in fair condition.

### ***Future growth***

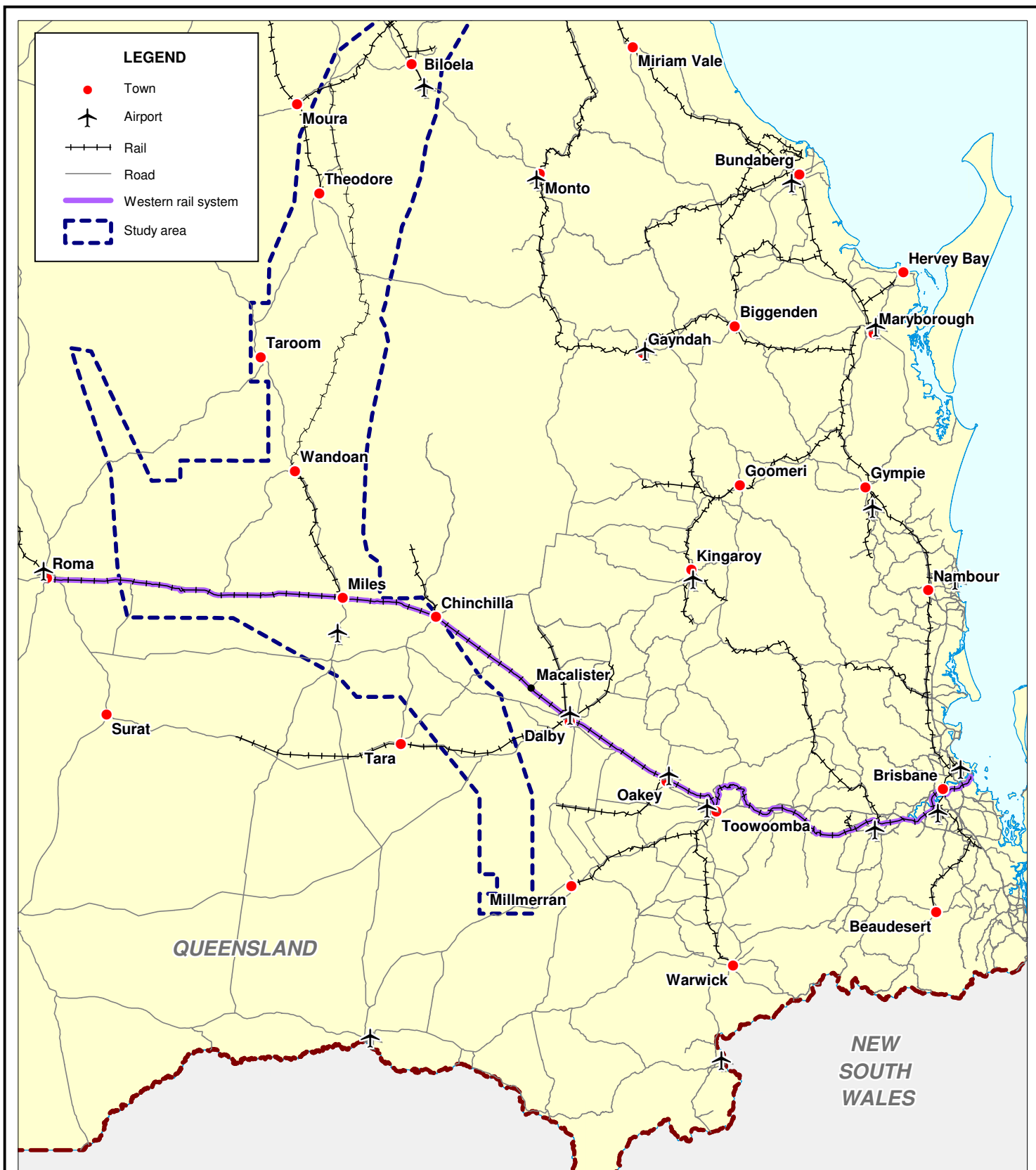
There are a number of major plans for this system. The Projects are listed below in order of their current priority in the Coal Master Plan. The Projects are in general triggered by expansion to increased tonnage (Million Tonnes (MT) per year) instead of by time. The tonnages shown in Queensland Rail's (QR) planning are maximum capacities for the Blackwater and Moura Systems combined. The timing will depend on world markets for coal, but expansion to 200MT would appear to be a long term possibility.

- 76MT Endorsed or Committed: - In the Gladstone Area:
  - Spur from Callemondah Complex towards the Port and extension of No. 2 Arrival Road at Callemondah Yard
- 76MT Endorsed or Committed:- In the Moura System:
  - Byellee Angle
  - Loop extensions in the Moura System
  - Early works for Wiggins Island Coal Terminal
- Expansion Project: The Surat Basin Railway (Under study - depends on new Wandoan area mine)
  - A consortium of Xstrata, QR, and ATEC has exclusive rights to construct approximately 210 kilometres of new railway to connect the Western Railway near Wandoan with the Moura System.
  - It proposes a single track with ultimately up to 8 passing loops and an ability to cater for 22-24 trains, each up to 2.5km long, every day.
- 120MT: In the Gladstone Area: The Moura Link Project:
  - Development of the Moura Link, a link from the Moura Line to Aldoga
  - A new rolling stock maintenance and provisioning yard at Aldoga
  - Quadruplicating the North Coast Line between Mt Larcom and the new Wiggins Island infrastructure
  - Additional tracks along the East End Mine branch line
  - Provision for future tracks
  - Provision of rail access for third party operators
- 120MT: In the Moura System:
  - Moura Link Junction to Fry duplication
  - Annandale to Belldleen duplication

- 
- Additional passing loops (Mt Rainbow – Dumgree, Beldean – Moura Mine)
  - Formation and structures strengthening
  - Holding roads at SBR Junction
  - 200MT: In the Gladstone Area:
    - Extra rail loops to service additional unloading facilities at WICT, to be located adjacent to NCL
    - Triplication between Aldoga and Callemondah on North Coast Line
    - Additional track to support traffic to WICT
  - 200MT: In the Moura System:
    - Full duplication of Moura System
    - New or altered link Monto to Moura System

#### **2.4.2 The Western System**



The Western System includes all lines west of Ipswich. The line generally between Toowoomba and Roma is within the geographical area of the Project. This is shown in Figure 2.28.



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Scale 1: 2,500,000 (at A4)  
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**Figure 2.28 Western Rail System**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0335

Rev: 0

This line carries a mix of long distance passenger trains, grain trains, general freight, livestock, and coal trains.

The rail infrastructure is of a relatively low engineering standard, although in good condition for its age and type.

Coal is carried from the Surat Basin coal mines at Macalister, Acland and Ebenezer. Export coal is carried down the Toowoomba Range through the Brisbane suburban area to the Port of Brisbane. Domestic coal is carried to Swanbank Power Station. In the 2006/07 financial year, QR carried 4.7MT of coal on the system.

Coal is the predominant traffic between Toowoomba and Macalister, making up at least 70% of trains per week, other than in the grain season. Since the coal mines are relatively close to Toowoomba, once past Macalister, 107.5 km by rail from Toowoomba, the number of trains per day drops substantially.

The frequency of trains varies depending on seasonal traffic related to grain. Outside of the grain season traffic levels are in the range of 4 – 6 trains per day.

### ***Future growth***

QR considers that the system in its current configuration could reach a possible maximum capacity of 7.2MT per annum, with an increase in the number of coal trains operating on the route, a reduction in non-coal services down the Toowoomba Range, and infrastructure works.

QR predicts the haulage task will increase to 7.7MTpa in 2010/11. They note that further increases would require significant investment in the Toowoomba Range and suburban rail infrastructure. There are no present plans for this scale of investment in the Toowoomba range.

Demand forecasts suggest that if there were no rail or port capacity constraints, there would be demand of up to 13MTpa by 2025 in the Western System. Therefore, any increase beyond the current capacity limit would require access to Gladstone via the Moura Line via the proposed new Surat Basin Rail Line.

If the new Surat basin line is built and connected to the Western Line via an altered Wandoan Line, coal traffic direction patterns and levels would change. The change would depend on demand at the time. Assuming no connection, and no investment in Toowoomba Range, the QR predicted coal traffic will peak at 7.7MT in 2011 and stay at that level for the foreseeable future.

### **2.4.3 Rail line crossings**

The existing rail network within the study area currently crosses the Warrego Highway by at grade crossings on a number of occasions. These are listed in Table 2.20. It is noted that none of the crossings have been identified for an alteration as part of the Federal Governments “Boom Gates for Rail Crossings Program”. The program has undertaken a risk assessment at all level crossings and prioritised crossings warranting an alteration.

**Table 2.20 Rail line crossings**

Rail line	Current operation on line	Road – rail crossing location description	Crossing type	Highway crossing	AADT - current	Speed limit
Western line between Toowoomba - Roma	Line carries a mixture of long distance passenger trains, grain trains, general freight and coal, the latter being the bulk of all train trips  Averages 4-6 trains a day	West of Miles close to Leichhardt Highway north /Warrego intersection	Active control (warning lights and signage)	Warrego Highway 1.135 – 44.099	1497	80km
Western line between Toowoomba - Roma	As above	Miles immediately south of Leichhardt south /Warrego intersection	Active control (warning lights and signage)	Leichhardt Highway 0.00 – 32.02	489	60km
Western line between Toowoomba - Roma	As above	Chinchilla. Close to Warrego Highway/Wambo Street intersection	Active control (warning lights and signage)	Warrego Highway 80.175 – 83.155	2751	60km

#### 2.4.4 Rail network – summary of existing conditions

QR reports that both rail lines primarily serve the coal industry and without further expansion of the networks the capacity to transport materials from either Brisbane or Gladstone is severely restricted. Nonetheless, QR have also reported that there may be opportunities for transportation of some material depending on timing and scheduling, and accordingly, further discussions will be held with QR to determine opportunities for transportation of Project materials by rail.

### 2.5 Shipping

Two ports have been identified as being utilised by this Project, namely;

- Port of Gladstone
- Port of Brisbane

Laird Point on Curtis Island is the LNG facility site and the location for the LNG berth and Material Offloading Facility (MOF). Fisherman's Landing is the main site selected for the staging area for the Project. The staging area will be used for ferry transits out to Curtis Island during the construction and the operational phases. The area will also be used as a loading terminal for construction works. The Port of Brisbane will be used throughout the life of the Project, most likely for the importation of construction materials such as pipes.

#### 2.5.1 Port of Gladstone

This port is administered by the Gladstone Ports Corporation. The Port of Gladstone consists of the area covered by waters, including tidal waters, of the sea or waters connecting with the sea within the following boundary:

- From the high-water mark at the most eastern extremity of Connor Bluff on Curtis Island
- To latitude 23° 53.80' south, longitude 151° 32.60' east
- To latitude 23° 57.12' south, longitude 151° 32.60' east
- To the high-water mark at the most northern extremity of Tiber Point on Hummock Hill Island
- Then due west across Colosseum Inlet to the high-water mark of Wild Cattle Island
- Along the high-water mark of Wild Cattle Island, in a north-westerly direction, to the northern extremity of Wild Cattle Island
- Then due west to the high-water mark on the mainland
- Along the high-water mark, initially in a northerly direction, to the north bank of Munduran Creek at its junction with The Narrows
- To the high-water mark on the north bank of Monte Christo Creek on Curtis Island at its junction with The Narrows
- Along the high-water mark, initially in a south-easterly direction, to the most eastern extremity of Connor Bluff on Curtis Island.

This also includes the area covered by waters of navigable rivers and creeks flowing directly or indirectly into waters within the boundary.

### **Existing shipping capacity**

The Port of Gladstone is a major commodities export port which had a throughput in 2007/08 of 75.5 million tonnes of cargo of which 54.1 million tonnes were coal (GPC 2008a). This generated 1,368 ship visits during the financial year.

The ships comprised bulk carriers, multi-purpose vessels, tankers, break bulk vessels, and liquefied petroleum gas (LPG) carriers. The approximate distribution of number of vessels is summarised in Table 2.21. The major cargos imported into the port include bauxite, caustic soda, LPG, petroleum coke, liquid ammonia, bunker oil, magnetite, gypsum, and copper slag. Additionally, major cargoes exported from the port include coal, alumina, magnesia, cement, limestone, scrap metal and ammonium nitrate. The largest ships to use the port include a 231,850 dead weight tonnage (DWT) vessel.

**Table 2.21 Shipping trends in Gladstone Port**

Ship / Vessel Type	Movements per year as percent of total ship movements (%)
Bulk Carriers	77
Oil Tankers	9
Multi-purpose Vessels	10
Break Bulk Vessels	3
LPG	1
Total	100

Table 2.22 provides details of the port's six wharf centres which together have 15 wharves. Each wharf contains facilities to handle a number of specific cargoes as shown in the table. The port's maximum capacity (Clinton Wharf) is 220,000 DWT.

**Table 2.22 Gladstone wharfs**

Wharf Centre	Wharf	Cargoes	Maximum Vessel Size (DWT)
Boyne	Boyne Wharf	Aluminium, petroleum coke, general cargo, break bulk and liquid pitch	60,000
South Trees	South Trees East	Alumina, caustic soda and bunker oil	80,000
	South Trees West	Bauxite and bunker oil	80,000
Barney Point	Barney Point Wharf	Coal, magnetite, bunker coal and limonite	90,000
Auckland Point	Auckland Point No. 1	Magnesia, calcite and break bulk	65,000
	Auckland Point No. 2	Grain	60,000
	Auckland Point No. 3	Petroleum products, caustic soda, LP gas and	55,000

Wharf Centre	Wharf	Cargoes	Maximum Vessel Size (DWT)
		break bulk	
	Auckland Point No. 4	General cargo, containers, gypsum, magnetite, break bulk, scrap metal and ammonium nitrate	70,000
Clinton	Clinton No. 1	Coal	220,000
	Clinton No. 2	Coal	220,000
	Clinton No. 3	Coal	220,000
	Clinton No. 4	Coal	220,000
Fisherman's Landing	Fisherman's Landing No. 2	Bauxite, alumina and caustic soda	80,000
	Fisherman's Landing No. 4	Cement clinker, cement, fly ash, caustic and limestone	25,000
	Fisherman's Landing No. 5	Liquid ammonia	35,000

### ***Channel configuration and navigational aids***

Gladstone Port lies within a large natural harbour. The proposed LNG berths are located on Laird Point on the south-west shore of Curtis Island. The approach length from Fairway Buoy to Laird Point is approximately 50km. Each visit will require an entry and exit, so the total distance is 100km.

The channels are marked by both leading lights and light buoys. Outer leading lights provide the lead into the centre of the Wild Cattle Cutting entrance. Once into the Wild Cattle Cutting, a further series of leading lights and boards ensure safe passage through the harbour to the berth. Masters of LNG Carriers calling at Gladstone Port who may be unfamiliar with the port will be apprised of relevant information through the Master/Pilot information exchange. As well as the port layout and channel depths, this information exchange includes ship's draught and other particulars, route to be taken to the berth, number of tugs and mooring arrangements and tidal information. In addition, the locations of particularly sensitive environmental areas, such as seagrass beds and dugong habitats are known by the pilots who guide the ships into and out of the port.

LNG and LPG vessel transit through the Port of Gladstone will be along existing shipping channels from the outer harbour to the Targinie Channel and to the Australia Pacific LNG approach channel:

- The South Channel leads from the Fairway Buoy to the harbour entrance. This channel has two 40° bends and consists of three joined straight channels – Wild Cattle Cutting, Boyne Cutting and Golding Cutting. The entrance to the harbour is to the south of Gatcombe Head on Facing Island and at the entrance to Gatcombe Channel. The Golding Bypass Channel and Gatcombe Bypass Channel are not suitable for LNG vessels due to depth restrictions and will, therefore, not be used.
- The Gatcombe Channel passes close to the Boyne Smelter Wharf. To the west of the Boyne Smelter Wharf are the Auckland Channel and the Auckland Bypass Channel. The Auckland Bypass Channel is not suitable for LNG carriers due to depth restrictions and will not be used.

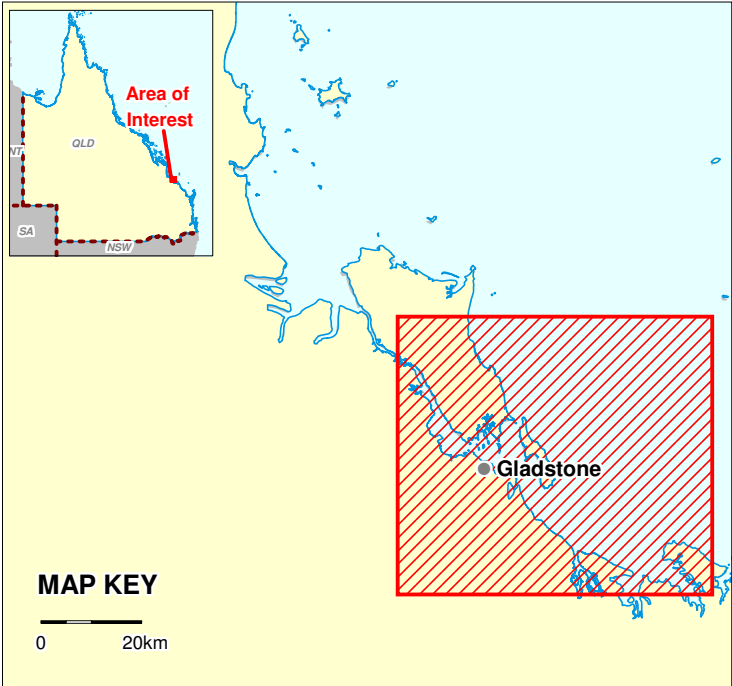




Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Road	single-lane roundabout	<p>traffic only.</p> <p>The Project's traffic will have a minor impact on the operation of the existing intersection but will not result in bringing forward the need for the alteration earlier than 2016.</p> <p>The recommended alteration works include:</p> <ul style="list-style-type: none"> <li>Two circulating lanes, additional approach lanes consistent with the planned four-lane alteration of Hanson Road and an additional approach lane on Red Rover Road.</li> <li>An additional approach lane on Red Rover Road.</li> </ul> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>
Gladstone-Mt Larcom Road/Landing Road	Priority controlled T-intersection	<p>The existing intersection will operate within capacity to 2020 under background traffic only.</p> <p>The Project's traffic will have an impact on the operation of the existing intersection resulting in the capacity being reached by 2015.</p> <p>The recommended alteration to the intersection is to convert to a single lane roundabout.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>
Gladstone-Mt Larcom Road/Calliope River	Four-way priority	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p>	<p>The cumulative traffic from the regionally-significant projects will have a negligible</p>

- 
- The Auckland Channel leads to the Barney Point Wharf. The Clinton Channel and the Clinton Bypass Channel pass from the Barney Point Wharf to the Clinton Coal Wharf.
  - From the Clinton Coal Wharf the Targinie Channel leads towards the Fisherman's Landing Wharf. Access to the Australia Pacific LNG Project loading jetty and shipping berth will be via a new channel along Curtis Island to the north-west from the Targinie Channel. This new channel will extend past Hamilton Point, North China Bay and through the GLNG turning basin, up through the QCLNG turning basin, and arriving at Laird Point, between Laird Point and North Passage Island.

A map of the existing shipping channels is shown in Figure 2.29 and configuration of the existing channels within the Port of Gladstone is shown in Figure 2.30.



**MAP KEY**

0 20km

**LEGEND**

- Existing shipping channel
- Preferred pipeline alignment
- Main road
- Proposed LNG plant site
- Conceptual LNG plant layout

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SCALE - 1 : 200,000 (at A3)

Map Grid of Australia Zone 56  
Geocentric Datum of Australia 94

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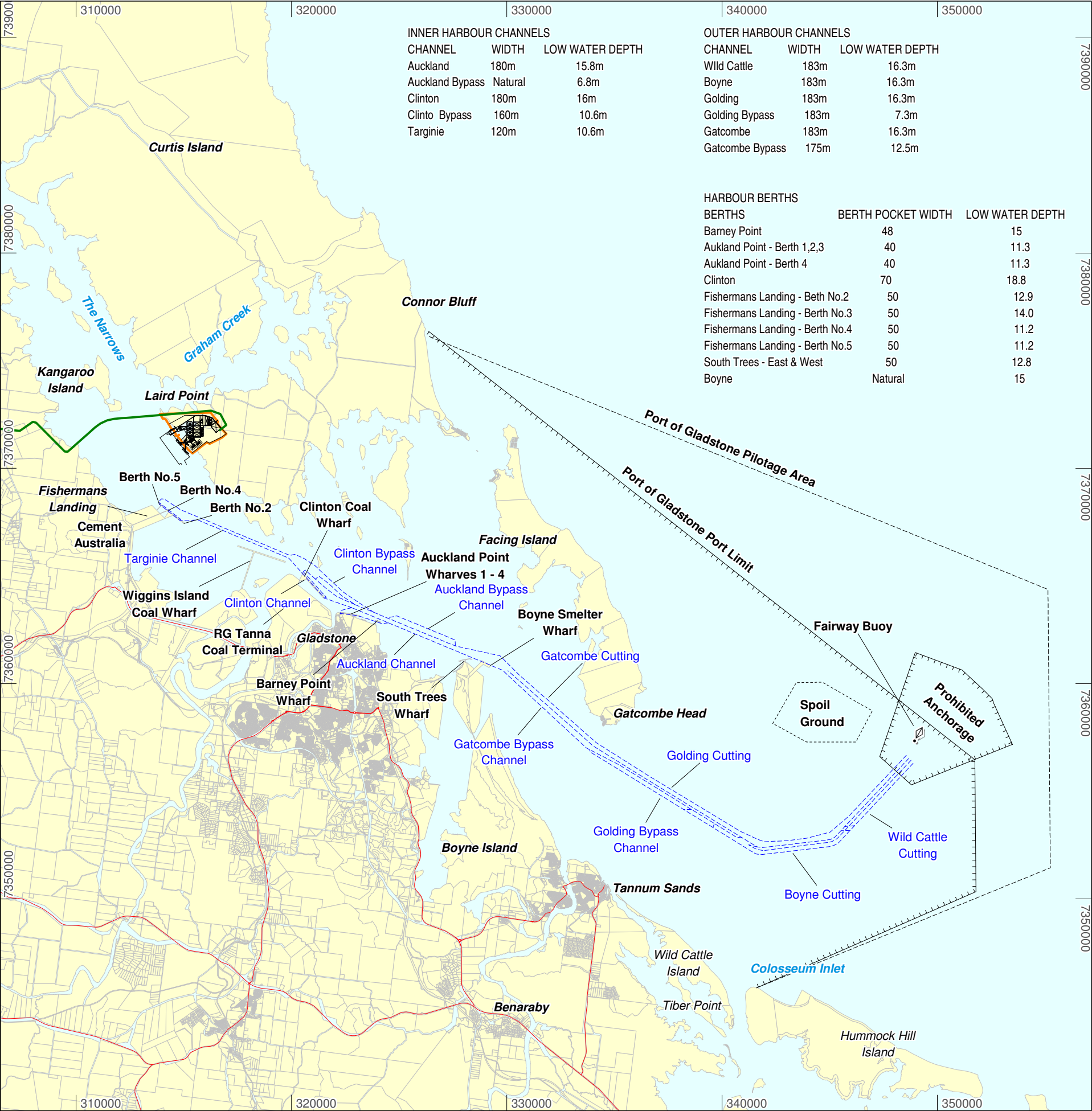


**AUSTRALIA PACIFIC LNG PTY LIMITED**

**AUSTRALIA PACIFIC LNG PROJECT**  
**Figure 2.29 Existing Shipping Channels**  
**within the Port of Gladstone**

Project No: 301001-00448	Figure: 00448-00-EN-DAL-0393	Rev: 0
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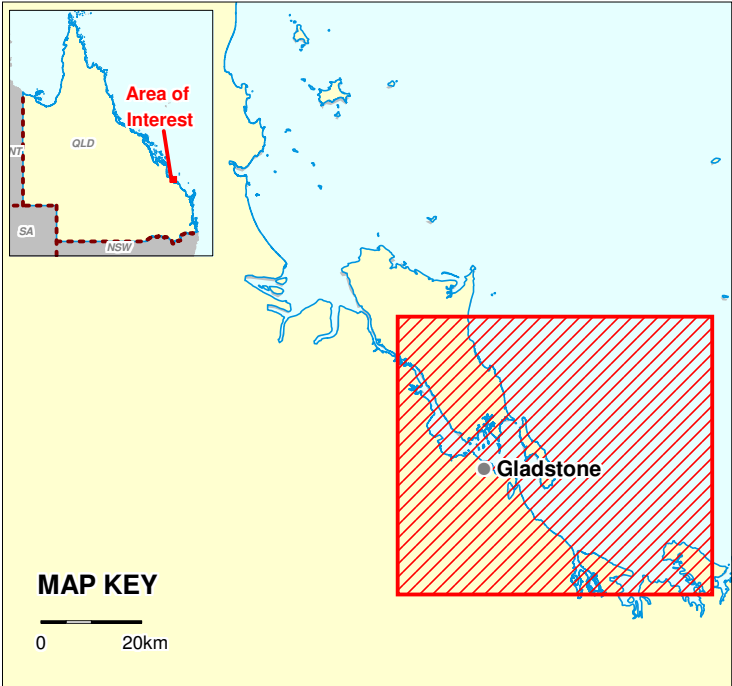




INNER HARBOUR CHANNELS			OUTER HARBOUR CHANNELS		
CHANNEL	WIDTH	LOW WATER DEPTH	CHANNEL	WIDTH	LOW WATER DEPTH
Auckland	180m	15.8m	Wild Cattle	183m	16.3m
Auckland Bypass	Natural	6.8m	Boyne	183m	16.3m
Clinton	180m	16m	Golding	183m	16.3m
Clinto Bypass	160m	10.6m	Golding Bypass	183m	7.3m
Targinie	120m	10.6m	Gatcombe	183m	16.3m
			Gatcombe Bypass	175m	12.5m

HARBOUR BERTHS		
BERTHS	BERTH POCKET WIDTH	LOW WATER DEPTH
Barney Point	48	15
Aukland Point - Berth 1,2,3	40	11.3
Aukland Point - Berth 4	40	11.3
Clinton	70	18.8
Fishermans Landing - Beth No.2	50	12.9
Fishermans Landing - Berth No.3	50	14.0
Fishermans Landing - Berth No.4	50	11.2
Fishermans Landing - Berth No.5	50	11.2
South Trees - East & West	50	12.8
Boyne	Natural	15



MAP KEY

Existing shipping channel

Preferred pipeline alignment

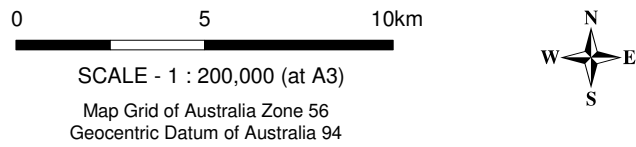
Main road

Proposed LNG plant site

Conceptual LNG plant layout

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Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
<div><div><div></div></div><div><b>WorleyParsons</b> resources &amp; energy</div></div>			<div><div><div></div></div><div><b>AUSTRALIA PACIFIC LNG</b></div></div>			
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 2.30 Port Limits and Channel</b> <b>and Berth Depths</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0394		Rev: 0	

Table 2.23 provides details of the ports main channel's length, depth and width.

**Table 2.23 Port of Gladstone channels**

Channel	Length (km)	Depth (m)	Width (m)
Outer harbour Channel	22.45	16.30	183
Auckland Channel	8.70	15.80	180
Clinton Channel	2.20	16.00	180
Clinton By-Pass Channel		10.60	160
Targinie Channel	6.10	10.60	120

Key features relating to ship transit from the port limit to Targinie channel are:

- The anchorage for commercial ships (including LNGC's) is outside the Port Limit (but still inside the Pilotage Area) beyond the Fairway Buoy and out of any ship routes to or from Gladstone.
- There is the South Channel that leads from the Fairway Buoy to the harbour entrance. This channel has two 40° bends and consists of three joined straight channels – Wild Cattle Cutting, Boyne Cutting and Golding Cutting.
- The entrance to the harbour is to the south of Gatcombe Head on Facing Island and at the entrance to Gatcombe Channel.
- There is a Golding Bypass Channel and a Gatcombe Bypass Channel but these are not generally suitable for panamax sized vessels (equivalent to LNGC's) due to the lesser depth.
- The Gatcombe Channel passes close to the Boyne Smelter Wharf, which may have ships berthed when other vessels pass.
- To the west of the Boyne Smelter Wharf are the Auckland Channel and the Auckland Bypass Channel, although the Auckland Bypass Channel is not suitable for LNGC's due to the depth. The Auckland Channel leads to the Barney Point Wharf, where ships may be berthed.
- The Clinton Channel and the Clinton Bypass Channel pass from the Barney Point Wharf to the Clinton Coal Wharf.
- The Targinie Channel leads from the Clinton Coal Wharf towards the Fisherman's Landing Wharf.
- The proposed Australia Pacific LNG berths will either be accessed from Targinie Channel via a proposed channel to the north that passes by both Gladstone LNG and Queensland Curtis LNG proposed berths (option 2A); or via a proposed channel past the end of Fisherman's Landing Wharf (option 1B). These options are examined in subsequent sections of the report.

## **Anchorage**

Anchorage for LNG vessels while awaiting transit through the Port of Gladstone to the LNG plant will be within an extension to the bounds of the existing anchorage and pilot boarding area for the Port of Gladstone, with the existing anchorage area extended eastward to allow for an additional four

dedicated LNG anchorages. The LNG anchorage area is outside the Port Limit (but still inside the Pilotage Area) beyond the Fairway Buoy and outside of any ship routes to or from Gladstone.

The depth of the transit channels has been investigated by GPC and MSQ and it has been determined that most of the existing channels are deep enough to meet the full range of LNG vessels proposed for this Project. The only bypass channel to be used will be Clinton Bypass channel which will be dredged to 13.0 m (CD) and 200 m in width.

Delayed passage for whatever reason, (e.g. mechanical breakdown), has the potential for the ship being stranded in the channel on a falling tide. Attending tugs would have to be capable of holding the ship "in situ" or towing the vessel clear of the channel. The 10% under keel clearance requirement imposed by the Harbourmaster provides a significant safety factor to prevent a ship being grounded in the channel.

The channel configuration allows a passing zone along the 7m depth parallel Golding channel. Small ships going the opposite direction could pass the LNG vessels in the parallel Golding channel. Australia Pacific LNG and the other LNG proponents are generally opposed to any passing of LNG vessels and are working with Harbourmaster to establish operating rules for LNG's.

The proposed turning areas are located off the Australia Pacific LNG berths and these turning areas or swing basins will be dedicated to Australia Pacific LNG ships. These turning basins meet the required diameter and have a control depth of 13.0m at all locations in the turning areas.

### ***Existing maintenance dredging regime***

Many of the channels within the Port of Gladstone are naturally scoured by strong water currents, and do not accumulate material that could lead to a potential de-rating of channels. Those channels that do require maintenance dredging have relatively small volumes of infilling material. GPC removes, on average, approximately 100,000 m<sup>3</sup> of maintenance dredge material each year.

Maintenance dredging will be the responsibility of GPC. Maintenance dredging for most ports in Queensland is undertaken by the DV Brisbane, a Trailer Suction Hopper Dredge (TSHD) owned and operated by the Port of Brisbane. Dredging of the volumes required for Port of Gladstone would typically take less than a month to perform with dredged material deposited at the current GPC approved offshore disposal site.

Swing basin and channel construction will include over-dredging and the inclusion of siltation pockets in likely deposition zones. These permit the gradual accumulation of material in areas where channel ratings are not threatened, and where removal can be conducted more efficiently. Based on anticipated maintenance dredging volumes and initial over-dredging and silt pocket construction, it is unlikely that any maintenance dredging will be required for five years and that the DV Brisbane would only need to include Channel in its annual northern campaign every few years after that.

Maintenance dredging activities should be able to be planned and implemented without causing significant marine transport disruption.

### ***Pilotage, vessel traffic services and towage***

Maritime Safety Queensland currently operates a Vessel Traffic Service (VTS) in the Port of Gladstone which regulates shipping movements within the Port and allocates the berthing priority, pilot bookings, tug requirements, etc. All vessels over 20 m in length are required to report to the Gladstone VTS when navigating within the Port. This operates on a constant basis with oversight of the Port and approaches by means of:

- Automatic Identification System (AIS) to identify and provide information on vessels approaching the port
- Radar (via single radar station located on Gatcombe Head)
- Closed Circuit Television (CCTV) on Auckland Point which can be panned and zoomed to provide coverage of shipping in channels adjacent to the main Port berths.

Pilotage in Gladstone is provided by the port pilotage department of Maritime Safety Queensland (MSQ). There are currently 20 pilots on the Gladstone roster (including the pilotage manager) of which seven are available at any given time. All pilots have a captains' certificate and have regularly undertaken simulation training at the Australian Maritime College (AMC) either for skills maintenance and development or for examining the feasibility of proposed new port developments.

Pilots typically board vessels at the Fairway Buoy as shown in Figure 2.30 for transit through the outer harbour, with an additional pilot (or pilots) to board within the harbour as required. An increase in the number of pilots, tugs, etc. is planned by the GPC to commensurately support the increase in LNG carrier traffic.

Port towage is provided by a commercial supplier under licence from GPC, with towage licences renewed approximately every seven years by competitive tender. Currently five tugs are maintained in the Port with bollard pull ratings as follows:

- 2 x 46 tonne bollard pull
- 3 x 62 tonne bollard pull.

### ***Bunkering***

Gladstone is a bunkering port both for ships calling to load or discharge cargo, and for ships calling solely for bunkering. Bunkering is currently undertaken by a commercial contractor operating a self-propelled bunker barge. Bunker transfers take place at the vessels' berth, at the South Tree Anchorage, or at the outer anchorage.

### ***Emergency response capacity***

MSQ has ownership of two key emergency response plans for the Port, including:

- A Marine Emergency Response Plan which provides procedures regarding collision, grounding, etc)
- An Oil Spill Response Plan

### ***Current shipping activities in the Great Barrier Reef***

Shipping in the Great Barrier Reef Marine Park (the Marine Park) is managed by several government agencies including the Australian Maritime Safety Authority, Maritime Safety Queensland, the Great Barrier Reef Marine Park Authority and the Department of Infrastructure, Transport, Regional Development and Local Government. The Great Barrier Reef marine Park Authority (GBRMPA) is the principal adviser to the Australian Government on the management and development of the Marine Park. GBRMPA's role includes regulating the entry and use of the Marine Park by ships and other vessels through the Great Barrier Reef Marine Park Zoning Plan 2003 (the Zoning Plan).

As prescribed by the Zoning Plan, ships may transit the Marine Park through the General Usage Zone or through other designated shipping areas by permit where required.



The shipping area designated in the Zoning Plan is designed to minimise the potential impact on the shipping industry whilst having regard for Australia's international obligations. The placement of the designated shipping area reflects vessel usage patterns in the inner and outer shipping routes, existing recommended tracks, and new routes to allow for growth in shipping (GBRMPA, 2003a).

There is significant shipping traffic in the Great Barrier Reef (GBR) and Torres Strait areas. A summary of the approximate numbers of different types of ships/vessels that ply these areas is provided in Table 2.24.

**Table 2.24 Shipping trends in the GBR and Torres Strait**

Ship/Vessel Type	Description of Activity	No. of Movements Per Year
Bulk carriers	Carrying coal, bauxite, nickel ores, raw sugar, alumina, silica sand	2,520
Oil tankers	Refined oil products	600
Containers	Carrying containers	1,440
General cargo ships	Carrying general cargo	1,320
Other large ships	Various	120
Tourism vessels	Tourism	1,500
Commercial and recreational fishing vessels	Fishing and commerce	25,000

Most movements of large ships (bulk carriers, tankers, containers general cargo ships and others) are via the inner route. Only a fraction of these ships use the outer route. The actual distribution of the number of ships that use the outer route and the portion from Gladstone Fairway Buoy to the outer route is uncertain.

As described by Lloyds Register, recent studies on ship transit in the GBR have identified a number of incidents, mainly collision and groundings. These incidents have also been reported in incident databases of the Australian Transportation Safety Board (ATSB) from 1982 to December 2008. On the basis of these studies and databases, Lloyds Register has prepared a summary of incidents for the GBR, Torres Strait and outer route/coral sea areas for the period from 1985 to 2008, provided in Table 2.25.

**Table 2.25 Summary of incidents in the GBR and Torres Strait (1985-2008)**

Type of Incident	Area		
	GBR	Torres Strait	Outer Route/ Coral Sea
Collision	16	-	-
Grounding	12	9	1
Other	-	2*	2**
Total Incidents	28	10	4

Notes:

\*1 equipment failure; 1 founder:

\*\*1 cargo shift; 1 man overboard

It is noted that the majority of incidents occurring in the GBR take place in the inner route.

### ***Recreational boating***

In addition to commercial shipping described above, there are approximately 13,000 marine licenses and 6,890 recreational vessels registered in Gladstone. The Gladstone Sailing Club has approximately 200 sailing members and between 6,000 and 7,000 social members. The Harbour, Auckland Creek, The Narrows and Graham Creek are popular areas for boating, sailing and fishing, with The Narrows and Graham Creek traditionally popular safe harbours for smaller private sailing vessels during storms and cyclones.

### **2.5.2 Port of Brisbane**

This port is administered by the Port of Brisbane Corporation (PBC). The Port of Brisbane consists of the area covered by waters, including tidal waters, of the sea or waters connecting with the sea within the following boundary:

- From the high-water mark at the eastern extremity of Caloundra Head
- To the high-water mark at the northern extremity of North Point on Moreton Island
- Along the high-water mark of the western side of Moreton Island to Reeders Point on Moreton Island
- To the southern corner of lot 548 on plan SL 8565 (at Lytton)
- Along the high-water mark in a northerly direction to lot 573 on plan SL 12145 at station 3 (beside Aquarium Passage)
- To the high-water mark on lot 468 on plan SL 5433 at station 18 (beside Aquarium Passage)
- Along the high-water mark of the Brisbane River to the north western extremity of Bulimba Point
- To the high-water mark at the eastern extremity of Newstead Park
- To the high-water mark at the northern junction of Breakfast Creek and the Brisbane River
- Along the high-water mark of the Brisbane River and Moreton Bay to the eastern entrance of the Kedron Brook Floodway
- To the high-water mark at South Point on Bribie Island
- Along the high-water mark of the southern and eastern sides of Bribie Island to the northern extremity of Bribie Island
- To the high-water mark at the eastern extremity of Caloundra Head.

### ***Port characteristics***

The Port of Brisbane has 28 operating berths and over 7,700m of quayline at the Port of Brisbane and upriver facilities. Table 2.26 provides a summary of existing port characteristics.

**Table 2.26 Port characteristics**

Berth	Number
Container	7
Oil – crude and refined	5
General Purpose (Fisherman Islands)	1
Grain/woodchip/cottonseed	1
Grain/dry bulk/general cargo (Pinkenba)	2
General cargo/motor vehicles	3
Clinker (Bulwer Island)	1
Coal/clinker	1
Chemicals and fertilisers	2
Private Berth (formerly sugar)	1
Wet bulk	2
Forgacs Cairncross dock fit-out berths	2
Cruise-vessel facility	1
Lay-up Berths (non-operational)	2

### ***Existing capacity***

The Port of Brisbane has seven container berths (1,800m of quayline), which are leased and operated by two stevedores. PBC owns the wharves and issues priority-use licences and leases for their operation. The port's dry-bulk facilities have flexible operational arrangements while most wet-bulk facilities at the port are either crude-oil or refined-products berths.

The Port of Brisbane has 697m of general-cargo (GP) wharves that can handle break-bulk cargo, containers, motor vehicles and other ro/ro cargo. These wharfs are also suitable for the import and short term storage of piping. Some of the GP wharfs are leased by AAT who manages Berths 1-3 with various stevedores providing ship loading and unloading facilities at these berths. AAT manages cargo receivable and delivery. The berths are equipped with one conventional Panamax container crane and one mobile harbour crane.

## **2.6 Shipping network – summary of existing conditions**

The Port of Gladstone is a major commodities export port which had a throughput in 2007/2008 of 76 million tonnes of cargo with the majority of the cargo being coal. Overall, the port looks to have available land to develop new facilities and should have the ability to expand its trade along its trading channels. The port also has land to site areas for general operations and construction works (staging areas). The traffic impacts on the harbour are described in Section 4.

The Port of Brisbane is the major trading port for Queensland and has a number of possible berth options for importing and in loading the pipeline. The increase in trade for the Port resulting from the importation of pipeline will be insignificant.

## 2.7 Air network

Three airports and one aerodrome have been identified as possible fly in/fly out locations for construction and operations personnel. These are:

- Gladstone Regional Airport
- Thangool (Biloela) Airport
- Miles Aerodrome
- Roma Airport.

### 2.7.1 Gladstone Regional Airport

#### *Airport operations*

The Gladstone Regional Airport is operated by the Gladstone Regional Council. The airport caters primarily for business travellers and freight activities associated with the region's developed and emerging industrial complexes. Regular public transport (RPT) services are currently provided by QantasLink, primarily using Dash 8 Q400 series aircraft that cater for 74 passengers.

Eight flights a day operate out of the Gladstone Regional Airport from Monday to Friday, with reduced services on weekends. Approximately 50 people are employed at the airport.

The operating details of the Gladstone Regional Airport are given in Table 2.27.

**Table 2.27 Gladstone Regional Airport operating details**

Flights / Day	Staff	General Operations
Approximately: <ul style="list-style-type: none"> <li>• 8 flights/day Monday – Friday</li> <li>• 5 flights on Saturdays and</li> <li>• 7 flights on Sundays.</li> </ul>	Approximately 50 people are employed at this airport, including: <ul style="list-style-type: none"> <li>• Operation Staff</li> <li>• Ground Agents</li> <li>• Rental Car</li> <li>• Bistro and</li> <li>• Helicopter Companies</li> </ul>	The main operators are: <ul style="list-style-type: none"> <li>• QantasLink</li> <li>• Australian Helicopters</li> <li>• Curry-Kenny Aviation</li> <li>• Stewart Aviation</li> <li>• RFDS</li> <li>• Police and Government Airwing</li> <li>• Customs</li> <li>• Military and</li> <li>• General Aviation.</li> </ul>

Gladstone Regional Airport is currently undergoing a complete runway reconstruction due to deterioration to provide continued operations for existing aircraft services. The sealed runway will also be extended from 1635m to 1960m. In addition, a 'dip' in the runway will be removed. Also included in this project is the diversion of Callemondah Drive to allow for the eastern end runway extension.



Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Targinie Road	controlled	The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.	impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.
Bruce Highway/Gladstone-Mt Larcom Road	Priority controlled T-Intersection	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p> <p>The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>	The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.
Dawson Highway/Karboe Street	Four way signalised intersection	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p> <p>The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>	The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.
Warrego Highway/Leichardt Highway	Priority controlled T intersection	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p> <p>The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>	The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.

This involves construction of a new access road to the Callemondah Industrial Estate from the Police Creek roundabout with a grade separated crossing of the main northern rail line, alteration of the terminal building to facilitate future provision of security screening and extension to car parking facilities.

### ***Future growth***

Since 1998, the airport expansion has been guided by a development plan which the Aerodrome Board updated in 2004. This update focused on current and likely future aircraft types and numbers, and stronger growth in passenger numbers than previously forecast.

The 2004 update was based on the airport continuing to cater for up to Code 3 aircraft such as the Q400, E170 and similar 70-seat capacity aircraft. Operations by larger Code 4C aircraft such as the E190, B717, B737 and A320 were considered. However, the 2004 plan concluded that catering for larger aircraft was not justified by forecast activity if the existing service frequency was maintained. It also concluded that significant pavement strengthening would be required to allow unrestricted operations by these aircraft.

The plan was updated again in 2008. At this time, it was identified that the runway required strengthening due to deterioration following the introduction of regular Q400 services. It was also recognised that the runway profile was not compliant with Civil Aviation Safety Authority regulations, and would require re-profiling or a modified taxiway to cater for larger aircraft.

Plans to cater for larger aircraft have been considered and the runway is being lengthened to allow for larger Code 4C aircraft. Pavement strength remains a constraint to catering for regular Code 4C aircraft services, but this may be overcome by further asphalt strengthening.

The plan concludes that with the upgraded and/or new facilities, the current airport site will cater for projected long-term air travel growth in the Gladstone region beyond the 2027/28 planning horizon. This would provide an appropriate level of service and continued convenience to the travelling public.

## **2.7.2 Miles Aerodrome**

### ***Airport operating details***

The Miles Aerodrome is approximately 12 km south of Miles and is operated by the Western Downs Regional Council. The aerodrome is classified as an aircraft landing area and is not registered or certified. There are no Regular Passenger Transport (RPT) services operating out of the aerodrome and it is currently only used occasionally by eight seater aircraft, however it is understood that the aerodrome may be capable of accepting larger aircraft such as Dash 8-200 aircraft capable of carrying 36 passengers. Facilities at the Miles aerodrome include a sealed apron with a capacity for two aircraft and a small terminal.

### ***Future growth***

There are currently no published plans to upgrade the facility.

## **2.7.3 Biloela Airport**

### ***Airport operations***

The Biloela Airport is located at the township of Thangool, which is 11 km south of Biloela and is operated by the Banana Regional Council. The airport services Biloela and other Banana Shire towns

including Moura, Thangool, Jambin, Goovigen, Baralaba, Theodore, Banana, Wowan, and Dululu. The airport caters for flights to and from Brisbane and Blackwater with two flights per day Monday to Friday and one flight on a Sunday.

The 1520 m long runway is sealed and has an apron capacity for two aircraft. QantasLink operate a Dash 8 fleet out of the Biloela Airport, which is mainly comprised of 200 series aircraft that can cater for 36 passengers.

### ***Future growth***

There are currently no published plans to upgrade the facility.

## **2.7.4 Roma Airport**

### ***Airport operations***

The Roma airport is a commercially operating airport which is administered by Maranoa Regional Council. QantasLink operates approximately 17 flights a week from the airport, which equates to around two to three flights a day.

This airport has the capacity to cater for Dash 8-300 aircraft which caters for 50 passengers. There is apron capacity at the airport for two Dash 8-300 aircraft and 18 parks for light planes.

### ***Future growth***

There are currently published plans by Council to alter the Roma airport.

## **2.7.5 Regional Airport Development Scheme**

The Queensland Government assists Local Government in the upgrading of aviation infrastructure through the Regional Airport Development Scheme (RADS), which is administered by the Department of Transport and Main Roads. While in the first instance it is the responsibility of the airport owner to fund aviation infrastructure, including ongoing maintenance, some projects where a shortfall has occurred may be eligible for supplementary funding through the RADS.

The aim of the program is to assist Local Governments to provide safe and operationally effective airports that allow access to basic air services, including emergency services and Regular Passenger Transport (RPT) services.

Local Governments, located in remote and regional areas, may apply for assistance under the scheme. Funds are available to a maximum of 50 per cent of the capital cost of the works. Examples of alterations that may attract funding include runway alterations and extensions, construction of animal proof fencing and installation of runway lighting. Funding is not available for works to airport buildings or car parks. The application and assessment process is extremely competitive. Funding is allocated on a priority basis.

The Federal Government administers the Remote Aerodrome Safety Program (RASP). The RASP is a national program aimed at assisting the alteration of airstrips for remote and isolated aerodromes to facilitate the provision of non-commercial essential community services. Where eligible, councils are encouraged to seek RASP funding in addition to RADS funding.

The Queensland Department of Transport is not aware of any applications for funding of alterations for Thangool, Miles or Roma Airports. The current redevelopment of the Gladstone Regional Airport is the only published expansion amongst the four affected airports.



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## 2.8 Air network – summary of existing conditions

The three regional airports and one aerodrome that could be utilised by the Project are Roma, Biloela and Gladstone Regional Airports, and the Miles Aerodrome.

Gladstone Regional Airport has experienced significant growth in passenger numbers in recent years and this is expected to grow with the addition of a number of major developments that utilise fly-in/fly-out staffing arrangements. The airport is currently being expanded with further plans to expand operations to allow a limited jet service. QantasLink operates an RPT service from this airport that utilises Dash 8-Q400 aircraft that can cater for 74 passengers.

Roma airport offers a limited commercial service. Passenger levels vary according to demand from mining and other local industries. There are published plans to upgrade this airport. QantasLink operates an RPT service from this airport that utilises Dash 8-300 aircraft that can cater for 50 passengers.

Miles Aerodrome offers no regular passenger transport service. There are no RPT services operating out of this airport however the airport may be able to cater for Dash 8-200 aircraft that can cater for 36 passengers.

Similarly, Biloela Airport offers a very limited passenger service. QantasLink operates an RPT service from this airport that utilises Dash 8-200 aircraft that can cater for 36 passengers. There are no published plans to alter or expand services at either the Miles Aerodrome or Biloela Airport.

## 3. Proposed Project

### 3.1 Project overview

The Australia Pacific LNG Project consists of three interrelated components, as follows:

- Gas fields - further development and expansion of the CSG fields to the north west and south east of the existing Walloon gas fields development area centred around Miles.
- Gas pipeline - construction of a gas pipeline between the gas fields and Gladstone.
- LNG Plant, Curtis Island Gladstone - staged construction of a liquefied natural gas (LNG) plant and associated facilities at Curtis Island off Gladstone to export LNG to international markets.

This chapter of the report describes the:

- Characteristics of the Project's gas fields, gas pipeline and LNG facility.
- The traffic generated by the Project
- Distribution of the traffic during the construction and operational phases
- Timing, maintenance and proposed rehabilitation details.

Due to the proposed scale, complexity and Project's lifecycle, these details may change. However, this document represents what is known about the Project to date and forms the basis for the assessment reported upon in Section 4.

#### 3.1.1 Terms explained

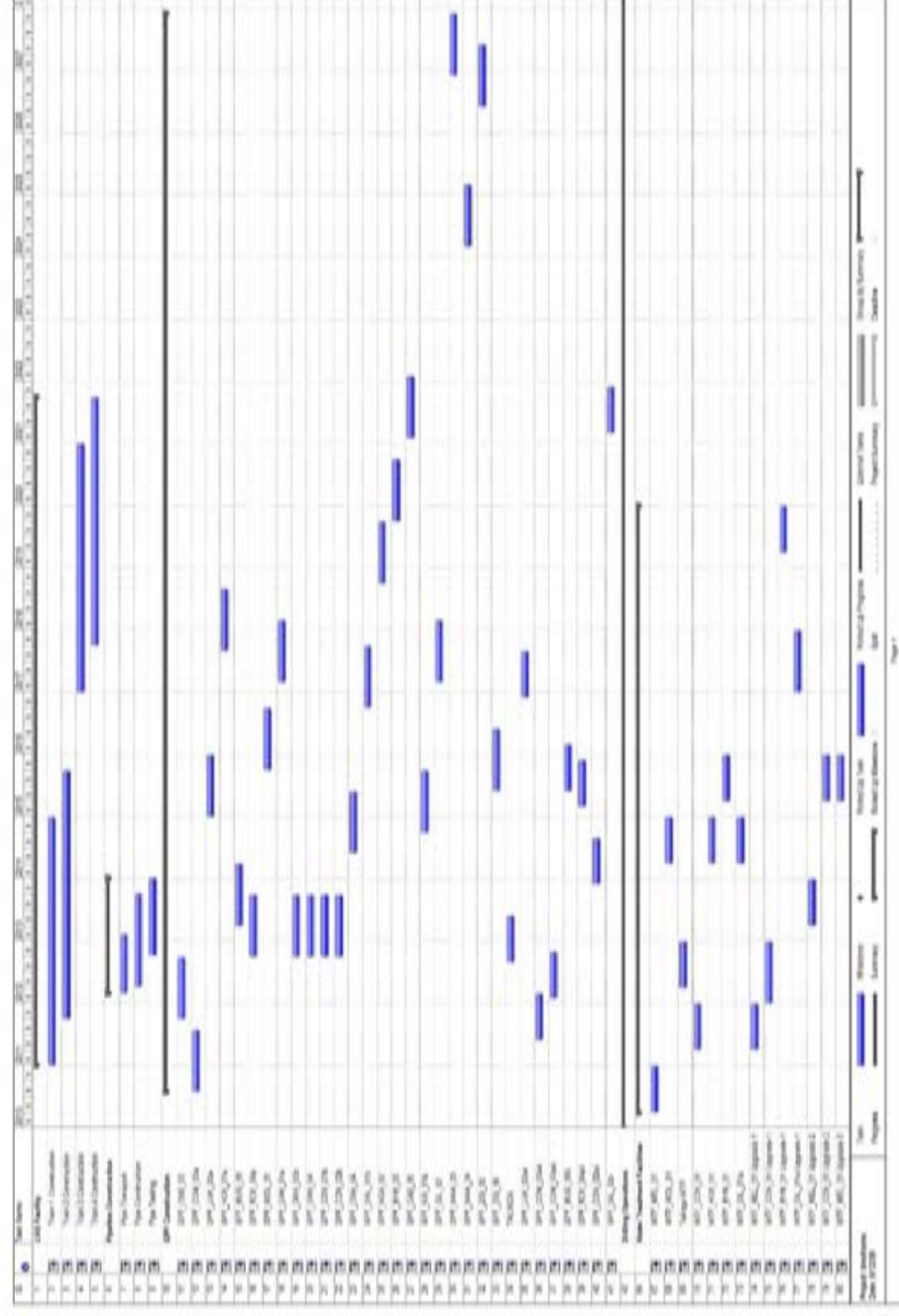
In describing the proposed Project a series of terms are used to identify development items. A detailed explanation of acronyms and terms is provided within Abbreviations and Glossary of Terms at the beginning of the report.

### 3.2 Proposed Project timing

Pending approvals, a staged development is proposed as shown in Figure 3.1 below.

For assessment purposes, the following key activities and timing were assumed;

- Early construction works commencing in late 2010
- Pipe delivery for the pipeline will begin early 2012 and be complete by early 2013
- Construction of the gas pipeline will begin in 2012, and be complete by late 2013
- Stage 1 (trains 1 and 2) of the LNG plant on Curtis Island operating in 2015 (train 1 in 2014) with stage 2 (trains 3 and 4) of the facility completed by 2022
- The final gas processing facility being constructed in the gas fields by 2027
- The ongoing development of wells and associated gas and water gathering systems within the gas fields will continue until the cessation of production at 2045.



### 3.3 Gas fields project traffic

#### 3.3.1 Description and location of proposed facilities

The gas fields include eight development areas, as identified below:

- Combabula/Ramyard, which includes Pine Hills and Reedy Creek
- Wooleebee
- Carinya
- Condabri, which includes South and Central
- Talinga/Orana, which includes Orana North
- Dalwogan
- Kainama
- Gilbert Gully

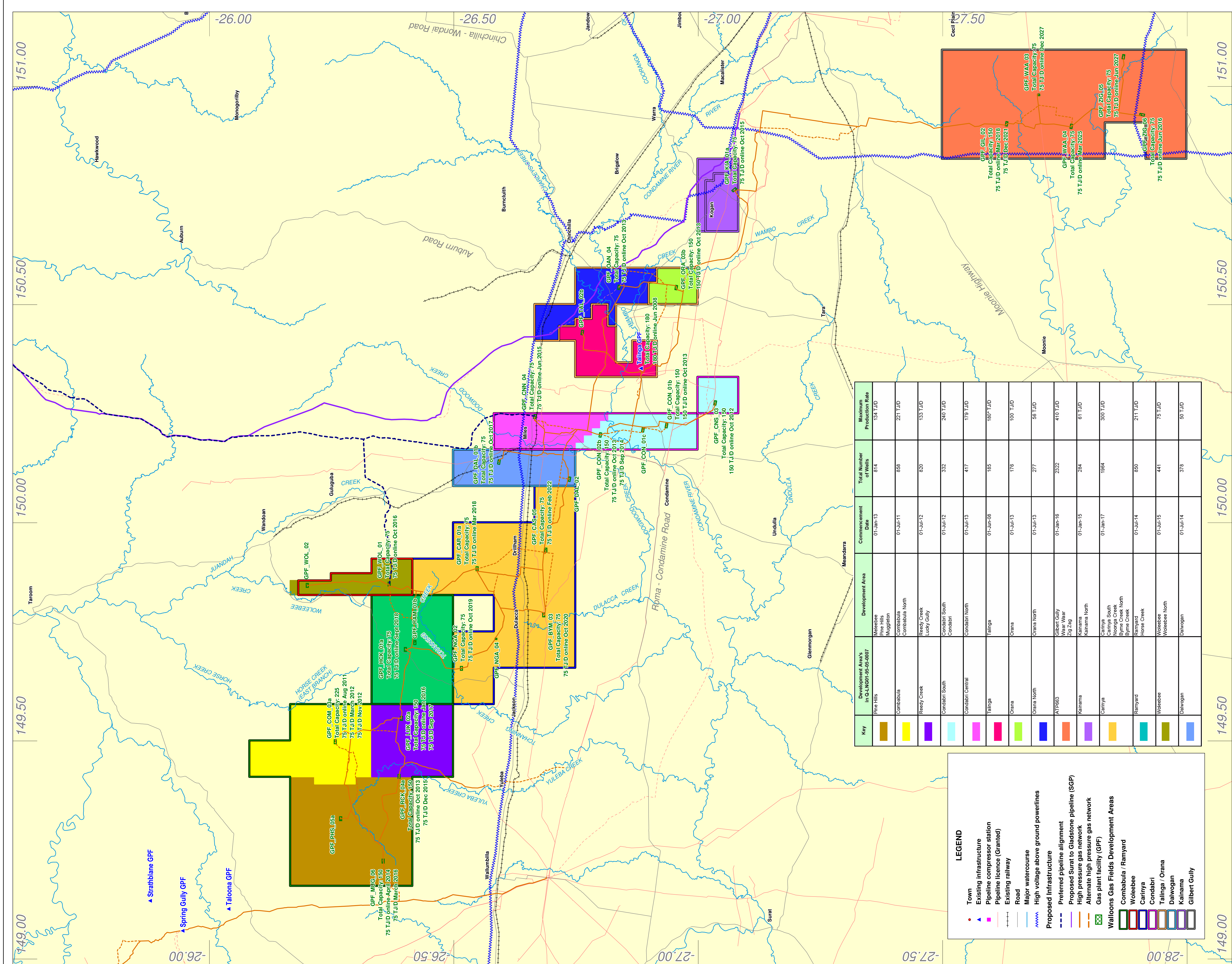
These are locations broadly centred around the town of Miles, either side of the Warrego Highway west of Toowoomba.

The following key infrastructure items make up the gas field Project:

- Gas Processing Facilities (GPFs) – 23 new GPF sites are proposed
- Water Treatment Facilities (WTFs) and the associated Water Transfer Stations (WTSs) – six new WTFs are planned
- Up to 10,000 gas wells are planned from 2011 to 2045
- Up to 20,000km of gas and associated water gathering networks is proposed
- Eleven communication towers are proposed to support the Project
- Distribution centres are proposed at Miles, Roma and Brisbane, where Project material can be stored and distributed as required
- More than 1,400km of high pressure network pipe is proposed.

Figure 3.2 to Figure 3.4 below identify the proposed location of the gas fields, gas processing facilities, water treatment facilities and communication towers. While the infrastructure in the Combabula/Ramyard, Wooleebee and Carinya areas are reasonably well defined, the exact location of the infrastructure in other areas may vary. Considering the limited road network in this area, any changes will not significantly affect the validity of the traffic distribution assessment contained in Section 4.





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SGP pipeline route digitised from Initial Advice Statement dated December 2008  
Preferred pipeline alignment provided by Origin Energy 09/11/2009.  
HP Gas Network RevB supplied by client 04/11/2009.  
Gas processing facility capacity data provided by A. Skelley on 07/09/2009.

0 12.5 25km

SCALE - 1 : 400,000 (at A1)

Latitude - Longitude  
Geocentric Datum of Australia 1994

Legend

- Town
- Existing infrastructure
- Pipeline compressor station
- Pipeline licence (Granted)
- Existing railway
- Road
- Major watercourse
- High voltage above ground powerlines
- Proposed Infrastructure
- Preferred pipeline alignment
- Proposed Surat to Gladstone pipeline (SGP)
- High pressure gas network
- Alternate high pressure gas network
- Gas plant facility (GPF)
- Walloons Gas Fields Development Areas
- Combabula / Ramyard
- Woleebee
- Carinya
- Condabri
- Talinga / Orana
- Dalwogan
- Kainama
- Gilbert Gully

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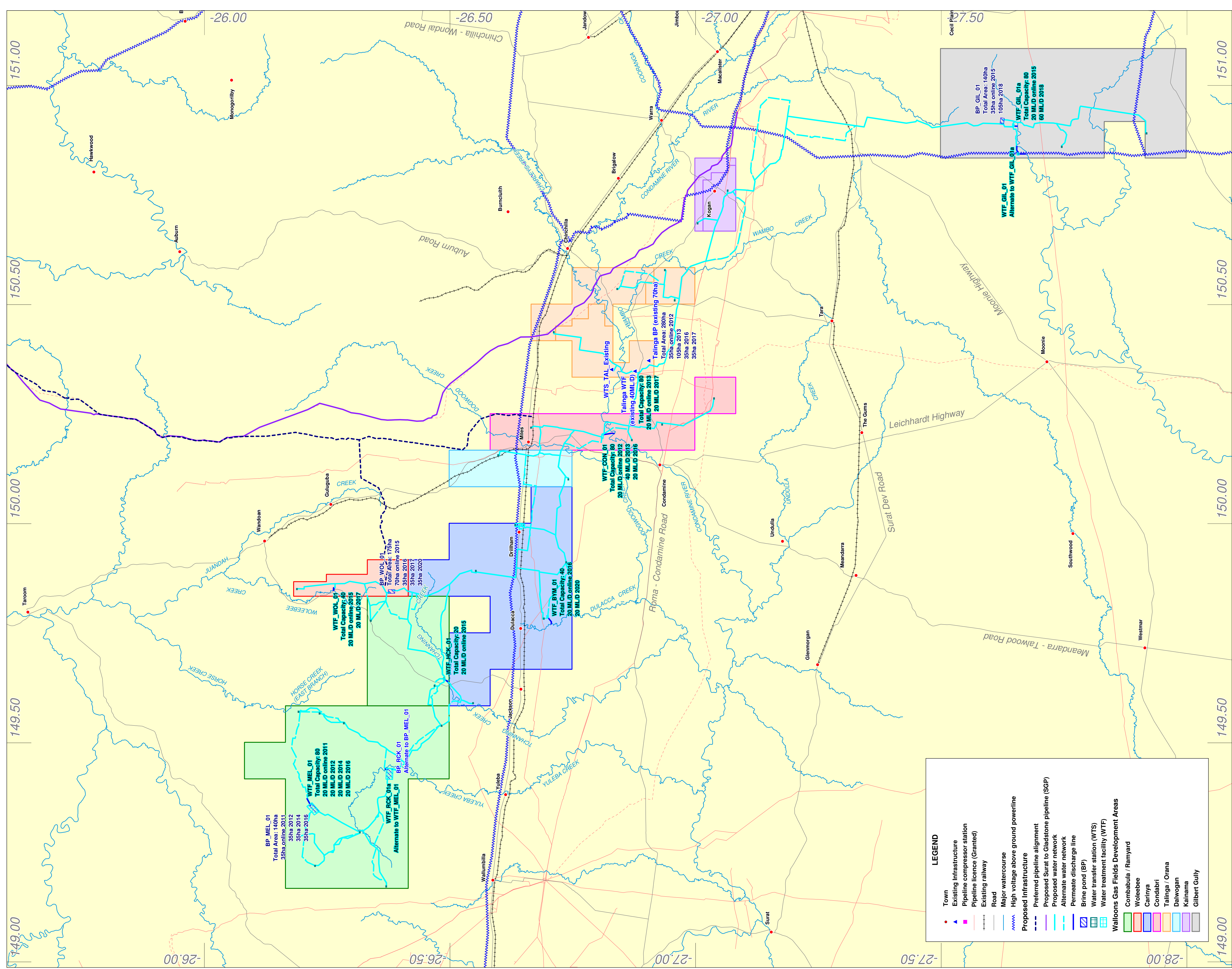
**AUSTRALIA PACIFIC LNG PROJECT**

**Figure 3.2 Gas processing facility locations**

Project No: 301001-00448      Figure: 00448-00-EN-DAL-0417      Rev: 0

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SGP pipeline route digitised from Initial Advice Statement dated December 2008  
Preferred pipeline alignment provided by Origin Energy 03/11/2009.  
Gas processing facility capacity data provided by A. Skelley on 07/09/2009.

using facility capacity data provided by A. Skelley

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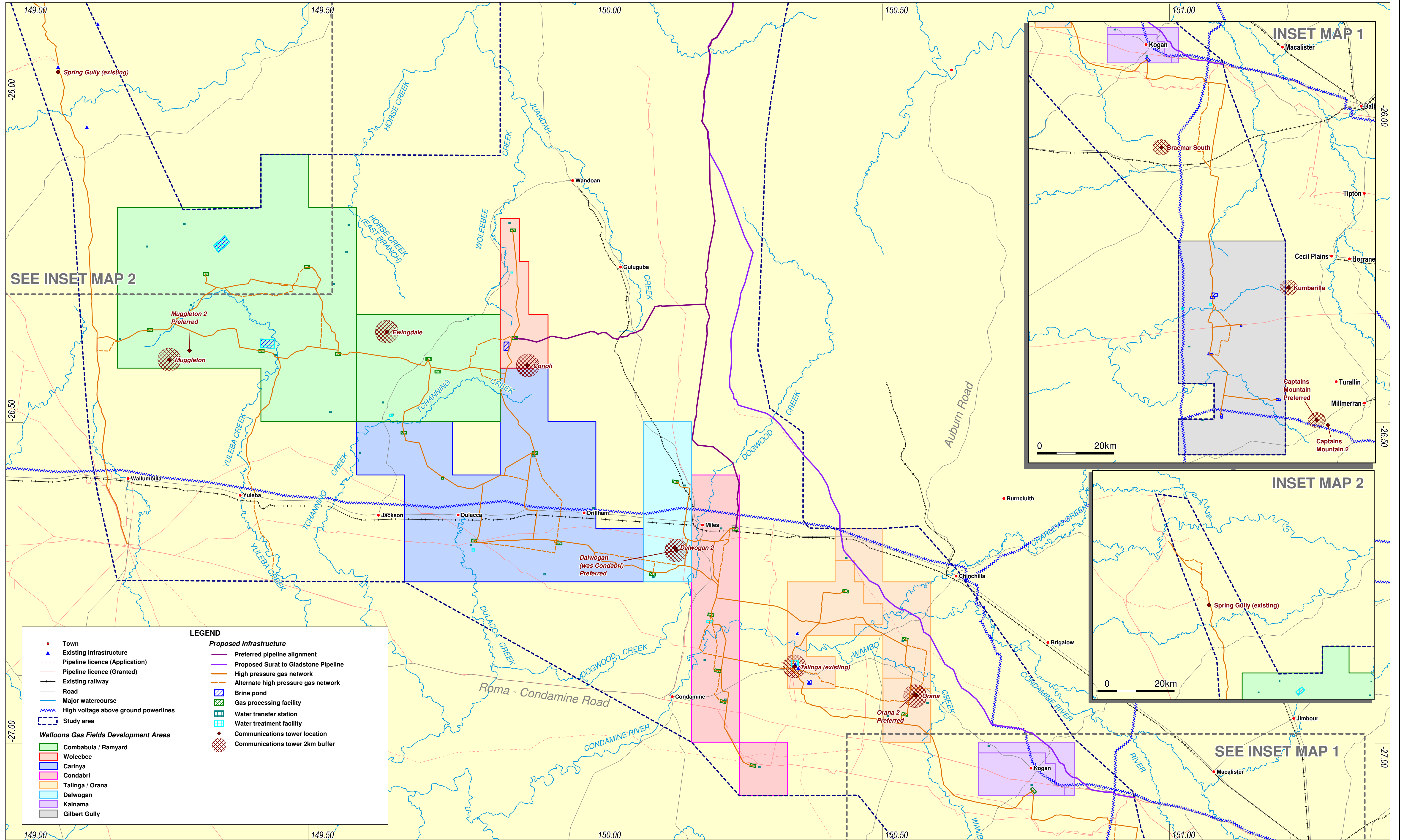
### AUSTRALIA PACIFIC LNG PROJECT

#### Figure 3.3 Water treatment facility locations

Project No: 301001-00448  
Figure: 00448-00-EN-DAL-0418  
Rev: 0

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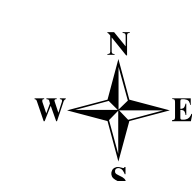






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SGP pipeline route digitised from Initial Advice Statement dated December 2008  
Communication tower locations supplied by client 07/10/2009

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SCALE - 1 : 300,000 (at A1)  
Latitude - Longitude  
Geocentric Datum of Australia 1994



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<b>AUSTRALIA PACIFIC LNG LIMITED</b>		
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.4 Proposed Microwave Communications Tower Locations</b>		
Project No: 301001-00448	Figure: 00448-00-EN-DAL-0419	Rev: 0

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### 3.3.2 Proposed operating and construction activities

This section provides details of how the gas field infrastructure is proposed to be built and operated during its planned 30-year operating lifecycle.

#### Gas wells

In order to produce gas from a coal seam water is first withdrawn using a pump installed in the well at the depth of the coal seam being developed. Once sufficient water has been removed, the coal seam gas (CSG) will begin to be released. Then both water and gas are piped into a small vessel called a wellhead separator, where the mixture is separated into separate gas and water streams. The two streams are injected into the low pressure gas and water gathering network initially using the pressure from the well.

Throughout the 30-year life of the Project it is anticipated that up to 10,000 wells will be constructed. The actual number and location of the wells is subject to numerous criteria such as exploration results, quantity of LNG required and production rates.

Each of the wells is located within a 9km drainage circle of the GPFs. Accordingly, the number of wells potentially associated with each GPF was calculated alongside details relating to the traffic distribution for each plant. A summary of the number of wells associated with each GPF is provided in Table 3.1.

**Table 3.1 Gas field numbers**

Gas Field	2010-2015	2016-2020	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	Total
Pine Hills	240	289	188	97	0	0	0	814
Combabula	204	380	274	0	0	0	0	858
Reedy Creek	288	218	277	37	0	0	0	820
Condabri South	170	127	35	0	0	0	0	332
Condabri Central	140	172	105	0	0	0	0	417
Talinga	118	64	0	0	0	0	0	182
Orana	66	65	45	0	0	0	0	176
Orana North	45	63	78	91	0	0	0	277
Gilbert Gully	0	326	833	705	458	0	0	2322
Kainama	0	176	62	46	0	0	0	284
Carinya	0	336	387	330	320	310	281	1964
Ramyard	96	312	210	200	32	0	0	850
Woleebee	0	268	100	73	0	0	0	441
Dalwogan	96	166	92	24	0	0	0	378



Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Warrego Highway/Leichardt Highway/Dawson Street	Four way priority controlled intersection	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p> <p>The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>	<p>The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>

### ***Pipeline gathering network***

The low pressure gas and water from each of the drilling wells flows into a network of buried pipelines that ultimately connect to the nearest gas processing facility (GPF) or water treatment facility (WTF). Where possible, gas and water gathering networks are generally installed at the same time and where these follow the same route, are installed in a common trench (in some cases larger diameters require individual trenches).

The entire gas gathering network is constructed from high density polyethylene (HDPE) pipe which is predominately manufactured in Queensland and New South Wales. It is estimated that 1000m of gas and water gathering network, respectively will be required to connect each CSG well. The final quantity of pipe depends upon numerous criteria such as well location, topography and location of the GPF and WTF.

### ***Water treatment facilities***

Water treatment facilities (WTFs) collect and process the associated water, and utilise or dispose of the water and associated salts. The water extracted from the CSG wells has a higher salt content than fresh water and will be treated in a reverse osmosis (RO) plant to produce a clean water product prior to its regulated discharge or further beneficial use.

Typical facilities associated with a water treatment facility (WTF) include:

- Associated water feed ponds
- The RO facility
- Management ponds for high salinity reject water
- Power generation - this may either be large gas engine driven generators fuelled by CSG or a bank of specialised 'micro turbine' generators, also burning CSG.

Proposed locations of the water treatment facility are shown on Figure 3.3.

### ***Water transfer stations***

Water gathered from the wells may either flow directly to the associated WTF or to a water transfer station (WTS). Because of the large area covered by the wells and the water gathering system, it is not always possible for the water to free flow back to the WTF, primarily due to the terrain profile. The WTS simply collects water from a water gathering network and pumps the water into another part of the network which is able to free-flow to a WTF.

The traffic movements associated with the construction and operation of water transfer stations (WTS) are minimal and will not impact the transport network. The one-off transport of infrastructure for water transfer station construction has been accounted for within the modelling of the WTFs.

### ***Gas processing facility***

Gas processing facilities are provided across the Walloons development area to allow access to gas reserves within the expected gas drainage circle. The proposed locations are identified in Figure 3.2.

The gas arrives in a number of gas gathering trunklines from the wells in the drainage circle. The gas is collected and piped to a number of compression units operating in parallel. The cooled compressed gas is routed to a dehydration unit to remove most of the water so that it meets the required specification for transmission in the pipeline and as LNG feedstock.

As part of the maximum Project development case it is expected that 23 new GPFs and eight existing plant alterations will be required. The timing is proposed in Figure 3.1.

### **High pressure gas network**

The high pressure (HP) gas network conveys compressed gas from the GPF to the main gas pipeline.

### **Communication towers**

An integrated telecommunications infrastructure network is proposed and includes eleven 50m high microwave communication towers located throughout the Project area as illustrated on Figure 3.4. Once the communication towers are installed, there are no reoccurring traffic movements associated with the infrastructure, apart from infrequent maintenance.

### **Distribution centres**

Distribution centres will be based in Brisbane, Miles and Roma. These distribution centres will service the construction of the gas field infrastructure and perform a number of functions, as follows:

- Be the delivery point for some of the materials
- Be a holding yard for excess materials
- Store materials for further distribution.

Materials sourced from the distribution centres will include potable water, food, waste disposal, concrete, gravel and fuel (delivery) trucks through the construction period. Fuel storage facilities at the distribution centre are filled by fuel tankers that travel from Brisbane.

### **3.3.3 Construction staff**

Australia Pacific LNG have advised that all construction staff movements will be by bus (80% - 20 people capacity) and by private vehicle (20% - 1.2 person per vehicle).

Table 3.2 below identifies the construction workforce adopted in the transport modelling for each gas processing facility.

**Table 3.2 Construction workforce adopted in transport modelling**

Component	No. staff	Shift	Notes
Temporary accommodation facilities	50	Five days per week	Accommodating the workforce at these facilities will allow initial civil works (e.g. clearing, earthworks, installation of services and utilities) to be undertaken without the need to source immediate accommodation within local towns.
Drilling wells	400	Two 12-hour shifts – two weeks on, two weeks off	This is an average figure based on 44 workers per gas well, working on 4.5 work sites simultaneously. Workers will move between the gas processing fields' temporary accommodation facilities as required.
Gathering network	120	12-hour shift – four weeks on, one week off	This is an average figure based on connecting 150 wells per annum per gas processing facility



Component	No. staff	Shift	Notes
Gas processing facilities	200 - 300	12-hour shift – four weeks on, one week off	This figure is the maximum number, and will depend on the size of the facility and the number of compressors.
Water treatment facilities/Water transfer stations / brine ponds	75 - 90	12-hour shift – four weeks on one week off	This will depend on the capacity of the facility.
High pressure gas pipelines	80	12-hour shift – four weeks on one week off	This is an average figure per gas processing facility

These figures represent the maximum number of people working on site per day per gas processing facility. It is assumed that a portion of the workforce will be rotated on a daily basis.

### 3.3.4 Operations staff

Operations staff, exclusive of the staff at the distribution centres, will work a selection of rosters. Some may work 11-hour day shifts on a two weeks on and two week off basis. These workers will be accommodated at site within the relevant gas processing field's operations accommodation facility. Other personnel may work a standard day working Monday to Friday roster and others a nine days on and five days off roster. These people will travel home from site at the end of each day. All site personnel with the exception of Site Superintendents are responsible for their own transport to and from site. There will be 40 people required to operate each gas processing field. This includes personnel operating the GPF's, WTF's and water transfer sites, maintenance personnel and administration personnel for the remaining gas field infrastructure.

### 3.3.5 Construction traffic

In addition to the personnel movements, traffic movements will also include the delivery of construction materials and plant.

While there will be a preference for local and regional sourcing, it was assumed that construction machinery and temporary accommodation facilities would most likely be sourced from Brisbane. Other materials and consumables are generally supplied from the distribution centres in Miles and Roma, including a portion of the total water requirement.

A summary of the significant construction materials for the gas field infrastructure is given in Table 3.3. Most of the traffic will be heavy vehicles.

**Table 3.3 Construction materials**

Component	Activity/material	Quantity
Gas well (per well)	Cement	22.5m <sup>3</sup> (3 deliveries)
	Fuel	42,000l (3 deliveries)
	General materials	Six deliveries
	Construction machinery	Four heavy and staff vehicles

Component	Activity/material	Quantity
Gathering network	HDPE pipe	2.2 deliveries per gas well
	Construction machinery	20 deliveries
Gas processing facility (including temporary accommodation facility)	Temporary accommodation facility	525 average deliveries per site
	Support facilities/structures	70 deliveries
	Concrete	1,500m <sup>3</sup> per camp and 3,000m <sup>3</sup> per GPF
	Gravel	180,000t (2,500 deliveries)
	General materials	110 deliveries
	Construction machinery	12
	Pipes	14 deliveries
	Water	5.6MI (280 deliveries)
	Fuel	1.5MI (100 deliveries)
Water treatment facility	Construction materials	40–120 deliveries depending on capacity
	Concrete	1,000 m <sup>3</sup> –3,000 m <sup>3</sup> depending on capacity

### 3.3.6 Operations traffic

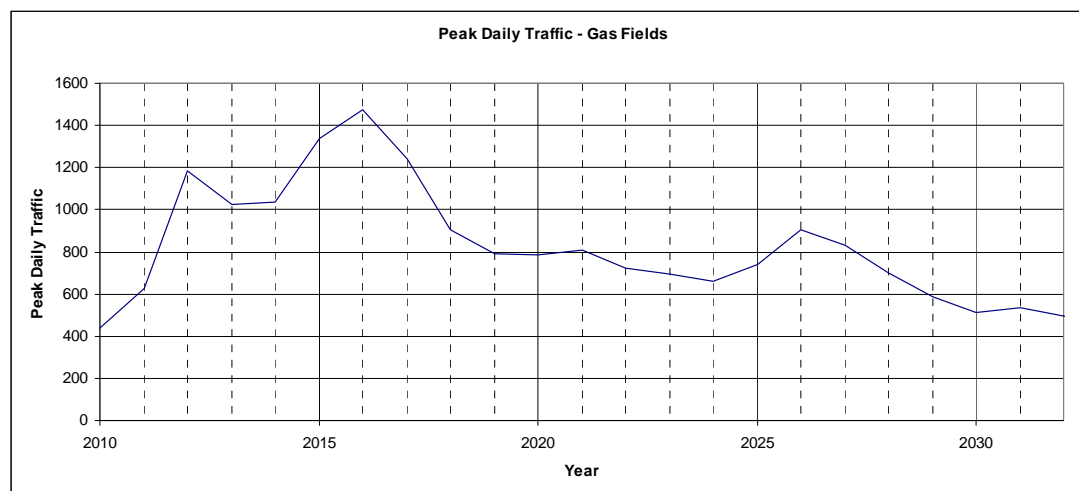
There will be a number of deliveries in the operations phase of the Project for each of the Project components. Table 3.4 below provides a summary of the anticipated delivery schedules during operation.

**Table 3.4 Delivery schedules**

Component	Activity/Material	Frequency
GPFs and temporary accommodation facilities	Potable water	Two deliveries per week
	Non-potable water	One delivery per week
	Waste disposal	Two pick- ups (one solid and one liquid) per week
	Fuel	One delivery every two weeks
	Food	One delivery every week
	Maintenance vehicles	Two trucks per week
Drilling wells	Maintenance vehicles	One inspection per month

### 3.3.7 Traffic generation

A summary of the peak daily traffic generated by the construction and operation of the gas field Project infrastructure is given in Figure 3.5 below.



**Figure 3.5 Traffic generated**

Annual, daily and peak hour trip generation was calculated for use in the assessment contained in Section 4. The traffic generation and distribution calculation is detailed in Appendix D.

Table 3.5 below identifies the peak average daily traffic generation from Project traffic for the peak year (2017) in vehicles per day (VPD).

**Table 3.5 Peak daily traffic generation**

	GPF	Drilling	Gathering network	WTF	Total
Total	153	228	151	30	562

In the peak year of the gas field Project the biggest influence on generated traffic is the construction of the drilling wells and associated gathering network construction.

The peak hour, peak daily and average daily traffic generation for the gas field Project is given in Table 3.6 below.

**Table 3.6 Summary of road based traffic generated by the gas field infrastructure**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Peak Hour													
Heavy vehicles	39	57	107	90	91	117	130	106	74	63	63	65	57
Light Vehicles	12	15	29	32	31	41	44	46	41	39	39	39	38
All vehicles	51	72	135	121	123	158	173	152	115	102	102	104	95
Peak Daily Traffic													
Heavy vehicles	395	566	1068	896	912	1172	1299	1056	741	633	633	650	575
Light Vehicles	46	62	114	127	126	164	174	185	166	156	155	157	151
All vehicles	441	628	1183	1024	1037	1336	1474	1240	906	789	788	806	726
Average Daily													
Heavy vehicles	74	131	228	299	284	389	334	423	363	352	355	371	319
Light Vehicles	26	34	57	75	84	107	104	139	135	136	136	139	131
All vehicles	100	166	286	374	368	497	438	561	498	488	491	510	450

### 3.3.8 Traffic distribution

Detailed analysis of the origin and destination of construction materials such as aggregate, module units and delivery vehicles for food, water, waste and so forth was obtained per facility per time period and coded into the traffic model based on local availability and demand.

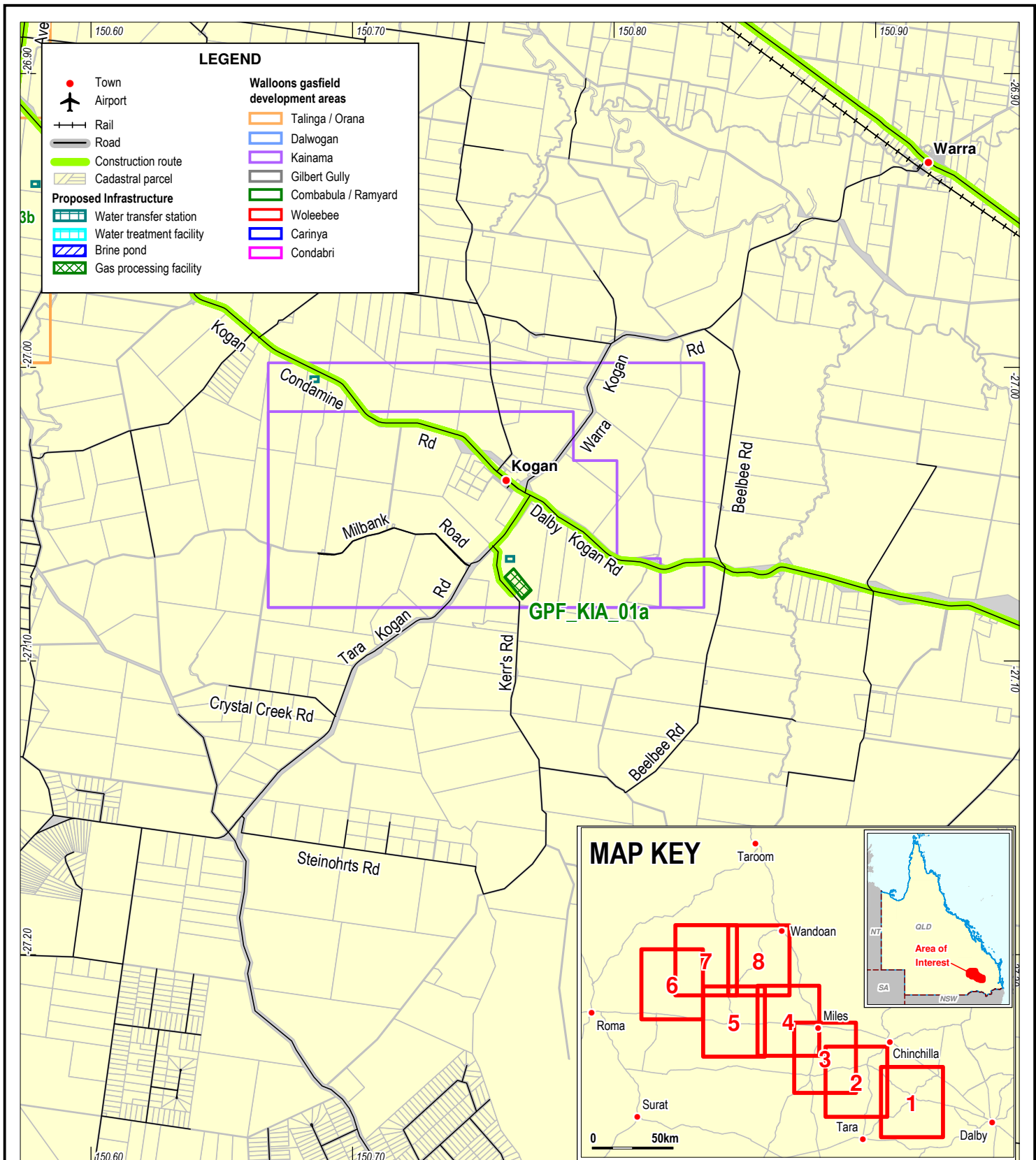
The construction traffic routes assumed for the gas fields Project are broadly described in Table 3.77 below and are shown on Figure 3.6 to Figure 3.13.

**Table 3.7 Traffic routes**

Item	Origin	Gas field	Route
Distribution centre materials and staff movements.	Miles	Kainama, Talinga, Orana, Orana North, Condabri South	Leichhardt highway south of Miles then east onto the Kogan-Condamine Road.
		Gilbert Gully	Leichhardt Highway south of Miles then east onto the Surat Development Road, to Dalby, then south on the Dalby Cecil Plains Road.  Access to the southern fields from Miles follows the Leichhardt Highway, turning east onto the Gore Highway.
		Dalwogan	Leichhardt Highway north of Miles.
		Woleebbee, Carinya	Leichhardt Highway north of Miles then west onto a local government road - Gilgilgul Road.
	Roma	Carinya, Combabula, Ramyard, Pine Hills, Reedy Creek	Warrego Highway east of Roma, then north onto the Jackson Wandoan Road, then onto local government roads - Crossroads Road, Yuleba Taroom Road and Cattle Creek Road.
Gathering network pipes.	Townsville	Carinya, Combabula, Ramyard, Woleebbee	Capricorn Highway south of Rockhampton, then the Burnett Highway to Biloela, Dawson Highway, Leichhardt Highway through Theodore and Taroom then the Jackson-Wandoan Road through Wandoan to site.
		Kainama, Talinga, Orana, Orana North, Condabri Central, Condabri South	Follows Leichhardt Highway as above, continuing through to Miles to turn east onto the Kogan-Condamine Road.
		Gilbert Gully	Leichhardt Highway south of Miles then east on the Surat Development Road, to Dalby, then south onto the Dalby Cecil Plains Road.  Access to the southern fields from Miles follows the Leichhardt Highway, turning east onto the Gore Highway.
General	Brisbane	Kainama, Talinga, Orana,	Warrego Highway through Dalby then the



Item	Origin	Gas field	Route
materials		Orana North, Condabri South	Kogan-Condamine Road.
		Combabula, Pine Hills, Reedy Creek, Condabri Central, Ramyard, Woleebee	Warrego Highway through Dalby and Miles, then north on the Leichhardt Highway
		Carinya,	Follows Warrego Highway through Dalby and Miles, then west to Roma
		Gilbert Gully	Warrego Highway to Toowoomba, then west on Gore Highway



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Latitude/ Longitude

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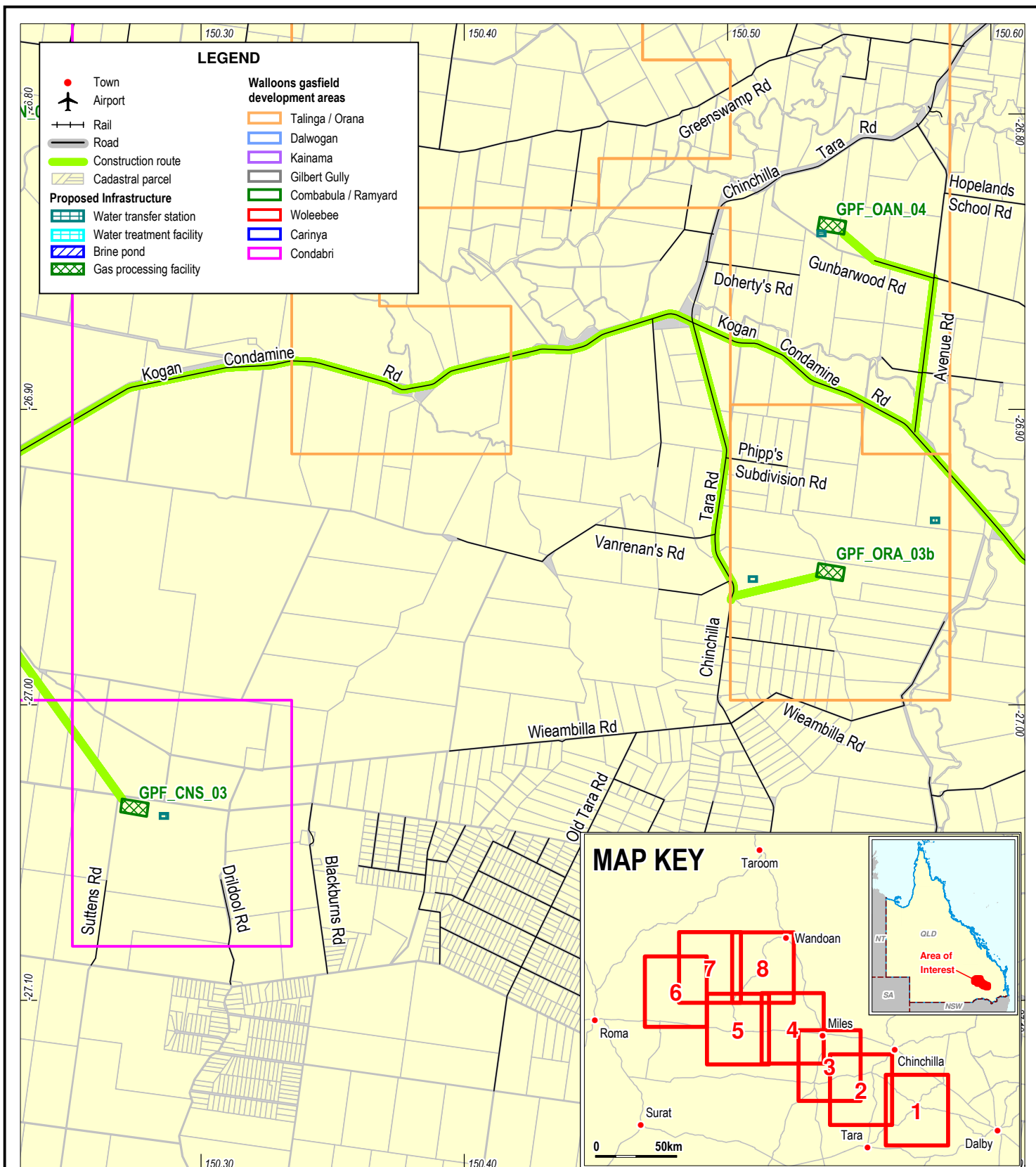
**AUSTRALIA PACIFIC LNG PROJECT**

**Figure 3.6 Gas plant construction route (Map 1)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0363

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**Figure 3.7 Gas plant construction route (Map 2)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0364

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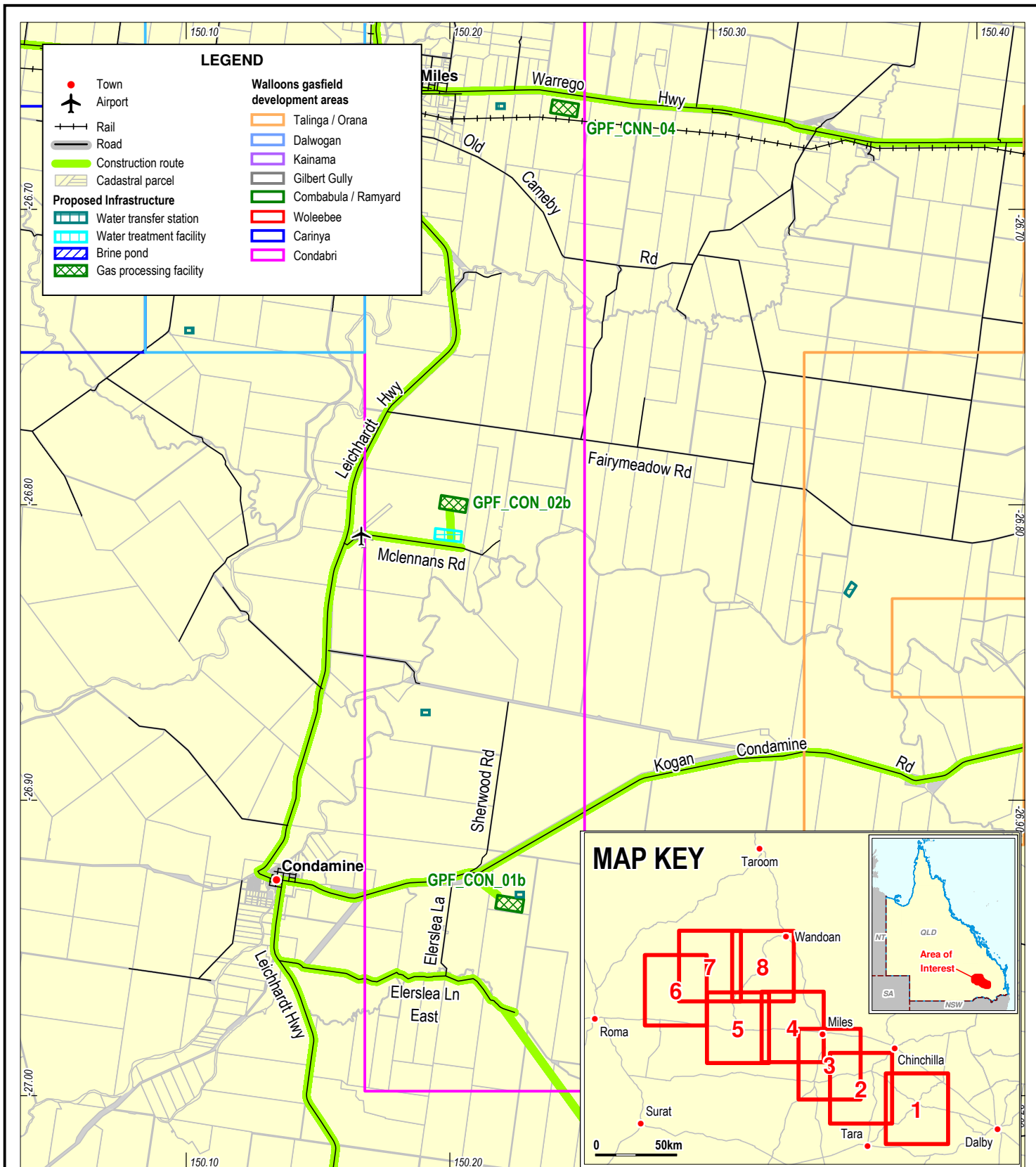


### **Roadway (strength) capacity**

The pavement analysis comprises two components, namely the impact on the timing of future pavement rehabilitation and the increased maintenance required on the network due to the Project traffic.

The methodology adopted to undertake the impact assessment of pavement rehabilitation on the State-controlled road links was to obtain data on existing traffic (heavy vehicle) volumes, calculate existing current Equivalent Standard Axles (ESA) on the road links and identify the year that the existing pavement would reach terminal roughness based on background traffic and future growth. Heavy vehicle project traffic was then added to the background traffic to determine the year at which the existing pavement would reach terminal roughness based on background plus Project traffic. Road links where the need to bring forward pavement rehabilitation by one year or more were identified.

The road links that may require rehabilitation are given in Table 0.2.



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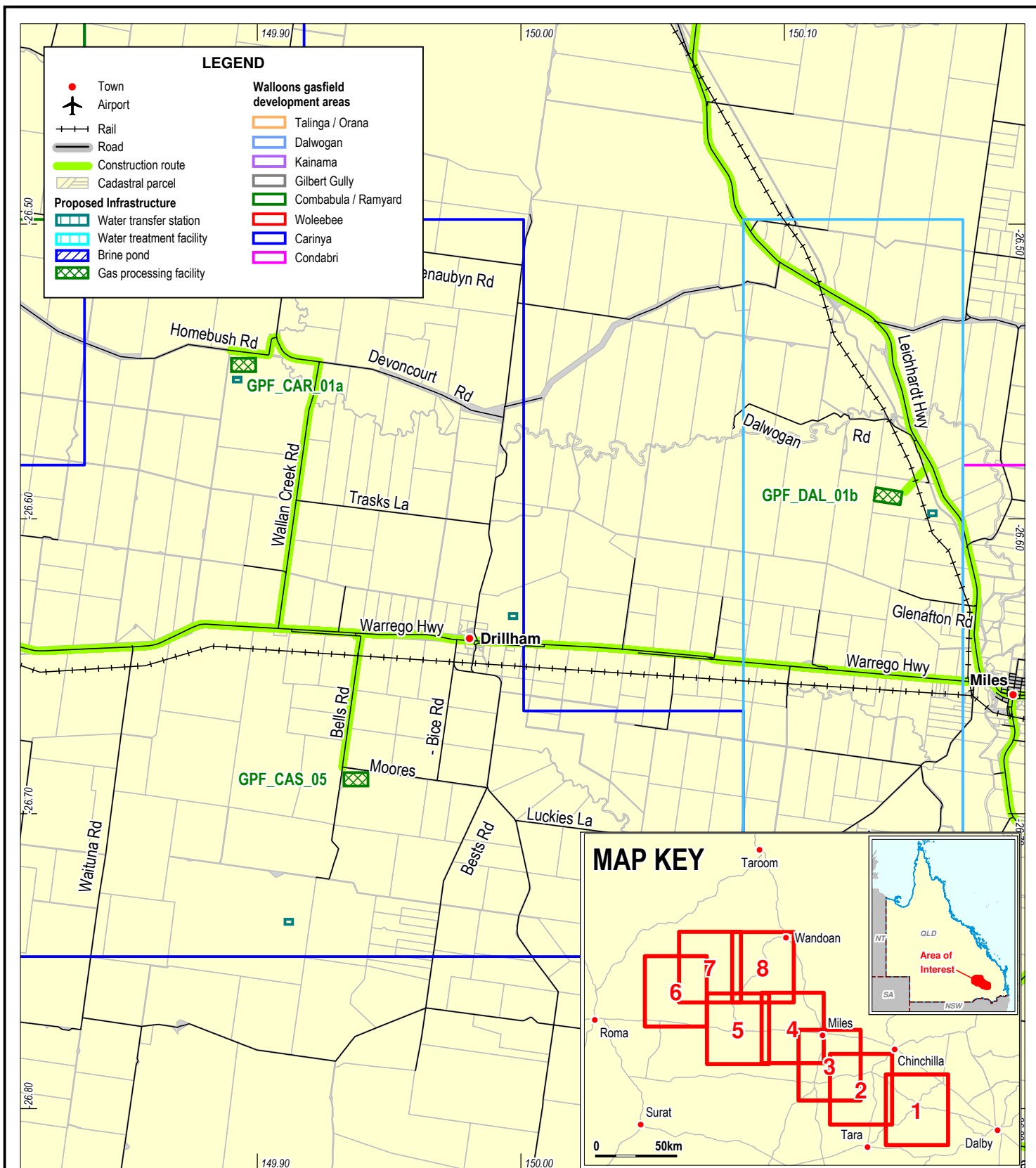
**Figure 3.8 Gas plant construction route (Map 3)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0365

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0 2.5 5km

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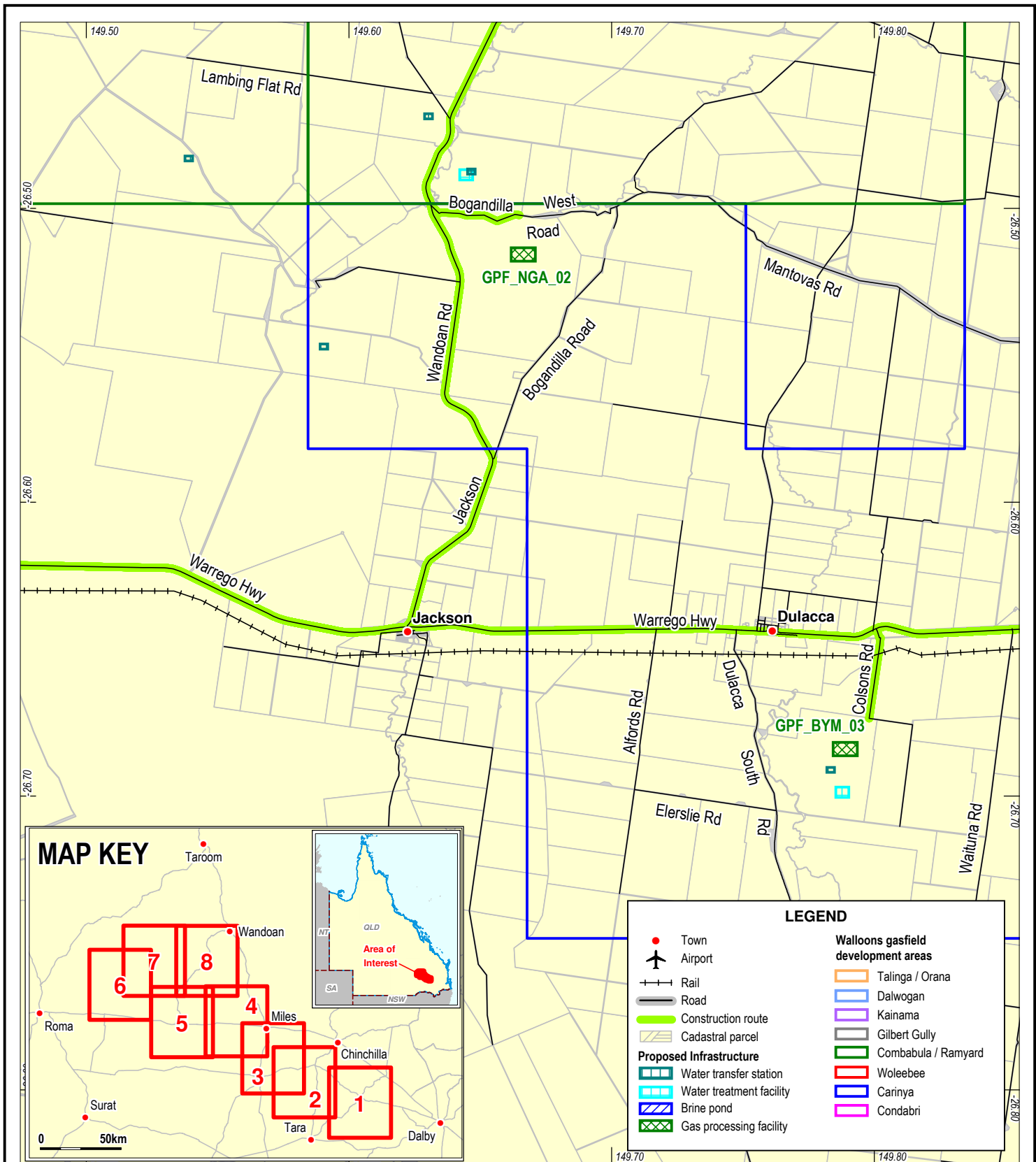
**AUSTRALIA PACIFIC LNG PROJECT**

**Figure 3.9 Gas plant construction route (Map 4)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0366

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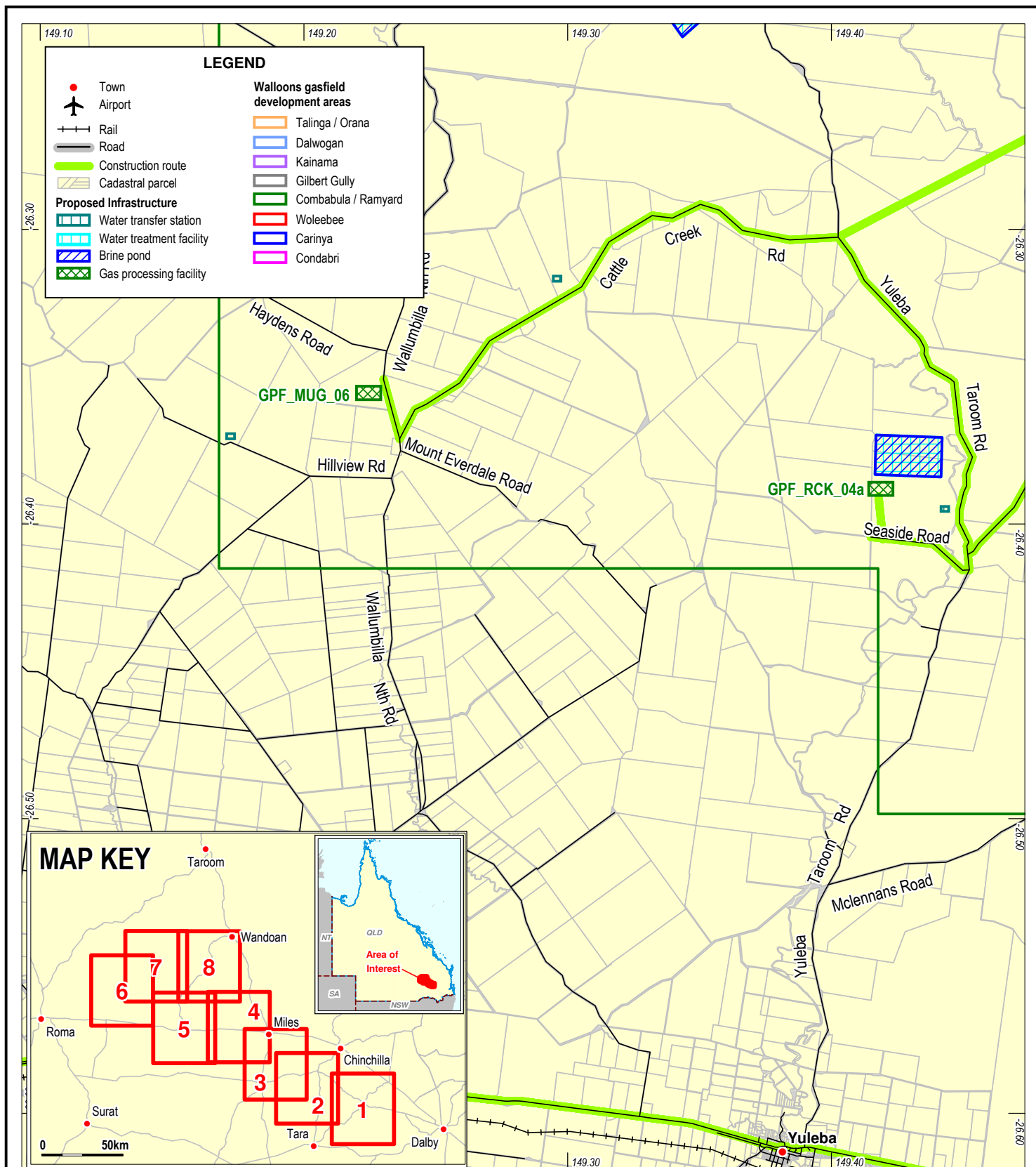
**AUSTRALIA PACIFIC LNG PROJECT**

**Figure 3.10 Gas plant construction route (Map 5)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0367

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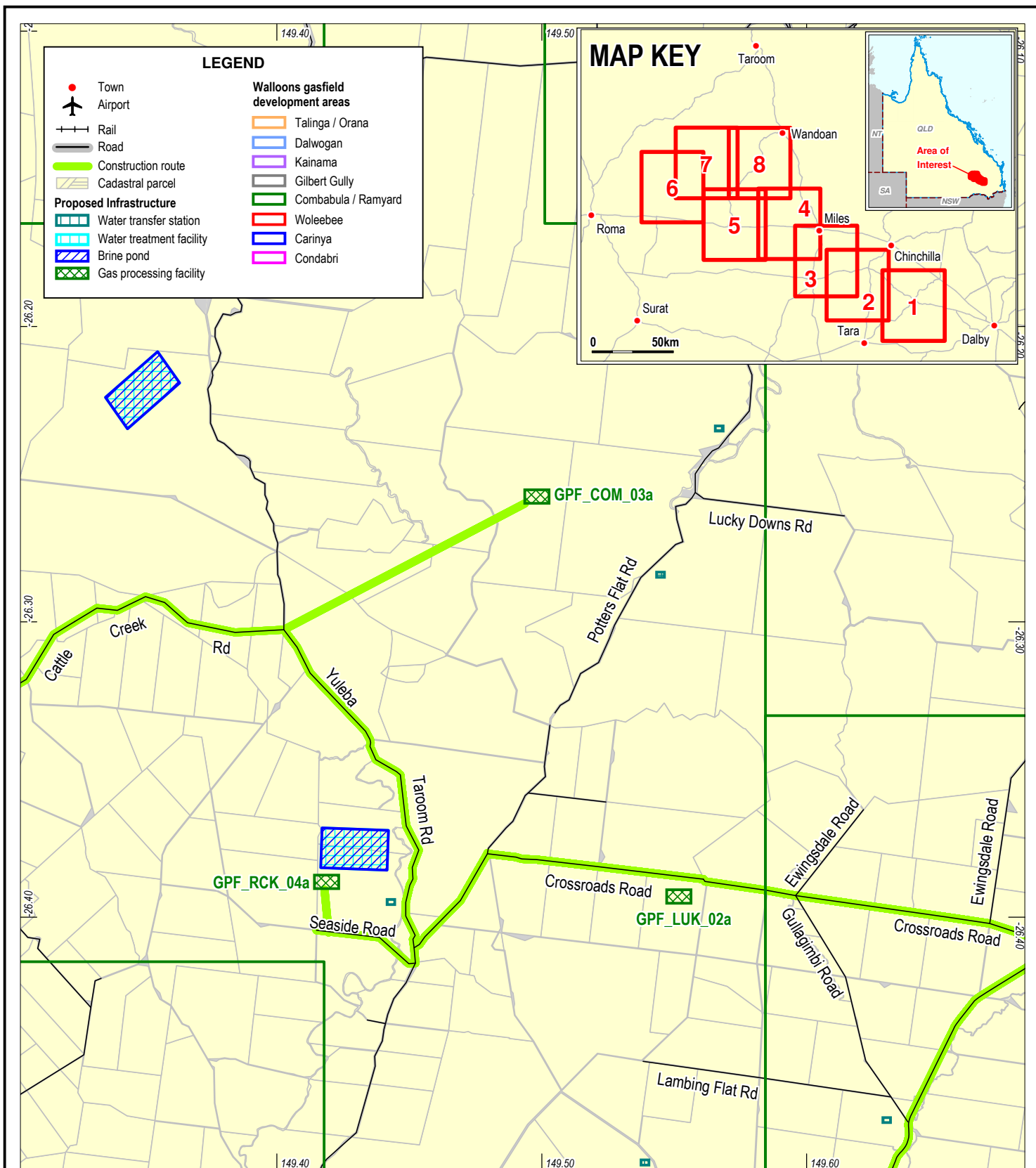
**AUSTRALIA PACIFIC LNG PROJECT**

**Figure 3.11 Gas plant construction route (Map 6)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0368

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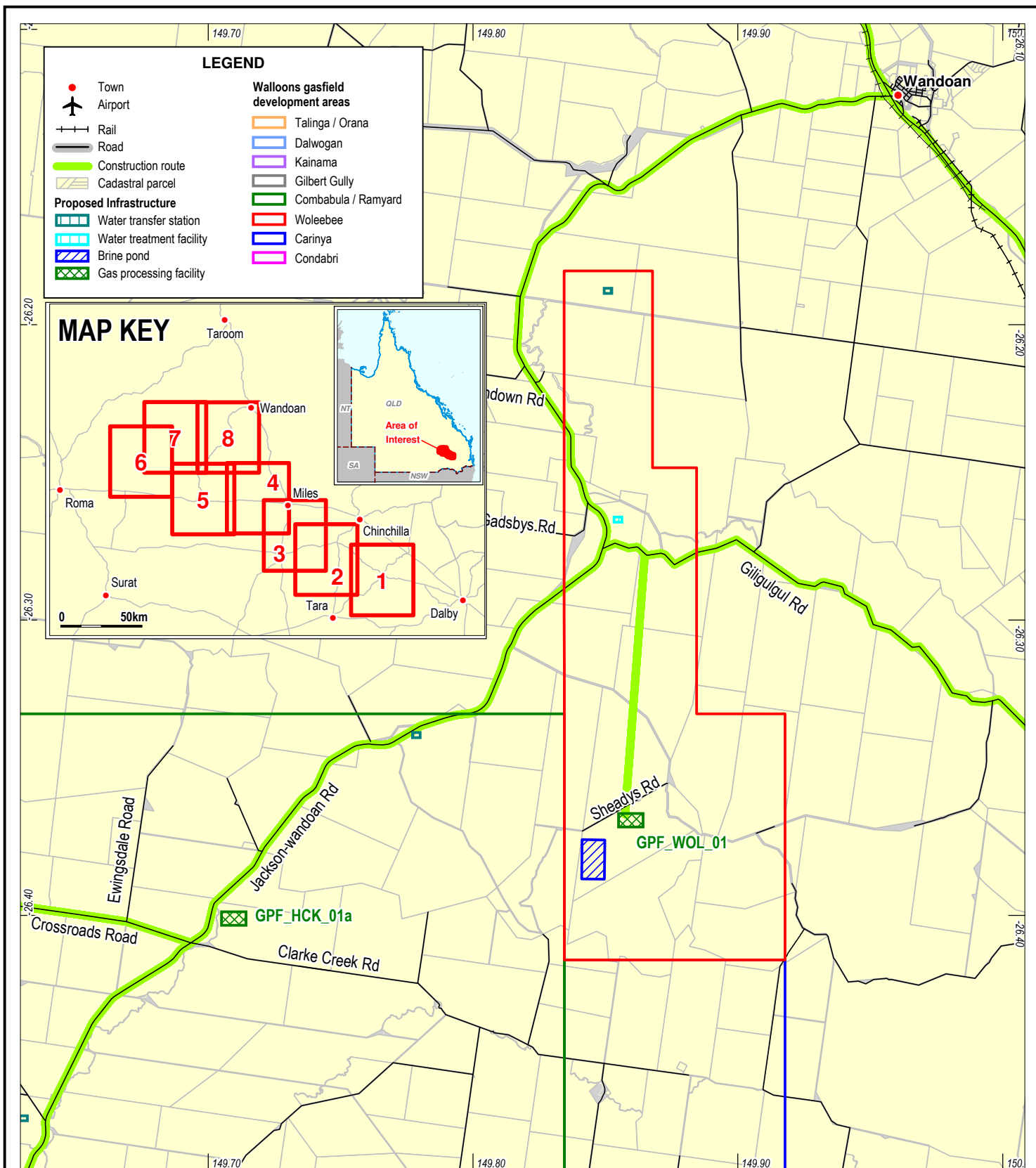
**Figure 3.12 Gas plant construction route (Map 7)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0369

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**Figure 3.13 Gas plant construction route (Map 8)**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0370

Rev: 0



### 3.4 Gas pipeline project traffic

#### 3.4.1 Description and location of proposed pipeline

The gas produced within the gas fields will be transported to the LNG facility via the gas pipeline. The buried steel pipeline is approximately 450km in length and could include a future booster compression station (or stations) to enable operation at a higher pressure and/or flow regime. Slight alterations in pipeline length are not expected to significantly change the traffic generated or traffic distribution.

The designated starting point of the pipeline is near the town of Miles. There will also be a separate pipeline connecting the Woleebee field to the pipeline. The pipeline consists of three main sections, namely:

- The Woleebee lateral – 30" pipe, 37km long
- Miles to Woleebee lateral junction – 36" pipe, 44km long
- Woleebee lateral junction to Curtis Island – 42" pipe, 359km long

A diagram showing the pipeline route is given in Figure 3.14.

#### 3.4.2 Road traffic

##### ***Proposed activities***

The process for transporting and constructing the main pipeline is as follows:

- Pipe segments are transported from either Auckland Point or Brisbane to coating facilities located along the pipeline transport route. It is assumed that 70% of the pipe will come from Gladstone and 30% from Brisbane.
- After coating, the pipeline is transported to lay down yards, strategically located along the study area in preparation for construction.
- Working north to south, construction camps are established along the pipeline route.
- The pipe is progressively constructed within the vicinity of the temporary accommodation facilities. When pipeline construction in the area has been completed, the temporary accommodation facility is relocated further along the route to enable construction of the next section.

#### 3.4.3 Construction staff

A portion of construction staff are proposed to use temporary accommodation facilities located along the pipeline route. On average, 600 people are expected to reside in the main temporary accommodation facility (TAF), working 12-hour shifts for four weeks on and nine days off. In addition to the main construction crew, there will be specialist crews of up to 200 people working elsewhere, carrying out clearing, restoration, and construction in the Callide Range and crossing 'The Narrows', who will reside separate TAF's or local accommodation. Temporary accommodation facilities locations are shown in Figure 3.14.

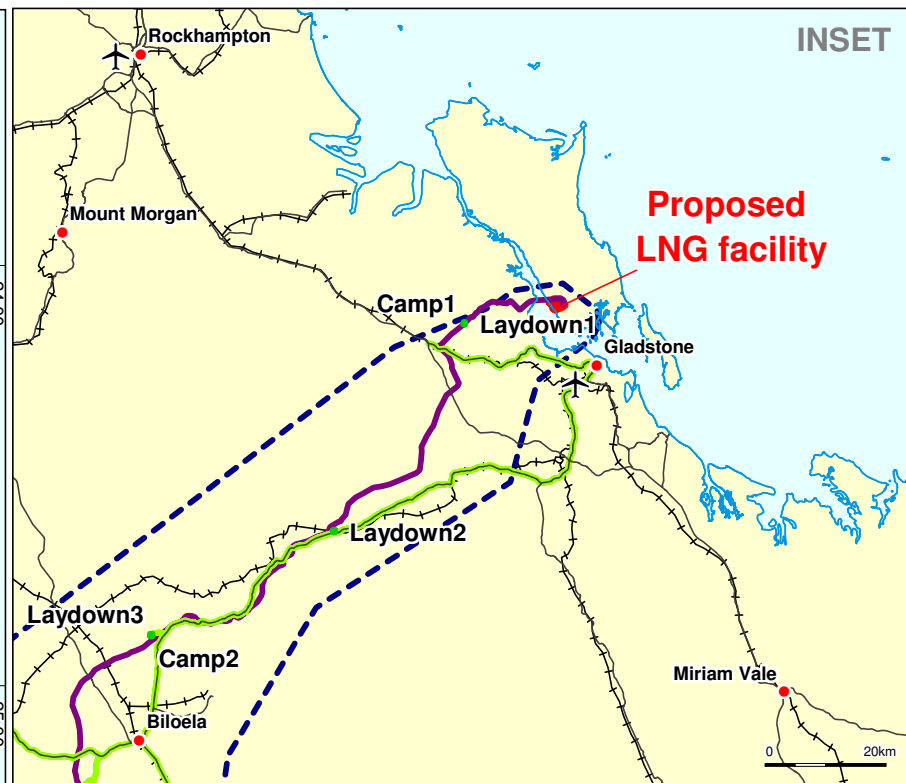
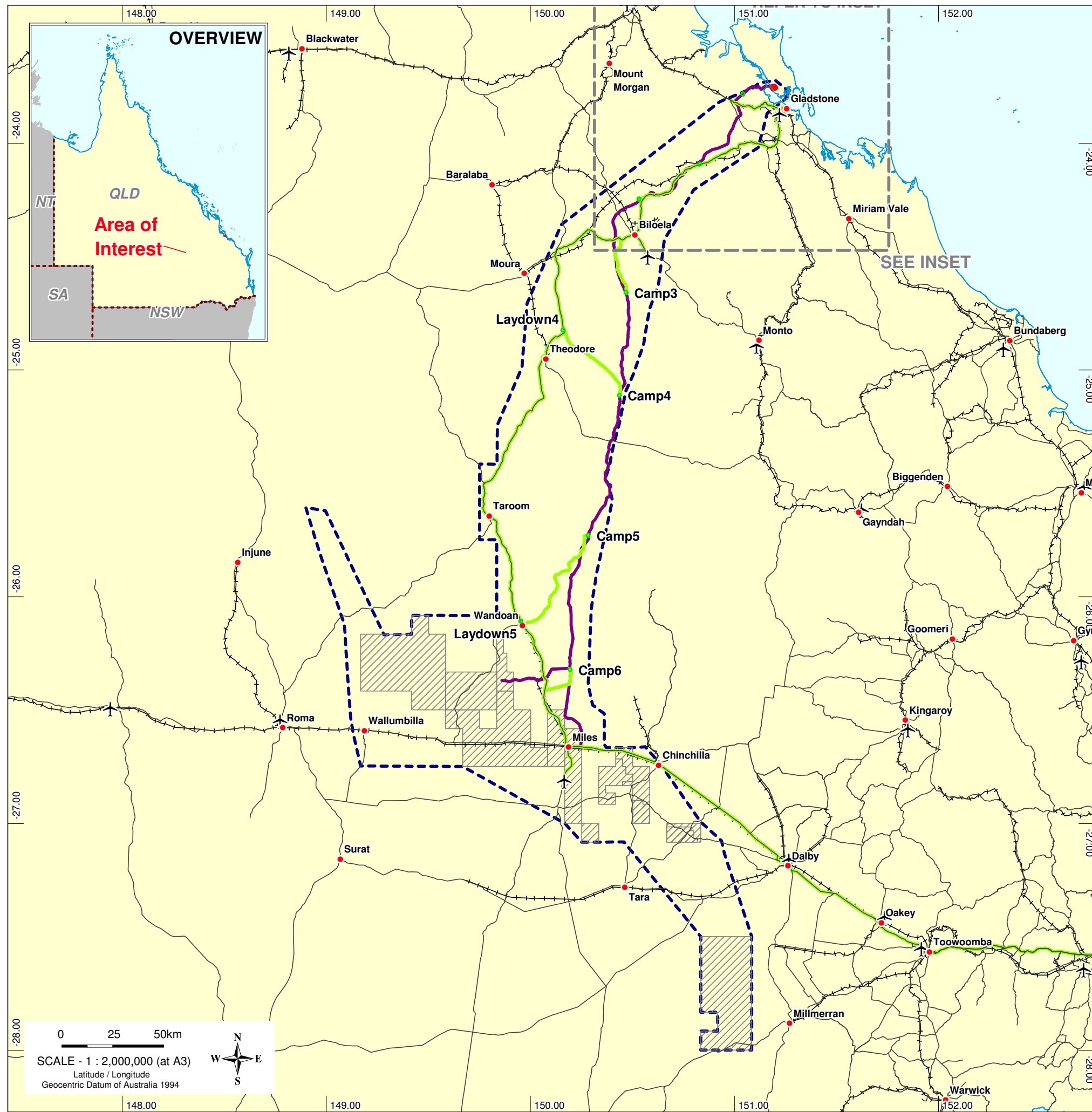
Overall, it is assumed that 10% of the staff will travel by vehicle to site, with 90% being transferred by bus. After working the four week roster, non-local staff will be transported by bus to the nearest airport for flights to their usual place of residence. The airports to be used for the staff rotations include Gladstone, Miles and Biloela.

With respect to the transfer of personnel to the nearest airport, under some circumstances the full main pipeline construction workforce may need to be demobilised in a short timeframe. To achieve this, a combination of transport modes would be utilised, i.e. not all personnel would be transported by bus to the nearest airport.

Construction camps will operate for about 90-140 days, depending on the length of pipe being built at that particular location.

#### **3.4.4 Operation staff**



It is proposed that Australia Pacific LNG staff operating out of offices at either end of the pipeline will undertake periodic pipeline inspections and maintenance.



#### LEGEND

- Town
- Aircraft facility
- Railway
- Road
- Preferred pipeline alignment
- Construction route
- Temporary accommodation facilities / laydown / compressor locations
- Walloons gas fields development areas
- Study area

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<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 3.14 Gas pipeline construction routes</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0336			Rev: 0

### 3.4.5 Construction traffic

Gas pipeline construction is proposed to commence in April 2012 and be completed by October 2013. To meet this schedule, transport of the pipe segments to the lay down yards needs to begin in March 2012 at the latest, however it may begin as early as 2011 subject to manufacturing and delivery timing.

The main traffic generated by gas pipeline construction is the transport of pipe segments. If the pipeline is to be moved by road transport then a 25m extendable semi-trailer may be used to transport the 18m long segments. Each load would contain two pipe segments of the 42" and 36" diameters and three pipe segments of the 30" diameter. To transport the pipe, a total of 11,900 truck loads may be required for a 9–12 month period, with an average daily traffic volume of 32 truck loads (65 trips daily) during that time.

There may also be additional pipe movement from the lay down yard to the work front in situations where the lay down yard is remote from the site. However, where practicable, this traffic will use the gas pipeline right of way. It is preferable that the right of way be accessed at 10km intervals via the local road network.

Other traffic generated in the construction of the pipeline and establishment of the temporary accommodation facilities is shown in Table 3.8.

**Table 3.8 Traffic generated during construction**

Item	Quantity
Pipeline transport from Gladstone	8,600 truck loads
Pipeline transport from Brisbane	3,300 truck loads
Civil machinery required for pipeline construction and temporary accommodation facility establishment	36 deliveries
Concrete	203 deliveries
Mess, office and ancillary facilities	140 deliveries originating from Gladstone (40% and Brisbane (60%))
Fuel	12,000 litres/day during pipeline construction, with one delivery per day
Waste disposal	Two pickups per week
Potable water	Three deliveries per day
Non-potable water	One delivery per day

The water requirement shown above is not the entire water requirement for the Project. Other water, including water required for testing, was assumed to be conveyed to site via pipelines from the gas wells and recycled on site to minimise transport requirements. Water may also be captured and recycled on site.

**Table 0.2 Road link rehabilitation**

Road name	Chainage	Extents	Rehab Yr			Bring forward	
			No project	Rehab year with project	with Project	with Project	with Project
18D - Warrego Hwy	Ch 0 to 1.135	Leichhardt Highway to Leichhardt Highway, Miles	2028	2026	1.9		
	Ch 56.831 to 101.157	Jackson Wandoan Road to Chadford Street	2020	2018	1.8		
	Ch 101.157 to 135.247	Chadford Street to Roma Surat Road	2021	2020	1.1		
26B - Leichhardt Hwy	Ch 60.47 to 127.61	Jackson Wandoan Road to Warrego Highway	2020	2018	1.8		
26C - Leichhardt Hwy	Ch 0 to 32.02	Warrego Highway to Roma Condamine Road	2019	2010	8.6		
	Ch 32.02 to 53.04	Roma Condamine Road to 16.6km south of Elerslea Ln	2012	2010	2.3		
3251 - Milmerran - Cecil Plains Rd	Ch 0 to 45.61	Dalby- Cecil Plains Road to Gore Highway	2036	2019	17.2		
3402 - Tara-Kogan Rd	Ch 34.8 to 43.03	Kerrs Road to Dalby Kogan Road	2022	2018	4.1		
342 - Kogan-Condamine Rd	Ch 0 to 45.82	Tara-Kogan Road to 9.6km west Noel Robinson Road	2033	2024	8.8		
	Ch 45.82 to 71.41	9.6km west Noel Robinson Road to Leichhardt Highway	2031	2026	5.1		
4302 - Jackson-Wandoan Rd	Ch 68.93 to 81.1	Bundi Road to Leichhardt Highway	2033	2029	3.9		
86A - Surat Developmental Rd	Ch 119.3 to 142.67	Leichhardt Highway to 23km east	2010	2009	1.0		
86B - Surat Developmental Rd	Ch 0.6 to 40.39	600m west of Moonie Highway to Tara	2013	2012	1.0		

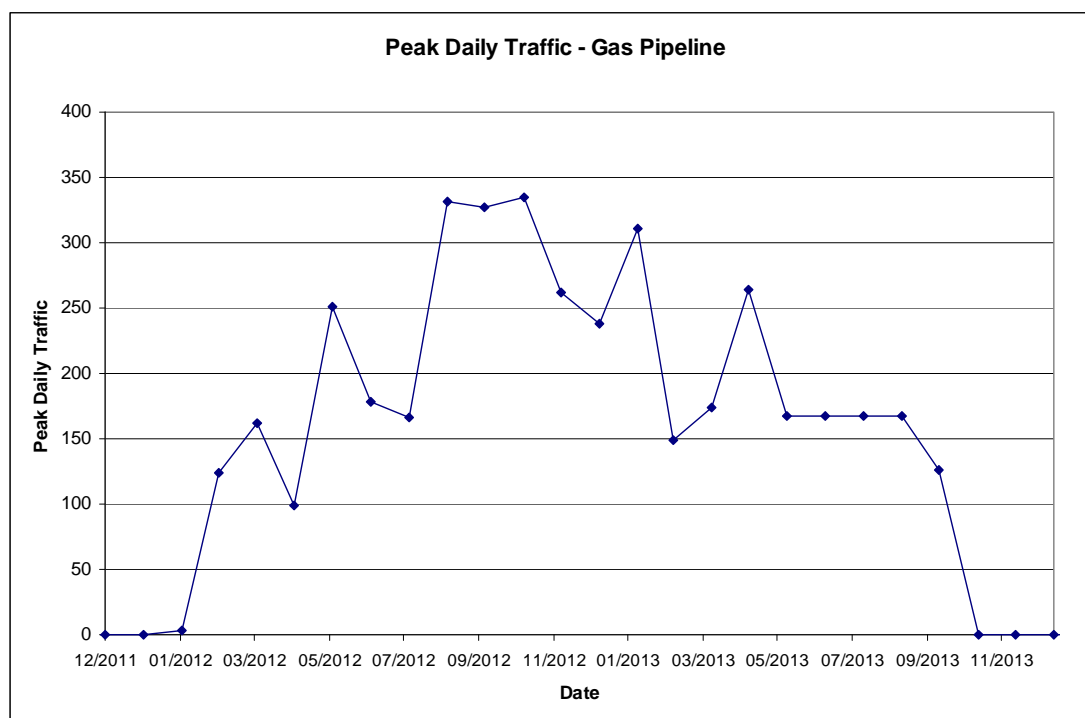


### 3.4.6 Operation traffic

Compared to construction traffic volumes there will be negligible traffic volumes generated by pipeline inspections and maintenance activities.

### 3.4.7 Traffic generation

Figure 3.15 below provides details of the estimated traffic generation for the construction of the gas pipeline.



**Figure 3.15 Peak daily traffic generated**

Table 3.9 provides a summary of the estimated peak hour, peak daily and average daily road based traffic generation from the construction of the gas pipeline.

**Table 3.9 Traffic generated from pipeline construction**

		2011	2012	2013	2014
Peak Hour	Heavy vehicles	0	28	26	0
	Light Vehicles	0	14	14	0
	All vehicles	0	42	39	0
Peak Daily Traffic	Heavy vehicles	0	280	256	0
	Light Vehicles	0	55	55	0
	All vehicles	0	335	311	0
Average Daily	Heavy vehicles	0	96	54	0
	Light Vehicles	0	5	6	0
	All vehicles	0	101	60	0

As noted in Table 3.9 the peak daily traffic generated from the pipeline construction is 335 trips per day. This occurs in a time when the following activities are being undertaken:

- When the main accommodation facility is moved from one site to the next additional traffic movements will occur
- The staff bound for accommodation facility 4 leave site on the shift change – 72 trips per day
- Pipe segments are being moved from the Gladstone and Brisbane ports to lay down area 5 – 65 trips per day
- Pipe segments are being moved from lay down area 4 to the right of way near accommodation facility 4 – 72 trips per day
- Miscellaneous fuel, waste, water and food trucks service existing accommodation facilities – 28 trips per day.

### 3.4.8 Traffic distribution

The traffic routes assumed for transporting the pipeline are given below in Table 3.10 and are shown in Figure 3.14.

**Table 3.10 Pipeline construction routes**

Item	Origin	Destination	Route
Pipe delivery	Gladstone	Lay down area 1	Gladstone Port Access Road, Gladstone-Mt Larcom Road, then The Narrows Road (a Council-controlled road)
		Lay down area 2	Gladstone Port Access Road, Gladstone-Mt Larcom Road, Dawson Highway
		Lay down area 3	Gladstone Port Access Road, Gladstone-Mt Larcom Road, Dawson Highway, then Argoon Kilburnie Road (a Council-controlled road)
		Lay down areas 4 and 5	Gladstone Port Access Road, Gladstone-Mt Larcom Road, Dawson Highway, Leichhardt Highway
	Brisbane	Lay down area 5	Warrego Highway through Dalby and Miles, then north onto Leichhardt Highway
Staff movements	Gladstone Regional Airport	Accommodation facility 1	Dawson Highway, Gladstone-Mt Larcom Road, then The Narrows Road (a Council-controlled road)
		Accommodation facility 4	Dawson Highway, Leichhardt Highway, then Defence Road (a Council-controlled road)
	Biloela Airport	Accommodation facility 2	Des Burton Drive, Winston Street, Aerodrome Road (all Council-controlled roads), then Burnett Highway, north on Dawson Highway at Biloela, then onto Argoon Kilburnie Road (a Council-controlled road)
		Accommodation facility 3	Des Burton Drive, Winston Street, Aerodrome Road (all Council-controlled roads), then Burnett Highway and south on Dawson Highway, then Crowsdale

Item	Origin	Destination	Route
			Camboon Road (a Council-controlled roads)
	Miles Aerodrome	Accommodation facility 5	Leichhardt Highway north through Miles, then on Council-controlled roads: Windeyer Road, Roche Creek Road, Bungaban Road and Ponty Pool Road
		Accommodation facility 6	Leichhardt Highway north through Miles, then on Welsh's Road and L Tree Creek Road (both Council-controlled roads)

### 3.5 LNG facility project traffic - Curtis Island, Gladstone

#### 3.5.1 Description and location of proposed facility

The LNG facility will be located in the Curtis Island Industry Precinct of the Gladstone State Development Area (GSDA) at Laird Point. The LNG facility comprises LNG manufacturing and storage facilities and marine export facilities.

The LNG facility will be constructed in four stages (or trains) and has an ultimate production capacity of approximately 18 million tonnes per annum (Mtpa). The initial development will be comprised of trains one and two, with approximately 4.5Mtpa capacity each. Trains one and two will be constructed and both operational by 2015, while trains three and four will both be operational by 2022. The timing of commencement of construction of trains three and four will depend on the LNG markets and gas development. It is assumed that the construction of train three would be 2017 and train four would commence nine months after the commencement of train three.

In addition to the construction of the first two trains of the LNG production facility, construction will include wharf and jetty structures for the loading of LNG vessels. Construction will also involve the establishment of temporary rock dock and a material offloading facility (MOF) for the transfer of building materials and heavy equipment to the site. The construction of the marine infrastructure will also involve dredging at the wharf and MOF and the subsequent management of the dredged material. It is likely any capital dredging required for shipping access will be provided under separate approvals sought by the GPC.

The LNG facility on Curtis Island will generate additional shipping and road-based transport trips. Section 3.6 describes the proposed shipping movements within and outside the Port of Gladstone.

#### 3.5.2 Road traffic

A description of the road-based transport generated by the LNG facility within Gladstone and operations at FLNE is given below.

##### **Construction staff**

Construction of the LNG facility is expected to commence in early 2011 with the establishment of a temporary accommodation facility (TAF) on the island. The construction of these facilities will take approximately six months and be used to accommodate up to 1800 workers.

It is estimated the construction workforce requirements will peak at approximately 2100 workers during the construction of stage 1 (trains one and two) and stage 2 (trains three and four).

It has been assumed that up to 80 percent of the total workforce will be accommodated on Curtis Island in a Temporary Accommodation Facility (TAF) and will work four weeks on and one week off. These workers living in the TAF will be non-residents and will either fly in/fly out (FIFO) from Gladstone Regional Airport or drive in/drive out (DIDO) from outside the local area (local area being defined as within 60km of the Gladstone Post Office). The FIFO workers will be shuttled to/from the airport on busses. DIDO workers will park their cars in the designated secure car park (Ash Pond #7 off Blain Drive) area during their rotation in the construction camp.

The remaining 20 percent or more of the workforce are assumed to be residents of the Gladstone area and will commute by private vehicle to a secure car-park at Ash Pond #7 off Blain Drive, park their vehicles and then will be bussed to the Fisherman's Landing North Expansion ferry terminal. From here these workers will be transported by ferry to Curtis Island.

It has been assumed that on average 1.2 workers will occupy each vehicle.

### 3.5.3 Operations staff

Staff will commute daily from the Gladstone area to the LNG facility on Curtis Island. It is assumed, for this study that these workers will drive by private vehicle (1.2 persons per car) to FLNE before boarding a barge/ferry for the journey to Curtis Island. The following staff numbers have been assumed during the operational phase of each train:

- Train one - 100 staff per shift; two shifts working 24hrs/day, seven days per week.
- Trains two to four - additional 75 staff per train; two shifts working 24hr/day, seven days per week.

### 3.5.4 Construction traffic

An estimate of the total number of deliveries of construction materials and equipment for each LNG train is provided in Table 3.11. This is an estimate based on the current construction plan which is yet to be finalised, however the total number of truck loads is approximately 14,000.

**Table 3.11 Number of deliveries per LNG train**

Item	Quantity of truck loads
Equipment	3250
Electrical	200
Insulation	500
Fuel	100
Concrete/Grout	2000
Steel	4250
Aggregate/stone	3000
Miscellaneous	500
Water	Assumed desalination plant to be constructed on Curtis Island.
Oversized and pipe	To be delivered by barge to MOF on Curtis Island.

There will be some initial water deliveries from the mainland until the temporary construction phase desalination plant is constructed.

It has been assumed for this assessment all deliveries will be trucked to FLNE and barged to Curtis Island.

Oversized/pre-assembled items and pipe material will be shipped directly to the MOF on Curtis Island.

It has been assumed deliveries will be made at a constant rate throughout the four-year construction period and approximately 10 percent of the daily delivery movements will occur during each of the morning and afternoon peak hour periods. This assumption is consistent with the expected loading capacity of the barge/ferry to Curtis Island.

During the construction of the LNG trains, it has been assumed 25 percent of the daily construction personnel traffic will commute during each of the morning and afternoon peak hour periods. The model assumes that arrival and departure of personnel will extend across a two hour period.

### 3.5.5 Operations traffic

Deliveries of materials and equipment during the operation of each LNG train are provided in Table 3.12 below.

**Table 3.12 Delivery of materials during operation of the LNG train**

Item	Quantity of trucks per month
Refrigerants	2
Fuel	1
Chemicals	1
Miscellaneous	10

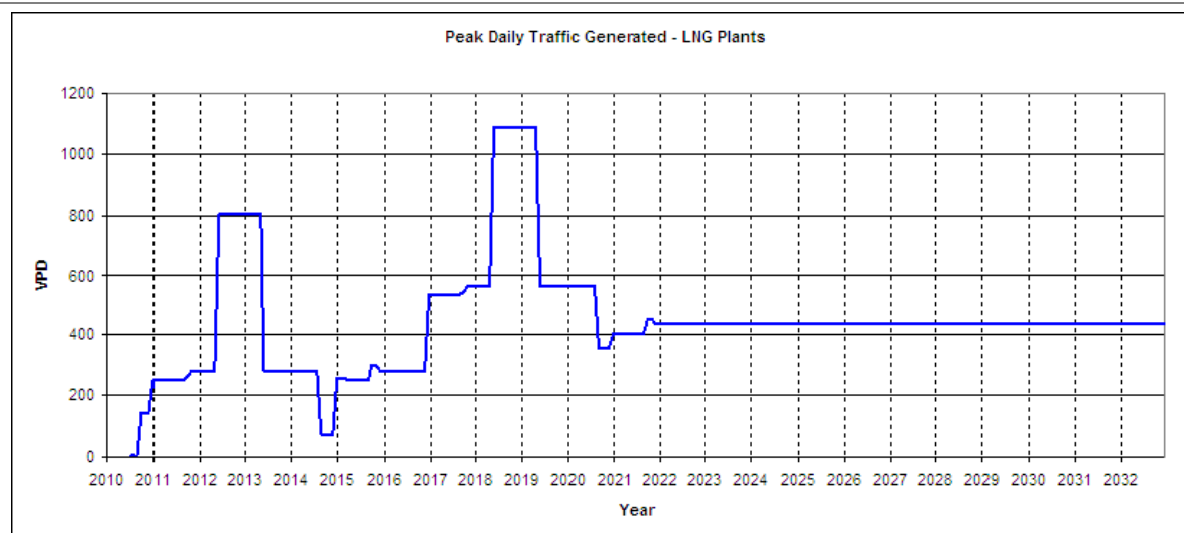
It has been assumed that 10 percent of deliveries will occur during each of the morning and afternoon peak hour periods and 25 percent of the operational personnel traffic will commute at the same time.

LNG will be transported by specially-designed ships. With two trains in operation at 4.5Mtpa (nominal production for each train), LNG ships will likely arrive every 3-4 days for loading and export, with an estimated 24-hours turnaround time.

### 3.5.6 Traffic generation

Figure 3.16 below provides details of the estimated traffic generation for the construction and operation of the LNG facility to the maximum case. All Project generated Vehicle per Day (VPD) are shown.





**Figure 3.16 Peak daily generated traffic**

Table 3.13 provides a summary of the estimated peak hour, peak daily and average daily road-based traffic generation from the construction and operation of the LNG facility.

**Table 3.13 Summary of estimated peak hour, road based traffic**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Peak Hour													
Heavy vehicles	15	7	11	11	7	4	0	7	11	11	7	3	0
Light Vehicles	0	52	174	174	52	65	70	122	244	244	122	106	109
All vehicles	15	59	185	185	59	69	70	130	255	255	130	109	109
Peak Daily													
Traffic													
Heavy vehicles	149	74	109	109	74	39	1	74	109	109	74	31	1
Light Vehicles	0	208	696	696	208	261	281	489	977	977	489	425	436
All vehicles	149	282	806	806	282	300	281	562	1086	1086	562	456	437
Average													
Daily													
Heavy vehicles	0	7	29	29	29	22	0	7	29	29	29	22	1
Light Vehicles	49	252	568	453	174	241	281	533	848	734	455	394	437
All vehicles	49	260	598	482	203	263	281	540	877	763	484	416	437

### 3.5.7 Traffic distribution

Traffic routes adopted for the construction of the LNG facility are given in Table 3.14 below.

**Table 3.14 LNG facility traffic distribution**

Traffic type	Origin	Route
Construction staff	Up to a maximum of 20% local residents	Assumed local residents from throughout the Gladstone Region, drive to Ash Pond #7 car park off Blain Drive and bussed to FLNE via Gladstone–Mt Larcom Road / Landing Road. Approximately 90% will approach Ash Pond #7 car park from the Dawson Highway and 10% from Gladstone Mt Larcom Road.
Construction material	Local and regional	Assumed local deliveries from throughout the Gladstone Region are delivered to FLNE via Mt Larcom Road / Landing Road.  Regional deliveries from various locations outside the Gladstone Region including Brisbane. Northern deliveries along Gladstone–Mt Larcom Road/Landing Road to FLNE. Southern deliveries along Bruce Highway, then Calliope River Targinie Road to Gladstone–Mt Larcom Road / Landing Road to FLNE.
Operations staff	Local residents	Assumed local residents from throughout the Gladstone Region, to FLNE via Blain Drive - Gladstone–Mt Larcom Road / Landing Road
Operational deliveries	Local	Assumed local deliveries from throughout the Gladstone Region to FLNE via Mt Larcom Road / Landing Road.

### 3.5.8 Project traffic generation summary

Figure 3.17 details the combined peak daily traffic volumes for construction and operation of the gas fields, gas pipeline and LNG plants. There are two peaks, the first in 2013 which coincides with the construction of the gas pipeline and the construction of trains 1 and 2. The second peak traffic generation period is in 2019, which coincides with the operation of trains 1 and 2 and the construction of trains 3 and 4.

Table 3.15 provides the peak hour, peak day and average daily traffic generated by the Project.



**Table 3.15 Project Traffic Generation**

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Peak Hour													
Heavy vehicles	54	64	146	126	99	121	130	113	85	74	71	68	58
Light Vehicles	12	67	216	220	83	106	114	168	286	283	161	145	147
All vehicles	66	131	362	346	182	227	244	281	371	358	232	214	204
Peak Daily Traffic													
Heavy vehicles	543	640	1457	1261	985	1211	1300	1129	850	742	706	681	576
Light Vehicles	46	270	866	879	334	424	455	673	1143	1133	644	582	587
All vehicles	589	909	2323	2140	1319	1635	1755	1803	1992	1875	1350	1263	1163
Average Daily													
Heavy vehicles	74	139	354	382	313	411	335	430	393	381	384	393	319
Light Vehicles	76	287	630	534	258	348	385	671	983	870	591	533	568
All vehicles	150	425	984	916	571	759	720	1101	1376	1252	975	927	888

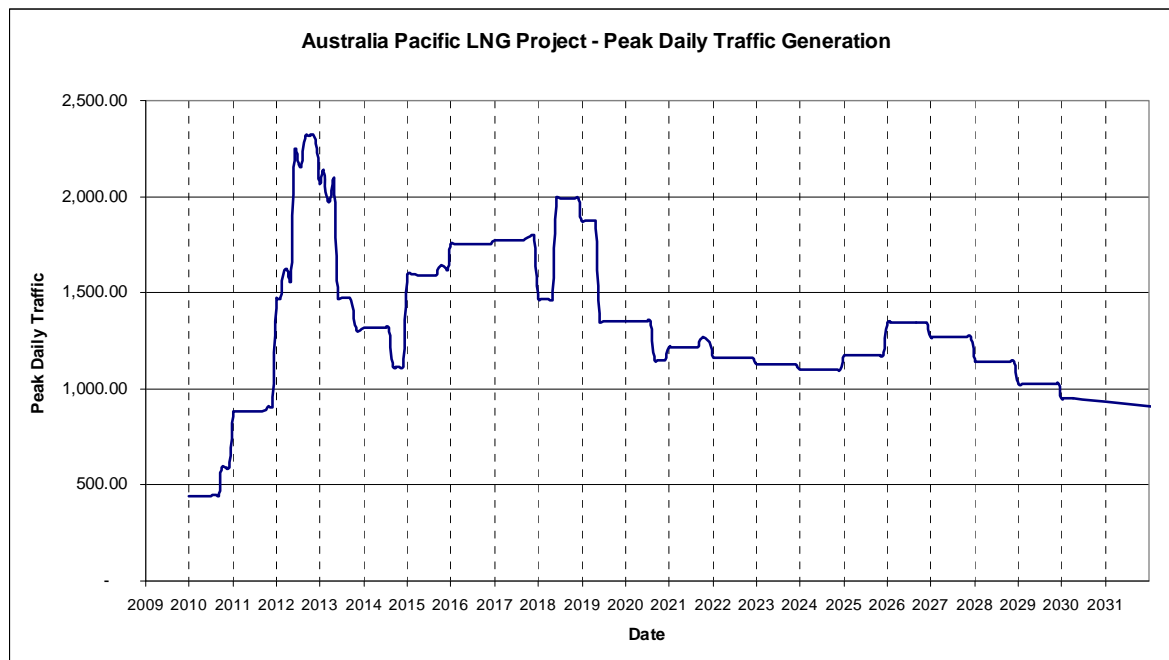


Figure 3.17 Project traffic

## 3.6 Transport - shipping

### 3.6.1 Construction materials transport – LNG plant Curtis Island

Shipping activities associated with construction relate to:

- Transfer of personnel and equipment between Gladstone and the LNG facility site; staging to occur from ferry embarkation point (FLNE) by barge and ferry
- Delivery of plant, materials and equipment to the LNG facility site on Curtis Island directly via the MOF and temporary rock dock on Curtis Island

The MOF will have the following functions:

- Offloading of modules for LNG trains
- Offload general construction materials from barges
- Support to load-out jetty construction

A permanent facility on the mainland may be established to provide for barge and ferry transport. For the purpose of this study FLNE was assumed.

A ferry dock will be constructed on Curtis Island to receive construction and operational personnel.

A materials staging area on the western side of the harbour at Gladstone would also need to be established to facilitate the transport of materials and personnel. Such a wharf facility should include car parking and waiting areas. FLNE has been assumed as the site for this facility.

The transport of heavy loads of construction equipment and consumables to the site will be undertaken by barge. It is estimated that 15-20 barges per day will be required over a period of 2-4 years.



## **Bridges**

The methodology adopted to examine the capacity of the bridges was to identify bridges on the likely Project traffic routes, identify any existing load limits or restrictions on the bridges and determine if Project traffic would impact the bridge.

Qualitative analyses have been conducted to identify the potential impact of heavy vehicle movements from the Project. Information concerning the capacity of bridges along the proposed Australia Pacific LNG routes was obtained during site inspections and from a desktop review of the data provided by the Department of Transport and Main Roads.

Bridges with known limits and conditions were also identified, as well as bridges that were perceived to be 'at risk'. These are detailed below;

### **Dogwood Creek Bridge**

There are mass restrictions on this bridge. This bridge may be heavily impacted on by the Project in the construction of both the pipeline and the gas field infrastructure as it is on the western route from Miles. The restrictions on this bridge are unlikely to affect the majority of Project traffic however large, heavy loads such as those that may be required for the gas plants will need comply with the restrictions. There are no reasonable opportunities for alternative routes.

### **One Arm Man Creek Bridge**

One Arm Man Creek Bridge is closed to vehicles with a Gross Vehicle Mass (GVM) greater than 30 tonnes. This bridge provides access from Gladstone and Townsville to the gas fields. An alternative route is available via the Leichhardt Highway and Gilgilgul Road. This route may be taken for any vehicle with a GVM in excess of 30t.

### **Kogan Creek Bridge**

This bridge is a narrow wooden bridge that provides access from Brisbane to the gas fields and the Miles airport. As this bridge is narrow, large loads originating from Brisbane may need to use an alternative route to access the gas fields. The route may be via the Warrego Highway through Chinchilla, then south on the Leichhardt Highway at Miles then east on the Kogan-Condamine Road at Condamine.

### **Fourteen Mile Creek Bridge**

This bridge has been removed and there is a diversion in place for traffic. The crossing is prone to flooding and provides access from Brisbane to the gas fields and Miles Airport. During flooding periods loads originating from Brisbane may need to use an alternative route to access the gas fields, for example via the Warrego Highway through Chinchilla, then south on the Leichhardt Highway at Miles then east on the Kogan-Condamine Road at Condamine. Personnel transport to/from Miles may also be affected by flooding of this crossing and it may be necessary to use the Warra-Kogan Road as a diversion during these times.

### **Braemer Creek Bridge**

This bridge is a narrow wooden bridge that provides access from Brisbane to the gas fields. Large loads bound for the Kianama gas fields may need to be diverted via the Warrego Highway and the Warra-Kogan Road. Large loads bound for the remaining fields may need to be diverted via the

For the main construction phase, the non-local workforce will be accommodated in a temporary construction camp on Curtis Island. Transportation of the majority of the workforce from Gladstone to Curtis Island will be by ferry. It is estimated that there will be two ferry trips in the morning and two ferry trips in the afternoon. The transportation of the remaining personnel will be undertaken using water taxis for fast transit of small numbers of personnel throughout the day.

While final specifications of these vessels are yet to be determined, it is expected that the vessels will be similar in size and configuration to existing vessels currently operating in Moreton Bay in south-east Queensland. A photo of a vessel similar to that being proposed for the Project is shown in Figure 3.18.

Large ferries will allow for embarkation and debarkation of personnel and will be used for vehicular transport only. LNG personnel will arrive on passenger only vessels.



**Figure 3.18 Example of possible ferry**

The assumed average movement of vessels expected during the construction phase is as follows:

- Large deck barges with coarse aggregate - six per month
- Typical deck barges with sand - two per month
- Bulk cement vessels - two per month
- Roll-on/Roll-off ships - two and a half per month
- Passenger ferries, two trips in the morning and evening with potential weekday evening trips from the island for TAF residents
- Jetty tenders - daily round trips from the wharf to the jetty with piling and beams, armour rock, modules and topside commodities
- Jetty tenders - daily round trips with armour rock, modules, topsides commodities
- Jetty multicastr - pushing tenders and running personnel daily
- Crew boats and food supplies for site camp: one every two days
- Patrol boats – as required, up to three daily
- Pilot boats - as required
- Diesel fuel barges - four per month
- Subcontractors' deliveries - four per month

For the very early part of the construction phase, clean treated water will be brought to the site in tankers from Gladstone on barges. As described elsewhere approximately 800,000m<sup>3</sup> of fresh water will be needed on Curtis Island. A temporary seawater desalination plant will be installed as soon as practical to meet on-going fresh water needs during construction

A seawater reverse osmosis desalination plant will be constructed and operational in time for the start of the operations providing the primary water source for the Project, with supplementary water provided through the capture of site run-off. As a result there will not be the need for any barging of water during operations.

Logistics vessels used during normal operations will include a water taxis at shift start and end (plus additional movement of personnel, as required throughout the day), as well as daily ferries carrying supplies and waste to and from site.

Water taxis and ferries used will be high speed relatively low draught and highly manoeuvrable. These vessels, despite the anticipated numbers of daily vessel movements, are anticipated to be able to operate without appreciable impact on bulk shipping operations or recreational users of the waterways.

During major maintenance shutdowns at the LNG facility, additional ferries and water taxis will transfer personnel and equipment from the operational staging facility to Curtis Island. Vessels used will be similar to those used for normal operations and during the construction phase.

### **3.6.2 Exporting LNG**

LNG is transported by specially-designed ships. At the LNG facility's ultimate capacity of approximately 18Mtpa, LNG vessels will arrive every two to three days for loading and export. Turnaround time for vessels will be approximately 24-hours, with a product loading duration of approximately 14-hours. The plant will be operating 24-hours per day, seven days per week.

Typical LNG carriers (LNGCs) have a minimum draught of 11.5m and are between 285-314m in length, with a typical carrying capacity of 125,000-165,000m<sup>3</sup> of LNG. However, it is possible LNG carriers with a capacity of up to 220,000m<sup>3</sup> may also be used. These vessels have a draught of 12m and with a length of 315m.

LPG/propane shipping activity is nominated as infrequent transit. The number of vessels will vary subject to commercial requirements relating to the high heating value (HHV) of LNG exported and therefore the amount of LNG spiking required. The number of vessels will also depend upon the size of the vessels used. However, indicatively, there will be one propane vessel per month once four trains are operational.

A photograph of a typical LNGC is shown in Figure 3.19.

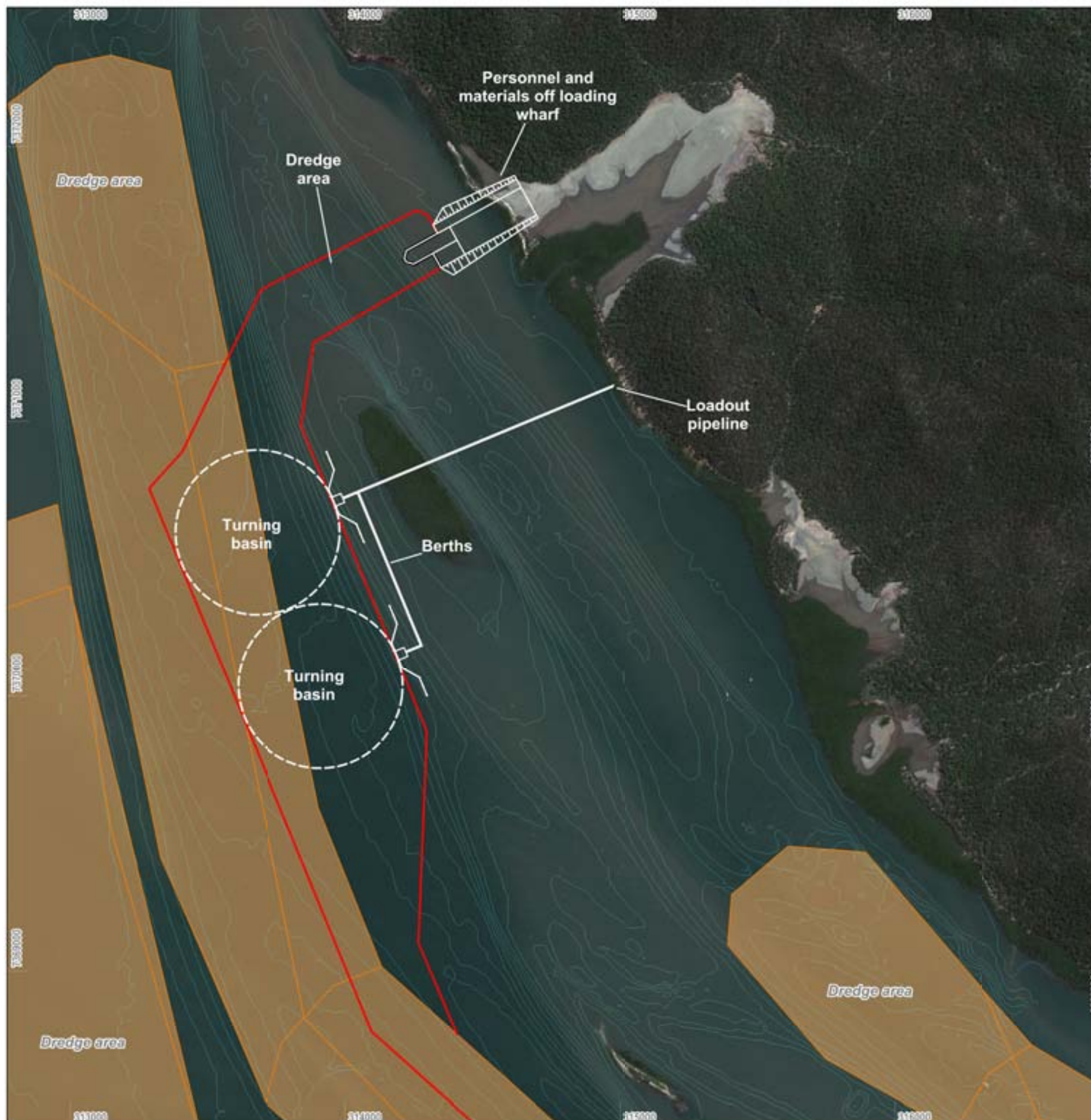


**Figure 3.19 Example of possible tanker**

### **3.6.3 Berthing/departure for Australia Pacific LNG**

Two alternative LNG loading facility options have been considered for the Project. Option 1B locates the loading jetties between North Passage Island and Curtis Island, whereas Option 2A locates the jetties to the east of North Passage Island between the Laird Point site and North Passage Island. Option 2A is the preferred option due to decreased safety issues, restriction zones, Port Curtis access and infrastructure cost associated with a jetty and pipeline across North Passage Island. The two alternative Australia Pacific LNG berths are shown on Figure 3.20 and Figure 3.21. Option 2a located at the end of a proposed spar channel along Curtis Island, past Gladstone LNG and Queensland Curtis LNG.





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Proposed dredge area: 1:5 digitised from Sechart CAD drawing 2503/101-42-421-20071.dgn supplied on 15/09/2009.

Dredge areas translated from GPC CAD drawing of output\_000088 on 15/09/2009.

Bathymetry contours calculated using Vertical Mapper from points supplied by Gladstone Ports Corporation.

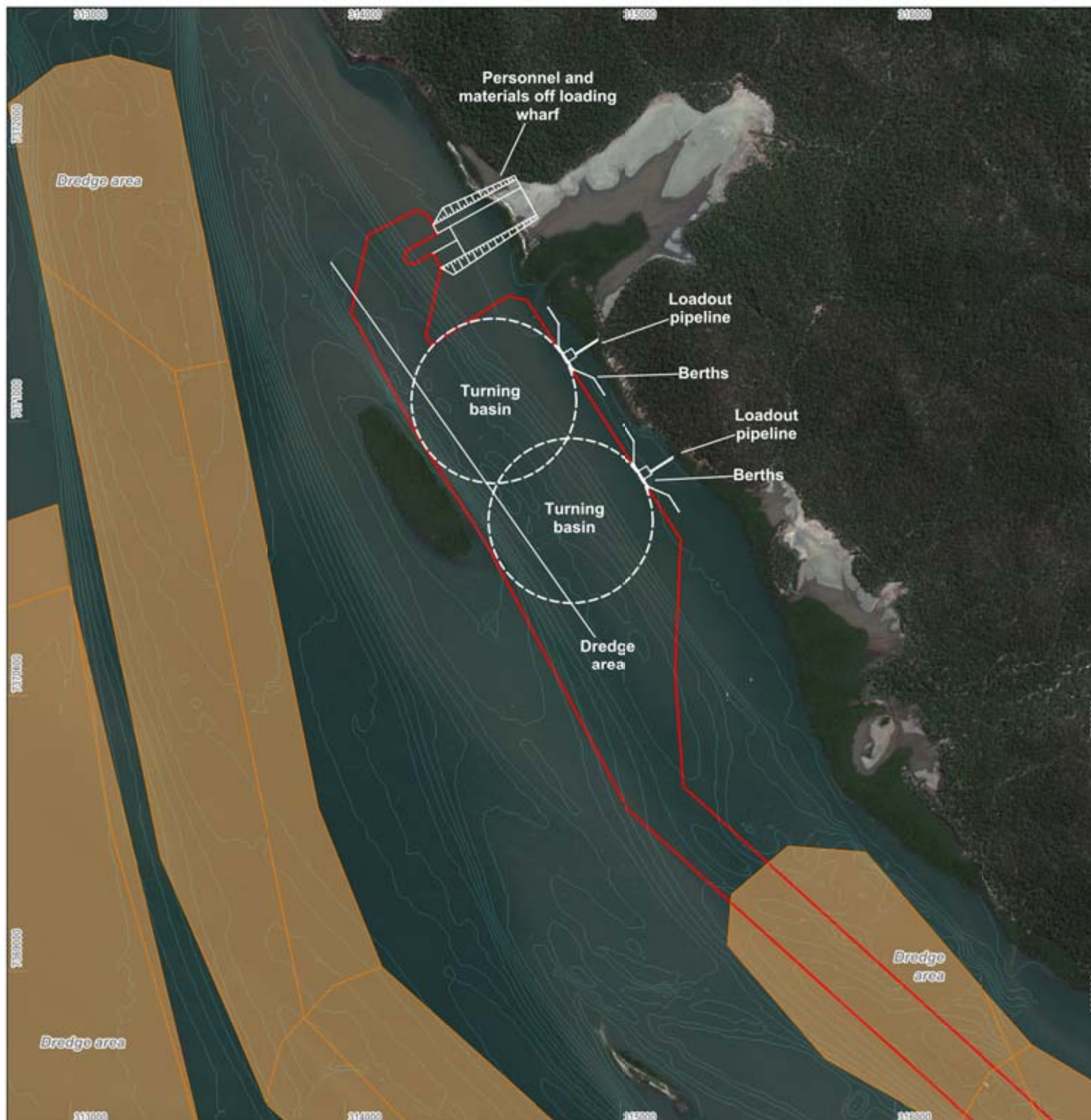
Satellite imagery captured by GeoEye-1 on 24/03/2009.

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 Map Grid of Australia Zone 56  
 Geocentric Datum of Australia 94



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 <b>WorleyParsons</b> resources & energy						
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.20 Location of APLNG Berth</b> <b>- Option 1b</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0388			Rev: 0






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 Dredge areas translated from GPC CAD drawing of output\_000008 on 10/06/2008.  
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 Satellite imagery captured by GeoEye-1 on 24/03/2009.

0 250 500m  
 SCALE - 1 : 15,000 (at A3)  
 Map Grid of Australia Zone 56  
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<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.21 Location of APLNG Berth</b> <b>- Option 2a</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0389			Rev: 0

In general, only Option 2A will be assessed within this report.

As the Australia Pacific LNG berths for Option 2a would be at the end of this channel along the Curtis Island coast, no large ships other than LNGC's will pass the moored liquefied natural gas carriers (LNGC's) as would be the case for Option 1b. It is important to note that neither option would result in obstruction of access to Graham Creek for recreational vessels, such as those used by non-commercial fishers; however, the trestle associated with Option 1B will preclude access to Graham's Creek via the passage between Curtis Island and North Passage Island due to safety and security issues.

### 3.6.4 Great Barrier Reef shipping routes

Major shipping routes within the GBRMP can be divided into an inner and outer route, with a number of additional channels connecting these. These are described by the Australian Maritime Safety Authority as follows:

*"The inner route extends north-south between the GBR and the Queensland coast from Torres Strait to Gladstone in the south. The northern section from Torres Strait to Cairns is most restricted and passage through these waters involves navigation within confined waters for a long period, normally 40 hours. The inner route is well charted and marked with navigational aids.*

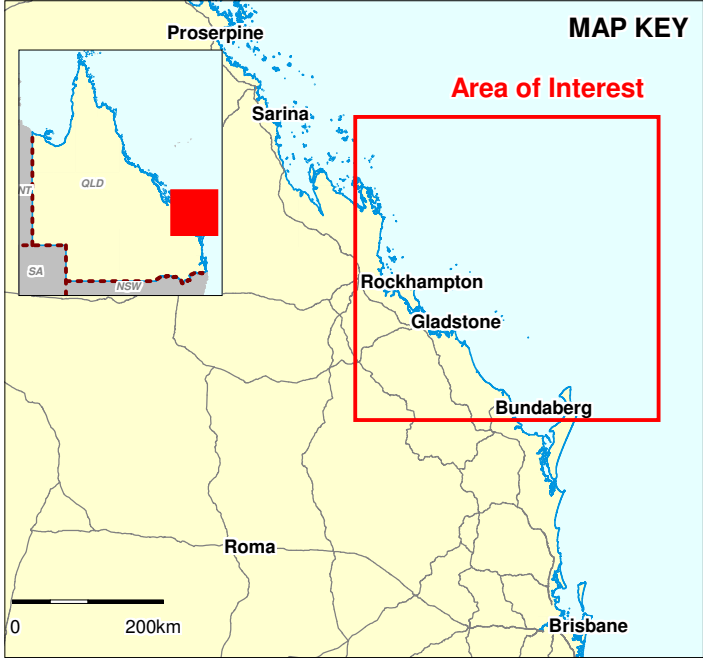
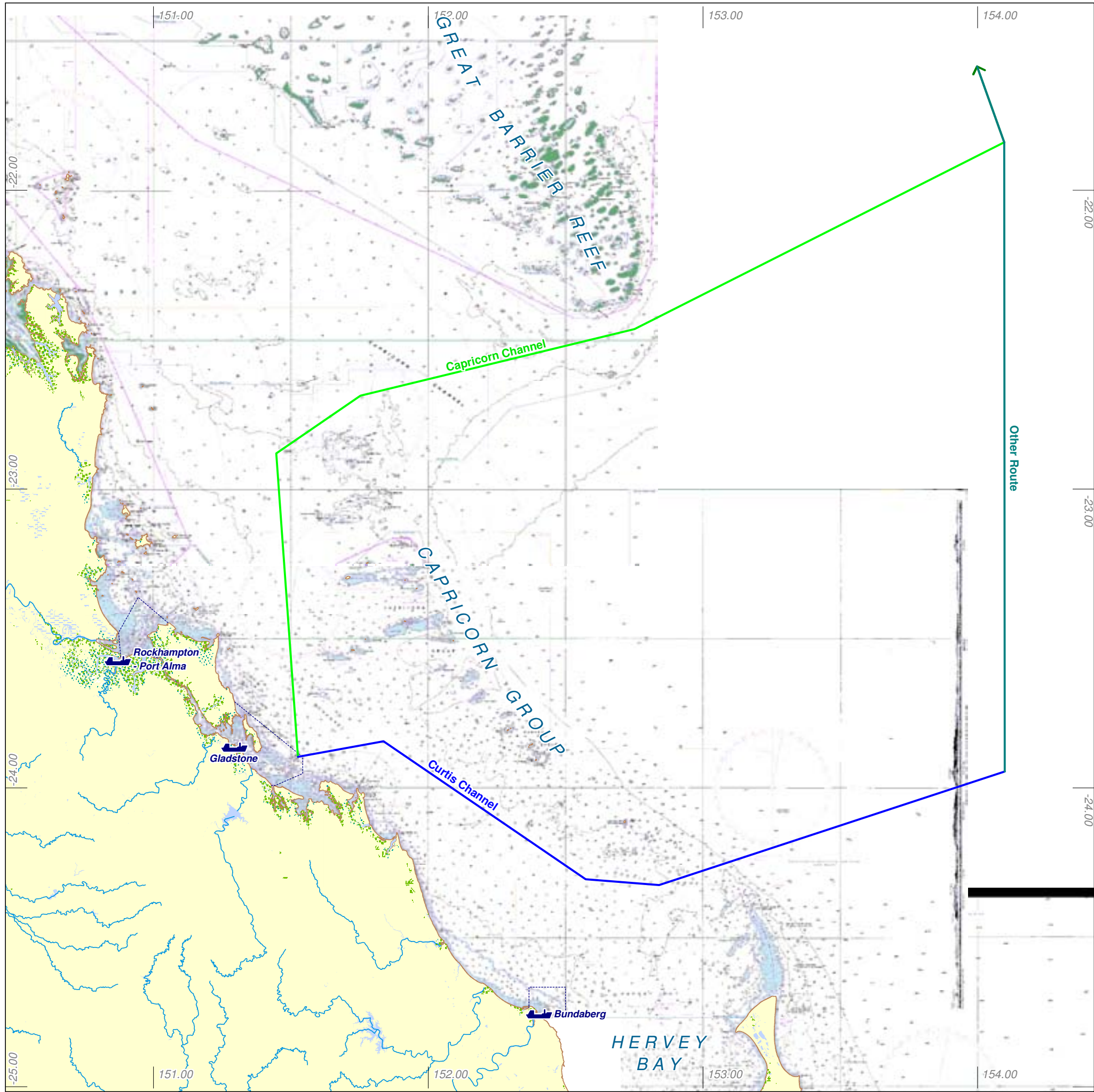
*The outer route commences at the eastern limit of the Torres Strait (the Great North East Channel), continuing southwards through the Coral Sea and rejoining the Queensland coast near Sandy Cape, south of Gladstone. The outer route was surveyed and charted to international standards in 1997, encouraging a greater number of vessels, particularly oil tankers, to use the outer route."*

Following consultation with MSQ, it is probable that LNG shipping associated with the Project will use the outer route only for westbound cargoes and ships returning in ballast from Western Ports. Shipping destined for northern Asia ports will avoid the Torres Strait, transiting the Coral Sea and Western Pacific. Some ships may cross the Pacific Ocean bound for the Americas.

The Project's anticipated shipping route starts from the Gladstone Fairway Buoy to the outer route via the Capricorn Channel or Curtis Channel Entrance, then along the outer route toward Torres Strait and then traverses the Torres Strait. The total length of the route, from Sandy Cape (north of Brisbane) to the western approaches to the Torres Strait (Booby Island) is approximately 1,344 nautical miles. Key features relating to ship transit are provided below. Entrance to the outer route from the Fairway Buoy is via either of two routes: (i) proceeding north (green line in Figure 3.22 through the Capricorn Channel) or (ii) proceeding south-east (blue line in Figure 3.22 through the Curtis Channel).

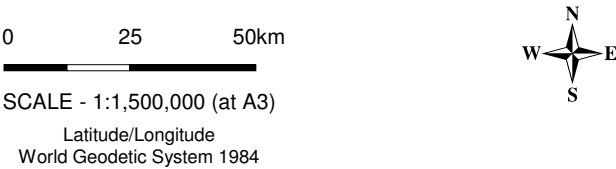
North of the GBRMP, the vessels will transit Torres Strait between Cape York and Papua New Guinea. This is an important international shipping lane and contains more than 100 islands and numerous coral cays, exposed sand banks and reefs. The narrowest point in Torres Strait between Cape York and Papua New Guinea is approximately 150km wide. Owing to significant cyclonic activities, high currents, high tidal fluctuations, high shipping traffic (including seasonal fishing activities) and environmental and culturally sensitive nature of the area, there is compulsory pilotage, compulsory reporting and a high degree of navigational control along this portion of the route. The Torres Strait pilotage area and shipping channel is shown in Figure 3.23.







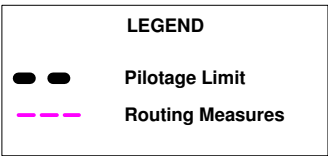
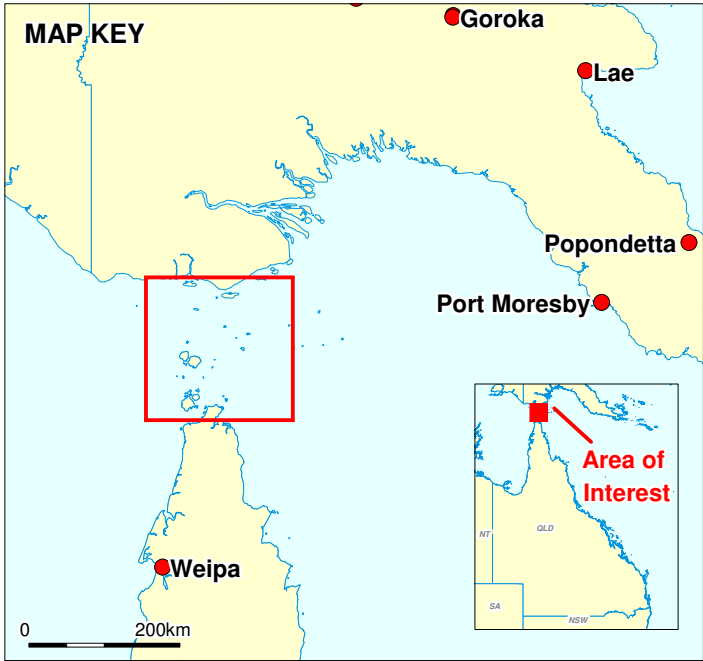
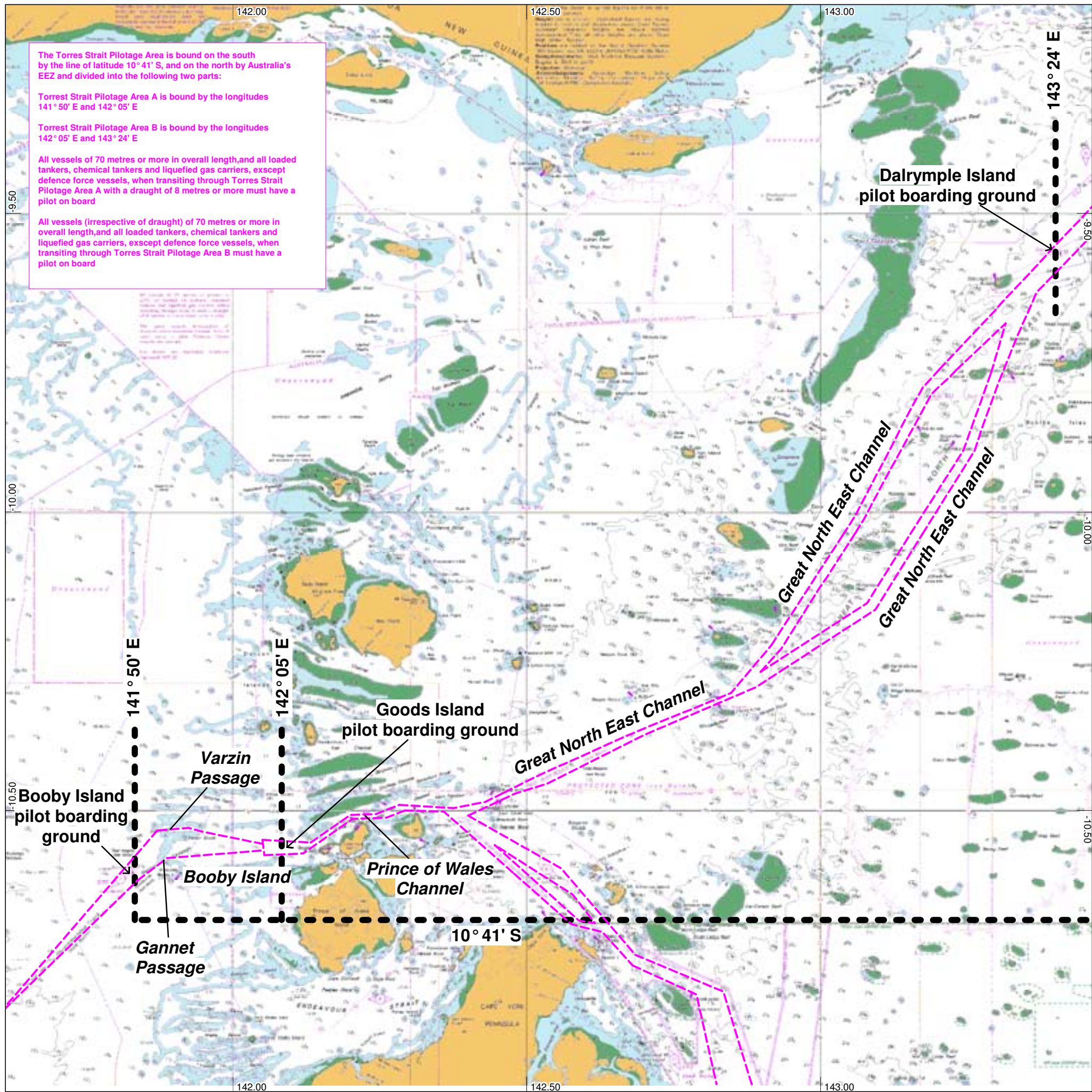
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Background imagery - Seafarer GeoTIFF AUS00365, AUS00366 and AUS00367.



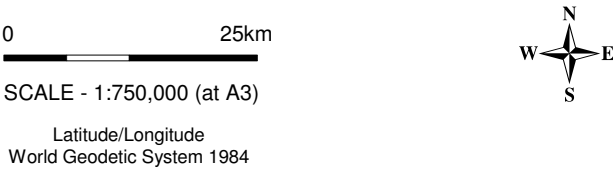
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Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
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<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.22 Proposed Shipping Routes</b> <b>outside of Port of Gladstone</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0390			Rev: 0





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Background imagery - Seafarer GeoTIFF AUS00376



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Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 <b>WorleyParsons</b> resources & energy						
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 3.23 Torres Strait Shipping Channels</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0391			Rev: 0



### 3.6.5 Description and location of proposed mainland facility

The planned 153 hectares reclamation area on the north side of the existing Fisherman's Landing will act as the primary embarkation point for personnel and materials to be transported to and from Curtis Island.

The Project would seek approval to:

- Include a staff car park for mainland administration and LNG Facility operational personnel only (a temporary construction staff car park is proposed at location off Blain Drive known as Ash Pond#7)
- A marshalling area for construction personnel
- A temporary laydown and pre-assembly area for construction materials and equipment
- Facilities to allow embarkation of personnel, plant, materials and equipment onto barges or ferries for transit to and from Curtis Island

The proposed location of the mainland facility at Fisherman's Landing North Expansion is shown in Figure 3.24. This is only a possible layout. Discussions with Gladstone Ports Corporation will determine the final layout configuration.

The proposed location of a secure temporary construction staff car park on vacant land off Blain Drive in West Gladstone (commonly referred to as Ash Pond #7) is shown in Figure 3.25. Construction personnel will drive their private vehicles to this location and then be bussed (20 person capacity) to the embarkation point at FLNE, and then back to the car park at completion of their shift period on the Island.

Auckland Point will be used as a staging area for the importation of gas pipeline segments. The proposed Auckland Point site includes a pipe laydown area of approximately 11ha. The location of these areas at Auckland Point is shown in Figure 3.26.





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 Satellite imagery captured by GeoEye-1 on 26 March 2009  
 Ferry terminal layout adopted from hard copy supplied by CairnsPHSA Dec 2008

0	27/01/2010	Issued for use	KM	GSB	WJA	RB
Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 <b>WorleyParsons</b> resources & energy						
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.24 Fisherman's Landing North Expansion</b> <b>logistics site layout</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0429			Rev: 0



Warrego Highway through Chinchilla, then south on the Leichhardt Highway at Miles then east on the Kogan-Condamine Road at Condamine.

#### **Unidentified bridge on Dalby Kogan Road (No. #24700)**

This bridge is closed and there is a diversion in place for traffic. This bridge provides access from Brisbane to the gas fields and it is assumed that this crossing is affected by flooding. During flooding periods, traffic to the Kianama gas fields may need to be diverted via the Warrego Highway and the Warra-Kogan Road. Traffic bound for the remaining fields during flooding periods may need to be diverted via the Warrego Highway through Chinchilla, then south on the Leichhardt Highway at Miles then east on the Kogan-Condamine Road at Condamine.

#### **Ashall Creek Bridge**

This bridge is closed and there is a diversion in place for traffic. This bridge provides access from Gladstone to the gas fields and it is assumed that this crossing is affected by flooding. During flooding periods, traffic from the gas fields may need to be diverted via south on the Dalby-Cecil Plains Road, west on the Gore Highway then north on the Leichhardt Highway to access Miles.

#### **Rail network**

There are two Queensland Rail (QR) systems that access the study area. These are the Moura System and the Western Line which is part of the Western System.

The Moura System services the coal mines of Dawson, Baralaba, Boundary Hill and Callide. Coal is transported to Gladstone Power Station, Comalco Aluminium Refinery, Queensland Alumina Limited (QAL) and the Port of Gladstone. The route is a single line with passing loops, which has recently been extended to allow 'Blackwater' size trains to operate in this system.

The Western System includes all lines west of Ipswich. The line generally between Toowoomba and Roma is within the geographical area of the Project. This line carries a mix of long distance passenger trains, grain trains, general freight, livestock and coal trains.

Coal is the predominant traffic between Toowoomba and Macalister, making up at least 70% of trains per week, other than in the grain season. Since the coal mines are relatively close to Toowoomba, once past Macalister the number of trains per day drops substantially.

The frequency of trains varies depending on seasonal traffic related to grain. Outside of the grain season traffic levels are in the range of 4 – 6 trains per day.

Aspects of rail transportation discussed in this report include the transport of workers and materials, predominately pipe segments.

#### **Transport of workers**



There is currently no passenger rail network operating within the study area. A long distance passenger rail service operates along the coast between Brisbane and Cairns but does not stop in Gladstone.

At this point, the transport of workers by rail has been dismissed as a possibility. It is highly unlikely that QR would consider providing passenger rolling stock, passenger facilities, or passenger subsidisation for daily commuting to and from a construction project. While passenger trains do operate on the Western Line, their schedules and operations are designed around long distance operation and only provide passenger stops at major locations.





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Satellite imagery captured by GeoEye-1 on 24 March 2009

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Rev	Date	Revision Description	ORIG	CHK	ENG	APPD
 <b>WorleyParsons</b> resources & energy			 AUSTRALIA PACIFIC LNG			
<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b> <b>Figure 3.25 Ash Pond Number 7 temporary construction staff car park</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0430			Rev: 0







### 3.7 Cumulative development

A review of the Department of Infrastructure and Planning's (DIP) website has been undertaken to identify other regionally significant projects that may potentially impact the transport network. Not all projects outlined in the DIP list could be assessed, because of the lack of information available in the public domain.

The cumulative impact of regionally significant projects on the DIP list for which data was available on the operation of the transport network within the study area has been assessed through a combination of quantitative and qualitative assessments, based on available data.

Table 3.16 below provide details of the regionally significant project assessed within the cumulative impact assessment.

**Table 3.16 Cumulative impact assessment**

Project	Description	Methodology for Cumulative Traffic Assessment
Central Queensland Pipeline (Jemena)	Construction of an underground, high pressure, 440km pipeline to transport coal seam methane (natural gas) from coal mining regions in northern Bowen Basin to customers in Gladstone and also to connect with South East Queensland's existing gas pipeline network.	There is no current information on available on traffic generation from this project. It is noted however that the Project is scheduled to be constructed over the period 2010/2011; therefore it will not coincide with the peak year movements associated with Australia Pacific LNG Project of 2019. It is anticipated that the potential impact on the road network in the greater Gladstone area will be associated with the transport of pipes from Gladstone Port; however the daily and peak hour truck movements are not likely to be significant and will be accounted for in the Project background growth rates.
Gladstone LNG ( Santos / Petronas)	GLNG involves exploring and producing CSG in the Surat and Bowen Basins, a 425km pipeline from the gas fields to Gladstone and a gas liquefaction and export facility on Curtis Island for up to 10mtpa of LNG.	<p>This project is expected to potentially have a similar impact on the road network system within the greater Gladstone area as the Australia Pacific LNG Project as the two projects have a similar scope and project timing. This assumes Gladstone LNG project description is as per the originally submitted EIS.</p> <p>Although there is significant information about the traffic generation from the project and information about the daily project volumes for the surrounding road network, detailed information peak hour turning movements is not available.</p> <p>In order to undertake a quantitative assessment of the cumulative impact on the intersections within the network the following approach has been undertaken;</p> <ul style="list-style-type: none"> <li>Assumed traffic distribution on the road network in Gladstone based on all project traffic utilising Auckland Point.</li> <li>For the peak traffic generation year of the Australia Pacific LNG Project, i.e. year 2019, the peak hour generation rates for the two projects were compared and it was determined that generally the Gladstone LNG peak hour traffic was in the order of 100% of the</li> </ul>

Project	Description	Methodology for Cumulative Traffic Assessment
Australia Pacific LNG peak hour traffic.		
Gladstone LNG Project—Fisherman's Landing	Proposed development of a mid-scale liquefied natural gas (LNG) plant at Fisherman's Landing Wharf (FLW) near Gladstone. The proposal has an expected life of 25 years and the first stage would produce up to 1.6Mtpa of LNG. A proposed second stage to 3 Mtpa, CSG from Arrow Energy-supplied CSG.	Information obtained from September 2008 traffic impact assessments were used to generate project-linked volumes and intersection turning movements at relevant intersections.
Queensland Curtis LNG Project (QGC/BG)	Expanding the Surat Basin gas fields and constructing a 12Mtpa LNG production facility on Curtis Island, near Gladstone. The Project includes a 380km pipeline to connect the gas fields to Curtis Island; 400km of pipeline network in the gas fields; a 3-train gas plant, and wharf facilities in Port Curtis to ship the product.	<p>This project is expected to potentially have a similar impact on the road network system within the greater Gladstone area as the Australia Pacific LNG Project as the two projects have a similar scope and project timing. Although there is significant information about the traffic generation from the project and information about daily project volumes on the surrounding road network, detailed information for the project peak hour turning movements is not available. In order to undertake a quantitative assessment of the cumulative impact on the intersections within the network the following approach has been undertaken:</p> <ul style="list-style-type: none"> <li>Assumed traffic distribution on the road network in Gladstone based on all project traffic utilising Auckland Point.</li> <li>For the peak traffic generation year of the Australia Pacific LNG Project, i.e. year 2019, the peak hour generation rates for the two projects were compared and it was determined that generally the Queensland Curtis LNG peak hour traffic was in the order of 200% of the Australia Pacific LNG peak hour traffic.</li> </ul>
Gladstone Pacific Nickel	The Gladstone Pacific Nickel project is a greenfield project. The Gladstone refinery will process ore from Gladstone Pacific Nickel Ltd's two mine sites located at Marlborough and New Caledonia. Stage 1 will produce 60,000 tonnes of nickel and 6,000 tonnes of cobalt per year. During the first few years of operation, rail will transport ore from Marlborough to Gladstone but, later, a dedicated 175km ore slurry pipeline will transport the ore.	Trip generation data provide details of project volumes and intersection turning movements to impacted roads. The data were used to assess the cumulative impacts of the project on the road network.

Project	Description	Methodology for Cumulative Traffic Assessment
Surat to Gladstone Pipeline (Arrow/Shell)	A 470km x 660 mm diameter buried pipeline to deliver CSG from the Surat Basin near Dalby to the Fisherman's Landing LNG plant, Gladstone.	Some information was available about the potential traffic generated during the construction of the pipeline. It is anticipated that the potential impact on the road network in the greater Gladstone area will be associated with the transport of pipes from Gladstone Port; however the daily and peak hour truck movements are not likely to be significant and will be accounted for within the Project background growth rates.
Wandoan Coal Mine	The Wandoan project comprises several shallow deposits that contain large resources of high-volatile thermal coal within the Walloon Subgroup. Feasibility studies are underway for a large, open-cut mine to supply export and possibly domestic markets. Associated with the project is the development of the Surat Basin Railway to transport the product coal approximately 390km to the Port of Gladstone for export. The coal deposits are large enough to also sustain a domestic power plant or other coal-based domestic industries.	Most transport is via the rail network, and is not anticipated to generate significant road impacts. Any cumulative impacts assumed to be catered for in background growth assumptions.
Wiggins Island Coal Terminal#	Initially develop a 25Mtpa coal terminal on the western side of the Calliope River. Construct and operate an electrified rail access from the north and west and supporting infrastructure. Stage 1 - 25Mtpa, ultimate proposed capacity 70Mtpa.	Trip generation data provides details of project volumes and intersection turning movements for impacted roads. The data was used to assess the cumulative impacts of the project on the road network.
Surat Basin Railway	The Surat Basin Railway, sometime referred to as the Southern Missing Link' is a joint venture between Queensland Government and industry for the development of an open-access rail link through the Surat Coal Basin from Toowoomba to Gladstone	Although a draft EIS was released in November 2008 this project is still at the planning stage. It will not be constructed in time to assist in the movement of any freight associated with the project and as such is not expected to impact on the Project

## 4. Impacts and mitigation

This section provides details on the impact of the Project on transport infrastructure. Additionally, it describes the mitigation measures and changes that could be made to the network to cater for this Project and other regionally significant projects.

### 4.1 Project assessment parameters

The assessment of the transport network has been undertaken within the following parameters;

- The Project's early works are assumed to commence in late 2010, with the operation of trains one and two commencing by 2015. For the purpose of this assessment, it is assumed that construction of train three will commence in 2017 and train four would commence approximately nine months after the commencement of train 3 with full operations in place by 2022. The dates of construction will be market driven however the timing has been assumed for the purpose of impact assessment on the traffic and transport network.
- Movement of material and personnel to site will initially be by road based transport and ferry/barge from Fisherman's Landing North Expansion.
- Fisherman's Landing North Expansion has been assumed as the location of the mainland facility for material, personnel and aggregate material movements from the mainland to Curtis Island.
- During construction vacant land off Blain Drive in West Gladstone (commonly referred to as Ash Pond #7) will be used as a construction staff car park. Personnel will drive their private vehicles to this location and then are bussed to the Fisherman's Landing site. Operational staff will drive directly to Fisherman's Landing, park their vehicles in a staff car park and then be ferried to the LNG facility
- Movement of material and personnel to site will be primarily by road based transport, although the use of the rail network for the movement of some construction material has been investigated and is identified as an alternative scenario.
- The Project does not include an assessment of a possible bridge from the mainland to Curtis Island. While this has previously been identified as an option in other reports, it has been excluded from this assessment as the bridge would not be operational within the Project's construction timeline.
- The maximum length of the main gas pipe segments to be transported by road is assumed to be 18m. This complies with available transportation vehicles, current legislation and access provisions.
- Distribution centres for the compiling, storage and management of construction and operational materials for the gas fields will be located in Brisbane, Miles and Roma. Miles will act as the primary distribution centres for the Project. Wherever possible materials and consumables such as food will be sourced from local suppliers or Australian manufacturers.
- Construction personnel will be transported to and from temporary accommodation facilities by bus
- Pipe will be imported as uncoated pipe with application of a coating to be applied at a coating facility to be established in the Project area



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#### **4.1.1 Terms of Reference**

The DIP Terms of Reference (November 2009) provide the base assessment criteria for this proposed Project. For Transport a series of issues to be addressed have been identified and these are reproduced below. To aid the reviewer the relevant requirements of the ToR are cross referenced against where they are primarily addressed in this report.

**Table 4.1 Terms of Reference**

TOR section	Title	Requirement	Section in Report
3.9.1	Existing transport infrastructure	Describe the current road and rail networks and intersections of the surrounding region and specify current traffic volumes. The current rail operations occurring during the Project construction phase should also be described. This description should identify whether they comprise 24 hours a day/ seven day a week, and the number and types of services per day (e.g. coal, general freight, passenger services). Maps should be provided at an appropriate scale and level of detail.	2 Existing transport network assessment
3.9.2	Transport tasks and routes	<p>The EIS should specify the nature and quantitative estimates of:</p> <ul style="list-style-type: none"> <li>any proposed changes to transport-related infrastructure required by the Project. This includes modifications to roads for access works and realignments, rail lines (including level crossings and services) and air and sea port facilities. The EIS should also identify where the construction of project-related plant and utilities may impact on the jurisdiction of any transport authority.</li> <li>expected volumes/tonnage of transported raw materials, wastes, and hazardous goods for all phases of the Project</li> <li>how the identified goods and materials will be moved through the transport network (volume/tonnage, composition, trip timing and routes)</li> <li>workforce journey-to-work traffic generated by all project activities. This data should identify traffic mode, volume, composition, timing and routes</li> <li>likely heavy and oversize/indivisible loads (volume, composition, timing and routes) highlighting any vulnerable bridges and structures along the proposed routes.</li> </ul>	<p>Project impacts are addressed by mode, namely:</p> <p>4.2 Road transport</p> <p>4.3 Rail network</p> <p>4.4 Shipping</p> <p>4.5 Air services</p> <p>The Project and associated traffic generation is described overall and by each of the three project components under Section 3, namely:</p> <p>3.3 Gas Fields Project traffic</p> <p>3.4 Gas Pipeline Project traffic</p> <p>3.5 LNG Facility Project traffic - Curtis Island, Gladstone</p> <p>4.2.15 Oversized Vehicles</p>
3.9.3	Potential impacts and	The impact assessment should include:	Assessment Methodology is presented by mode and in the case of roads also by sub category



TOR section	Title	Requirement	Section in Report
mitigation measures		<ul style="list-style-type: none"> <li>details of the assessment methodology adopted with a summary of the consultation undertaken with the relevant transport authorities (Department Transport and Main Roads (DTMR), QR Limited and local government)</li> <li>details of all base data assumptions, including the current condition of the affected network and its performance</li> <li>road and rail safety issues, in particular safety for other transport users and safe access to the construction sites</li> <li>road use resulting in reduced life of roads/pavements requiring additional or accelerated rehabilitation and maintenance</li> <li>seasonal considerations such as potential for transport impacts during wet weather</li> <li>reduced efficiency of traffic flows along road sections and at intersections along key routes, including estimates of possible interruptions to transport operations</li> <li>details of any impacts on the natural environment within the jurisdiction of an affected transport authority (for example road and rail corridors)</li> <li>details on the nature and likelihood of product-spill during transport where relevant</li> </ul>	<p>namely:</p> <p>4.2 Road transport</p> <p>4.3 Rail network</p> <p>4.4 Shipping</p> <p>4.5 Air Services</p> <p>Existing transport network including legislative and policy are addressed in Section 2. Existing transport network assessment</p> <p>2.3.5 Traffic incident history</p> <p>2.4.3 Rail line crossings</p> <p>4.2.9 Road Safety</p> <p>4.2.13 Traffic Management Plan</p> <p>4.2.6 Road pavement</p> <p>4.2.11 Road flooding</p> <p>4.2.3 Road link capacity analysis</p> <p>4.2.5 Intersection impact assessment</p> <p>4.2.12 Environmental impacts</p> <p>4.4.3 Environmental impacts – Gladstone Port Marine Area</p> <p>4.4.4 Environmental impacts – shipping outside the Port of Gladstone</p>

TOR section	Title	Requirement	Section in Report
3.9.3.1	Road impacts	<p>The description and analysis should address the capacity of existing facilities to support the requirements and any additional requirements for the construction, upgrading or relocation of any transport related infrastructure required by the Project directly and as a result of potential cumulative impacts. The analysis should also address any requirements for new or changed services in road reserves</p> <p>The assessment of road impacts should address the issues outlined in the DMR publication <i>Guidelines for Assessment of Road Impacts of Development (2006)</i>. Reference should be made to other DTMR planning documents and relevant legislation.</p> <p>This section should also address how transport elements and impacts of the Project, taking into account publicly published or DIP advised future demand growth, (including the potential impact of other major infrastructure and industrial projects in the nearby area) relate DTMR's existing transport strategies for the Central Queensland area and the future infrastructure needs of this area as presented in State Government documents, including: Statements of Intent for Road Link Development; Gladstone Integrated Regional Transport Plan 2001 – 2030; and Capricornia Integrated Regional Transport Plan 2004 – 2030.</p> <p>The EIS should also discuss the results of consultation with the relevant district and regional officers of DTMR and local government regarding the potential impacts of the Project on the road network.</p> <p>In particular, the assessment should describe:</p> <ul style="list-style-type: none"> <li>impacts (from either transport or project operations) on the safety, efficiency and condition of road operations and assets</li> <li>impacts on overland water-flows and their interaction with the road network</li> </ul>	<p>Road impacts and associated mitigation is addressed under 4.2 Road transport</p> <p>(Road) transport legislation, policy and network planning is addressed under</p> <p>2.1 Transport legislation</p> <p>2.2 Policy and network planning framework</p> <p>Project related road impacts are addressed under</p> <p>4.2 Road transport</p> <p>4.2.11 Road flooding</p> <p>4.2.9 Road Safety</p> <p>4.2.8 Public and active transport network</p>



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Therefore the main impact on rail will be in relation to under track crossings and potentially the transport of pipe segments and materials.

### **Transport of pipe segments**

The transport of pipe segments required for the construction of the gas pipeline could possibly be transported by rail to lay down areas at Moura and Miles. The pipe segments would be sourced from Auckland Point and Port of Brisbane.

An estimate of the transport task has been made based on the information contained in Section 3 of this report. Pipe segments were assumed to be 18m long.

If transported by rail, the pipe segments would have to be transported to lay down points at Miles and Moura, and then moved by road to their destinations. This would require construction of rail sidings and support facilities at these destinations. A preliminary assessment of these locations has indicated that this is feasible although additional infrastructure would be required. In addition, an alteration and or modification of existing facilities would be required at Auckland Point and the Port of Brisbane.

The use of the rail network will continue to be investigated.

### **Air services network**

Three airports and one aerodrome have been identified as possible fly in/fly out locations for construction and operations personnel. These are;

- Gladstone Regional Airport
- Thangool (Biloela) Airport
- Miles Aerodrome
- Roma Airport.

The methodology for assessing the impact of the Project on air services was undertaken by comparing the Project traffic to the airport capacity. Generally there was insufficient information available to assess the cumulative impact of other developments on the air services network.

### **Gladstone Regional Airport**

The Gladstone Regional Airport is currently operated by the Gladstone Regional Council. The airport caters primarily for business travellers and freight activities associated with the region's developed and emerging industrial complexes. Regular public transport (RPT) services are currently provided by QantasLink primarily utilising Dash 8 Series Q400 aircraft that can cater for 74 passengers.

Eight flights per day operate out of the Gladstone Regional Airport from Monday to Friday with reduced services on the weekends.

Based on the assumption that all gas pipeline construction personnel operating out of accommodation facility near The Narrows undertake a shift change during the one day, it is estimated that up to 150 people in any one day may pass through the airport during the pipeline construction period. Additionally, it has been estimated that based on a rotating shift pattern up to 80 Australia Pacific LNG personnel constructing the LNG facility may pass through the airport. Therefore, the maximum total increase in airport passengers during the construction of the gas pipeline and the LNG facility could be in the order of 230 passengers per day, on the days that the gas pipeline shift changes occur. This would only occur over a short timeframe of approximately three to four months of the gas pipeline

TOR section	Title	Requirement	Section in Report
3.9.3.2	Rail impacts	<ul style="list-style-type: none"> <li>impact of driver fatigue for workers travelling to and from regional centres and key destinations</li> <li>impacts on any existing public transport networks (assets and services).</li> </ul> <p>The assessment of rail impacts should consider:</p> <ul style="list-style-type: none"> <li>project impacts on the amenity and health of adjacent land users as a result of dust, noise and vibration</li> <li>impacts on transport and services, should the Project generate large public transport trip movements.</li> </ul>	<p>The use of the rail network to transport project freight is currently being considered. At this stage the assessment has been based on rail not being used.</p> <p>A discussion of the existing rail network is found in 2.4 Rail network and potential rail usage and impacts in 4.3 Rail network</p>
3.9.4	Proposed infrastructure alterations	<p>The EIS should detail proposed alterations to road and rail infrastructure occasioned by the Project. This includes road realignments; grade separated crossings, level crossings, road alterations and resurfacing, bridges, access roads, and associated civil works.</p> <p>Special reference should be made to any relationship between road works undertaken as part of the Project and works proposed in DTMR's <i>Roads Implementation Program</i> where details of such works are provided by the DIP to the proponent or otherwise published. Any proposed new infrastructure provision or requirements to mitigate impacts of development on State-controlled roads should be in accordance with DTMR's <i>Road Planning and Design Manual</i>.</p> <p>The EIS should also discuss the results of consultation with the relevant district and regional officers of DTMR and local government regarding the potential impacts of the Project on the road network and proposed infrastructure alterations.</p> <p>This consultation should also discuss developing an integrated approach with this and other existing or planned projects (whether publicly published or advised by DIP) known to the proponent.</p>	<p>Road and rail impacts are addressed under</p> <p>4.2 Road transport</p> <p>4.3 Rail network</p> <p>Their relationship to current network planning is addressed under</p> <p>2.2 Policy and network planning framework</p>

construction. The typical daily passenger numbers during the peak construction period of the LNG facility will be in the order of 80 passengers per day.

During construction of the Australia Pacific LNG pipeline, specifically the section involving The Narrows Crossing, it is estimated that an additional three Dash-400 aircraft movements per day may be required to cater for the increased passenger numbers. Once this section of pipeline is complete, one or two additional Dash-400 aircraft movements may be required to cater for the daily rotation of LNG facility construction staff.

Construction of LNG facilities on Curtis Island will be undertaken by not only Australia Pacific LNG but also by Queensland Curtis Island LNG and Gladstone LNG. It is estimated that up to an additional 120 personnel associated with the construction of the LNG facility for the Queensland Curtis Island LNG and Gladstone LNG may pass through the airport in any one day during the same period. To cater for the increased passenger numbers arising from the construction of LNG facilities on Curtis Island by Queensland Curtis Island LNG and Gladstone LNG, an additional two Dash-400 aircraft movements per day may be required.

Australia Pacific LNG will work with industry to optimise roster timings and reduce daily passenger movement peaks.

The cumulative growth plans for the Gladstone region are complemented by the current upgrades being completed at the Gladstone Regional Airport. Flexibility for larger aircraft including jet service as well as more frequent service will afford advantages and opportunities to source resources more efficiently throughout Australia. This combined with increased competition would benefit the projects as well as the community at large.

### **Biloela Airport**

The Biloela airport at Thangool is operated by the Banana Regional Council. The airport services Biloela and the other Banana Shire towns (Moura, Thangool, Jambin, Goovigen, Baralaba, Theodore, Banana, Wowan, Dululu) with flights to and from Brisbane, and Blackwater. The runway is sealed, is 1520 m long and has an apron capacity for two aircraft. QantasLink operate a Dash 8 fleet out of the Biloela airport comprising mainly Q200 aircraft that seat 36 passengers.

The Biloela Airport is impacted by the pipeline construction personnel during shift changes when personnel are bussed to and from the airport.

Based on a rotating shift pattern it is estimated that up to 120 people in any one day may pass through the airport during 2013/2014.

There was no information available to make an assessment of the cumulative impacts of other regionally-significant projects on the Biloela airport.

To cater for the impact of the gas pipeline construction, up to an additional four Dash 8-200 aircraft movements may be required.

### **Miles Aerodrome**

Miles Aerodrome is approximately 12 km south of Miles and is classified as an aircraft landing area. It is not registered or certified, there are no Regular Passenger Transport (RPT) services, and it is currently only used occasionally by eight-seater aircraft. There is apron capacity for two aircraft. Western Downs Regional Council administers the Aerodrome and there are currently no plans to alter the facility.



The Miles Aerodrome is impacted by gas fields and gas pipeline construction and operations personnel during shift changes when personnel are bussed to and from the aerodrome.

The total number of personnel estimated to be using the Miles Aerodrome could be 240 people per day from 2013 to 2014, 120 people per day from 2014 to 2018 and 50 people per day thereafter. Should the current aerodrome be capable of supporting Dash 8-200 aircraft, up to an additional seven Dash 8-200 aircraft movements may be required up to 2014. Up to four Dash 8-200 aircraft movements may be required from 2014 to 2018 and one to two aircraft movements may be required beyond 2018.

### **Roma Airport**

Roma airport is a commercially operating airport, administered by Maranoa Regional Council. QantasLink operates approximately 17 flights a week from the airport, which equates to around two to three flights a day. This airport has the capacity for a Dash 8-300 which seats 50. There is apron capacity at the airport for two Dash 8-300 aircraft and 18 parks for light planes.

There are currently published plans to alter the Roma Airport.

The Roma Airport is impacted by gas fields construction and operations personnel during shift changes when personnel are bussed to and from the airport. Based on a rotating shift pattern, between 2012 and 2018 it is estimated that up to 60 people in any one day may pass through the airport. After 2018 this is expected to reduce to approximately 10 people.

To cater for the impact of the gas field construction, up to an additional one to two Dash 8-300 aircraft movements may be required up to 2018.

### ***Shipping network***

Two ports have been identified as being utilised by the Project, namely the Port of Gladstone and the Port of Brisbane. Issues relevant to shipping activities discussed in this report are the impact of increased shipping numbers within, and external to the Port of Gladstone and the impact of the Project on Auckland Point.

### **Port of Gladstone**

The Port of Gladstone is a major commodities export port which had a throughput in 2007/08 of 75.5 million tonnes of cargo of which 54.1 million tonnes was coal (GPC 2008a). This generated 1,368 ship visits during the financial year.

The ships comprised bulk carriers, multi-purpose vessels, tankers, break bulk vessels, and LPG carriers. The major cargos imported into the port include bauxite, caustic soda, LP Gas, petroleum coke, liquid ammonia, bunker oil, magnetite, gypsum, and copper slag. Additionally, major cargoes exported from the port include coal, alumina, magnesia, cement, limestone, scrap metal and ammonium nitrate. The largest ships to use the port include a 231,850 DWT vessel.

### **Port of Brisbane**

The Port of Brisbane has 28 operating berths and over 7,700m of quayline at the Port of Brisbane and upriver facilities. The ships and commodities shipped through the port comprise container ships, oil tankers, general purpose shipping, grain and agricultural containers, motor vehicles, coal, chemicals and other products.

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## ***Shipping movements***

Shipping activities associated with the construction of the Project include:

- Transfer of personnel and equipment between Gladstone and the LNG facility on Curtis Island by barge and ferry from Fisherman's Landing North Expansion (FLNE)
- Delivery of plant, materials and equipment to the LNG plant site on Curtis Island directly via the materials offloading facility (MOF) and temporary rock dock on Curtis Island
- Importation of pipe materials for the construction of the gas pipeline and gas field pipe gathering network through Auckland Point and Port of Brisbane.

LNG will be exported by specially-designed ships from the LNG facility on Curtis Island. At the LNG plant's capacity of four trains at approximately 18Mtpa, LNG vessels will arrive about every two to three days for loading and export. Turnaround time for vessels will be approximately 24 hours, with a product loading duration of approximately 14 hours. The plant will be operating 24 hours per day, seven days per week at this stage. LNG ships will represent an increase of three percent in current shipping movements for the first train. This may increase to 13 percent once the four trains are operational.

Australia Pacific LNG has adopted Fisherman's Landing North Expansion (FLNE) as the primary embarkation point for the transfer of goods and personnel during the construction and operational phase of the LNG facility.

FLNE will act as the embarkation point for materials to the LNG facility during the initial phases of construction until the MOF is built. The MOF will then allow direct shipment of some facility modules and other materials.

The transport of heavy loads of construction equipment and consumables to the site will be undertaken by barge. It is estimated 15-20 barges per day will be required during a period of two to four years.

For the main construction phase, the non-local workforce will be accommodated in a temporary accommodation facility on Curtis Island. Transportation of the majority of the workforce from Gladstone to Curtis Island will be by ferry. It is estimated there will be two ferry trips in the morning and evening. The transportation of any remaining personnel will be undertaken using smaller water taxis, for fast transit of small numbers of personnel, throughout the day.

Large ferries will allow for embarkation and debarkation of personnel, and also be used for vehicular transport when personnel are not in transit.

The assumed average movement of vessels expected during the construction phase is as follows:

- Large deck barges with coarse aggregate - six per month
- Typical deck barges with sand - two per month
- Bulk cement vessels - two per month
- Roll-on/Roll-off ships - two and a half per month
- Passenger ferries, two trips in the morning and evening with potential weekday evening trips from the island for temporary accommodation facility (TAF) residents
- Jetty tenders - daily round trips from the wharf to the jetty with piling and beams, armour rock, modules and topside commodities

- Jetty tenders - daily round trips with armour rock, modules, topsides commodities
- Jetty multicast - pushing tenders and running personnel daily
- Crew boats and food supplies for site camp: one every two days
- Patrol boats – as required, up to three daily
- Pilot boats - as required
- Diesel fuel barges - four per month
- Subcontractors' deliveries - four per month.

During the operations phase a seawater reverse osmosis desalination plant will be constructed and operational in time for the start of the permanent operations. This will provide the primary water source for the Project with supplementary water provided through the capture of site run-off. As a result, there will not be the need for any barging of water during operations.

Logistics vessels used during normal operations will include a water taxi at shift start and end, plus additional movement of personnel, as required throughout the day, including ferries carrying waste and supplies and waste to and from site.

Water taxis and ferries used for the Project's operations phase will be high speed, have a low draught and be highly manoeuvrable. These vessels, despite the anticipated number of daily movements, are anticipated to be able to operate without appreciable impact on bulk shipping operations or recreational users of the waterways.

During major maintenance shutdowns at the LNG facility, additional ferries and water taxis will transfer personnel and equipment from the operational staging facility to Curtis Island. Vessels used will be similar to those used for normal operations and during the construction phase.

### **Potential impacts**

In assessing the impacts of shipping associated with the LNG facility, primary key areas of concern were addressed as follows:

- Environmental and safety issues arising from:
  - The increase in shipping within the marine environment, including, passage through the Marine Park.
  - The transfer of material and personnel to and from the mainland to the proposed facility on Curtis Island and vessel berthing arrangements at the proposed MOF.
  - Operations at FLNE (LNG facility operations only)
  - Operations at Auckland Point (pipeline importation only)

### **Increase in shipping**

A workshop was undertaken with Australia Pacific LNG and the Gladstone Port Authority and other regulatory agencies to address a range of issues that could arise with this proposal.

A total of 28 recommendations were generated in the workshop for incidents that were assessed to pose significant risk and those assessed to pose medium risk, but with high consequence severity levels. These relate to scenarios that required additional consideration of the procedural controls; training on safe harbour boating for pilots, tug captains and small craft and recreational boaters, as

well as use of tugs and other aids during traverse of Gladstone Port and berthing. The implementation of these recommendations will ensure that the risks involved in LNG carrier (LNGC) transit in the vicinity of the Gladstone Port are reduced to as low as reasonably possible.

### **Transfer of personnel and materials**

Ferries used within the Port of Gladstone will comply with a reasonable marine assurance standard. All vessels employed in marine activity, whether contracted or sub-contracted, will be inspected according to the International Marine Contractors Association (IMCA) 'Common Marine Inspection Document'. This inspection will be performed by a suitably qualified inspector from an approved marine contractor.

Any vessel contracted by, or on behalf of, the Australia Pacific LNG Project will have a structured and documented safety management system (SMS). All systems shall demonstrate that quality management and quality system elements meet the requirements of the International Maritime Organization's (IMO) regulations on the International Safety Management Code for the Safe Operation of Ships (ISM Code) and for Pollution Prevention (MARPOL).

### **Operations at FLNE**

FLNE has been assumed as the embarkation point for materials to the LNG facility during the initial phases of construction until a MOF is built on the island to allow direct shipment of facility modules and other materials.

### **Auckland Point operations**

Pipes and other materials that are required to construct the gas pipeline, gas fields' pipe gathering network and other project infrastructure items will also be shipped through Auckland Point.

Facilities will need to be constructed to facilitate the import and export of these materials and personnel.

In October 2009 at a meeting with the Gladstone Ports Corporation (GPC), representatives of the GPC indicated that a proposed area has been set aside at Auckland Point for the construction activities associated with a number of LNG projects. The GPC considers that this area will be sufficient to cater for all of the proposed developments, however all concepts developed to date are indicative and discussions with the GPC about the nature of these facilities are ongoing.

From the initial appraisal of the marine traffic inside the Port of Gladstone if the Australia Pacific LNG facility and the other proposed LNG projects are constructed at the same time and use the Auckland Point facility there is likely to be congestion around the Wiggins Island in the Clinton and Auckland channel areas.

By Australia Pacific LNG using Fisherman's Landing North Expansion (FLNE) as the primary embarkation point for the transfer for goods and personnel during the construction and operational phase of the LNG facility, a significant amount of the LNG facility's marine traffic is shifted into the Western Basin and avoids the congestion around Wiggins Island.

### **Port of Brisbane operations**

It is reported that the Port of Brisbane has sufficient capacity to cater for the importation of any materials for the Project.



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## Executive Summary

### *Project description*

The Project consists of three integrated components: -

- Gas Fields - Further development and expansion of the coal seam gas (CSG) fields to the north- west and south-east of the existing Walloon gas fields development area centred around Miles.
- Gas Pipeline - Construction of a gas pipeline between the gas fields and the LNG Plant on Curtis Island, Gladstone
- LNG Plant, Curtis Island Gladstone - Staged construction of a liquefied natural gas (LNG) plant and associated facilities at Curtis Island off Gladstone to export LNG to international markets.

For assessment purposes, early construction works were assumed to commence in late 2010, with ongoing construction of the gas field facilities, the gas pipeline and stage one of the Curtis Island LNG facilities. It is anticipated that production and export of LNG will begin by 2014 (train one). The gas fields will be progressively developed with further expansion of the LNG facility completed by 2022 and LNG production continuing to 2045. A full description of the Project as it relates to traffic and transport issues is contained within Section 3 of this report.

The analyses detailed in this report relates to a maximum development scenario. The project configuration, timing, workforce requirements, route selection and materials requirements assumed in this report describe information as it is currently understood and depict the “maximum case” scenario in terms of traffic and transport impacts. Consequently, any future changes to the project made by Australia Pacific LNG, such as a decrease in workforce requirements or a change in location of a gas plant are not likely to have an appreciable impact on the transport network greater than what is reported in this study.

### *Scope of the Traffic and Transport Technical Report*

This Traffic and Transport Technical Report provides information on the analysis undertaken to determine the impact of the Project on the transport networks (road, rail, air and shipping) within the study area. The analysis initially determines vehicle trips and increased demand associated with the movement of materials, machinery and personnel resulting from the Project. The impacts of the increased demand on the networks due to background growth and Project traffic are evaluated after considering the capacity of the infrastructure to cater for increased traffic volumes. Finally, mitigation measures and strategies are proposed that aim to lessen the impacts of the Project on the infrastructure networks. Additionally, the impact of other regionally-significant projects on transport infrastructure within the study area has also been assessed.

Analysis of the networks was therefore undertaken for three scenarios, namely the existing or “background” situation (without development), the “with Project” scenario and “with all projects” scenario for the cumulative assessment of other regionally-significant projects. Analyses were undertaken at peak stages of construction and operation of the Project components as well as the ten year design horizon at 2032.

The assessment has been undertaken with reference to the Terms of Reference (ToR) issued by the Department of Infrastructure and Planning (DIP), Government Acts, regulations and guidelines that are relevant to the mode of transport being considered.

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## 1. Introduction

This Traffic and Transport Technical Report for the Australia Pacific Liquid Natural Gas (Australia Pacific LNG) project (the 'Project') reports the impact of the Project on the regional transport network in the study area (including road, rail, air and shipping) and, where warranted, proposes mitigation measures to lessen these impacts.

The transport infrastructure assessed has included Commonwealth Government, State Government and Local Council controlled roads, airports, rail and maritime ports.

The Australia Pacific LNG project has been declared by the Queensland Government as a 'significant project for which an environmental impact statement (EIS) is required pursuant to section 26(1) of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The government administrative body charged with managing this process is the Department of Infrastructure and Planning (DIP). DIP has issued Terms of Reference (ToR) for the Project (the final version issued in December 2009), which identify a series of issues that need to be addressed for any conditional approval to be granted.

A section entitled Transport within the ToR identifies matters to be assessed in relation to transport. The assessment of the Project's impacts has been undertaken in accordance with these ToR. The Transport component of the ToR is identified within Section 4 of this report. In addition to the ToR, the assessment has been undertaken in accordance with Government Acts, regulations and guidelines. For example, road-related impacts have been addressed using the former Department of Main Road's 'Guidelines for Assessment of Road Impacts of Development' (GARID) (2006).

### 1.1 Project overview and study area

The Project consists of three integrated components: -

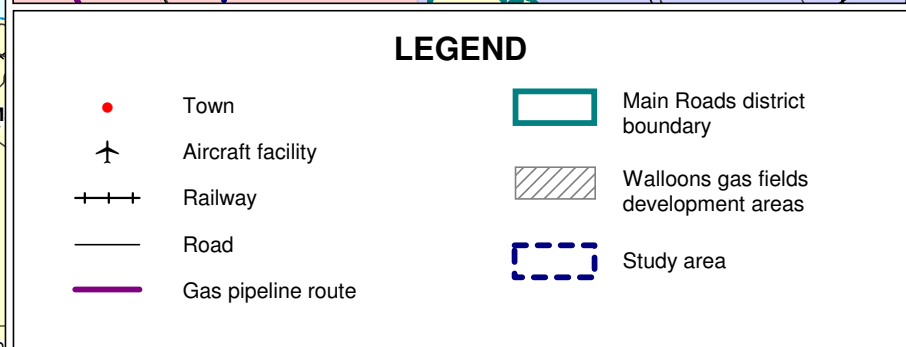
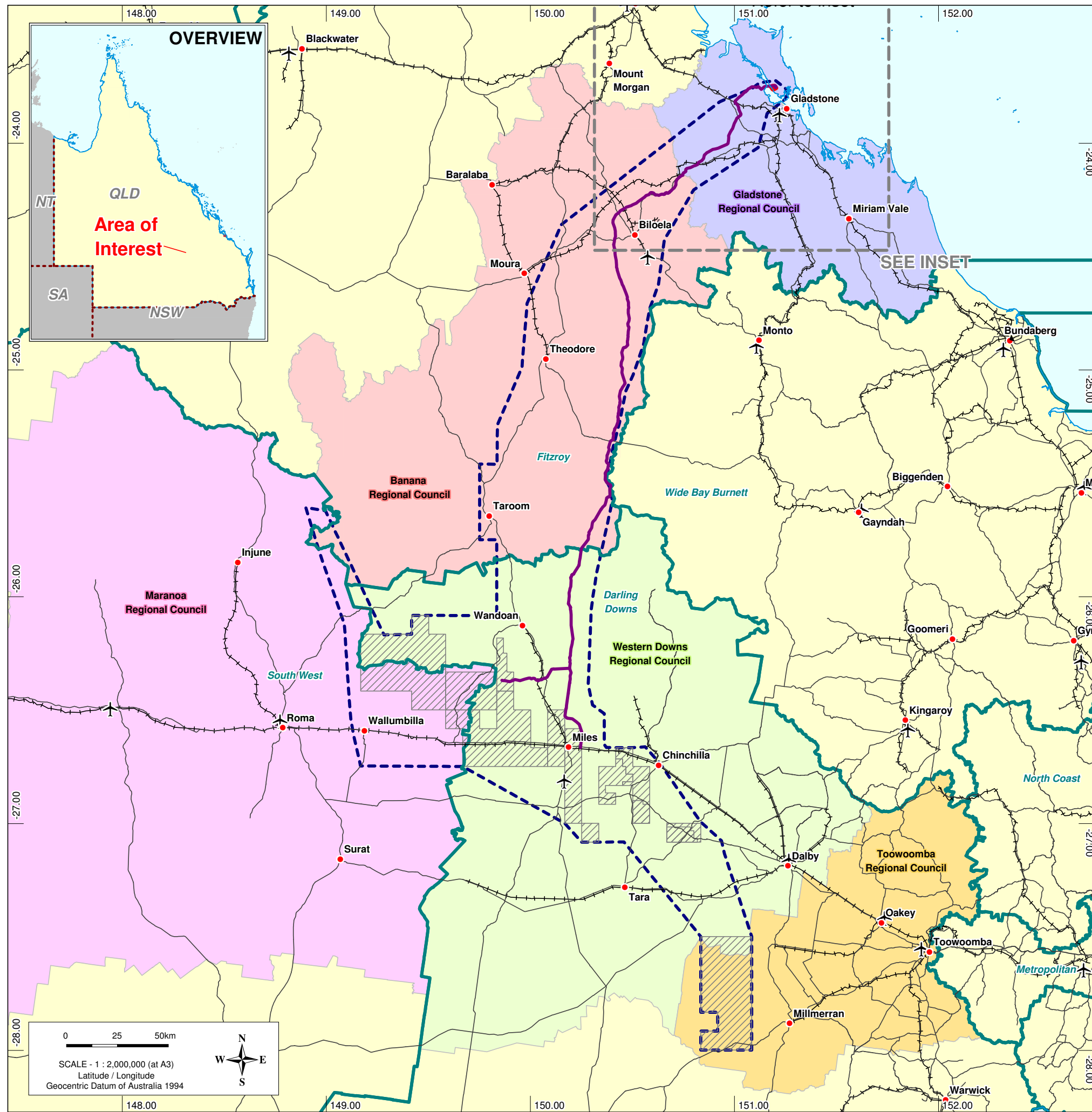
- Gas Fields - Further development and expansion of the coal seam gas (CSG) fields to the north- west and south-east of the existing Walloon gas fields development area centred around Miles.
- Gas Pipeline - Construction of a gas pipeline between the gas fields and the LNG Plant on Curtis Island, Gladstone
- LNG Plant, Curtis Island Gladstone - Staged construction of a liquefied natural gas (LNG) plant and associated facilities at Curtis Island off Gladstone to export LNG to international markets.

For assessment purposes, early construction works were assumed to commence in late 2010, with ongoing construction of the gas field facilities, the gas pipeline and stage one of the Curtis Island LNG facilities. It is anticipated that production and export of LNG will begin by 2014 (train one). The gas fields will be progressively developed with further expansion of the LNG facility completed by 2022 and LNG production continuing to 2045. A full description of the Project as it relates to traffic and transport issues is contained within Section 3 of this report.

The analyses detailed in this report relates to a maximum development scenario. The project configuration, timing, workforce requirements, route selection and materials requirements assumed in this report describe information as it is currently understood and depict the "maximum case" scenario in terms of traffic and transport impacts. Consequently, any future changes to the project made by Australia Pacific LNG, such as a decrease in workforce requirements or a change in location of a gas



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plant are not likely to have an appreciable impact on the transport network greater than what is reported in this study.



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<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 1.1 Study Area</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0332			Rev: 0

Modes and components of the transport networks analysed in this report include:

- Road – roadway capacity, intersections and pavement (strength) capacity, bridges for roads on the State-controlled and Local Government controlled networks.
- Rail – the Moura line and Western line were investigated for their potential to be used for the transport of workers and materials, predominately pipe segments.
- Air – Gladstone, Roma and Biloela Airports and the Miles Aerodrome are proposed to be used by the Project.
- Shipping – the Gladstone Port and the Port of Brisbane are proposed to be used by the Project with increased shipping inside and outside of Gladstone Harbour and operations at Auckland Point being critical issues address in the report.

The assessment of the transport network has been undertaken within the following parameters;

- The Project's early works are assumed to commence in late 2010, with the operation of trains one and two commencing by 2015. For the purpose of this assessment, it is assumed that construction of train three will commence in 2017 and train four would commence approximately nine months after the commencement of train 3 with full operations in place by 2022. The dates of construction will be market driven however the timing has been assumed for the purpose of impact assessment on the traffic and transport network.
- Movement of material and personnel to site will initially be by road based transport and ferry/barge from Fisherman's Landing North Expansion.
- Fisherman's Landing North Expansion has been assumed as the location of the mainland facility for material, personnel and aggregate material movements from the mainland to Curtis Island.
- During construction vacant land off Blain Drive in West Gladstone (commonly referred to as Ash Pond #7) will be used as a construction staff car park. Personnel will drive their private vehicles to this location and then are bussed to the Fisherman's Landing site. Operational staff will drive directly to Fisherman's Landing, park their vehicles in a staff car park and then be ferried to the LNG facility.
- Movement of material and personnel to site will be primarily by road based transport, although the use of the rail network for the movement of some construction material has been investigated and is identified as an alternative scenario.
- The Project does not include an assessment of a possible bridge from the mainland to Curtis Island. While this has previously been identified as an option in other reports, it has been excluded from this assessment as the bridge would not be operational within the Project's construction timeline.
- The maximum length of the main gas pipe segments to be transported by road is assumed to be 18m. This complies with available transportation vehicles, current legislation and access provisions.
- Distribution centres for the compiling, storage and management of construction and operational materials for the gas fields will be located in Brisbane, Miles and Roma. Miles will act as the primary distribution centres for the Project. Wherever possible materials and consumables such as food will be sourced from local suppliers or Australian manufacturers.
- Construction personnel will be transported to and from temporary accommodation facilities by



The Project study area includes the following agencies:

**Table 1.1 Agencies within the study area**

Agency	Regions/local areas	Transport subject area
Department of Transport and Main Roads (DTMR)	Fitzroy, Darling Downs, South West Region	State Controlled Roads including Bridges
Local Government	Gladstone Regional Council, Banana Regional Council, Western Downs Regional Council, Maranoa Regional Council	Council controlled roads, airports
Queensland Rail (QR)	All of study area	Rail
Gladstone Ports Corporation (GPC)	Gladstone Port	Shipping
Great Barrier Reef Marine Park Authority (GBRMPA)	Great Barrier Reef Marine Park (the Marine Park)	Shipping
Maritime Services Queensland (MSQ)	Gladstone Port	Shipping
Civil Aviation Safety Authority (CASA)	All of study area	Air

The Project will also utilise transport infrastructure within the Toowoomba Regional Council, Brisbane City Council, Ipswich City Council and the Port of Brisbane Corporation administrative areas for the movement of construction materials.

## 1.2 Scope of study

This assessment has been undertaken in accordance within the following parameters:

- DIP's Terms of Reference (ToR)
- Government Acts, regulations and guidelines pertaining to the mode of transport that identify assessment triggers, methodology and reporting requirements.
- Study Area, as illustrated in Figure 1.1.
- Maximum Project development scenario

A Project study area was defined by DIP within the EIS assessment process and incorporates the proposed gas field development areas, the pipeline corridor to Gladstone and an area on Curtis Island allocated for the development of this Project and other proposed LNG plants.

Accordingly all transport infrastructure located within this study area has been reviewed and assessed in terms of potential Project impacts in accordance with the ToR and other government assessment requirements.

Assessment of transport outside this study area has not been undertaken unless triggered by a relevant Government Act or legislation. The following details provide examples that have been included within this assessment.

- Project shipping will pass through the Great Barrier Reef Marine Parks Zone and impacts of the

Project need to be considered.

- Some construction materials will need to be shipped through Port of Brisbane and as such this is referenced in this report.
- Movement of oversized materials to the gas fields may need to pass through Toowoomba and will trigger assessment under the movement of oversized vehicles regulations.

The assessment of the Project has been undertaken against a maximum development scenario. This provides the 'maximum case' as it assumes the highest level of development and as such the greatest level of impact, and is consistent with standard industry practice.

Where appropriate, details on alternative Project scenarios are provided. For example, the potential to use rail to move Project freight has been investigated. However, in line with the maximum development assessment methodology, the maximum case forms the basis of assessment. This includes:

- Four train development of the LNG facility on Curtis Island by 2022
- Full staged exploration of the gas fields up to 2045
- The movement of land based personnel (construction and operational) primarily by road transport

### 1.2.1 Cross references with other chapters in the EIS

Traffic generated by the Project may result in impacts outside of the scope of this traffic and transport report. In this case the impacts have been addressed in other chapters of the EIS as given below. Table 1.2 below identifies the chapters within volumes two, three and four of this EIS where issues identified in this report are further assessed.

**Table 1.2 Cross referencing with other Chapters in EIS**

Transport related issue	Chapter in EIS where addressed
Likelihood of product Spill	Chapter 22 – Hazard and Risk
Quarantine management/ spreading of weeds/pests	Chapter 8 - Terrestrial Ecology
Waste Management	Chapter 16 - Waste
Greenhouse gas emissions	Chapter 14 – Greenhouse Gases
Projected construction and operational workforce	Chapter 20 – Social Impact
Impact of the Project shipping on marine environment	Chapter 10 – Marine Ecology
Construction and use of roads and other Project infrastructure in flood prone areas	Chapter 11 – Water Resources
Impact on bridges of heritage value along roads used by Project traffic	Chapter 19 – Shared Cultural Heritage
Measures to reduce the risk of accidents involving APLNG personnel and/or machinery	Chapter 24 – Environmental Management Plans
Impact on foreshore from shipping	Chapter 12 Coastal Environment
Heritage and cultural considerations	Chapter 18 – Indigenous Cultural Heritage and Chapter 19 - Shared Heritage

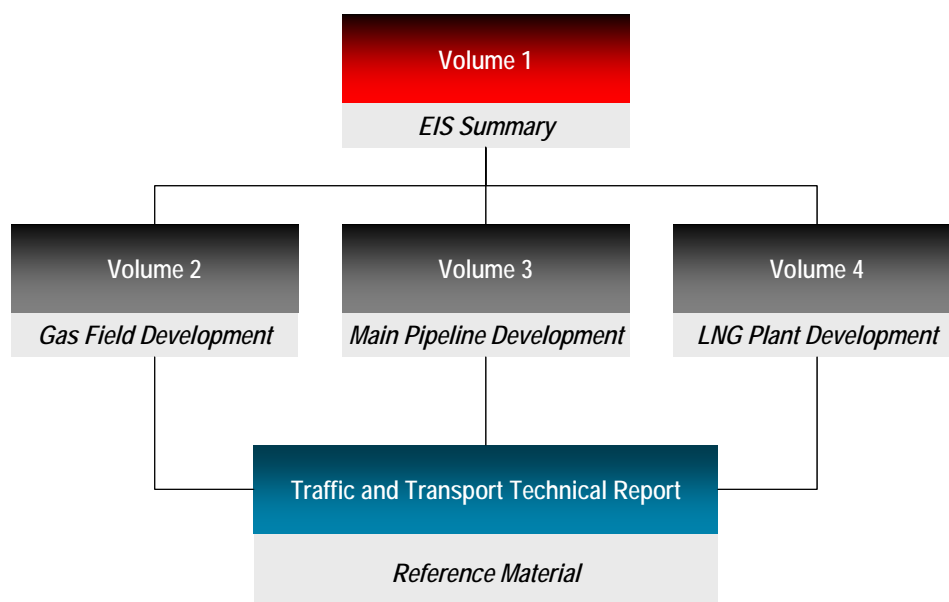
## 1.3 Structure of the report

The structure of the report is as follows;

- Section 1 – Introduction: Introduction to the Project and details the scope and role of the report.
- Section 2 - Existing network assessment: Describes and provides information on the characteristics, planning and capacity of the existing and future transport networks.
- Section 3 - Project Description: Describes the Project and provides information on the traffic generated for each of the three Project components (gas fields, gas pipeline and LNG facilities).
- Section 4 - Project impacts and mitigation: Describes the impact of the Project on the transport networks and presents options to mitigate Project impacts and the cumulative impact of regionally- significant projects by transport mode and component. This section also contains details of the assessment methodology and resultant scope of assessment
- Section 5 - Summary of key issues: Provides a summary of the issues discussed in this report as the issues relate to the three Project components by transport mode and component.

## 1.4 Role of transport technical report within the overall EIS assessment structure

Project traffic will vary for each of the gas fields, gas pipeline and LNG facilities during the operational and construction phases of the Project over it's 30-year life. For example, some of the gas pipeline segments will be imported and distributed from Auckland Point by road and the roads used for pipeline transport may be shared with the traffic generated from the construction of the gas fields. In order to consider the combined effects on transport infrastructure from the various Project components, the approach illustrated in Figure 1.2 has been adopted.



**Figure 1.2 Role of the Transport Technical Report within the EIS**

The Traffic and Transport Technical Report provides a detailed assessment of the impact of the Project on all modes of transport infrastructure and operations within the area of investigation. This is supported by data and reference material that includes traffic counts, road and shipping modelling. Information not contained in this report can be made available for review.

Key salient points identified in each of the five sections of this technical report have been incorporated into the relevant three Project component volumes of the EIS, as appropriate. For example, Volume 2 Gas Fields Chapter 17 – Traffic and Transport, includes a description of the proposed development of the gas fields, traffic generation and distribution and a discussion of the relevant impacts.

The Traffic and Transport Technical Report therefore acts as an appendix to each of these Project component EIS volumes.

This structure acknowledges that impacts on certain items of transport infrastructure and the required mitigation cannot be solely attributed to one particular component of the Project. In addition, it also allows for the cumulative impacts of other regionally-significant projects to be assessed and mitigation measures to be identified.

## **1.5 Key issues addressed**

During the preparation of this EIS a review of other EIS documents was undertaken. A number of issues were raised as being 'of concern' by government agencies and others. Where possible, these concerns have been addressed in this EIS, as detailed below.

### **1.5.1 Mainland facilities and embarkation point**

Concern has been raised by government agencies associated with development in Gladstone regarding to the viability of Auckland Point (or 'Port Central' as commonly referred) as the primary staging post for the distribution of project materials and personnel, both during the construction and operational phases. The two other LNG proponents (Gladstone LNG and Queensland Curtis LNG) have identified Auckland Point for this purpose.

Auckland Point has relatively undeveloped infrastructure in terms of existing berthing facilities. Although a dedicated port access road has recently been constructed it is constrained at its interface with the wider road network due to limited road space for alterations and low level bridges en route. Further, although a rail line is available at this location; its potential use for this Project raises issues pertaining to available capacity on this line and associated operational issues.

To address these concerns an alternative option to Auckland Point at Fisherman's Landing North Expansion (FLNE) has been developed and forms the basis for assessment in this report.

Fisherman's Landing North Expansion (FLNE) has been identified as the primary embarkation point for the transfer for goods and personnel during the construction and operational phase of the LNG facility. This plan shifts a significant amount of LNG facility's marine traffic into the Western Basin and avoids the congestion around Wiggins Island compared to shipping from Auckland Point. In terms of road traffic this option also avoids the potential capacity and operational constraints at Port Central.

During construction vacant land off Blain Drive in West Gladstone (commonly referred to as Ash Pond #7) will be used as a construction staff car park. Personnel will drive their private vehicles to this location and will then be bussed (20 seat capacity) to FLNE, where they will then be ferried to the LNG facility. Operational staff will drive directly to FLNE, park at the car park provided and will then be ferried to the LNG facility.

### **1.5.2 Gladstone – overall capacity**

In addition to Auckland Point, concern has been raised over the capacity of the Gladstone road, rail, air services and shipping networks to handle the projected growth in traffic from all of the proposed LNG developments.



This report has undertaken a cumulative assessment of the potential impacts of this and other regionally-significant projects to provide a strategic view of cumulative project impacts and to determine appropriate mitigation options.

### **1.5.3 Local council controlled roads**

A comprehensive traffic model that models likely traffic movement per site along state-controlled roads and local roads has been developed. This enables appropriate mitigation strategies to be developed.

These issues are addressed in Section 4 – Impacts and Mitigation.

### **1.5.4 Distribution of materials by rail**

For the purpose of assessment it has been assumed that the movement of all land based Project materials will be by road. However, the option of moving Project material by rail, principally pipe segments, has been investigated and is reported upon in this report. Discussions with Queensland Rail (QR) are on-going to the viability of this option.

## 2. Existing transport network assessment

This section provides information about the existing and proposed transport networks.

The transport network identified for assessment is generally that contained within the study area and selected elements outside this area have been included where required by the relevant acts and guideline triggers.

The transport network assessment includes the actual transport infrastructure, operations and services that utilise this infrastructure and policy and legislation that apply to its construction, use and maintenance.

The existing and planned transport infrastructure network for the Project's proposed 30-year lifecycle (2015 to 2045) and the assumed initial construction period from 2010 is also assessed within this section of the report. Transport infrastructure planning will need to be continually reassessed throughout the life of the Project as budgetary constraints and other issues will influence planning in the years to come.

### 2.1 Transport legislation

There are numerous pieces of legislation relevant to transport operations. In addition to the Terms of Reference (ToR) these details provide the reference point for undertaking this assessment. The purpose and relevance of these documents to the Project are outlined below.

Details are provided on;

Legislation	Name of Act or Regulation
Objective or purpose of legislation	The outcome the legislation is intended to achieve
Administering authority	The government department, state or federal, that administers the Act or regulation
Output or related documents	Provides details on related Acts, regulations, guidelines and agencies established to further the objectives of this Act or regulation.
Relevance to this Project	Details the provisions of this Act or Regulation apply to the Australia Pacific LNG Project



**Table 2.1 Government legislation**

Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
Transport Infrastructure Act 1994	To encourage effective integrated planning and efficient management of a system of transport infrastructure.	Department of Transport and Main Roads (DTMR)	<ul style="list-style-type: none"> <li>Transport infrastructure strategies</li> <li>Roads Implementation Program (RIP)</li> <li>Department of Main Roads Planning and Design Manual, 2004 (as amended)</li> <li>Establishment of Queensland Rail under Government Owned Corporations (Queensland Rail) Regulation 1995.</li> <li>Guidelines for Assessment of Road Impacts of Development (2006), Department of Main Roads</li> </ul>	<ul style="list-style-type: none"> <li>Forms the basis for road impact assessment.</li> <li>Road design requirements, policy objectives for the efficient use of the network and identifies the capital roads program (RIP).</li> <li>Statutory requirements for rail safety.</li> </ul>
Transport Planning and Coordination Act 1994	The objective of this Act is to improve the economic trade and regional development performance of Queensland and the quality of life of Queenslanders by achieving overall transport efficiency and effectiveness through strategic planning and management of transport services.	DTMR	Transport Coordination plan	Objectives of this Act are promoted through mitigation measures proposed.
Transport Operations (Road Use Management) Act 1995	The Act complements the above two Acts by providing a	DTMR	Transport Operations (Road Use Management)—Mass, Dimensions and	To be complied with and identified in Traffic and Logistics Management



Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
	framework for the development of an efficient, safe and sustainable road network.  This Act establishes a scheme to allow the management of vehicles, drivers and access to the road network.		Loading) Regulation, 2005	Plans that form part of this overall EIS.
Transport Operations (Road Use Management—Mass, Dimensions and Loading) Regulation, 2005	Management of vehicle types on State-controlled roads	DTMR		Defines the regulations for issuing of permits for oversized vehicles, which will be required for some Project traffic.
Transport Operations (Road Use Management—Fatigue Management) Regulation, 2008	To provide for the safe management of the fatigue of drivers using fatigue-regulated heavy vehicles.	DTMR	Transport Legislation Amendment Act 2007, section 63.	The Project involves travel across long distances by road. Management of drivers' hours for the purpose of road safety will form part of the mitigation measures identified in this report.
Transport Infrastructure (Ports) Regulation, 2005	Defines the port limits and sets out port management guidelines and protection from liabilities.	DTMR	Transport infrastructure strategies and defines port limits.	Defines the extent of the port and the legislative requirements applicable for the area within the port and outside of the port limits.
Transport Operations (Marine Safety) Act 1994	This Act provides a system that achieves a balance between regulating the maritime industry to ensure marine safety and enabling the			Provides a system to assess strategic marine safety and related marine operational issues. Manages the operation and activities of ships and establishes a Marine





Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
	effectiveness and efficiency of the Queensland maritime industry to be further developed.			Board as a representative body to advise the Minister.  Identifies safety obligations to ensure seaworthiness and other aspects of marine safety
Transport Infrastructure (State Controlled Roads) Regulation, 2006	Regulations pertaining to access, road works and ancillary works encroaching on State-controlled roads.	DTMR	Transport Infrastructure Act 1994	Establishes regulations to be adhered to for pipelines crossing State Controlled roads and intersection works.
AusLink (National Land Transport) Act 200	The objective of this Act is to assist national and regional economic and social development by the provision of Commonwealth funding aimed at improving the performance of land transport infrastructure.	Federal Government		The commonwealth provides funding to a number of state controlled highways used by project traffic and that may require alterations.
Transport Operations (Marine Safety) Act, 1994	The overall primary objective of this Act is consistent with the objectives of the Transport Planning and Coordination Act 1994 and relates to providing a system that achieves an appropriate balance between —  (a) regulating the maritime	DTMR	<ul style="list-style-type: none"> <li>• Development of strategies</li> <li>• Implementation of safety strategies</li> <li>• General Safety Obligations</li> <li>• Registration, licensing, permits and accreditation</li> </ul>	Provides a system to assess strategic marine safety and related marine operational issues  Acts as a mechanism to enhance marine safety and operational issues in a way that contributes to overall transport efficiency with an appropriate balance between safety and cost.



Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
	<p>industry to ensure marine safety.</p> <p>(b) enabling the effectiveness and efficiency of the Queensland maritime industry to be further developed.</p>			<p>Manages the operation and activities of ships and establishes a Marine Board as a representative body to advise the Minister. The objectives of the Act also relate to the Project matters that include general safety obligations to ensure seaworthiness and other aspects of marine safety and allowing a general safety obligation to be discharged by complying with relevant standards.</p>
Transport Operations (Marine Safety) Regulation, 2004	The role of this regulation is to prescribe various matters for the Act.	DTMR	Defines the same matters as referred to in the Act and assists to provide a greater understanding of the general requirements of the Act. Some provisions of this regulation state matters with which particular people must comply.	As noted for the Marine Safety Act.
Transport Operations (Marine Pollution) Act 1994	The overall purpose of this Act is to protect Queensland's marine and coastal environment by minimising deliberate and negligent discharges of ship-sourced pollutants into coastal waters.	Great Barrier Reef Marine Park Authority (GBRMPA)	This purpose is to be achieved primarily by giving effect to relevant provisions of MARPOL – the International Convention for the Prevention of Pollution from Ships,	Defines the requirements for the management of potential ship discharges
Maritime Transport and Offshore Facilities Security Act 2003	This Act establishes a scheme to safeguard against unlawful interference with maritime	Australian Government. Department of	Maritime Transport and Offshore Facilities Security Regulations 2003 (the Regulations) provide the operational details of the Act and	The Act establishes an outcomes-based preventive security framework that enables Australia Pacific LNG to

bus

- Pipe will be imported as uncoated pipe with application of a coating to be applied at a coating facility to be established in the Project area.

### ***Road network***

Both State-controlled roads and Local Government roads were included in the assessment. State-controlled roads that were assessed included main roads generally from Gladstone to the north, to Roma to the south west, Dalby to the south east and Miles to the south with the Dawson Highway, Leichhardt Highway, Warrego Highway and Jackson-Wondoan Road being key access routes. Local Government roads such as Crossroads Road, Horse Creek Road and Yuleba Taroom Road provide access to the CSG fields while roads such as The Narrows Road, Welsh's Road and L Tree Creek Road provide access for the construction of the gas pipeline.

Road access to the LNG facility utilises roads within Gladstone such as the Dawson Highway, the Gladstone-Mt Larcom Road and Landing Road. Materials, machinery and personnel are proposed to be transported to Curtis Island through Fisherman's Landing North Expansion (FLNE).

### ***Project traffic***

Traffic generation for the Project has been estimated for the construction and operational phases of each of the components throughout the analysis period 2010 to 2032. 2032 was the final analysis year as this is 10 years following the proposed opening of the fourth (final) LNG train.

Traffic generation has been based on estimated material quantities, equipment, and workforce requirements and assumptions on delivery frequencies, origins and destinations. These include current proposed locations for workers' accommodation and pipe lay-down facilities as well as regional distribution centres proposed for Miles, Roma and Brisbane.

A diagram showing peak daily vehicle traffic is given in Figure 0.1. As can be seen in Figure 0.1 there are two peaks. The first peak in 2013 coincides with the construction of the gas pipeline and the construction of trains one and two. The second peak traffic in 2019 coincides with the operation of trains one and two and the construction of trains three and four.



Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
	transport or offshore facilities.	Infrastructure, Transport, Regional Development and Local Government	adopt the same outcomes-based approach	develop individual security plans that are relevant to the Project and specific defined risks
Civil Aviation Act 1988	The Act established a Civil Aviation Safety Authority (CASA) with functions relating to the safety of civil aviation and related purposes. The main objective of this Act is to establish a regulatory framework for maintaining, enhancing and promoting the safety of civil aviation, with particular emphasis on preventing aviation accidents and incidents.	Civil Aviation Safety Authority (CASA)	Bureau of Air Safety	Defines the legislative requirements for the operation of air services that will be utilised by the Project.
Transport Infrastructure (Dangerous Goods by Rail) Regulation 2008	This regulation gives effect to the standards and requirements of the Australian Dangerous Goods Code as they apply to transport of dangerous goods by rail. It also promotes consistency between rail and other modes of transport in relation to the transport of dangerous goods	DTMR	Transport Infrastructure Act 1994	Defines the standards and regulations to be adhered to if Project materials that fall within the category of a dangerous good are transported by rail





Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
Road Transport - Heavy Vehicle Driver Fatigue Act 2006 (as amended 29 September 2008)	The Act is a national model law that is intended to provide the basis for nationally consistent transport laws. The legislation makes all parties in the supply chain legally responsible for preventing driver fatigue. The new laws apply to both trucks and buses	Federal Government	Basis for nationally consistent transport laws	As identified under the relevant State legislation below mitigation measures identified in this chapter comply with this requirement.
Land Protection (Pest and Stock Route Management) Act 2002.	The purpose of the Act is to provide for pest management for land and stock route network management.	Department of Employment, Economic Development & Innovation (DEEDI)	Regulatory Impact Statement (RIS)—Stock Route Network Management Regulation 2009 Land Protection (Pest and Stock Route Management) Regulation, 2003.	Pipeline and new or improved road access will cross and/or impact a number of stock routes in the study area.
Great Barrier Reef Marine Park Act 1975	<ul style="list-style-type: none"> <li>Established the Great Barrier Reef Marine Park (the Marine Park).</li> <li>Established the Great Barrier Reef Marine Park Authority (GBRMPA), a Commonwealth authority responsible for the management of the Marine Park.</li> <li>Provide a framework for</li> </ul>	Great Barrier Reef Marine Park Authority (GBRMPA)	Great Barrier Reef Marine Park (Environmental Management Charge-Excise) Act 1993 Great Barrier Reef Marine Park (Environmental Management Charge-General) Act 1993 Great Barrier Reef Marine Park Regulations 1983	LNG shipping will pass through the Marine Park and will need to comply with the provisions of this Act



Legislation	Objective or purpose of legislation	Administering authority	Output or related documents	Relevance to this Project
	planning and management of the Marine Park, including through zoning plans, plans of management and a system of permissions.			
	<ul style="list-style-type: none"><li>Require compulsory pilotage for certain ships in prescribed areas of the Great Barrier Reef Region.</li></ul>			
	<ul style="list-style-type: none"><li>Provide for regulations, collection of Environmental Management Charge, enforcement etc.</li></ul>			

## 2.2 Policy and network planning framework

This section reviews the relevant government planning documents and how the documents relate to the Project.

Documents are reviewed in the following order:

- Regional and national-based documents that address broad strategic transport issues
- Local area planning documents, including planning schemes
- Subject and/or area specific documents

### 2.2.1 Regional and national-based planning documents

#### ***Gladstone Integrated Regional Transport Plan 2001 - 2030***

The Gladstone Integrated Regional Transport Plan (GIRTP) was developed in 2001 as is planned for further review, however the principles and intentions of the document remain valid. The Plan sets out a comprehensive framework for the future development of Gladstone's regional transport network for the next 30 years, based upon a partnership approach between State and Local government. It was endorsed by former Minister for Transport and the mayors from the former Gladstone City and Calliope Shire Councils. The Plan contains consolidated action plans which will be implemented co-operatively in a co-ordinated manner by all of the agencies involved. The GIRTP contains eight action plans aimed at improving the transport system of the Gladstone region, as follows:

- Action plan 1: Industrial Land
- Action plan 2: Rail Network and Services
- Action plan 3: Port and Marine
- Action plan 4: Road Network
- Action plan 5: Cross-modal Issues
- Action plan 6: Aviation
- Action plan 7: Passenger and Public Transport
- Action plan 8: Cycling and Walking

The guiding principles for the development of these action plans contained in the GIRTP are:

- Integrated transport planning
- Economic efficiency and growth
- Environmental sustainability
- Equity, employment and social justice

The GIRTP recommended a capital works program by transport mode. Some of these have been completed, (e.g. construction of the Port Access Road) while others such as improved access to the Aldoga precinct are dependant upon development.

Matters of particular interest to the Project include:

- The need to alter the Mt Larcom Road connection from the Bruce Highway to Gladstone Port

and city.

- Ongoing widening to four lanes of the Dawson Highway from Gladstone
- Improvements of facilities at Auckland Point and Fisherman's Landing, including improved road and rail access.
- The promotion of active transport strategies in particular the improvement of the limited bus network to enable an increase in bus usage which was identified as being very low.
- Improving air services at Gladstone Regional Airport and maintain the Kangaroo Island option as future (alternative) airport.
- An integrated transport network incorporating multi-modal infrastructure.

### ***Relationship to the Project***

Limited facilities and constrained access at Auckland Point poses issues for the Australia Pacific LNG Project and the other LNG projects. The cumulative demands on these facilities have prompted the FLNE alternative to be considered as part of this assessment.

The road network will experience increased traffic during the initial construction period, although this will reduce once operations commence due to lower personnel numbers and shipment of goods direct to the LNG facility. Nonetheless, network improvements are proposed as part of the mitigation strategies and will generate long-term benefits for transport operations and the local community.

Plans to alter facilities at Gladstone Regional Airport are supported by the proponent because these will not only increase capacity, but should also result in improved and cheaper services which will also benefit the wider community.

### ***Capricornia Integrated Regional Transport Plan 2004 – 2030***

Queensland's former Departments of Transport and Department of Main Roads, in conjunction with Rockhampton City Council, Livingstone Shire Council, Fitzroy Shire Council and Mount Morgan Shire Council developed the Capricornia Integrated Regional Transport Plan (CapIRTP) in 2004. The study area covered the local government areas of Rockhampton, Livingstone, Fitzroy and Mount Morgan, which now form the Rockhampton Regional Council.

Although somewhat now dated, the CapIRTP was the first comprehensive integrated and sustainable transport plan for the area which considered all modes of transport. The Plan provides guiding principles, key planning assumptions and issues associated with each mode of transport. It also provides strategies and action plans and recommends capital programs for the various modes of transport.

The Plan also contains approaches adopted in the Gladstone Integrated Regional Transport Plan and contains seven action plans that are aimed at improving the transport system of the Capricornia region. Each of the action plans relates to a specific mode of transport, as follows:

- Roads
- Rail
- Public transport
- Cycling
- Walking



- 
- Aviation
  - Water transport

A capital works program was proposed which involved the alteration of existing and construction of new strategic assets within the region.

### ***Relationship to the Project***

The plan lists a number of broad transport infrastructure objectives. The main significance to the Project is that it reinforces the integrated transport and environmental sustainability approach, as adopted in the Gladstone Integrated Regional Transport Plan at the State planning level. While new strategic infrastructure was identified in the plan, these were not incorporated into this EIS assessment because of the uncertainty of their funding and likely implementation.

### ***Roads Implementation Program (RIP)***

The Roads Implementation Program (RIP) [2008/09–2012/13] details the Department of Transport and Main Roads' (DTMR) projects that have been allocated funds and includes information about the funding allocation and expected timing of the proposed works.

DTMR projects are administered through regional district DTMR offices and each has a schedule of works included in the RIP. The Australia Pacific LNG study area encompasses the DTMR districts of Fitzroy, South West and Darling Downs.

The RIP contains a five-year rolling program of enhancement works and maintenance programs for State- controlled roads. However, when considering these proposed works, the following comments provided in the RIP should be noted:

*Allocations for projects scheduled to commence beyond 2010-11 are indicative, for planning purposes only. Priorities will be re-evaluated annually on a needs basis, according to available funds. The bulk of funding in years 2011-12 to 2013-14 will be held at a regional level until works have been prioritised.*

There are a number of proposed network projects within the Project's study area and these are described in Table 2.2 below.

Table 2.2 Roads Improvement Program (RIP)

Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
National Network	Fitzroy	Gladstone	27/10E/901	Bruce Highway (Benaraby - Rockhampton)	Calliope Crossroads interchange	Concept planning	2009-2010	This is a major un-signalised four- way intersection between the Dawson and Bruce Highways which will include a significant number of Project vehicle movements. Improvements to this intersection will greatly assist Project and general traffic movements.
Other state- controlled roads (OSCR)	Fitzroy	Banana	8/26A/56	Leichhardt Highway (Westwood - Taroom)	Don River	Replace bridge(s)	2009-2014	The Leichhardt Highway will act as a haul route for construction traffic to the gas pipeline and gas fields. It is assumed that the altered bridges will be constructed 'off-line' and therefore construction traffic from the Project will be accommodated.
	Fitzroy	Banana	8/26A/57	Leichhardt Highway (Westwood - Taroom)	Sections : 156- 165km	Widen and seal	2009-2010	As above
	Fitzroy	Banana	116/26B/39	Leichhardt Highway (Taroom - Miles)	11.40 - 14.96km and 22.52 - 24.90km	Widen pavement	2011-12 to 2013-14	As above



Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
	Fitzroy	Banana	8/41E/301	Burnett Highway (Biloela - Mount Morgan)	North of Biloela	Rehabilitate and overlay (>75mm)	2010-11, 2011-12 to 2013-14	A small amount of pipeline construction traffic will use this route. Project traffic will not hinder these proposed works.
	Fitzroy	Banana	8/41E/305	Burnett Highway (Biloela - Mount Morgan)	South of Argoon turn- off	Rehabilitate and overlay (>75mm)	2009-12	As above
	Fitzroy	Banana	8/41E/306	Burnett Highway (Biloela - Mount Morgan)	Sections : south of Alma Creek (58.10- 63.30km)	Rehabilitate and overlay (>75mm)	2011-12 to 2013-14	As above
	Fitzroy	Banana	116/4397/17	Roma - Taroom	Sections : 64.90 - 149.40km	Pave and seal	2009-11	A small amount of Project traffic will use this road to access this section of the gas fields. Project traffic will not hinder these proposed works.
	Fitzroy	Gladstone	27/46A/22	Dawson Highway (Gladstone - Biloela)	Calliope Range	Construct deviation - sealed standard	2009-11	Project construction traffic is proposed to use this route. Until works are completed, no oversize vehicles for the Project will be able to use this route due to existing sub- standard horizontal alignment. These proposed improvements will greatly assist Project and general traffic movements at this location.

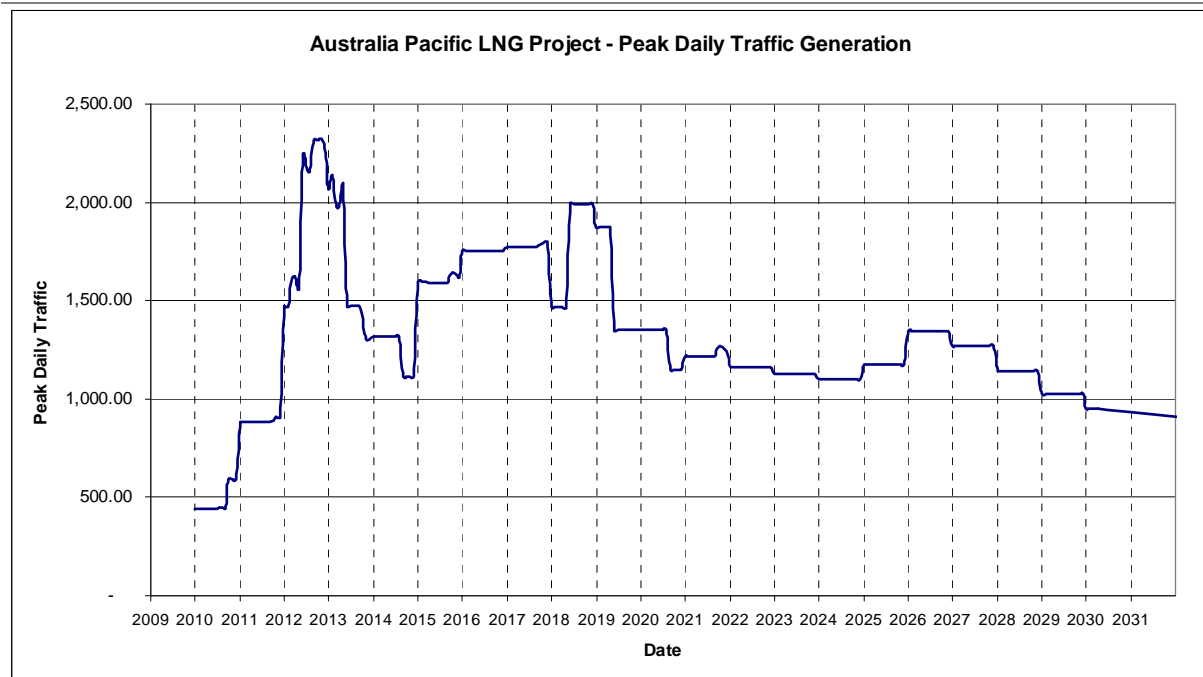


Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
	Fitzroy	Gladstone	161/181/14	Gladstone - Mount Larcom	Sections : 5.00 - 32.10km	Delineate/line marking	2009-10	Minor works. No significant impact from construction traffic.
	Fitzroy	Gladstone	161/181/15	Gladstone - Mount Larcom	Glenlyon Street / Dawson Highway / Bramston Street	Intersection improvements	2009-10	Minor works. Project construction traffic is proposed to use this route.
	Fitzroy	Gladstone	161/181/803	Gladstone - Mount Larcom	Wiggins Island intersection - Reid Road	Rehabilitate pavement	2009-11	Not on a Project-defined traffic route.
Transport Infrastructure Development Scheme (TIDS)	Fitzroy	Gladstone	229/LGSA/00 1	Calliope River Road	13.00 - 13.80km	Widen and overlay	2010-11	As above
	Fitzroy	Gladstone	229/LGSA/00 4	Derby Street		Bitumen chip reseal	2009-11	As above
	Fitzroy	Gladstone	229/LGSA/01 1	Calliope River Road	0.35 - 1.10km	Alter/replace floodway(s)	2009-11	As above
	Fitzroy	Gladstone	229/LGSG/0	Glenlyon Road		Bikeway	2010-11	Construction traffic will use a short



Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
			01			construction		section of this road en route to and from the port.
	Fitzroy	Gladstone	229/LGSG/02	Glenlyon Road	(under rail crossing)	Construct bikeway /footpath(s)	2010-11	As above
National Network	Darling Downs	Toowoomba	265/18B/201	Warrego Highway (Toowoomba - Dalby)	Hursley Road - Tor Street	Improve traffic signals	2009-10	Highway to be used by construction and operational traffic beyond these work dates.
	Darling Downs		265/28A/201	Gore Highway (Toowoomba - Millmerran)	South Street	Improve traffic signals	2009-10	As above
	Darling Downs	Western Downs	222/18B/201	Warrego Highway (Toowoomba - Dalby)	Condamine Street (Bunya Highway)	Improve traffic signals	2009-10	As above
Other state-controlled roads (OSCR)	Darling Downs	Toowoomba	81/325/801	Dalby - Cecil Plains Road	36.43 - 39.08km	Rehabilitate pavement	2009-11	Highway used by construction and operational traffic beyond these work dates.
	Darling Downs	Dalby	Various	Leichhardt Highway (Taroom - Miles)	Various sections	Widen pavement and seal, reduce hazards close to roads, intersection improvements	2009-14	As above. Project traffic will not hinder these proposed works. These proposed improvements will greatly assist Project and other traffic movements at this location.





**Figure 0.1 Peak daily traffic - Australia Pacific LNG Project**

## **Road network analyses**

### **Roadway capacity**

The methodology adopted to assess the roadway capacities within the study area involved assessing the existing traffic volumes then superimposing Project and regionally-significant project traffic onto the road network. Alteration requirements were determined for each road segment that exceeds capacity during the analysis timeframe. Analyses were undertaken to determine the number of years any alterations would need to be brought forward due to the Project and regionally-significant project traffic. Road links where alterations were brought forward by one year or more were identified.

It was found that the some of the road link capacities fail with background traffic alone during the assessment period, and that the Project was not the driver for any alterations. Additionally, the Project by itself did not result in the bringing forward of any road alterations due to inadequate capacity.

The cumulative impact of the other regionally-significant projects, particularly other LNG projects, does result in bringing forward the alteration of the following road links:

- Gladstone-Mt Larcom Road Ch 3.258 to 12.292 (Blain Drive to Reid Road) alter from two lane rural road to four lane urban road. Alterations to be brought forward from 2020 to 2018 (Blain Drive to Red Rover Road) and from 2029 to 2028 (Red Rover Road to Reid Road).
- Dawson Highway Ch2.24 to 3.13 (Blain Drive to Philip Street) alteration from four lane urban road to six lane urban road. Alteration to be brought forward from 2028 to 2027.

### **Intersections**

The methodology adopted to undertake intersection impacts involved gathering data (background AM/PM peak hour traffic volumes) on identified intersections, analysing the intersection operation over the assessment timeframe and determining the year the intersection may fail due to background traffic



Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
	Darling Downs	Dalby	Various	Leichhardt Highway (Miles - Goondiwindi)	Various sections	Recycle pavement, Widen pavement and seal	2009-14	As above
	Darling Downs	Dalby	124/325/12	Dalby - Cecil Plains Road	Ashall Creek (20.66 - 20.69km)	Replace bridge(s)	2009-11	Road used by construction and operational traffic beyond these work dates. These proposed improvements will greatly assist Project and other traffic movements at this location.
	Darling Downs	Dalby	33/340/5 and 9	Dalby – Kogan Road	(47.46 - 47.68km)	Replace bridge(s) and approaches	2011-2014	As above
	Darling Downs	Dalby	222/341/1	Chinchilla - Tara	3.00 - 7.00km	Widen shoulder(s) and sealing	2009-10	As above
	Darling Downs	Dalby	33/342/8	Kogan - Condamine	Wiembilla Creek (45.80 - 45.84km)	Replace bridge(s)	2009-14	As above
	Darling Downs	Dalby	87/344/4	Roma - Condamine	Moraby Creek (80.15 - 80.17km)	Replace bridge(s)	2009-10	As above
	Darling Downs	Dalby	222/3403/1	Warra - Kogan	14.80 - 22.86km	Construct new sealed two-lane	2009-11	Not directly used by Project traffic.



Section in RIP	Main Roads District	Local Government Area	DTMR reference	Road link	Location	Planned works	Timing	Relationship to Project
standard								
Other state- controlled roads (OSCR)	South West Region	Roma	22/4397/16	Roma - Taroom	Sections : 0 - 64.90km	Pave and seal	2009-2014	As above

### ***Relationship to the Project***

A number of road improvements and road safety schemes will enhance the efficiency and safety of the State-controlled road network to be utilised by Project traffic.

The most significant road works project proposed in the Australia Pacific LNG Project area, is the DTMR \$70M commitment to improve the Dawson Highway (Gladstone-Biloela) along the Calliope Range. The road works are proposed to be conducted between 2009 and 2011. The alteration will improve road alignment and reduce grades. This roadworks project will greatly assist the movement of traffic along with the pipeline construction traffic through this road section.

### ***DMR Statements of Intent for Link Developments***

The DTMR issues Statements of Intent (SOI's) to identify proposed future improvements to State-controlled network. Within the Project area, sections of the Warrego Highway, Dawson Highway, Bruce Highway and Gladstone-Mount Larcom Road have been identified as roads requiring future improvements to address current and projected traffic.

### ***Relationship to the Project***

The roads identified by DTMR are those used by Project traffic and in some instances alterations to these roads are proposed as part of the Project's mitigation measures.

## **2.2.2 Local area planning documents including planning schemes**

### ***Development Scheme for the Gladstone State Development Area***

The Gladstone State Development Area (GSDA) is some 28,000ha in area and incorporates lands situated to the north-west of Gladstone and on the southern part of Curtis Island, and includes the gas pipeline corridor. The GSDA was established to provide land for large-scale industrial development.

The development scheme, which is supported by a number of policies, is a land use planning instrument administered by the Queensland Coordinator-General for the purpose of guiding future development in the GSDA.

### ***Relationship to the Project***

The GSDA Development Scheme provides a land use approval process for the assessment of development proposals. Under this process, an application for a material change of use is made, and is assessed by the Coordinator-General against the provisions of the development scheme. Generally, all other development under the *Sustainable Planning Act 2009* (unless exempt) is assessed by the relevant assessment manager such as the Gladstone Regional Council or the Gladstone Ports Corporation.

When assessing a material change of use application, the Coordinator-General has regard to the intent, objectives and purposes of the land use designations and policies within the development scheme.

### ***Development Scheme for the Callide Infrastructure Corridor State Development Area***

The Callide Infrastructure Corridor State Development Area is an infrastructure corridor to provide for the co-location of underground pipelines to transport coal seam gas from Callide to the GSDA. The

corridor is approximately 44 kilometres long and is generally 200 metres wide. In specific areas where environmental, geographic and construction issues exist, the corridor is wider for pipe separation and construction purposes.

### ***Relationship to the Project***

The development scheme, which is supported by a number of policies, is a land use planning instrument administered by the Queensland Coordinator-General for the purpose of guiding future development in the Callide Infrastructure Corridor State Development Area. Preferred land uses for the corridor are animal husbandry, gas transportation infrastructure, and to a lesser degree services infrastructure.

The development scheme's operation is similar to that described above for the GSDA.

### ***Gladstone Regional Council Planning Scheme(s)***

As a result of recent Council amalgamations, Gladstone Regional Council is in the process of preparing a new planning scheme to replace the three existing planning schemes that applied to the former Gladstone City, Miriam Vale Shire and Calliope Shire Councils.

In preparing the new planning scheme, Council has compiled 11 Issues Papers to prompt thought and discussion. Issue #7 – Transport and Infrastructure, is reviewed within this assessment. Comments were to be finalised by 20 November 2009.

Council has recognised the importance of transport and other infrastructure in supporting the industrial economic base of the region. Key issues identified in this paper are the need to:

- Determine standards for roads, water, sewerage services and stormwater drainage.
- Investigate options for new or altered connections to major destinations and freight routes.
- Incorporate enhanced environmental protection measures in new roads and infrastructure.
- Ensure equitable cost recovery for roads and infrastructure from new development.
- Encourage walking, cycling and public transport.

To address these issues, possible strategies proposed include:

- Review the Gladstone Integrated Regional Transport Plan and extend the Plan area to include the former Miriam Vale Shire area.
- Prepare new planning scheme policies for engineering and sustainable environmental standards for roads, water, sewerage and stormwater management infrastructure.
- Promote an urban transport form that encourages walking, cycling and public transport and has good connectivity to higher order destinations.

### ***Relationship to the Project***

It is recognised that this Project will result in increased trips for all modes, particularly road-based trips. The proportional impact of Project traffic against background traffic growth and traffic from other projects has been calculated to assist determine the contributions towards these network improvements.

To reduce private car trips the Project proponent intends, where practical, to transfer the majority of construction personnel associated with the pipeline and gas field construction by bus to/from airports



or regional distribution centres. Additionally a significant number of the construction personnel associated with the LNG facility on Curtis Island will be transferred to/from FLNE and Gladstone Regional Airport by bus.

Options are also being investigated to promote the use of local private bus services, car pooling, public transport and other active transport initiatives.

Sustainability has underpinned this assessment and strategies and measures have been proposed to assist sustainability objectives.

### ***Banana Shire Planning Scheme***

Banana Shire Council adopted the current planning scheme in October 2005, replacing the old 1997 planning Scheme. The scheme set outs the regulatory and policy framework for general development within the Shire. In terms of transport policies, this scheme primarily addresses planning controls relating to new development, such as, car parking standards and access arrangements.

### ***Relationship to the Project***

Key issues for this Shire in relation to the Project include

- Water supply and management,
- The role of the mining and agricultural industries in the economic development of the shire,
- the use of local airports, the impacts of the pipeline route on crossing utility corridors,
- the impact on stock routes and local roads, and
- the impact of increased traffic.

### ***Western Downs Regional Council Planning Scheme(s)***

As a result of recent Council amalgamations, Dalby Regional Council was formed from the existing local councils of Dalby Town, Wambo Shire, Chinchilla Shire, Tara Shire, Murilla Shire and division two of Taroom Shire. The Council later reverted to the name Western Downs Regional Council. There is an overall planning scheme in preparation however the Council currently administers the existing planning documents to guide the development of the community. The current town planning schemes contain provisions for the regulation, implementation and administration of each area's specific planning scheme and includes a statement of objectives and relevant criteria for the implementation of the regional strategic plan. In terms of transport policies, these schemes primarily address planning controls relating to new development such as car parking standards and access arrangements.

### ***Relationship to the Project***

The bulk of the gas fields Project is located within the administrative area of this Council. Miles is identified as a potential logistics hub and there is a rolling program of development planned within the area for the next 30 years.

### ***Maranoa Regional Council Planning Scheme(s)***

Maranoa Regional Council (MRC) was officially formed on 15 March 2008 and named in June 2009, as part of the Queensland Local Government reform process and encompassed the previous Roma Town Council and Bungil, Bendemere, Warroo and Booringa Shire Councils. MRC is currently combining all of the previous planning schemes into one consolidated document. This document will seek to:

- Promote active transport such as bicycle paths and walkways
- Improve access and connectivity
- Retain and develop the rail network
- Maintain and manage airport infrastructure
- Protect the region from inappropriate development
- Develop a priority infrastructure plan

### ***Relationship to the Project***

Only a small part of the Maranoa Regional Council falls within the study area. However, Roma will act a key local resource and distribution centre for materials, people and regional transport access.

### ***Toowoomba Regional Council Planning Scheme***

Toowoomba Regional Council (TRC) was formed in March 2008 from a merger involving Cambooya, Clifton, Crows Nest, Jondaryan, Millmerran, Pittsworth and Rosalie Shire Councils and Toowoomba City Council. As with other amalgamated councils, TRC is in the process of streamlining existing planning documents and procedures to form one consolidated planning scheme.

A key planning initiative in this area is the proposed Toowoomba Bypass. The Bypass is promoted as a safer alternative to the existing Toowoomba range crossing and will span 42km from the Warrego Highway at Helidon Spa to the Gore Highway at Athol. Funding is being sought through the Federal Government's Building Australia Fund.

### ***Relationship to the Project***

This council will be affected by the transport of goods to the gas fields and pipeline during the construction period, particularly during the early phases. The Toowoomba Bypass is unlikely to be in operation in time for the Project and goods will need to be transported through the town by road or alternatively by rail.

## **2.2.3 Specific subject documents**

### ***Coal Rail Infrastructure Master Plan, 2nd Ed. 2008***

This plan is one of a series of plans produced by Queensland Rail (QR) to provide greater certainty for long-term capital expenditure and investment in the Queensland coal systems. This Master plan builds upon the work undertaken in 2006. From discussions with port owners, mining companies and others involved in the coal industry and supply chain network, QR has gained an understanding of the future coal demand on the rail network. This plan seeks to identify the phased expansion of the rail infrastructure to meet future expected growth. This includes possible extensions of each of the four systems comprising the Central Queensland coal region, as well as the Western System in southern Queensland.

### ***Relationship to the Project***

Use of the existing rail system for moving freight associated with the Project is currently being investigated as an alternative to road transport. The rail network within the study area is primarily used for the transportation of coal.

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### ***Gladstone Ports Corporation 50-year Strategic Plan***

In 2008 Gladstone Port Corporation (GPC) updated its 50-year strategic plan. The update identifies potential port developments and provides a plan to assist the port's readiness for accommodating the continuing growth of Gladstone's industry in a sustainable and secure manner. During the next few years a 50 Mtpa growth surge is predicted at the port. Key strategies identified in the plan include:

- No additional expansion at South Trees.
- Port Central will gain three berths suitable for up to panamax-sized vessels.
- RG Tanna Coal Terminal to be fully established with provision of a fourth-ship loader.
- Western Basin development to be the main focus of the port's future growth. The Western Basin includes Wiggins Island, Fisherman's Landing, Friend and Laird Points, North China Bay, Hamilton Point, and Boatshed Point. At Wiggins Island there are six new cape-sized vessel berths for a new coal and nickel terminal. At Fisherman's landing, five new panamax/post panamax berths are planned, bringing the number of berths to 11. Friend and Laird Points have the potential to expand to six new berths (catering for the loading of bulk products onto panamax vessels). At North China Bay there is potential to construct two berths to accommodate LNG exports. While Hamilton and Boatshed Point is to be developed for bulk, container or break bulk trade.
- Potential for a residential marina development at Boyne River marina.
- Investigation relating to the need to duplicate the main shipping channel to cater for the expected trade growth. The need to deepen the channel to cater for cape-sized vessels would also be investigated.
- Potential for a new boat ramp facility at the northern end of the marina.
- Potential for Port Alma to develop a 25-30Mtpa coal exporting terminal for panamax-sized ships.

### ***Relationship to the Project***

It is likely that the GPC's development will allow the Laird Point area to eventually include three berths, two LNG berths and one Materials Offloading Facility (MOF). However, there is no room for other developments at this location.

Front End Engineering Design (FEED) work for the Australia Pacific LNG Project included a range of studies and resultant recommendations have been made. These studies relate to the operation of the facility as well as the construction and dredging impacts. Many of these studies include transportation issues, as outlined in Section 4. The preferred berthing option (Option 2a) and associated dredging impacts are discussed further in the Project Description (refer chapter 3.5 and the Addendum Report of the Gladstone Port Corporation's EIS for the Western Basin Dredging and disposal Project).

Within the 50-year strategy there is the general recognition that the operation of the Project's LNG plant will increase shipping movements. Depending on the ultimate development of the Western Basin and related shipping movements, there may be a future need to duplicate the shipping channel. However, port congestion modelling conducted by GPC concludes that channel duplication is not triggered by the initial development of the proposed LNG projects.

In 2009 there was a discussion within GPC about the need to provide increased support facilities for the proposed LNG projects, including the need for a tug harbour facility. At present, current planning is

to position this tug facility near the RG Tanna wharves, on the northern shore of the Gladstone Marina breakwater.

### ***Draft Port of Gladstone Western Basin Master Plan, 2009***

This plan has been prepared under section 10(2) of the State Development and Public Works Organisation Act 1971 (SDPWO Act) by the Department of Infrastructure and Planning.

The plan was specifically prepared in response to the numerous LNG projects proposed for Gladstone. The master plan provides a framework for the development of the Western Basin and a basis for the consistent assessment of the cumulative impacts of the LNG industry and other proposals. The Plan identifies current and future land and marine uses, infrastructure development (including pipeline corridors, transport networks and potential bridge access to Curtis Island), as well as port activities, common-user channels, dredging and disposal options over the next 30 years to 2039. The plan also examines conservation areas and the potential for environmental areas to be set aside as part of the required mitigation measures.

### ***Relationship to the Project***

This plan is currently in draft form and as such is not endorsed government policy. It is not intended to replace existing legislation and regulations, including this EIS assessment process in regulating such LNG projects as the one reported here. However, it is intended to provide a framework for the development of this area. Proposed actions include removal of the Kangaroo Island Airport option as one to be pursued by government

### ***Gladstone Airport Development Plan, 2008***

High levels of growth in passenger demand in recent years prompted a review of the 2004 Development Plan passenger forecasts. Air travel is expected to grow as new projects are faced with the prospect that significant fly-in/fly-out (FIFO) workforces will be required to supplement the capacity of the local workforce.

The updated development plan provides for a range of alterations, including extension and alterations to the runway to enhance jet aircraft operations and improve passenger terminal facilities. The introduction of jet aircraft will also require a significant alteration to airport security.

Kangaroo Point Island was previously identified as an alternative airport site in this region. The 2004 Development Plan recommended an investigation into alternatives to this site. The subsequent study discounted other options and Kangaroo Island remains in the Gladstone Airport Development Plan, 2008 as an alternative airport site.

### ***Relationship to the Project***

Gladstone Regional Airport will be used by the Project's workforce during the construction phase and to a lesser extent for the operational phase. Improved facilities at this airport would assist the Project to source Project personnel and attract families to the region.

It is anticipated that the planned alterations to the existing Gladstone Regional Airport, along with increased competition for services, will suffice for the Project and the cumulative needs of upcoming projects. The feasibility of Kangaroo Island airport is not part of this EIS assessment.

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### ***Gladstone Airport Project Planning Report, 2008***

A technical compendium to the Gladstone Airport Development Plan, this report provides data about existing and likely future conditions, potential strategies, timeframes and costings.

#### ***Relationship to the Project***

Details about current and projected operations assist in the assessment of the Project.

### ***Gladstone City Council Walk - Cycle Network Improvement Plan, 2006***

Gladstone City Council introduced the Walk –Cycle Network Improvement Plan in June 2006. The plan sought to expand the existing limited and largely fragmented network and aimed to improve the relatively low level of cycle use. This was a theme later outlined within the Plan's 'Issues Fact Sheet #7 and current transport planning documents.

#### ***Relationship to the Project***

During the construction phase it is not feasible or practicable to move personnel to and from the work site other than by vehicles, be it by buses or light vehicles. However, options are being considered that could allow more active transport access to the ferry terminals that transfer staff to Curtis Island.

The major impact of the proposal will be to pedestrian and cyclist safety and the interaction of these modes of transport with the road network. It is recognised that the increase in vehicles, especially heavy vehicles using popular Project and mainstream networks, may pose a safety risk if not managed appropriately. Risk assessment plays an important part of this assessment. Road transport risk and proposed mitigation measures are discussed in detail within Section 4.

## **2.3 Road network**

### **2.3.1 State-controlled roads**

Key State-controlled roads in the study area that may be impacted by the Project are described below and are shown on Figure 2.1 to Figure 2.7.

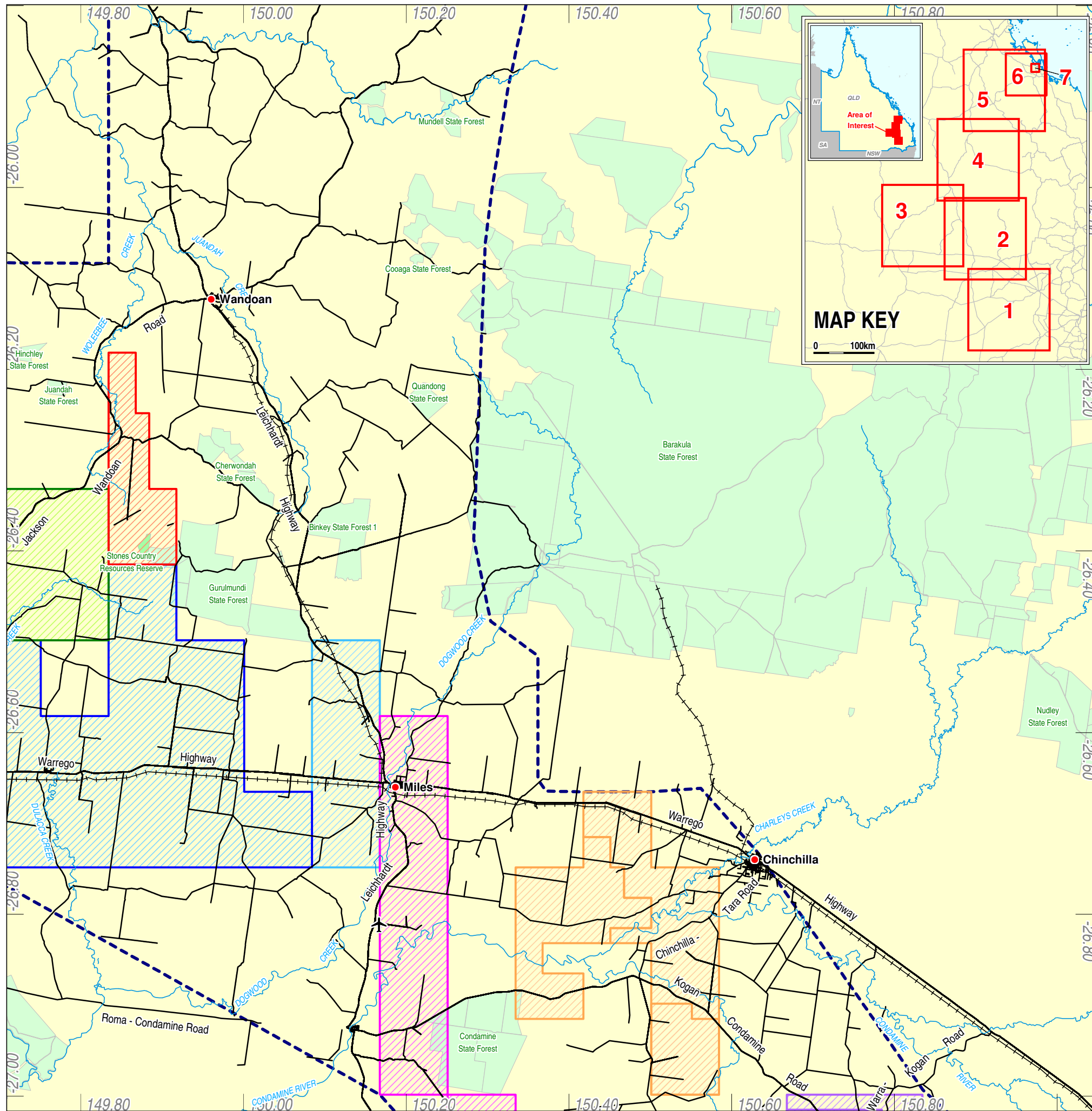
These roads will carry construction and/or operational traffic throughout the life of the Project. Sections of these roads do extend outside the investigation study area but are referenced and assessed within this document because journeys along these roads don't always begin or terminate at the study area's boundaries.





alone. Project and regionally-significant project traffic was then added to the background traffic to assess the impact of the developments and determine mitigation options.

Table 0.1 provides a summary of the intersection assessment undertaken.



**Wolloons Gasfield Development Areas**

Combabula / Ramyard

Woleebee

Carinya

Condabri

Talinga / Orana

Dalwogan

Kainama

Gilbert Gully

●

Town

✈

Airport

+++

Railway

—

Road

National park

State forest

- - -

Study area

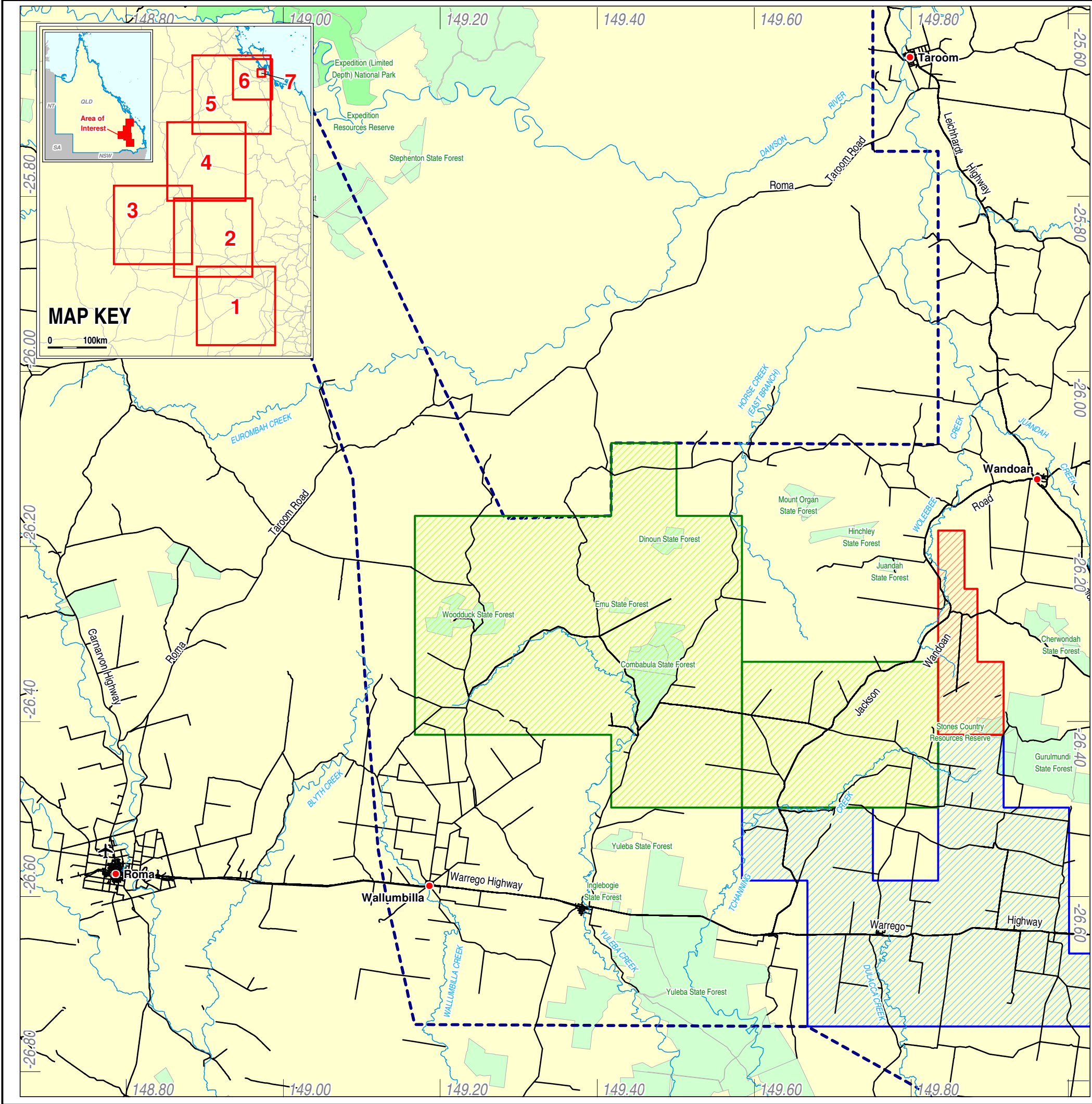
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<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 2.2 Key Roads (Map 2)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0339			Rev: 0





Wolloons Gasfield Development Areas

Combabula / Ramyard

Woleebee

Carinya

Condabri

Talinga / Orana

Dalwogan

Kainama

Gilbert Gully

Town

Airport

Railway

Road

National park

State forest

Study area

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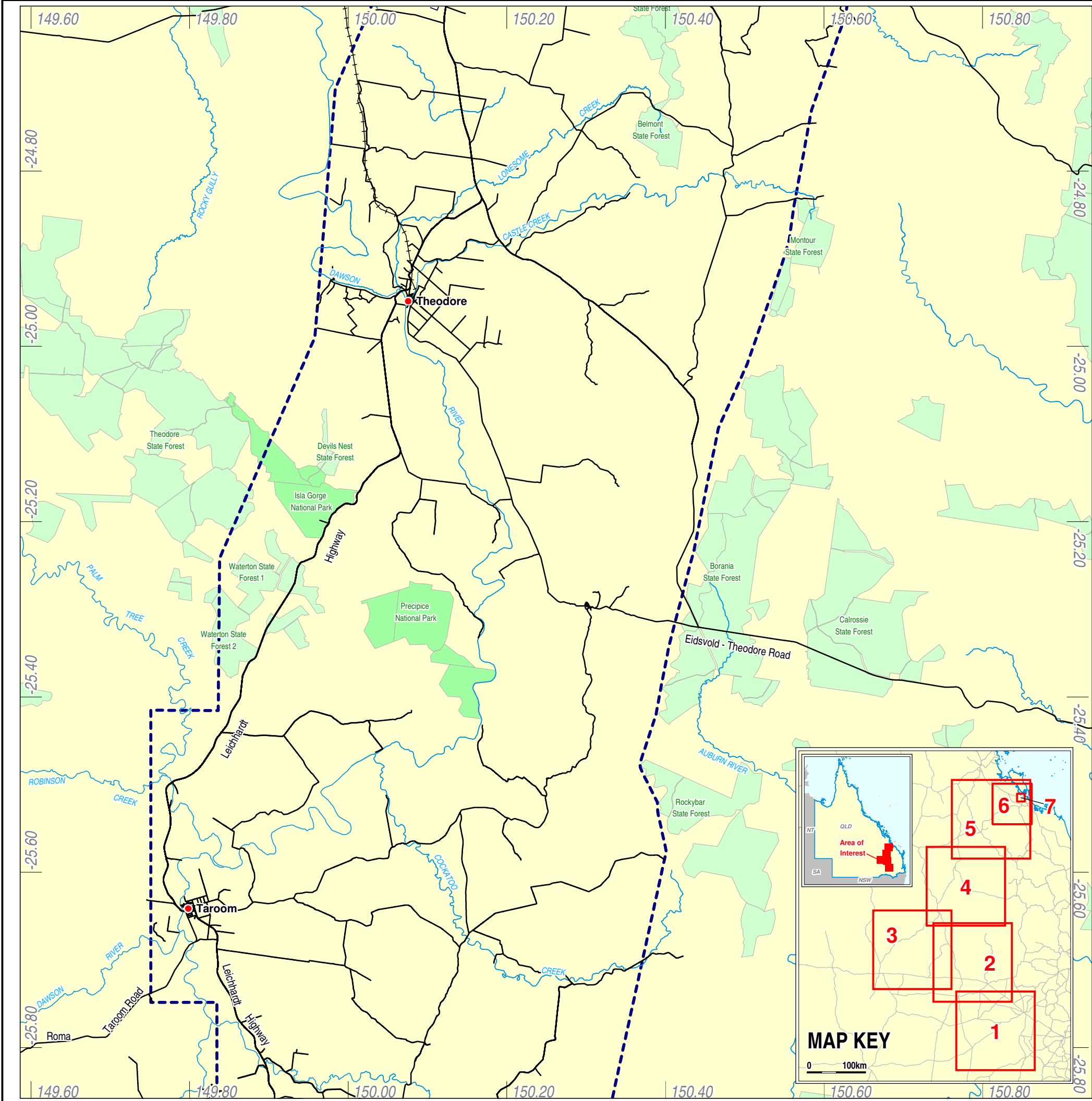
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AUSTRALIA PACIFIC LNG PTY LIMITED										
AUSTRALIA PACIFIC LNG PROJECT										
Figure 2.3 Key Roads (Map 3)										
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0340			Rev: 0				

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LEGEND

Town

Airport

Railway

Road

National park

State forest

Study area

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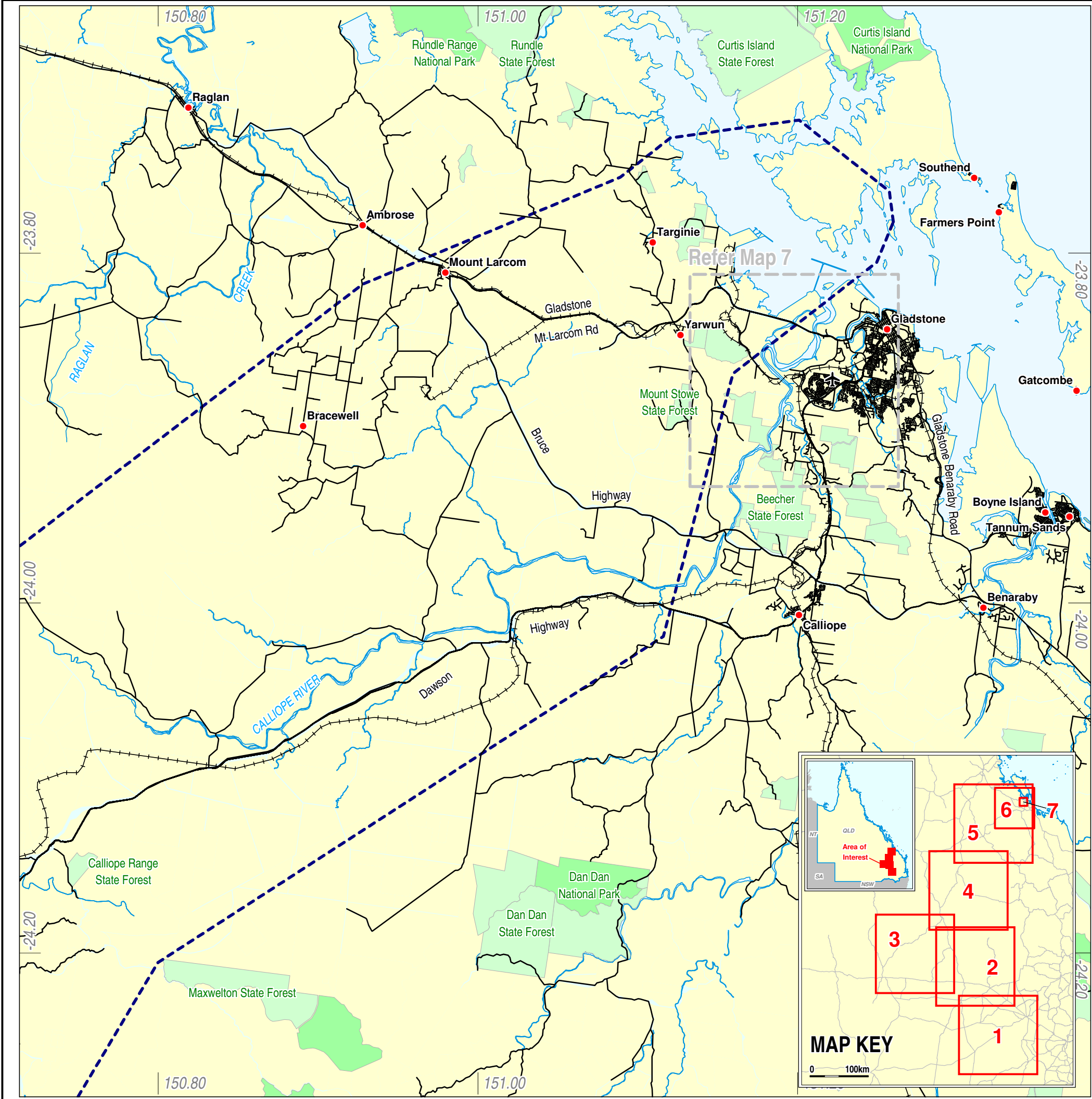
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<b>AUSTRALIA PACIFIC LNG PTY LIMITED</b>						
<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 2.4 Key Roads (Map 4)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0341			Rev: 0







**LEGEND**

Town

Airport

Railway

Road

National park

State forest

Study area

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**MAP KEY**

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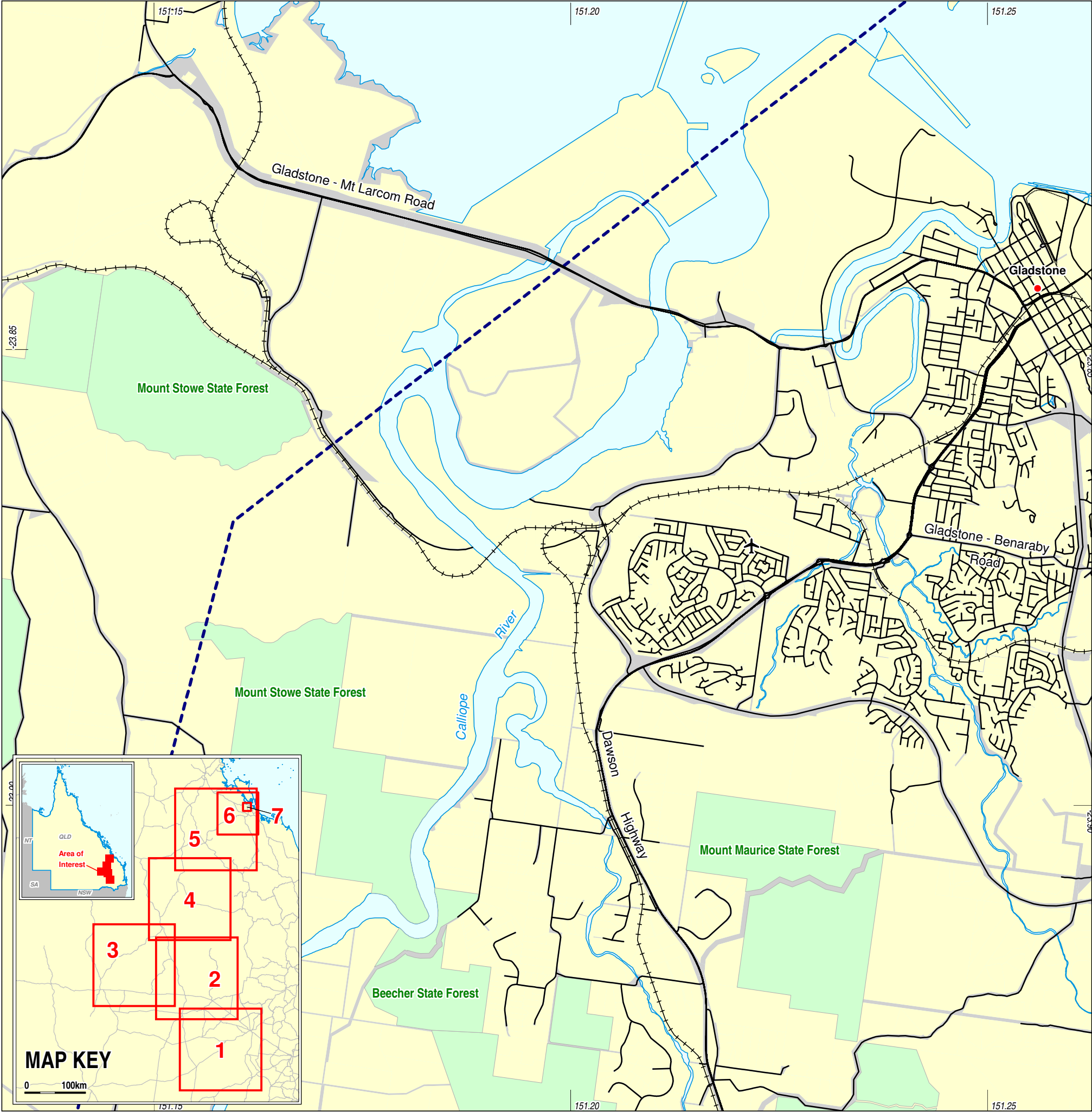
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AUSTRALIA PACIFIC LNG PTY LIMITED										
AUSTRALIA PACIFIC LNG PROJECT										
Figure 2.6 Key Roads (Map 6)										
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0343			Rev: 0				

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LEGEND

Town

Airport

Railway

Road

National park

State forest

Study area

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AUSTRALIA PACIFIC LNG PTY LIMITED									
AUSTRALIA PACIFIC LNG PROJECT									
Figure 2.7 Key Roads (Map 7)									
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0344		Rev: 0				

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**Table 2.3 Impacted roads within the Fitzroy region**

<b>Gladstone Port Access Road</b>	
The road was constructed in 2005 as a link road between Gladstone and the port facilities. It was initially identified as a project in the Gladstone Integrated Regional Transport Plan.	
Main Roads ID	183
Chainage extents (km)	Ch 0 to 0.858
Type	Urban
Surface	Asphalt
No. lanes	Two lanes – grade separated
Current AADT	2,033
Speed limit	60km/hr posted
Overtaking lanes	Nil
Capacity vehicles per day (VPD)	18,000
Haulage route	Designated haulage route for 23m and 25m B-doubles.
Intersections	No midblock intersections – grade separated.
Crash ratio (C/MVKT)	No crashes recorded.
<b>Gladstone-Mt Larcom Road</b>	
Gladstone-Mt Larcom Road is the connecting road from the Bruce Highway at Mt Larcom to Landing Road/Port Curtis Way, just outside of Gladstone at the Gladstone Port Access Road. This road is also called Glenlyon Street in parts.	
Main Roads ID	181
Chainage extents (km)	Ch 0 to 32.14
Type	Urban/rural
Surface	Asphalt/bitumen
No. lanes	Four lanes - divided
Current AADT	2,934 – 8,312
Speed limit	80-100km/hr
Overtaking lanes	Overtaking lanes for eastbound traffic provided east of the Bruce Highway and west of Mylrea Road.
Capacity (VPD)	18,000
Haulage route	Designated haulage route for 23m and 25m B-doubles.
Intersections	At-grade give-way or stop-sign controlled intersections providing access to side roads and properties.

Crash ratio (C/MVKT)	0.23-1.22
----------------------	-----------

### Bruce Highway

The Bruce Highway is an inter-regional link extending from Brisbane to Cairns. The highway is controlled by the DTMR as part of the Australian National Highway Network. The section of the Bruce Highway affected by the Project extends from Benaraby to Mount Larcom. The main function of this link is to for long distance trips and freight movements.

Main Roads ID	10E
---------------	-----

Chainage extents (km)	Ch 0 to 45.41
-----------------------	---------------

Type	Rural
------	-------

Surface	Bitumen
---------	---------

No. lanes	Two lanes - undivided
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Current AADT	3,450 – 4,556
--------------	---------------

Speed Limit	100km/hr
-------------	----------

Overtaking lanes	Regular provision of auxiliary overtaking lanes
------------------	---

Capacity (VPD)	16,000
----------------	--------

Intersections	At-grade give-way or stop-sign controlled intersections providing access to side roads and properties.
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Crash ratio (C/MVKT)	0.16–0.31
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### Dawson Highway

The Dawson Highway is a State-controlled road and part of the connection between the Central Highlands and Queensland's' central coast.

Main Roads ID	46A, 46B
---------------	----------

Chainage extents (km)	46A: Ch 0 to 119.9 (Biloela)
-----------------------	------------------------------

	46B: Ch 0 (Biloela) to 45.69 (Leichhardt Highway)
--	---

Type	46A: Ch 0 to 5.18 (Chapman Drive): urban
------	--

	46A: Ch 5.18 to 19.05 (Bruce Hwy): rural
--	--

	46A: Ch 19.05 to 119.9 (Biloela): rural
--	---

	46B: rural
--	------------

Surface	Bitumen
---------	---------

No. Lanes	46A: Ch 0 to 5.18: four lanes – divided
-----------	---

	46A: Ch 5.182 to 119.9: two lanes – undivided
--	---

	46B: two lanes - undivided
--	----------------------------

Current AADT	981-27,184
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Speed Limit	46A: Ch 0 to 19.05: 60km/hr 46A: Ch 19.05 to 119.9: 80-100km/hr with, 60km/hr in towns 46B: 80-100km/hr with, 60km/hr in towns
Overtaking lanes	46A: Ch 0 to 5.18: Kerbside parallel parking (Gladstone area) 46A: Ch 5.18 to 119.9: Overtaking lanes provided 46B: Overtaking lanes provided
Capacity (VPD)	46A: Ch 0 to 5.18: 36,000 46A: Ch 5.18 to 19.05: 16,000 46A: Ch 19.05 to 119.9: 16,000 46B: 16,000
Haulage route	Type 1 road train route
Intersections	Ch 0 to 19.05: controlled by dual lane roundabouts or signals Ch 5.18 to 119.9: at-grade give-way or stop-sign controlled intersections
Crash ratio (C/MVKT)	Ch 0 to 5.18: 0.15-1.21 Ch 5.18 to 119.9: 0.14–0.55

### **Burnett Highway**

The Burnett Highway runs north-south and meets the Leichardt Highway at Dululu and the Bruce Highway near Rockhampton and continues south of Biloela into the South Burnett region. The section of highway impacted by the proposed Project extends north from Coomanglah to Rockhampton.

Main Roads ID	41D, 41E, 41F
Chainage extents (km)	41D: Ch 41.74 to 85.53 ( Biloela) 41E: Ch 0 (Biloela) to 102.83 (Mt Morgan) 41F: Ch 0 (Mt Morgan) to 31.91 (Bruce Highway)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes - undivided
Current AADT	2619 - 3678
Speed limit	100km.hr, 60km/hr in towns
Overtaking lanes	Undocumented
Capacity (VPD)	16,000
Haulage route	Designated haulage route for 23m and 25m B-doubles
Intersections	At grade give-way or stop sign controlled intersections
Crash ratio (C/MVKT)	41D: 0.20 – 0.46

41E: 0.13 – 0.41

41F: 0.22 – 0.59

### Eidsvold-Theodore Road

Eidsvold-Theodore Road is a State-controlled road that travels from Eidsvold to Theodore. This road travels in an east/west direction from Eidsvold for approximately two thirds of the distance. From there it travels in a north/south direction to Theodore.

Main Roads ID	454
Chainage extents (km)	Ch 0 to 143.96
Type	Rural
Surface	Bitumen and unsealed sections
No. lanes	Two lanes - undivided
Current AADT	79-766
Speed Limit	100km/hr, 60km/hr in towns
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Numerous uncontrolled intersections
Crash ratio (C/MVKT)	0.34 - 0.94

### Leichhardt Highway

The Leichhardt Highway extends north from Goondiwindi on the Queensland/New South Wales border to the Capricorn Highway west of Rockhampton. This highway is a national and state funded highway.

Main Roads ID	26A, 26B, 26C
Chainage extents (km)	26A: Ch 0 (Westwood) to 256.508 (Taroom) 26B: Ch 0 (Taroom) to 127.61 (Miles) 26C: Ch 0 (Miles) to 224.14 (Goondiwindi)
Type	Rural
Surface	Bitumen
No. Lanes	Two lanes - undivided
Current AADT	654-3744
Speed Limit	100km/hr, 60km/hr in towns
Overtaking lanes	Limited
Capacity (VPD)	16,000
Haulage route	Designated haul route for type 1 road trains and 23m and 25m B-doubles.
Intersections	At grade give-way or stop-sign controlled intersections.



**Table 0.1 Results of the intersection assessment**

Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
Dawson Highway/Dawson Road/Breslin Street	Three-way signalised	<p>The existing intersection will operate within capacity for the full planning horizon under background traffic only.</p> <p>The Project's traffic will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>	<p>The cumulative traffic from the regionally-significant projects will have a negligible impact on the operation of the existing intersection and the intersection will operate within capacity for the full planning horizon.</p>
Dawson Highway/Blain Drive/Herbertson Street	Four-way, two-lane roundabout	<p>The existing intersection will operate within capacity to 2021 under background traffic only.</p> <p>The Project's traffic will have an impact on the operation of the existing intersection resulting in the capacity being reached during the first peak construction year of 2013.</p> <p>Alteration works recommended for the intersection include:</p> <ul style="list-style-type: none"> <li>• Addition of a free left turn lane on the Dawson Highway (South) approach.</li> <li>• Extension of the short right turn lane on the Blain Drive approach.</li> <li>• Conversion of the through/right lane on the Blain Drive approach to a left/through/right lane.</li> </ul> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner, provided that the roundabout is signalised.</p> <p>Australia Pacific LNG will work with State and Local government and industry with respect to potential alterations required to meet the increased demands from regionally-significant projects.</p> <p>It is noted that DTMR has previously conditioned the Gladstone Pacific Nickel development to contribute to the cost of signalisation of the roundabout.</p>
Dawson Highway/Philip Street/Shopping Centre	Four-way, two-lane	<p>The existing intersection currently falls during the PM peak hour. It is noted that the roundabout would be expected to operate at a higher level as three legs of</p>	<p>The alteration works described opposite will ensure that the cumulative impacts of</p>

Crash ratio (C/MVKT)	26A: 0.1 – 0.47
	26B: 0.15 – 0.17
	26C: 0.16 – 0.38

#### Roma-Taroom Road

The Roma-Taroom Road links between Roma on the Carnarvon Highway north-east to Taroom on the Leichardt Highway. The road is currently being altered as part of the RIP.

Main Roads ID	4397
Chainage extents (km)	Ch 0 (Roma) to 149.42
Type	Rural
Surface	Bitumen and unsealed sections
No. Lanes	Two lanes
Current AADT	53-228
Speed Limit	100km/hr
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Many uncontrolled
Crash ratio (C/MVKT)	0.14–1.42

**Table 2.4 Impacted roads within the Darling Downs region**

#### Warrego Highway

The Warrego Highway is a State-controlled road extending west from Ipswich through Toowoomba, Dalby, Miles and Roma and terminating in Charleville at the Mitchell Highway. The section of highway in the study area extends from Dalby to Roma. This highway is a national and state funded highway.

Main Roads ID	18C, 18D
Chainage extents (km)	18C: Ch 0 (Dalby) to 126.745 (Miles)
	18D: Ch 0 (Miles) to 141.267 (Roma)
Type	Rural
Surface	Bitumen
No. lanes	Two - undivided
Current AADT	1225 - 3095
Speed limit	110km/hr, 60km/hr in towns
Overtaking lanes	Periodic
Capacity (VPD)	16,000

Intersections	At grade intersections with acceleration/deceleration lanes and wide median refuge areas for turning vehicles.
Crash ratio (C/MVKT)	18C: 1,999 – 7,191
	18D: 1,225 – 3,095

### Dalby-Kogan Road

Dalby-Kogan Road is a state controlled road travelling east/west from Dalby to Kogan

Main Roads ID	340
Chainage extents (km)	Ch 0 (Dalby) to 47.682 (Kogan)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes - undivided
Current AADT	378 - 619
Speed limit	100km/hr
Overtaking lanes	Limited
Capacity (VPD)	16,000
Haulage route	Road train haul route up to 36m.
Intersections	Uncontrolled
Crash ratio (C/MVKT)	0.04 – 0.36

### Chinchilla-Tara Road

The Chinchilla–Tara road travels north/south between Chinchilla and Tara. There is a heavy vehicle bypass heading down the Chinchilla-Tara Road at the airport near Chinchilla.

Main Roads ID	341
Chainage extents (km)	Ch 0 (Chinchilla) to 69.72 (Tara)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes - undivided
Current AADT	415–1,552
Speed limit	100km/hr
Overtaking lanes	Limited
Shoulders	Unsealed
Capacity (VPD)	16,000
Intersections	Undocumented



Crash ratio (C/MVKT)	0.19–0.99
----------------------	-----------

### Kogan-Condamine Road

Kogan-Condamine Road is a State-controlled road travelling east/west from Kogan to Condamine. A school zone means the speed drops from 60km/h to 40km/h during school hours at this particular location.

Main Roads ID	342
Chainage extents (km)	Ch 0 (Kogan) to 71.41 (Condamine)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes - undivided
Current AADT	192 - 461
Speed limit	100km/hr, 60km/hr in towns
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	0.44

### Tara-Kogan Road

Tara-Kogan Road is a State-controlled road travelling east/west from Tara to Kogan.

Main Roads ID	3402
Chainage extents (km)	Ch 0 (Tara) to 43.03 (Kogan)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes
Trafficable width	8m
Current AADT	151 - 367
Speed limit	100km/hr
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	0.38–0.44

### Warra-Kogan Road

The Warra-Kogan Road links between Warra on the Warrego Highway to Kogan on the Kogan-Condamine Road

Main Roads ID	3403
---------------	------

Chainage extents (km)	Ch 0 (Warra) to 22.86
Type	Rural
Surface	Bitumen
No. lanes	Two lanes
Trafficable width	8m
Current AADT	47
Speed Limit	100km/hr
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	2.04

#### Jackson-Wandoan Road

The Jackson-Wandoan Road links between Jackson on the Warrego Highway north-east to Wandoan on the Leichardt Highway. The Jackson-Wandoan Road is characterised by sharp horizontal curves, crests and single lane waterway crossings. It is likely to be effected by flooding.

Main Roads ID	4302
Chainage extents (km)	Ch 0 (Jackson) to 81.1 (Wandoan)
Type	Rural
Surface	Bitumen
No. lanes	Two lanes
Current AADT	68 - 148
Speed limit	100km/hr
Overtaking lanes	Limited
Shoulders	Unsealed
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	0.37–0.38

#### Moonie Highway

The Moonie Highway runs from Dalby to St George. The section within the study area extends from Dalby to the Surat Developmental Road.

Main Roads ID	35A
Chainage extents (km)	Ch 0 (Dalby) to 50.37
Type	rural

Surface	sealed
No. Lanes	two lanes
Current AADT	1,420 – 6,543
Speed Limit	100km/hr
Overtaking lanes	limited
Shoulders	Sealed and unsealed
Capacity (VPD)	16,000
Intersections	at grade intersections and accesses
Crash ratio (C/MVKT)	0.21 – 0.36

#### Surat Developmental Road

The Surat Developmental Road connects Surat with Dalby. The section within the study area extends from the Leichhardt Highway to the Moonie Highway.

Main Roads ID	86A, 86B
Chainage extents (km)	86A: Ch 119.3 (Leichhardt Highway) to 147.86 (Tara) 86B: Ch 0 (Tara) to 40.39 (Moonie Highway)
Type	rural
Surface	bitumen
No. Lanes	two lanes
Current AADT	86A: 289 – 2,462 86B: 613 – 2,076
Speed Limit	100km/hr
Overtaking lanes	limited
Capacity (VPD)	16,000
Intersections	undocumented
Crash ratio (C/MVKT)	86A: 0.08 – 2.50 86B: 0.18

#### Dalby-Cecil Plains Road

The Dalby-Cecil Plains Road links Dalby on the Warrego Highway south to Cecil Plains where it becomes the Millmerran-Cecil Plains Road.

Main Roads ID	325
Chainage extents (km)	Ch 0 (Dalby) to 39.08
Type	rural

Surface	bitumen
No. Lanes	two lanes
Current AADT	470
Speed Limit	100km/hr
Overtaking lanes	limited
Capacity (VPD)	16,000
Intersections	undocumented
Crash ratio (C/MVKT)	0.15

#### Millmerran-Cecil Plains Road

The Millmerran-Cecil Plains Road links Millmerran on the Gore Highway north to Cecil Plains where it becomes the Dalby-Cecil Plains Road

Main Roads ID	3251
Chainage extents (km)	Ch 0 (Millmerran) to 45.61 (Cecil Plains)
Type	Rural
Surface	Bitumen
No. Lanes	two lanes
Current AADT	122
Speed Limit	100km/hr
Overtaking lanes	limited
Shoulders	unsealed
Capacity (VPD)	16,000
Intersections	undocumented
Crash ratio (C/MVKT)	0.78

#### Gore Highway

The Gore Highway runs from Goondiwindi to Toowoomba. This highway is part of the National Highway's Melbourne-Brisbane link. The section within the study area is from Toowoomba to Millmerran

Main Roads ID	28A
Chainage extents (km)	Ch 0 (Toowoomba) to 79.54 (Millmerran)
Type	Rural
Surface	Bitumen
No. Lanes	two lanes
Current AADT	2,249 – 19,574

Speed Limit	100km/hr, 60km/hr in towns and urban areas
Overtaking lanes	Limited
Shoulders	Sealed and unsealed
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	0.18 – 1.56

**Table 2.5 Impacted roads within the South West Region**

<b>Carnarvon Highway</b>	
The Carnarvon Highway is the main access to Carnarvon Gorge. It starts in Garah then heads west to the New South Wales border at Mungindi. From here, it runs in a north/south direction through Roma to the Dawson Highway at Rolleston	
Main Roads ID	24D
Chainage extents (km)	Ch 0 (Roma) to 17.57 (Roma – Taroom Road)
Type	Rural
Surface	Bitumen
No. Lanes	two lanes
Current AADT	1,088 – 1,788
Speed Limit	100km/hr
Overtaking lanes	Limited
Capacity (VPD)	16,000
Intersections	Undocumented
Crash ratio (C/MVKT)	0.03 – 1.83

## 2.3.2 Local Government controlled roads

### 2.3.3 Banana Regional Council

Information on local roads in the Banana Regional Council area was obtained from site inspection and relevant GIS databases. Local roads impacted by the Project are described in Table 2.6. Roads in the Banana Regional Council area will be impacted by the Project of the main gas pipeline.

It is noted that no traffic data has been obtained for local government roads in the Banana Regional Council area, however based on the volumes on the adjacent state controlled roads and site observations it is expected that the existing AADT volumes on the local government roads are less than 150 vehicles per day.



**Table 2.6 Banana Regional Council roads**

Road Name	Trafficable Width (m)	Surface	Type	Connecting main roads
Argoon – Kilburnie Road	6.3	Sealed	Rural	Dawson Highway
Aerodrome Road	5	Sealed	Urban	Chinchilla Tara Road
Crowsdale Camboon Road	5 – 6	Sealed and Unsealed	Rural	Dawson Highway
Defence Road	5 - 7	Sealed and Unsealed	Rural	Leichhardt Highway
Des Burton Drive	5	Sealed	Urban	N/A
Nicholson Street	10	Unsealed	Urban	N/A
Ponty Pool Road	8	Unsealed	Rural	Bungaban Road
Winston Street	10	Sealed	Urban	Burnett Highway

### ***Western Downs Regional Council***

Information on local roads in the Western Downs Regional Council was obtained from site inspection and relevant GIS databases. Local roads impacted by the Project are described in Table 2.7. Roads in the Western Downs Regional Council area will be impacted during construction of the gas field infrastructure and the construction of the main pipeline.

It is noted that no traffic data has been obtained for local government roads in the Western Downs Regional Council area, however based on the volumes on the adjacent state controlled roads and site observations, it is expected that the existing AADT volumes on the local government roads are less than 150 vehicles per day.

**Table 2.7 Western Downs Regional Council roads**

Road Name	Trafficable Width (m)	Surface	Type	Connecting main roads
Avenue Rd	4	Sealed	Urban	Chinchilla Tara Road
Bells Rd	7	Unsealed	Rural	Warrego Highway
Colsons Rd	7	Unsealed	Rural	Warrego Highway
Elerslea Ln East	6	Unsealed	Rural	Leichhardt Highway
Giligulgul Rd	5 - 6	Sealed and Unsealed	Rural	Leichhardt Highway and Jackson-Wandoan Road
Gunbarwood Rd	5	Unsealed	Rural	N/A
Homebush Rd	7	Unsealed	Rural	Warrego Highway
Kerr's Rd	5	Unsealed	Rural	Tara-Kogan Road
Mclennans Rd	7	Unsealed	Rural	Leichhardt Highway

Road Name	Trafficable Width (m)	Surface	Type	Connecting main roads
Wallan Creek Rd	5 - 6	Sealed	Rural	Warrego Highway
Bungaban Rd	6	Sealed	Rural	Leichhardt Highway
L Tree Creek Rd	8	Unsealed	Rural	Leichhardt Highway
Ponty Pool Rd	5 - 8	Sealed and Unsealed	Rural	N/A
Roche Creek Rd	6	Sealed	Rural	N/A
Welsh's Rd	7	Unsealed	Rural	Leichhardt Highway
Windeyer Rd	6	Sealed and unsealed	Rural	Leichhardt Highway

### **Maranoa Regional Council**

Information on local roads in the Maranoa Regional Council area was obtained from site inspection and relevant GIS databases. Local roads impacted by the Project are described in Table 2.8. Roads in the Maranoa Regional Council area will be impacted during construction of the gas field infrastructure.

It is noted that no traffic data has been obtained for local government roads in the Maranoa Regional Council area, however based on the volumes on the adjacent state controlled roads and site observations, it is expected that the existing AADT volumes on the local government roads are less than 150 vehicles per day.

**Table 2.8 Maranoa Regional Council roads**

Road Name	Trafficable Width (m)	Surface	Type	Connecting main roads
Bogandilla West Road	6	Unsealed	Rural	Jackson-Wandoan Road
Cattle Creek Road	4	Sealed	Rural	N/A
Crossroads Road	6	Unsealed	Rural	Jackson - Wandoan Road
Horse Creek Road	4 - 6	Sealed and Unsealed	Rural	N/A
Seaside Road	4 - 6	Unsealed	Rural	N/A
Wallumbilla North Road	4	Sealed	Rural	N/A
Yuleba Taroom Road	4	Sealed	Rural	Warrego Highway

### **Gladstone Regional Council**

The Narrows Road, Blain Drive and Landing Road are local roads in Gladstone affected by the Project. The Narrows Road is mainly unsealed, has a trafficable width of 8m and is located in a rural area. The connecting main road is the Bruce Highway. This road is impacted by the construction of the gas pipeline.

Blain Drive is a Council-controlled sub-arterial road which connects Hanson Road and the Dawson Highway. It is a two-lane undivided urban road with a 60 to 70 km/hr posted speed limit. Landing Road is a Council-controlled road and is a two lane rural road. The speed limit is generally 100km/hr reducing to 80km/hr in sections. Both these roads are impacted by the LNG facility construction and operation traffic.

#### **2.3.4 Bridges**

Bridges potentially impacted by the development along roads used by Project traffic were identified and assessed. The assessment was based upon information sourced from the DTMR database and site inspections of the haul routes. The assessment included consideration of the potential loads to the bridges due to Project traffic as well as physical constraints such as the height and width of the bridges. Data was only available for bridges located on the State-controlled road network.

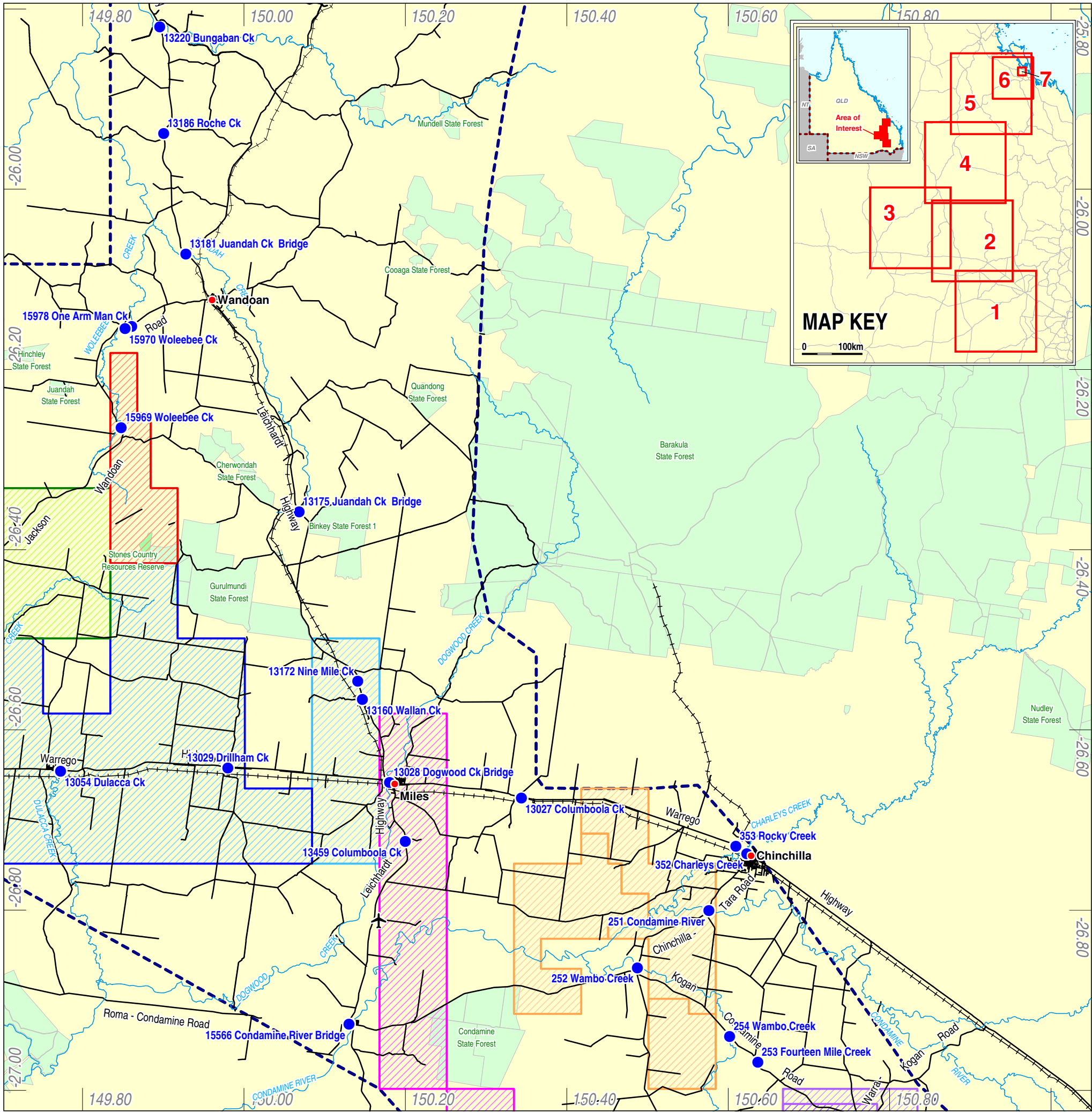
These bridges have been recorded and mapped, and are shown in Figure 2.8 to Figure 2.14.



Intersection	Current layout	Proposed mitigation treatment	
		Australia Pacific LNG Project	Cumulative
	roundabout	<p>the roundabout are metered during the peak hour periods.</p> <p>The Project's traffic will have a worsening effect on the intersection's performance, particularly during the peak construction years of 2013 and 2019.</p> <p>Alteration works recommended for the intersection include:</p> <ul style="list-style-type: none"> <li>• Signalisation of the intersection.</li> <li>• Provision of three stand-up lanes on each of the Dawson Road approaches consistent with the planned mid block alteration to a six-lane road.</li> <li>• Free left turn lane on all approaches.</li> <li>• Right turn lanes on all approaches.</li> </ul> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>	<p>all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>
Dawson Highway/Penda Avenue	Two-lane roundabout	<p>The existing intersection will operate within capacity to 2013 under background traffic only.</p> <p>The Project's traffic will have a minor impact on the operation of the existing intersection and will result in bringing forward the need for the alteration earlier to 2012.</p> <p>The alteration works recommended for the intersection include:</p> <ul style="list-style-type: none"> <li>• Signalisation of the intersection</li> <li>• Provision of three stand-up lanes on each of the Dawson Highway approaches, consistent with the planned mid block alteration to six lanes.</li> <li>• Dual right turn lanes into Penda Avenue.</li> </ul>	<p>The alteration works described adjacent will ensure that the cumulative impacts of all LNG projects and other regionally-significant projects are mitigated in a satisfactory manner.</p> <p>Australia Pacific LNG will work with the Federal, State, Local Government and industry in regard to the potential alterations to meet the increased demands on the intersection.</p>







### LEGEND

#### Walloons Gasfield Development Areas

- Combabula / Ramyard
- Woleebee
- Carinya
- Condabri
- Talinga / Orana
- Dalwogan
- Kainama
- Gilbert Gully

- Town
- Bridge
- Airport
- Railway
- Road
- National park
- State forest
- Study area

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01020km

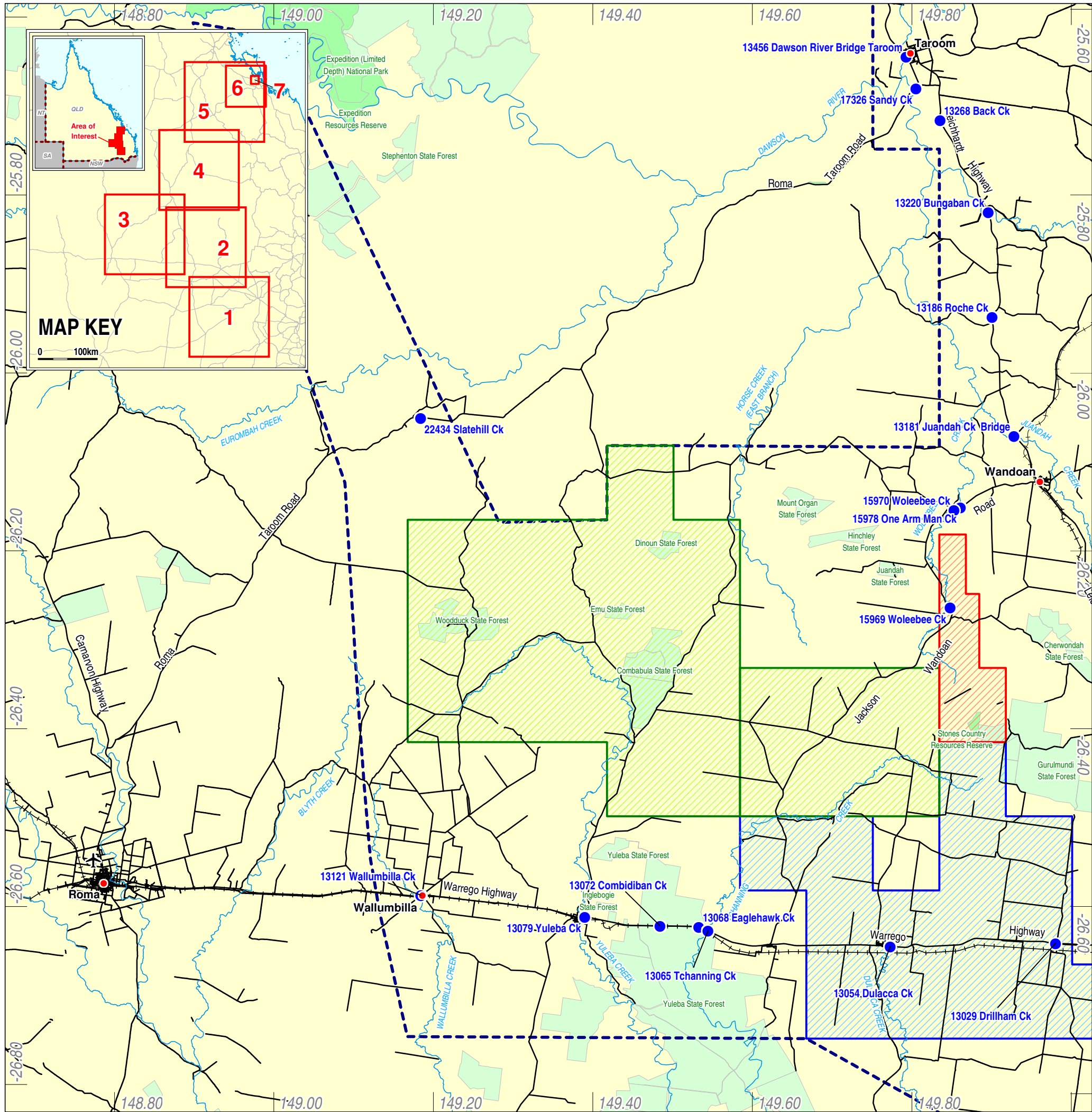
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Latitude / Longitude

Geocentric Datum of Australia 1994



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Project No: 301001-00448			Figure: 00448-00-EN-DAL-0353			Rev: 0



## LEGEND

### Walloons Gasfield Development Areas

- Combabula / Ramyard
- Woleebee
- Carinya
- Condabri
- Talinga / Orana
- Dalwogan
- Kainama
- Gilbert Gully

- Town
- Bridge
- Airport
- Railway
- Road
- National park
- State forest
- Study area

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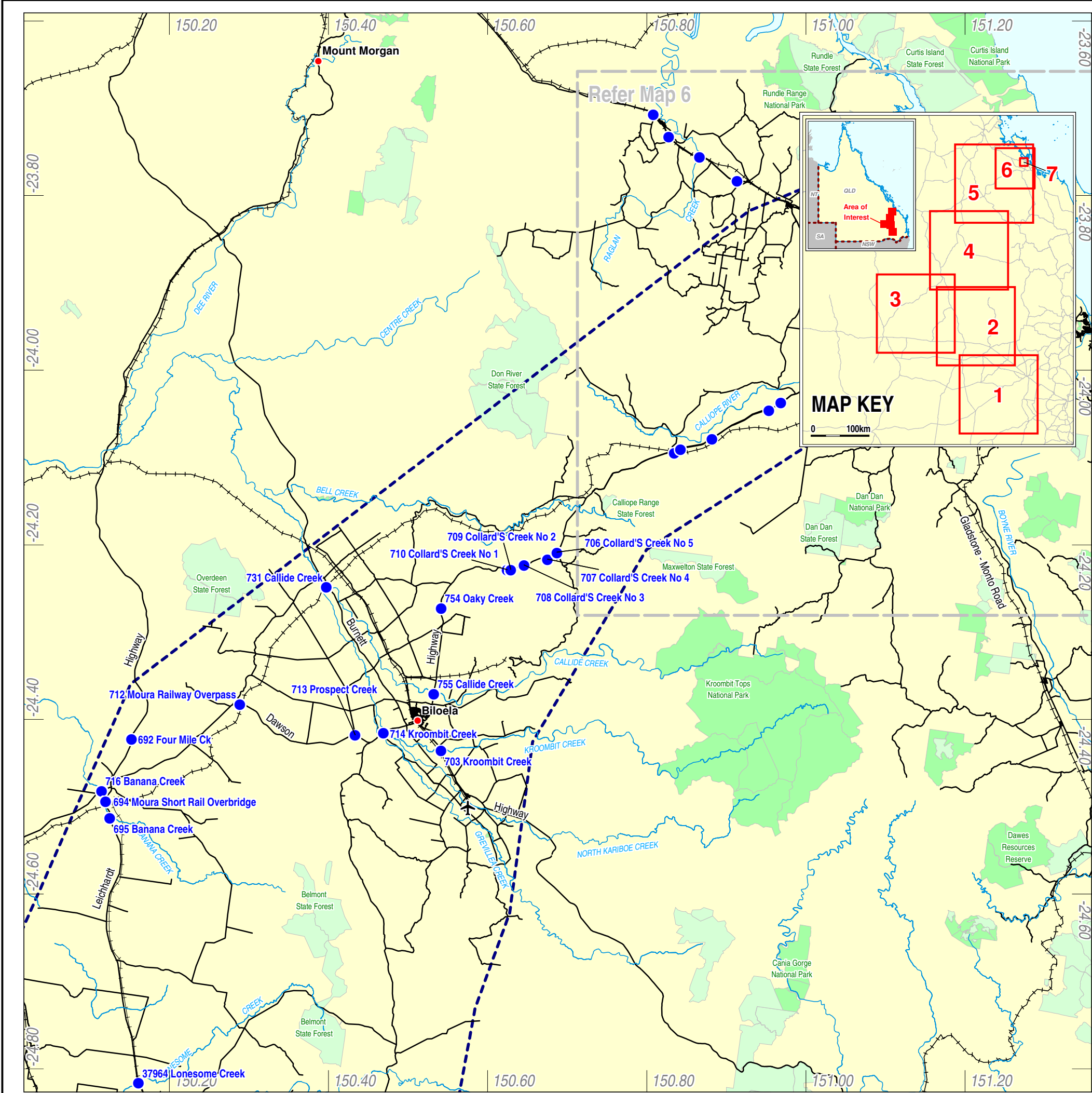
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<b>AUSTRALIA PACIFIC LNG PROJECT</b>						
<b>Figure 2.10 Bridge Locations (Map 3)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0354			Rev: 0







Town

Bridge

Airport

Railway

Road

National park

State forest

Study area

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Latitude / Longitude

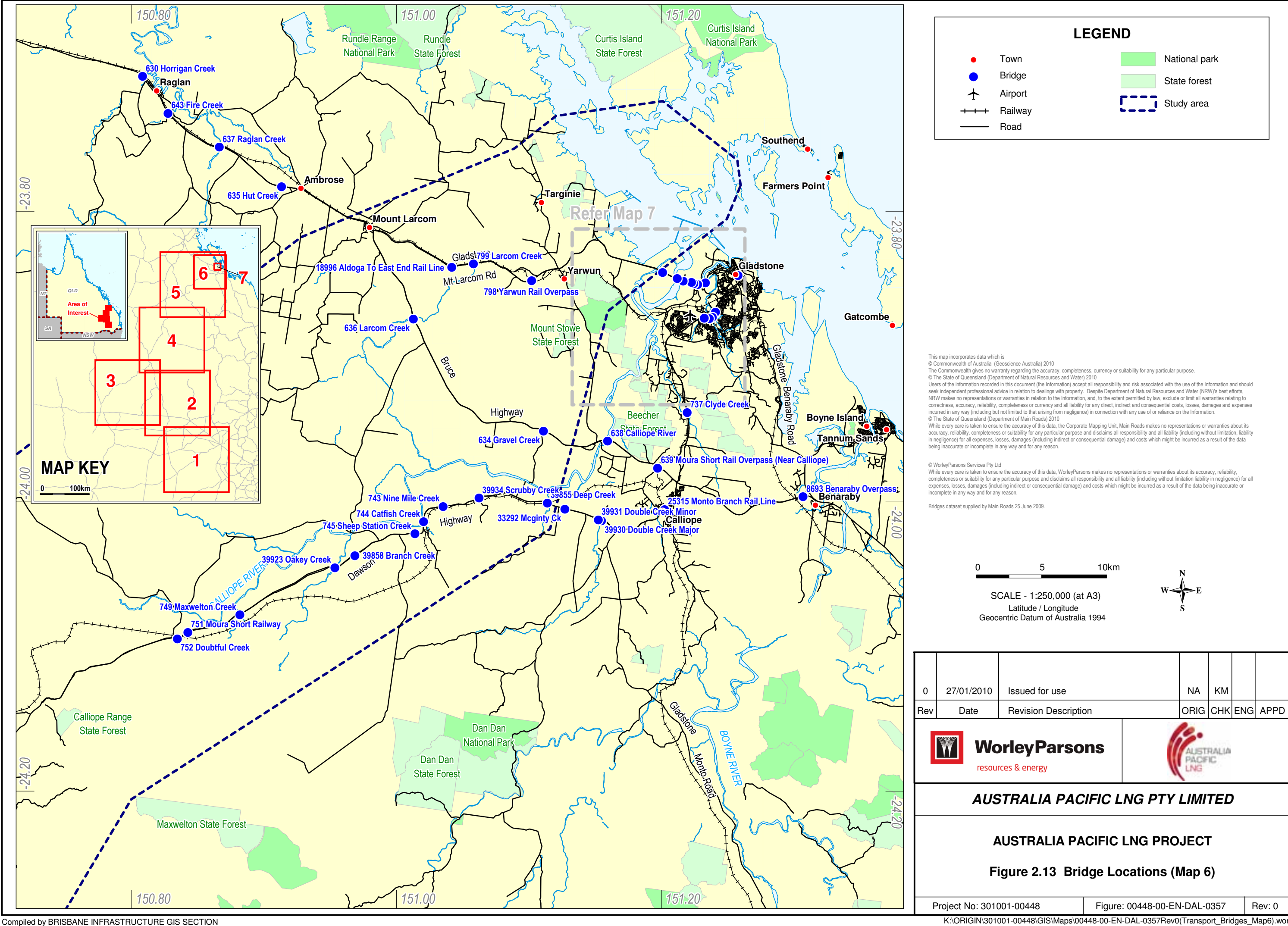
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AUSTRALIA PACIFIC LNG PROJECT										
Figure 2.12 Bridge Locations (Map 5)										
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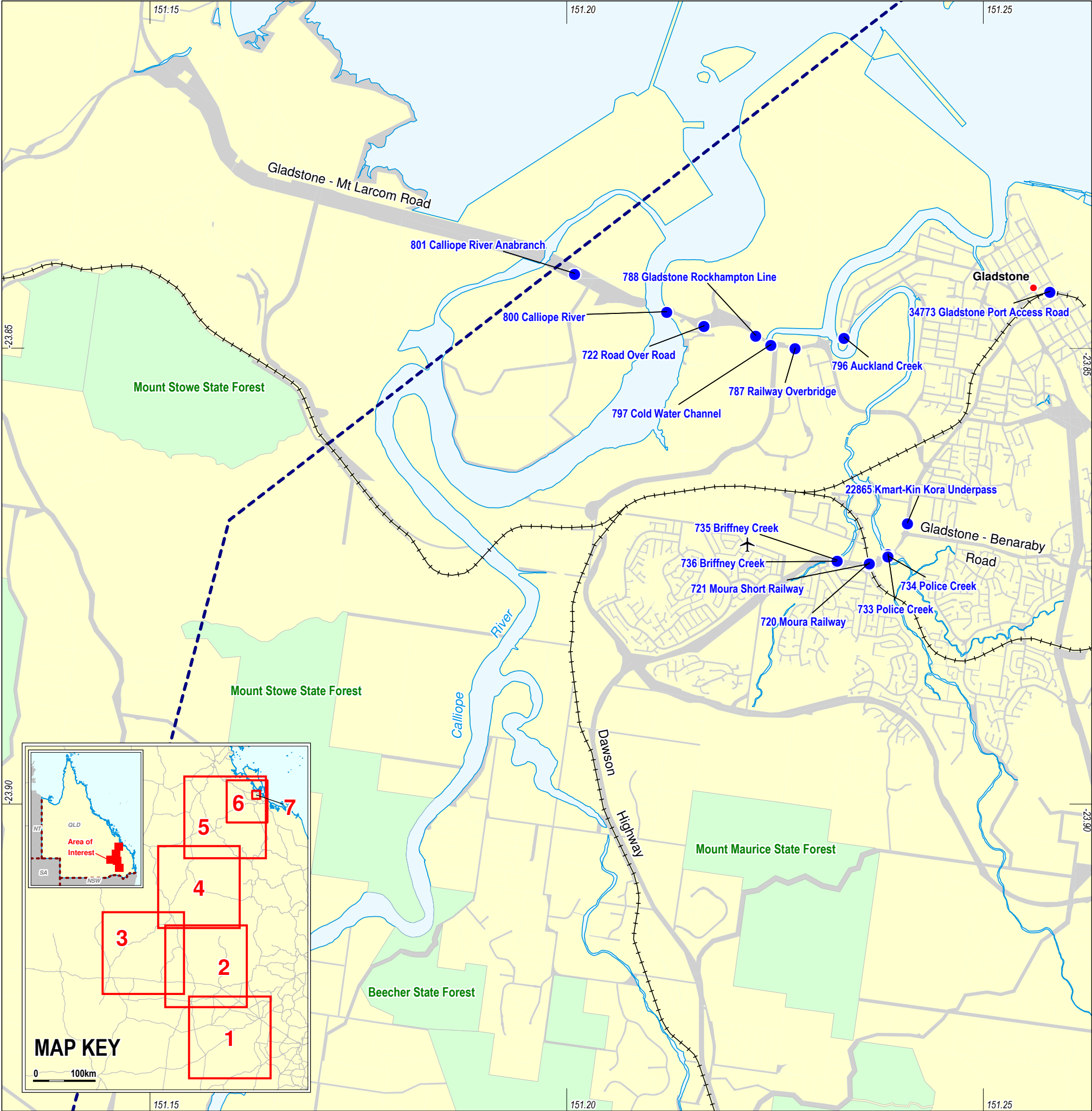
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LEGEND

Town

Bridge

Airport

Railway

Road

National park

State forest

Study area

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012km

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Latitude / Longitude

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<b>Figure 2.14 Bridge Locations (Map 7)</b>						
Project No: 301001-00448			Figure: 00448-00-EN-DAL-0358			Rev: 0

## ***Bridges of concern***

### **Fitzroy Region**

There are two bridges of note in the Fitzroy Region in Gladstone that pass over the proposed transport route from the Port of Gladstone. These are the Goondoon Street overpass on the Gladstone Port Access Road, and the rail overpass on Glenlyon Road.

The Gladstone Port Access Road travels under a narrow low bridge (Goondoon Street) which has a 5.1m clearance. This is shown in Figure 2.15. Any vehicles exceeding the 5.1m clearance on the Gladstone Port Access Road will need to utilise an alternative route, for instance Hopper Road.



**Figure 2.15 Goondoon Street, low clearance bridge**

Glenlyon Road is crossed by a low railway bridge with 4.7m clearance which is encountered after turning left out of the Gladstone Port Access Road. This is shown in Figure 2.16.

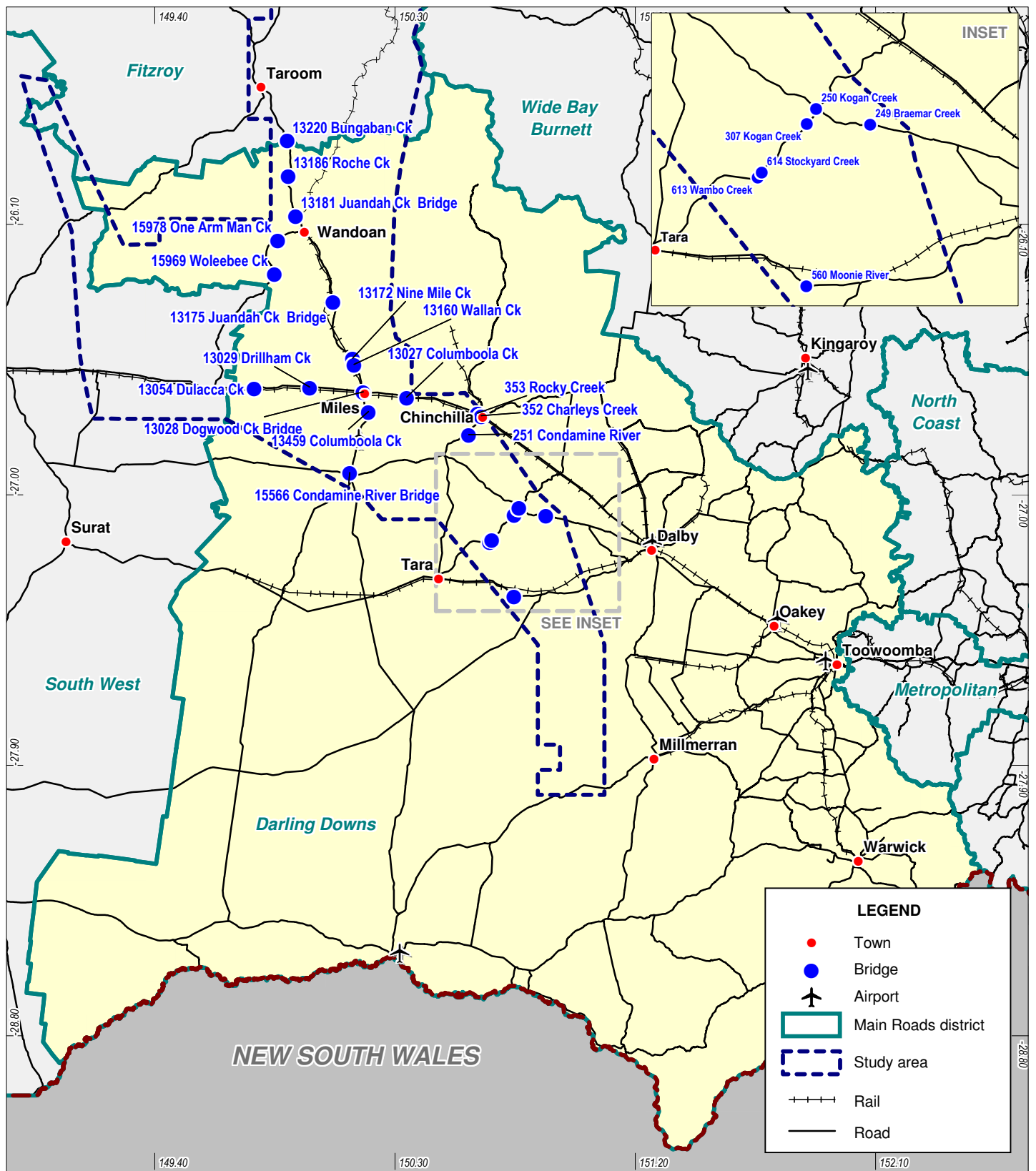
Vehicles more than 4.7m in height will need to access the port from the north, along Hanson Road



**Figure 2.16 Glenlyon Road, railway bridge**

### **Darling Downs Region**

There are five bridges identified on state controlled roads within the Darling Downs Region which are either load limited or in poor condition. Bridges in the Darling Downs Region are shown in Figure 2.17.



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Scale 1: 2,000,000 (at A4)

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**Figure 2.17 Darling Downs bridges**

Project No: 301001-00448

Figure: 00448-00-EN-DAL-0360

Rev: 0

The vehicle restrictions provided by the DTMR for these bridges are given in Table 2.9 below.

**Table 2.9 Darling Downs Region bridge parameters**

Bridge ID	Road		Structure / Location	Type	Restriction
	No.	Name / T Dist			Restriction
13028	18D	Warrego Highway (Miles – Roma)  T Dist: 0.705	Dogwood Creek Bridge	Mass	<p>The following load restrictions apply to this bridge:</p> <ul style="list-style-type: none"> <li>Heavy load platforms shall have a maximum permissible configuration of 10 axles per platform. All platforms crossing this structure must have a minimum axle spacing of 1.8m centres, must not carry more than 10 tonne per axle and must travel at 10 km/h on the bridge centreline.</li> <li>All mobile cranes within the mass limits specified in the Vehicle Limits Manual must cross the bridge strictly in the left hand lane, with no other heavy vehicles permitted on the same span of the bridge as the crane. All mobile cranes exceeding the mass limits specified in the Vehicle Limits Manual must be submitted to Bridge Asset Management for special assessment.</li> <li>With regards to the issue of period and single trip permits for all other vehicle types, the bridge should be treated as a 'B' class structure (Single trips permits are permissible for vehicles running at Period Permit mass limits).</li> </ul> <p>Alternative Route; d) Any movements that were previously approved by the Western Downs Regional Council will be allowed to travel on the South Dulacca Road – NO new approvals will be given as of the 22/10/2008.</p>
15566	26C / 342	Leichardt Highway (Miles – Goondiwindi)  T Dist: 32.31  Kogan-Condamine Road	Condamine River Bridge (Crawford Bridge) – 100m west of Condamine	Mass	<p>13 tonnes Per single axle.</p> <p>Heavy Load Platforms crossing this bridge at Condamine are restricted to 13t per axle line, regardless of axle spacing.</p>
15970	4302	Jackson-	Wooleebee	Mass	Wooleebee Creek Bridge is CLOSED to vehicles