# 13 TRANSPORT

This chapter addresses the potential interactions and impacts on transport networks from the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project.

The transport strategy of the Project has not been finalised but is expected to include shipping, road and potentially rail. Large items such as 1,050 mm-diameter pipes and compressor units are expected to be sourced from overseas, entering Australia through Brisbane or Gladstone.

From this point the material will be transported to site by road, rail or a combination of both. The use of rail would be a safety and commercial decision and would minimise impacts on the road network. To identify the worst-case impacts to the road network it has been assumed at this time that all land transport will be by road.

The key interactions of the Export, Lateral and Collection Header pipelines, which collectively comprise the Pipeline Component, with transport networks will be during the construction phase of the Project. These interactions will include:

- construction works within the road or rail reserve
- the use of the road or rail network for transporting construction materials and equipment.

This chapter focuses on the transport of construction materials and equipment and the proposed mitigation measures associated with transport for the Pipeline. The cumulative impacts of Pipeline Component and Gas Field Component transport are addressed in *Volume 4 Section 17.1.12.*

## 13.1 PROJECT ENVIRONMENTAL OBJECTIVE

The Project's environmental objective for transport is to ensure that use of roads, rail and other transport infrastructure does not impact on ecological health, public amenity or safety of those who use or are in proximity to transport infrastructure.

## 13.2 TERMINOLOGY & APPROACH

In this section the following terminology has been used:

- trucks – the number of truckloads required to transport materials and equipment
- trips – one trip is the movement of a vehicle from its origin to its destination. The return movement is counted as a separate trip. Thus, one truckload normally equates to two trips.

A preliminary road impact assessment has been carried out for the pipelines and is provided in *Appendix 4.4.*

In assessing on which roads the Project may potentially impact, four scenarios for entry points of the large-diameter pipe into Australia were considered and are described below:

- all pipe through Gladstone
- 50 per cent of pipe through Gladstone and 50 per cent through Bundaberg
- 40 per cent of pipe through Gladstone, 30 per cent through Bundaberg and 30 per cent through Brisbane
- 50 per cent of pipe through Gladstone and 50 per cent through Brisbane.

Bundaberg as a port of entry was not preferred because of a potential increase in road haulage hours, which was considered a safety risk.

Preliminary assessment of Brisbane as a port of entry identified potentially unacceptable increases in traffic loads through Toowoomba, and was not pursued as part of the preliminary road impact assessment for the pipelines. However, studies carried out for the LNG Facility traffic concluded that importing at least a portion of the pipe through Brisbane could minimise impacts to the road network within Gladstone (refer to *Volume 5, Chapter 14*). Thus, the option of importing pipe through Brisbane is still under consideration. QGC believes that mitigation measures can minimise the impacts through Toowoomba (refer to *Section 13.5.7*).

## 13.3 METHODOLOGY

A base case assumed all materials would be transported by road. This was adopted on the grounds that it would create the greatest impact on the road network, enabling key impact areas to be identified and mitigation strategies to be assessed.

Potential vehicle numbers were calculated to cover transport of pipe, mobilisation and demobilisation of plant, equipment and camps and construction worker movements.

The impact on the state-controlled network for the duration of construction for the pipelines was then assessed in accordance with Queensland Department of Transport and Main Roads (DTMR) Guidelines for Assessment of Road Impacts of Development (2006). This included a preliminary pavement impact assessment, link analysis, intersection analysis, safety review and environmental review.

Once this impact assessment was conducted, the EIS risk assessment methodology as described in *Volume 1, Chapter 3* was applied.

The distribution of the traffic generated on the local government-controlled network has not been assessed at this early stage because routes on this

network have not been fully determined. Roads that may be affected have been considered but will not be confirmed until a transport contractor is appointed prior to construction.

Identification of affected roads gives councils an indication of areas potentially impacted by the Project. The majority of the local government-controlled network that is likely to be affected is unsealed and the rate of deterioration under Project traffic is not predictable to any degree of accuracy. The condition of affected roads prior to Project traffic using particular roads and assessment of impacts on this road network will be agreed between QGC and the relevant authority (refer to *Section 13.5.8*).

## 13.4 EXISTING ENVIRONMENT

The Project pipelines lie approximately between Miles and Gladstone (Export and Lateral Pipelines) and Wandoan and Chinchilla (Collection Header).

Transport activities associated with pipeline construction have the potential to:

- impact on pest and disease strategies within the areas of activity
- generate dust that may impair visibility within the road reserve
- remove remnant vegetation within the road reserve
- damage the road pavement
- increase traffic flows within the road network.

The potential to impact on pest and diseases affects all Pipeline areas both on private and public lands and in transport corridors. The presence of pest species and managing construction activities to prevent the spread of pest species and disease have been addressed in *Volume 4, Chapter 7.*

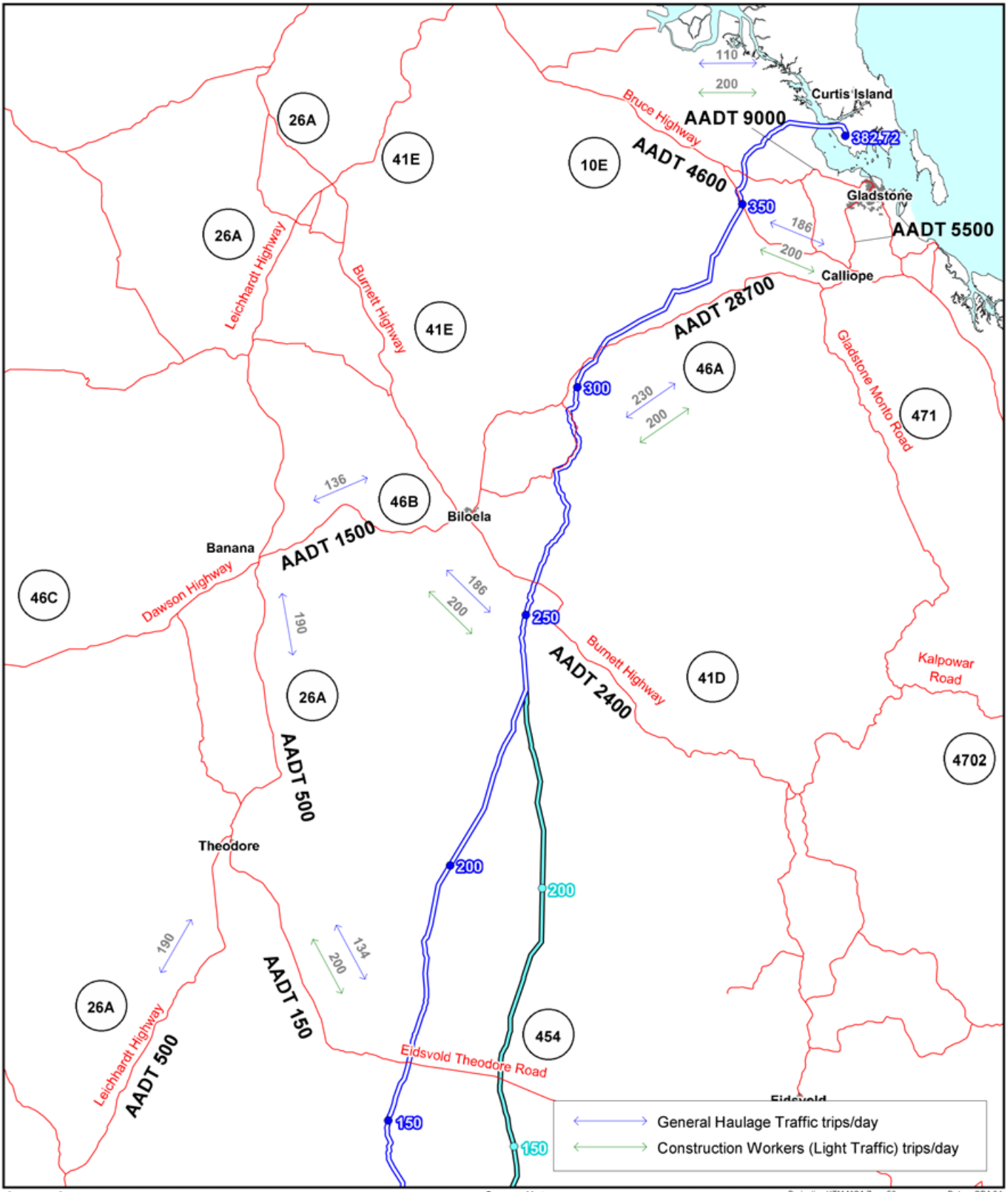
Dust control and erosion management are addressed in *Volume 4, Chapter 4.*

Clearing of vegetation has been addressed in *Volume 4, Chapter 7.*

Therefore, this chapter focuses on those issues relating to road pavement impacts and increased traffic flows.

### 13.4.1 Existing Road Network

The key state-controlled road links and key council-controlled road links which may provide access to the pipelines during the construction and operational phases are described in *Table 4.13.1* and are shown in *Figure 4.13.1* to *Figure 4.13.3.* These routes have been estimated based on the most likely access points to the worksites.




**Legend:**

- Export Pipeline & Kilometre Point
- Export Pipeline Option 2
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

**Source Note:**

1:250,000 Topographic vector copyright Geoscience Australia
AADT information from Kellogg Brown & Root Pty Ltd

Projection UTM MGA Zone 56 Datum GDA 94

0 10 20 30 40

Kilometres

N

QUEENSLAND CURTIS LNG
A BG Group business

| | |
|---|---|
| Project | Queensland Curtis LNG Project |
| Client | QGC - A BG Group business |
| Title | **Proposed Transport Routes - Gladstone to Eidsvold** |

ERM
Environmental Resources Management Australia Pty Ltd

| | | | |
|---|---|---|---|
| Drawn | Mipela | Volume 4 | Figure 4.13.1 |
| Approved | CDiP | File No: | EO5-P-MA-96184 |
| Date | 04.06.09 | Revision | A |

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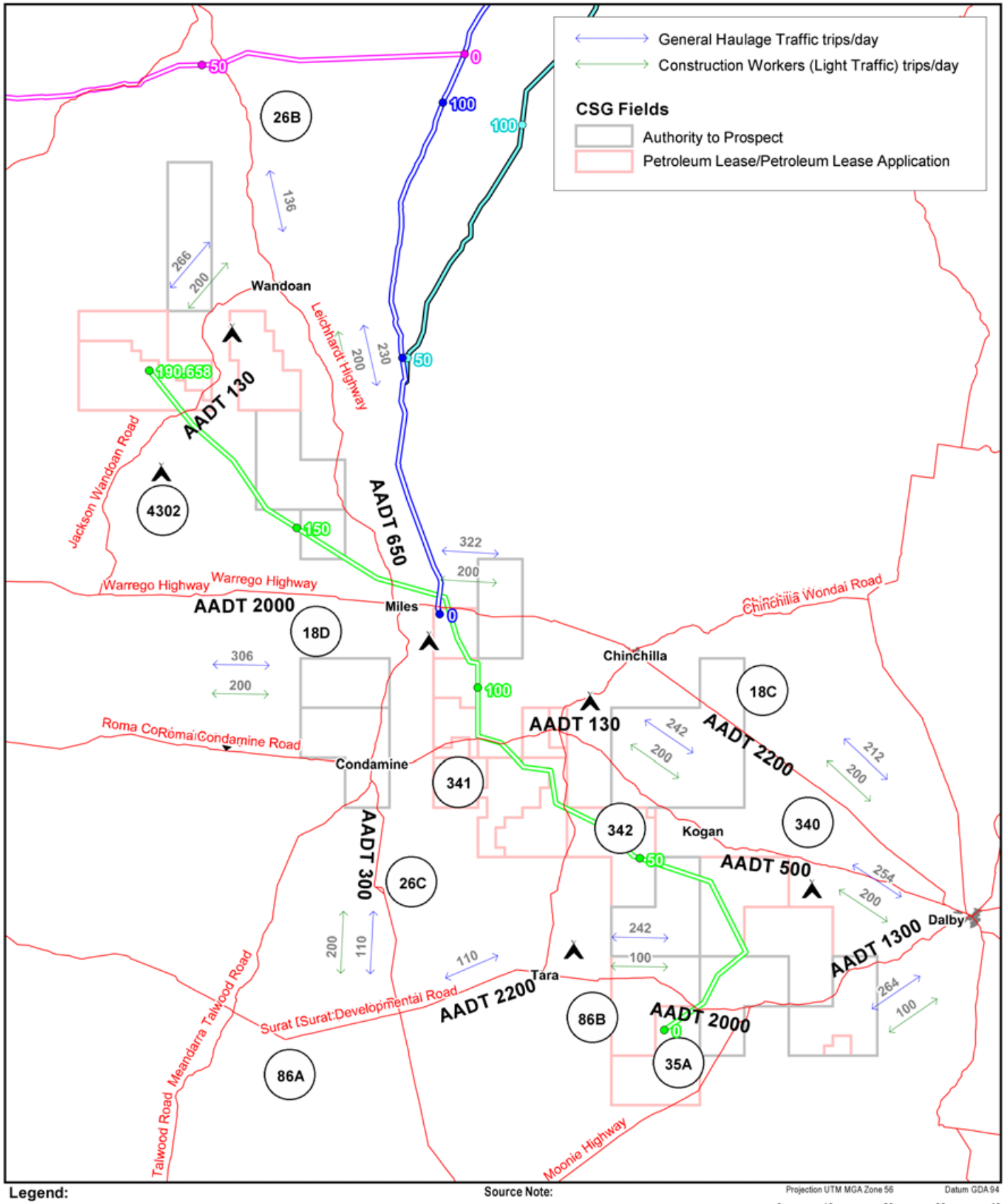


**Legend:**

- Export Pipeline & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point
- Export Pipeline Option 2
- Proposed Camp

**Source Note:**

1:250,000 Topographic vector copyright Geoscience Australia
AADT information from Kellogg Brown & Root Pty Ltd

Projection UTM MGA Zone 56 Datum GDA 94

0 10 20 30 40

Kilometres

N

QUEENSLAND CURTIS LNG
A BG Group business

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| | | | |
|---|---|---|---|
| Project | Queensland Curtis LNG Project | Title | Proposed Transport Routes - Eidsvold to Tara |
| Client | QGC - A BG Group business | | |
| Drawn | Mipela | Volume 4 | Figure 4.13.2 |
| Approved | CDiP | File No: | EO5-P-MA-96186 |
| Date | 04.06.09 | Revision | A |

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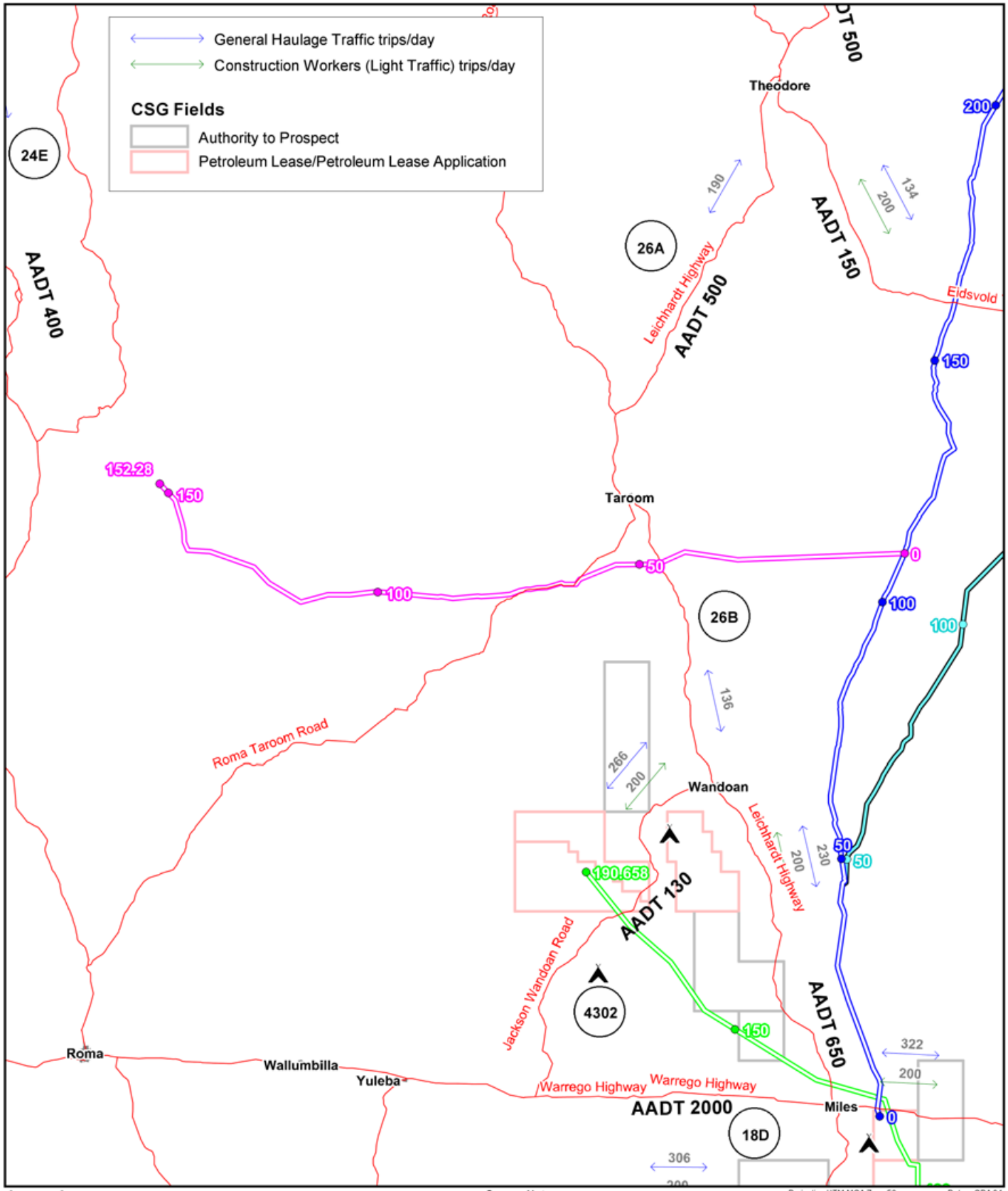


QUEENSLAND CURTIS LNG
A BG Group business

| | |
|---|---|
| Project | Queensland Curtis LNG Project |
| Client | QGC - A BG Group business |

Title: **Proposed Transport Routes - Theodore to Miles**

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Environmental Resources Management Australia Pty Ltd

| | | | |
|---|---|---|---|
| Drawn | Mipela | Volume 4 | Figure 4.13.3 |
| Approved | CDiP | File No: | EO5-P-MA-96185 |
| Date | 04.06.09 | Revision | A |

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*Table 4.13.1 Key State-controlled and Council-controlled Road Links*

| Road | Description | Export Pipeline | Lateral | Collection Header | |
|---|---|---|---|---|---|
| | | | | Gas | Water |
| **State Controlled** | | | | | |
| Bruce Highway | The Bruce Highway is a fully sealed bitumen road which provides connectivity for the major urban centres along the eastern coastline of Queensland. Forming part of the national highway network, the Bruce Highway runs from Brisbane to Cairns and is generally a two-lane undivided roadway with 1 m – 1.5 m sealed shoulders in rural areas. In urban areas and at major intersections (such as the Gladstone–Mt Larcom Road, Calliope River–Targinie Road and the Dawson Highway) the roadway form is a divided carriageway with raised or painted medians<br><br>The posted speed limit is generally 100 kph except in urban areas, where posted speed limits can drop down to 60 kph | √ | | | |
| Burnett Highway | The Burnett Highway is part of the state strategic road network between Nanango (where it intersects with the New England Highway) and Dululu. The highway between Dululu and Rockhampton is part of the regional road network. The highway is bitumen-sealed with sections of sealed shoulders and other sections with unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through towns | √ | | | |
| Carnarvon Highway | The Carnarvon Highway connects Mungindi on the Queensland–New South Wales border via St George, Surat and Roma to Rolleston in the central west. Between St George and Rolleston the highway is part of the state strategic road network. The highway is bitumen-sealed with sections of sealed shoulders and some sections with unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | √ | | |
| Chinchilla–Tara Road | The Chinchilla–Tara Road is part of the district road network. The road has two bitumen-sealed lanes with predominantly unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | | | √ |
| Dalby–Kogan Road | The Dalby–Kogan Road is part of the regional road network. The road has two bitumen-sealed lanes with predominantly unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | | | √ |
| Dawson Highway | The Dawson Highway is part of the state highway network and provides connectivity for the predominantly mining townships between Gladstone and Springsure. The link is generally a two-lane undivided cross section, with a 100 kph posted speed limit west of Don Young Drive. The part of the Dawson Highway which passes through the urban areas of Gladstone is referred to as Dawson Road, and the road form for this section is generally a four-lane divided roadway with a posted speed limit of 60 kph | √ | √ | √ | |

| Road | Description | Export Pipeline | Lateral | Collection Header | |
|---|---|---|---|---|---|
| | | | | Gas | Water |
| Eidsvold–Theodore Road | The Eidsvold–Theodore Road is part of the district road network connecting Eidsvold on the Burnett Highway with Theodore on the Leichhardt Highway. There are some remaining sections of unsealed road both east and west of Cracow. The travel speeds along the various sections of the road are dictated by the road geometry | √ | | | |
| Gladstone–Mt Larcom Road | Gladstone–Mt Larcom Road is the northern-most access road that provides connectivity between Gladstone and the Bruce Highway. It forms part of the state strategic road network and is generally a two-lane undivided sealed cross-section with a posted speed limit of 100 kph<br><br>As Gladstone–Mt Larcom Road extends eastward from Landing Road, it becomes Hanson Road. Hanson Road then becomes Glenlyon Road, south of Roseberry Street | √ | | | |
| Jackson–Wandoan Road | The Jackson–Wandoan Road is part of the district road network The road has two bitumen-sealed lanes with predominantly unsealed shoulders. There are some one-lane bitumen sealed floodways along the road. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | | | √ |
| Kogan–Condamine Road | The Kogan–Condamine Road is part of the regional road network. The road has two bitumen-sealed lanes with predominantly unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | | | √ |
| Leichhardt Highway | The Leichhardt Highway is part of the state strategic road network connecting Central Queensland with the Newel Highway on the Queensland–New South Wales border near Goondiwindi. The highway is bitumen-sealed with sections of sealed and unsealed shoulders. The posted speed limits are generally 100 kph in rural areas and 60 kph through towns | √ | √ | √ | |
| Moonie Highway | The Moonie Highway is part of the regional road network and connects Cunnamulla with Dalby (and the Warrego Highway). The highway is bitumen-sealed with sections of sealed and unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through towns | | | | √ |
| Roma–Taroom Road | Roma–Taroom Road is part of the district road network. There are some remaining sections of unsealed road. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | √ | | |
| Surat Development Road | The Surat Development Road is part of the district road network. It connects Surat with Dalby. The developmental road has two bitumen-sealed lanes with predominantly unsealed shoulders. The posted speed limits in rural areas are generally 100 kph and 60 kph through townships | | | | √ |
| Tara–Kogan Road | The Tara–Kogan Road is part of the district road network. The road has two bitumen-sealed lanes with predominantly unsealed shoulders. The posted speed limits in rural | | | | √ |

| Road | Description | Export Pipeline | Lateral | Collection Header | |
|---|---|---|---|---|---|
| | | | | Gas | Water |
| | areas are generally 100 kph and 60 kph through townships | | | | |
| Warrego Highway | The Warrego Highway is part of the national road network between Brisbane and Darwin. Between Dinmore and Toowoomba the highway is a divided four-lane roadway. Through Toowoomba the highway follows Cohoe Street, James Street, and Tor Street which are four lanes undivided before following Bridge Street which is four-lane median divided until the suburb of Torrington where the road becomes a two-way, two-lane road to Morven. West of Toowoomba the road is sealed with sections of sealed and unsealed shoulders | √ | | √ | √ |
| **Regional Council** | | | | | |
| Beelbee Road | Beelbee Road runs north and south off Kogan–Condamine Road. In the south direction running through Beelbee and terminating at the intersection with Braemar Boundary Road. Not covered in site visit, no pavement condition details available | | | √ | √ |
| Bungaban Road | Bungaban Road is one of the local government authority roads and originates at an intersection with Roche Creek Road at its southern end running north toward Cockatoo. The pavement is a 4 m to 6 m-wide sealed, unmarked road with no speed limit postings | √ | √ | | |
| Cool Road | Cool Road is just outside Biloela and runs alongside Lake Callide. The pavement is a sealed, unmarked 4 m-wide road with no clear signs of graded shoulders | √ | | | |
| Crowsdale–Camboon Road | Crowsdale–Camboon Road is a local government-controlled rural, unsealed, graded road running from an intersection with Defence Road in the south to its intersection with the Dawson Highway at its northern end. The pavement width ranges from 4 m to 6 m with multiple cattle grids along the alignment. There is a short, sealed section at the northern end of Crowsdale–Camboon Road and a couple of dips (floodway sections) along route | √ | | | |
| Deearne Road | This council-controlled road is a ‘dry weather only’ unsealed graded roadway with a pavement width between 4 m and 6 m | √ | | | |
| Defence Road | Defence Road is part of the local authority network and is typically a 6 m-wide sealed unmarked road with paved shoulders. There are sections of unsealed graded road which have recently or are currently undergoing re-grading and these sections are ‘‘dry weather only’’. Plant machinery was working on the road at time of site visit, either preparing for a new seal or just a general re-grading. Erosion control (rock check dams) was apparent on the roadside | √ | | | |
| Dingley Dell Road | The local government-controlled Dingley Dell Road is a 4 m-wide paved road with unpaved shoulders linking Crowsdale–Camboon Road (west) and Morettis Road (east) | √ | | | |
| Fairymeadow Road | With a 6 m to 8 m-wide sealed unmarked pavement width, Fairymeadow Road runs west | √ | | | |

| Road | Description | Export Pipeline | Lateral | Collection Header | |
|---|---|---|---|---|---|
| | | | | Gas | Water |
| | from the transition with Greenswamp Road to the intersection with Leichhardt Highway | | | | |
| Goombi–Fairymeadow Road | Goombi–Fairymeadow Road runs north from the intersection with Fairymeadow and Greenswamp Roads up to Goombi. The sealed 6 m-wide unmarked road is part of the locally controlled road network | | | √ | √ |
| Kumbarilla Lane | Kumbarilla Lane provides a link between Daandine on Kogan–Condamine Road in the north and Kumbarilla on Moonie Highway in the south. Not covered in site visit, no pavement condition details available | | | √ | √ |
| Moretti(s) Road | Off the Burnett Highway, the change between Moretti Road and Morettis Road occurs after approximately 20 km. Extending south from the Burnett Highway the 4 m-wide graded roadways pass the suburb of Harami before terminating at an intersection with Rawbelle (Camboon) Road | √ | | | |
| Mount Alma Road | Mount Alma Road is located just north of the Dawson Highway between Biloela and Calliope. Not covered in site visit, no pavement condition details available | √ | | | |
| Old Cameby Road | Old Cameby Road is part of the council-controlled road network and runs north off Fairymeadow Road eventually linking up to the Leichhardt Highway just south of Miles | √ | | | |
| Pelham Road | Pelham Road runs north from Miles through Hookswood and up to Pelham. Not covered in site visit, no pavement condition details available | √ | | | |
| Rawbelle Road | Following an undulating path through the countryside, Rawbelle Road is part of the local government-controlled road network. The pavement width is typically 4 m but has sections that are slightly wider | √ | | | |
| Roche Creek Road | Roche Creek Road extends north-east from Wandoan up to Roche Creek where is turns (intersection with Bungaban Road) to run adjacent to the creek. Not covered in site visit, no pavement condition details available | √ | | | |
| Thangool–Lookerbie Road | Thangool–Lookerbie Road runs south out of Thangool to an intersection with Lookerbie Circuit south-west of Lawgi Dawes. Not covered in site visit, no pavement condition details available | √ | | | |
| The Narrows Road | The Narrows Road runs north to north-east out of Mount Larcom toward the end of the Export Pipeline, north of Gladstone. Not covered in site visit, no pavement condition details available | √ | | | |
| Valentine Plains Road | Valentine Plains Road runs east out of the Biloela region through Valentine Plains continuing toward the Kroombit Tops National Park. Not covered in site visit, no pavement condition details available | √ | | | |

### 13.4.2 Existing Road Traffic Volumes

Data has been obtained from the relevant DTMR regional offices (i.e. Wide Bay/Burnett, Fitzroy, Darling Downs and South West) in relation to the existing traffic volumes on the potentially affected roads. This data is summarised in *Table 4.13.2* and *Figure 4.13.1* to *Figure 4.13.3*. Full data, including the annual average daily traffic (AADT) and the percentage of commercial and heavy vehicles used in the analysis, is provided in *Appendix 4.4*. Similar data is not available for local roads which are predominantly rural and unsealed.

**Table 4.13.2 Existing Traffic Volumes**

| Road | Section | AADT |
|---|---|---|
| Warrego Highway | Ipswich–Toowoomba | 13,000–20,500 |
| | Toowoomba City | 19,800–22,000 |
| | Toowoomba–Dalby | 4,400–17,500 |
| | Dalby–Miles | 2,100–6,500 |
| | Miles–Roma | 1,200–3,000 |
| Leichhardt Highway | Westwood–Taroom | 500–2,200 |
| | Taroom–Miles | 600–700 |
| | Miles–Goondiwindi | 300–3,400 |
| Bruce Highway | Benaraby–Rockhampton | 3,500–4,600 |
| Burnett Highway | Monto–Biloela | 700–2,400 |
| Dawson Highway | Gladstone–Biloela | 900–28,700 |
| | Biloela–Banana | 1,300–5,500 |
| | Banana–Rolleston | 200–1,700 |
| Moonie Highway | Dalby–St George | 1,300–6,400 |
| Gladstone–Mt. Larcom Road | | 2,900–9,000 |
| Carnarvon Highway | Roma–Injune | 600–1,800 |
| | Injune–Rolleston | 300–400 |
| Eidsvold–Theodore Road | | 80–800 |
| Surat Developmental Road | Surat – Tara | 300–2,200 |
| | Tara – Dalby | 600–2,200 |
| Dalby–Kogan Road | | 300–500 |
| Kogan–Condamine Road | | 130 |
| Chinchilla–Tara Road | | 350–720 |
| Tara–Kogan Road | | 160 |
| Jackson–Wandoan Road | | 70–200 |
| Roma–Taroom Road | | 50–300 |

### 13.4.3 Existing Rail Network

Rail infrastructure intersected by the Pipeline routes has been detailed in *Volume 4, Section 5.1.5.*

The Western Line connects Brisbane to Miles and could potentially be used for transporting pipe and other materials for the construction phase. The line is a standard Queensland 1,067 mm gauge track with a mix of timber, steel and concrete sleepers.

The Queensland rail network typically accepts rolling stock of a 16.2 m body

length but is able to accommodate 18 m lengths of pipe. This has been successfully used for other pipeline projects such as the North Queensland Gas Pipeline.

### 13.4.4 Shipping

The major impacts to shipping relate primarily to the LNG Facility and have been discussed in *Volume 5, Chapter 15.*

The option to import pipe through the Port of Brisbane is under consideration and will be pursued during the detailed design phase of the Project. It is anticipated that pipe would be shipped in at the rate of 25 km of pipe/ship/month. Thus 730 km of pipe (380 km of Export Pipeline, 150 km of Lateral Pipeline and 200 km of Collection Header), would require approximately 30 shipments of pipe. The Port of Brisbane recorded 2,600 commercial ship visits during 2006–07 (Port of Brisbane website) and it is expected that it will have adequate capacity to handle between 15 and 30 pipe shipments (i.e. 50 per cent to 100 per cent of the imported pipe). The Port's proximity to both major road and rail transport make it a favourable option.

The capacity of the Port of Gladstone to handle the Project's shipping needs is addressed in *Volume 5, Chapter 15.*

## 13.5 POTENTIAL IMPACTS AND MITIGATION MEASURES

### 13.5.1 Transport Methods

As previously discussed the transport of plant and materials for the pipelines is expected to be a combination of shipping, rail and road.

The key items to be transported will be:

- pipe and fittings
- pre-assembled components (e.g. scraper and meter stations)
- construction plant and equipment
- camp facilities.

In addition, there will be daily movements of construction vehicles servicing the accommodation camps, water trucks for dust management and movement of personnel to and from the work areas.

#### 13.5.1.1 *Pipe and Fittings*

Pipe for the Project will be sourced from overseas and arrive in Australia by ship. The pipe will then be transported to site either by road, rail or a combination of road and rail depending upon the availability of facilities to

manage the pipe.

A key criterion in developing a pipe transport strategy is the prevention of damage to the coating on the pipe. The coating protects the pipe from corrosion so it is essential that there are no imperfections in it.

The pipe may be coated at the manufacturing plant prior to shipping to Australia or may be coated on arrival in Australia. If the pipe were to be coated in Australia, the location for this activity is yet to be determined but is assumed to take place at the port of entry.

Limiting the number of times the pipe is handled minimises potential damage to the coating. Therefore, the pipe may be transported directly from the port of entry to the Right-of-Way (RoW) by road. Rail transport is still under consideration as it potentially minimises impacts on the road network and reduces traffic impacts. Rail options will be reviewed in more detail during detailed design and in consultation with the appointed construction contractor.

As discussed in *Section 13.2,* a number of scenarios for transportation of pipe materials to site included commencing at Gladstone, Bundaberg, Brisbane, or a combination of these locations (refer to *Appendix 4.4*).

The greatest impact to the road network, both in terms of effects on the pavement and traffic volumes, occurs if all the pipe materials are transported by road. The base case assumed that all of the large-diameter pipe will be delivered to the Port of Gladstone and transported by road from this location to site. This provided a worst-case scenario for the Gladstone road network. Materials for the water Collection Header are assumed to be transported from Brisbane.

Based on two or three 18 m-long pipe lengths per truck the total length of pipe (730 km) to be transported equates to approximately 13,520 to 20,280 trucks over the entire construction period (refer to *Table 4.13.3*) for pipe excluding the water Collection Header.

The total length of pipe for the water Collection Header is 200 km. This pipe is a smaller diameter so a larger number of lengths can be carried per truck, allowing for 108 m per truck or approximately 1,955 truckloads.

Thus, the total number of trucks required for pipe transport will be between 15,475 and 22,235. The larger number has been used in the overall assessment as the worst-case scenario.

Pipe will need to be delivered at a rate of around 2 km per day to each pipeline. As discussed in *Volume 2, Section 13.15,* this is approximately 35 to 55 trucks (i.e. 70–110 trips) per day for each gas pipeline throughout the construction period.

It has been determined that the Export Pipeline and Collection Header will be constructed concurrently, however pipe delivery will only occur to one pipeline on any given day. The Lateral Pipeline will not be constructed until a later date and not until after completion of the Export Pipeline and Collection

Header.

***Table 4.13.3 Approximate Pipe Truck Numbers***

| Pipeline | Length km | Trucks | |
|---|---|---|---|
| | | 2 pipes per truck | 3 pipes per truck |
| Export | 380 | 10,555 | 7,037 |
| Lateral | 150 | 4,170 | 2,780 |
| Collection Header (gas) | 200 | 5,555 | 3,704 |
| TOTAL | 730 | 20,280 | 13,520 |

Due to the length of the construction period (approximately 18 months) it is anticipated that the maximum pipe transported in any one month for the Export Pipeline and Collection Header combined will be 40 km. Changes to this, should they occur as the transport strategy is further developed, will be taken into account in future revisions of the transport model.

In addition to the pipe itself, materials for the joint coatings will also need to be transported to the RoW. These will include wrapping materials and garnet for grit blasting. It has been estimated (refer to *Appendix 4.4*) that this will generate an additional 134 truckloads in total for the three pipelines, of which 28 would be associated with the Lateral Pipeline. This will equate to an average of less than one truck per day.

### *13.5.1.2 Pre-assembled components*

Pre-assembled components such as the scraper stations and meter stations will be shipped to Queensland through a major port and then taken to RoW the by road. Given that the majority of the scraper stations and meter stations are located towards the southern end of the Project area, it has been assumed that these components will travel by road from Brisbane. This will be reviewed once a construction contractor has been appointed.

Each scraper station and each meter station will require 10 truckloads to transport it to site. Based on seven scraper stations and four meter stations this will generate 110 truckloads or 220 trips. A maximum of four loads on any one day over the construction period is anticipated because construction of these facilities will be staggered.

An in-line compressor will require 30 truckloads of materials to be transported to site. As previously discussed, it is not anticipated that the in-line compressor will be constructed during the Pipeline construction phase.

### *13.5.1.3 Construction plant and equipment*

Construction plant and equipment will be sourced from within Australia and this will be mobilised to the RoW from south-east Queensland. The plant and equipment will travel along the RoW and demobilise at the end of the route (e.g. Gladstone for the Export Pipeline, Wandoan for the Collection Header).

This is the worst-case scenario because some equipment may be sourced locally in the area of construction.

The anticipated quantities for transport of plant and equipment for each pipeline are set out in *Table 4.13.4.* Each item will require a separate truck for delivery.

***Table 4.13.4 Construction Plant & Equipment Transport***

| Plant Item | Quantity |
|---|---|
| Bulldozers | 20 |
| Graders | 6 |
| Excavators | 30 |
| Side boom tractors | 12 |
| Rollers | 2 |
| Heavy cranes | 2 |
| Total | 72 |

*13.5.1.4 Camp facilities*

Camp facilities will be sourced from within Australia and again it has been assumed that this will be from south-east Queensland although they may come from anywhere within Australia depending upon availability.

Based on the scenario set out in *Volume 2, Section 13.15.3* and two construction spreads per pipeline, each camp will require approximately 185 truckloads per move. Based on a delivery period of 20 days per camp, this means nine trucks (i.e. 18 trips) per day per camp.

*13.5.1.5 Construction Trips*

Construction trips relate to the transport activities associated with the servicing of camps and workshops and moving construction workers. It has been assumed that the camp and workshop servicing will require 30 trips per day per camp. Worker transportation covers the daily movement of personnel from the camp to the RoW and transport of personnel to and from the camp at the start and end of each cycle. The preliminary assessment has assumed 200 workers per camp giving approximately 230 trips per day per camp (refer to *Appendix 4.4)* resulting in, each camp generating around 260 construction trips per day. Changes in camp numbers, should they occur, (e.g. it may be necessary to use 400 person camps) will be taken into account in future transport mitigation planning.

*13.5.1.6 Maintenance and Surveillance*

Inspection of the pipeline easement will be required during operations. However, it is expected that inspections will be undertaken on the ground (four-wheel drive vehicles) and by air. Impacts to roads or traffic conditions will be negligible.

### 13.5.2 Traffic Generation

Traffic generation has been calculated based on the data in *Section 13.5.1* and assuming two construction spreads per pipeline, with each spread employing 200 personnel, and a pipe delivery duration of 15 months. On this basis the number of loads and/or trips for each transport element has been summarised in *Table 4.13.5*; where a load will equal two trips (i.e. in loaded and out empty).

Total Pipeline transport numbers for each route have been determined (refer to *Appendix 4.4*) and are shown in *Figure 4.13.1* to *Figure 4.13.3.*

**Table 4.13.5 Transport Numbers**

| Item | Total Load | Trips/day |
|---|---|---|
| Pipe & Fittings | | |
| Export Pipeline | 10,555 | 112 |
| Lateral | 4,170 | 112 |
| Collection Header | | |
| Gas | 5,555 | 112 |
| Water | 1,956 | 38 |
| Pre-assembled components | 150 | 8 |
| Plant and equipment/spread | 72 | n/a |
| Camps/camp/spread | 185 | 18 |
| Construction trips/spread | n/a | 260 |

Transport of any oversized loads will be in accordance with the Guidelines for Excess Dimensions – Vehicles Carrying Indivisible Articles; Special Purpose Vehicles in Queensland, June 2002.

### 13.5.3 Road Impacts

Activities with the potential to impact on roads include:

- extendable semi-trailers delivering pipe to worksites
- low loaders mobilising construction equipment between worksites
- increased traffic movement in rural townships (e.g. Wandoan, Miles, Chinchilla, Taroom, Biloela)
- transporting construction personnel to worksites
- open-cut crossings of unsealed roads
- pipeline surveillance and maintenance activities.

These actions may cause:

- localised traffic congestion or disruption
- accelerated deterioration of road pavement integrity

- introduction and/or spread of pest species
- dust nuisance to residences.

These are discussed in more detail in *Section 13.5.3.1*.

### *13.5.3.1 Traffic Congestion*

**Transport**

Transportation impacts during the construction period include slow-moving traffic on roads with subsequent disturbance to local traffic and motorists. Traffic will increase near any given location of the construction spread with transportation of pipe, materials, fuel, and construction personnel.

The level of disturbance is anticipated to be greater in small, rural communities and associated local roads where semi-trailers may need the entire road breadth. Similar disturbance to traffic may be expected in areas with steep inclines and / or high-traffic density conditions resulting in "intermittent'' movements.

**Construction within the Road Reserve**

There may be localised traffic disruption associated with constructing a pipeline across a road corridor.

On unsealed roads, which are typically open cut and can take up to six hours to transit, traffic may be delayed. However, QGC and its contractors, will always have bypass or detour options agreed with the local road manager (e.g. DTMR, regional council) prior to commencing these crossings.

All sealed roads and rail lines will be bored, reducing impacts on traffic flow and ensuring no damage to road pavement. Boring is a low-impact technique involving drilling short distances from below-ground within an enlarged trench area (borepit) either side of the road within the RoW. This technique has been described in *Volume 2, Section 13.8.8.3.* The feasibility of using a bore is limited by site conditions including depth required, width of crossing, geology, landform, soil type and service / infrastructure.

Traffic mitigation methods are set out in *Section 13.5.7.*

### *13.5.3.2 Road Pavement Integrity*

Heavy vehicle and equipment movement during construction may result in localised damage to the road pavement or surface.

A study has been carried out to assess the potential impacts on assumed transport routes (refer to *Appendix 4.4*) based on the estimated Project traffic (refer to *Section 13.5.1.5*).

Current pavement loadings on the state-controlled roads have been assessed using traffic count volumes, proportion of heavy vehicles and annual growth rates provided by the respective Department of Transport and Main Roads

(DTMR) regional offices. The Fitzroy regional office provided the required equivalent standard axles (ESA) for the Bruce Highway. All other ESAs were calculated based on AADT and the proportion of heavy/commercial vehicles. This resulted in an ESA of between 2.52 and 4.36 for the remaining roads. Growth rates, as provided by the regional offices, were taken into account in the calculations and the applied rates adopted were between 0 and 5 per cent.

Where a development will create more than a 5 per cent increase in the existing ESA loading on a road or section of road the DTMR requires an assessment of impact on the road pavement. The indications from the preliminary assessment are that all of the proposed state-controlled roads except the Chinchilla–Tara Road will have Project ESAs greater than 5 per cent (refer to *Table 4.13.6*).

The traffic impact from the pipelines has therefore been assessed against the 20-year life of the road pavements (refer to *Table 4.13.6*). However the DTMR process is based on a long-term impact over the life of a road. The impacts assumed for this analysis only occur over a short period of the life of the road and therefore the overall impact will need to be negotiated with DTMR (refer to *Section 13.5.8*).

It has not been possible to carry out a similar analysis for local government roads because data is unavailable from which to derive traffic loadings. The majority of the local government roads within the Pipeline Component project area are unsealed.

An inventory of road conditions will be developed, in consultation with the relevant authority, prior to construction commencing. The wheel loads, load dimensions and truck speeds associated with transport will comply with the requirements of the DTMR, so damage to state-controlled roads and risk to other road users is minimal. Any damage proven to be caused by hauling Project pipes and equipment on gazetted roads will be rectified in agreement with the DTMR or the relevant local government authority.

As construction activities will be temporary and short term, no long-term adverse impacts on the road system are expected as a result of Pipeline construction transport requirements. The Project will manage road access and potential deterioration directly with the relevant authorities. It is expected that selected locations will require upgrades prior to construction and that water and maintenance grading (at QGC's expense in liaison with the relevant authorities) will be required during concentrated construction periods.

Given the short period over which pipe will be delivered, traffic impacts on major highways are expected to be insignificant.

The proposed process for assessing and agreeing mitigation measures is set out in *Section 13.5.8.*

***Table 4.13.6 Average Daily ESA Impact***

| Road | Section | Anticipated Generated ESAs/day | Daily Impact | Max 20-year Pavement Life Used * |
|---|---|---|---|---|
| Bruce Highway | Benaraby–Rockhampton [0 km–46 km] | 152 | 10% | |
| | Monto–Biloela [42 km–94 km] | 139 | 50%–90% | 9%–15% |
| Carnarvon Highway | Roma–Injune | 102 | 20%–30% | |
| | Injune–Rolleston | 163–235 | 40%–60% | |
| Dalby–Kogan Road | 0 km–52 km | 66–142 | 30%–120% | 12.5% |
| Dawson Highway | Gladstone–Biloela | 148–161 | 10%–60% | 8%–28% |
| | Biloela–Banana [0 km–46km] | 120 | 20%–40% | 7%–20% |
| | Banana–Rolleston | 163 | 20%–80% | 5%–7% |
| Eidsvold–Theodore Road | 3 km–144 km | 107–203 | 120%–620% | <5%–30% |
| Gladstone–Mt Larcom Road | 0 km–32 km | 105–106 | 10% | |
| Jackson–Wandoan Road | 0 km–81km | 108 | 260%–470% | 36%–67% |
| Kogan–Condamine Road | 0 km–72 km | 108 | 120% | 27% |
| Leichhardt Highway | Westwood–Taroom [105 km–256 km] | 117–127 | 20%– 50% | 19%–44% |
| | Taroom–Miles | 113–117 | 30% | 20%–32% |
| | Miles–Goondiwindi [0.km–82 km] | 57 | 20%–30% | 5.63% |
| Moonie Highway | Dalby–St. George [0 km–51km] | 121–154 | 20%–40% | |
| Roma–Taroom Road | 110 km–150 km | 232 | 700% | 58% |
| Surat–Developmental Road | Surat–Tara [120 km–147 km] | 57 | 20%–70% | 6%–13% |
| | Tara–Dalby [0 km–41 km] | 57–97 | 20%–50% | |
| Tara–Kogan Road | 0 km–43 km | 2 | 10% | |
| Warrego Highway | Dalby–Miles [84 km–126 km] | 88 | 10% | |
| | Miles–Roma [0 km–45 km] | 117–156 | 10%–20% | |

*1. Where the generated pavement loading is greater than 5% of the annual pavement loading*

### *13.5.3.3 Spread of Pest Species*

Transportation of plant and equipment from other areas has the potential to spread pest species and diseases. Movements of personnel, pipe deliveries and camp servicing may also transport weed seed.

QGC recognises the importance of preventing the introduction and/or spread of pest species and diseases and has implemented management measures

from the inception of the Project.

Further details on pest species management are provided in *Volume 4, Chapter 7.*

#### *13.5.3.4 Dust*

Earth-moving activities such as clearing and grading, trenching, padding, and backfilling of the trench can all generate dust. A dust nuisance may be created for road users where the RoW is in proximity to roads. In addition heavy vehicle movement, such as pipe trucks, on unsealed roads in dry conditions can also create dust hazards.

Dust management measures throughout construction will minimise dust and improve overall safety of vehicle movements. The majority of the Pipeline route is well away from major routes, however, construction works close to crossings of the Warrego, Burnett, and Bruce highways are necessary. Weather conditions will be monitored and where conditions create unsafe dust hazards works will be suspended in those crossing areas until it is safe to resume (refer to *Section 13.5.7*).

### ***13.5.4 Safety***

The Pipeline route will be predominantly located in rural areas. The existing road network will be used wherever practicable as access to the RoW, associated pipeline construction sites and for moving equipment and personnel in the local area.

Fences would be erected where the pipeline intersects public roads to prevent public access to or from the RoW during construction. Post-construction all fences will be reinstated and temporary access tracks removed. Brush from the clearing process will be spread back across the RoW, to assist in preventing entry and reducing the visibility of the access where a pipeline intersects with public roads.

The progressive nature of pipeline construction enables a staggered mobilisation of resources that minimises the impact on the public and other road users. Convoys are not planned for transporting pipe, and vehicle movements are not expected to create any issues for overtaking or turn-out. Haulage through major population centres (e.g. Gladstone, Toowoomba) will be via heavy-vehicle detour routes or as otherwise agreed with the appropriate authorities prior to mobilisation through these centres. This will be coordinated by the major haulage contractor(s) appointed to the Project.

A safety check has been carried out as part of the transport study (refer to *Appendix 4.4*). This check considered:

- intersections and access
- pedestrians, cyclists and motorcyclists
- school bus routes.

The assessment found that, given camp sites were appropriately located

(e.g. good line of sight for access point), the construction of the pipelines should not create undue safety issues for intersections and access.

Traffic interactions with pedestrians, cyclists and motorcyclists typically occur in cities and towns. Major traffic increases in urban areas are not expected. Any increases would be confined to major transport routes where other road users are already alert to interactions with heavy transport. Therefore an increase in safety risk to these road users is not likely.

The Project proposes to use a number of roads which are school bus routes. Construction personnel movements would normally be outside of school hours starting earlier and finishing later than school bus times. Delivery of materials and equipment may occur throughout the day and therefore truck movements may interact with school bus times. The interaction of haulage traffic and school pick-up and set-down times will be assessed on a road-by-road basis during detailed design, and a traffic management plan implemented to ensure the safety of all school bus routes is maintained.

QGC emphasises safety. In addition to the safety check carried out as part of the transport assessment, QGC conducted its own hazard and risk review of transport issues. This hazard review considered impacts of transport with respect to:

- location
- Project areas and types of activities
- types of road use
- frequency of road use
- road types
- other users.

The review found that the types of transport that have the greatest potential impacts are general truck transport, pipe truck transport and large numbers of light vehicles. The locations with the highest traffic frequency possibly leading to hazards are in the Gas Field where there is adjacent construction activity and other industry.

The Project has also identified possible measures and processes that will be considered in planning controls to reduce these impacts. These include:

- transport pipe by rail to reduce the frequency of pipe truck movements by road
- escorts for heavy transport and traffic management plans to reduce hazard impacts of heavy transport which, in any case, is not significantly frequent
- require contractors to meet strict company standards of driving skills and experience and meet the Project's fatigue management guidelines
- audit all transport companies
- raise awareness of increased road activity and road usage changes for

local residents and the wider community through community education, information sessions, publicity and signage

- develop a safety management system for the Project which focuses on driving and transport issues, and implement a range of requirements for the entire Project and all its contractors.

### *13.5.5 Emergency Access*

Land officers have commenced plotting all access tracks and local roads using a Global Positioning System. Maps have been developed using the Geographical Information System, and these will identify suitable access to and from the RoW, particularly for emergency access. Emergency facilities in the region have been reviewed (refer to *Volume 8*) and access arrangements for construction will be documented in QGC's emergency response plan.

### *13.5.6 Road Infrastructure Alterations*

#### *13.5.6.1 Road Link Analysis*

Each road link was assessed to determine the existing "level of service" on state-controlled roads and the required level of service based on the estimated traffic generation. Level of service generally describes the operational conditions within a traffic stream, and their perception by motorists.

These conditions are described in terms of factors such as speed, travel time, freedom to manoeuvre, traffic interruptions, comfort, convenience and safety. In general there are six levels of service, from A to F, with level of service A representing the best operation and level F the worst.

The assessment found that no change in the level of service will be required on any of the potentially affected roads as a result of Project traffic.

#### *13.5.6.2 Intersection Analysis*

The haulage of pipe materials may be a 24-hour operation on major roads. Total trips in a single day will be 110 (refer to *Section 13.5.2*) of which 10 per cent (i.e. 11 trips) may occur in the peak hour. In relation to the base case of all large-diameter pipe being transported through Gladstone and the water pipeline material through Brisbane, this could result in an additional 11 trips through Gladstone and six trips through Toowoomba during peak hour.

This increase has been assessed as unlikely to adversely affect any of the intersections on the potentially affected transport routes. The intersection analysis will be reviewed if a greater quantity of pipe needs to be transported by road through Toowoomba as part of the mitigation strategy to reduce impacts in Gladstone (refer to *Volume 5 Chapter 14*).

The single busiest location will be the camps at the start and end of each working day. Access to camp locations will be reviewed to ensure that safe access and egress is maintained at all times.

#### *13.5.6.3 Bridges*

The transport assessment has identified some one- and two-lane bridges on both the Eidsvold–Theodore Road and the Roma–Taroom Road. The capacity of these bridges for Project construction traffic is yet to be assessed. This work will form part of the detailed design phase once the transport routes have been finalised.

### *13.5.7 Transport Management Measures*

Mitigation measures to reduce the effects of pipeline construction activities on the transport network will include, as appropriate:

- Transport
  - plan equipment and material transport routes and storage areas in consultation with local and state authorities to minimise disruption to residents and industry
  - deliver Project-related equipment during daylight hours, where practicable
  - investigate during the detailed design phase using rail transport from Brisbane to minimise the number of vehicle movements on the road network, if practicable and commercially viable
  - stage construction to mitigate traffic-flow impacts (e.g. the Collection Header may be constructed in phases to reduce the interaction with Gas Field construction activities)
  - adhere to all road closures and directives of road authorities
  - address temporary stockpiling or, on occasion, temporary abandonment of load (on trailers) in pipe-delivery contingency plans during wet season / flooding
  - consult, negotiate and permitting with DTMR on movement of oversized loads
  - stockpile Project-related equipment close to main roads to reduce impacts to unmade roads
  - encourage use of multi-person vehicles for travel to and from worksites
  - drive at reduced speeds near residences.
- Construction Activities
  - implement a road use management plan (RUMP) that addresses the use of safety vehicles signs and qualified flagmen
  - use warning signs at road crossings to alert personnel and the public of

hazard

- use a series of warning and speed restriction signs and barriers to provide ample warning to road users
- use dedicated and trained personnel, where appropriate, to coordinate the movement of traffic in the roadway with the movement of construction personnel and equipment across the roadway
- where practicable, bore sealed road crossings to minimise disruption
- plan road crossings outside peak periods to minimise disruption
- reinstate open-cut roads to the satisfaction of the local authorities
- erect temporary gates and signage across easements at all roads to reduce illegal entry.

### *13.5.8 Procedures for Assessing & Agreeing Mitigation*

At this stage of the Project, QGC cannot commit to the actual transport methods and routes. The assessment conducted for this EIS has been based on what QGC believes will be the worst-case impacts on the state's road infrastructure. This has identified potential impacts on the road network and has been presented as the basis for further negotiations and agreement on the methodology for assessing the impacts on the road network.

When construction and haulage contractors are appointed, the nominated transport strategy, routes and road impact assessment will then be reviewed to reflect the actual routes and transport methods.

Once the road impact assessment has been revised QGC and/or its appointed construction contractor will negotiate with DTMR or relevant regional council about the level of compensation and/or road works required for the Project. Depending upon the transport method and the routes selected potential exists for the following works to be agreed with DTMR or regional councils:

- widening/strengthening of bridge structures
- widening of some sections of road
- resurfacing of roads
- compensation for road pavement impacts.

### *13.5.9 Rail*

Construction activities close to rail lines may impact on the rail network. All crossings of rail lines will be bored to minimise impacts. Lower train speeds may be necessary near construction works but there would be no direct interruption to rail transport.

The Project will liaise with Queensland Rail on the design requirements for all rail crossings. This will be done during the detailed design phase of the

Project. Management procedures for construction will ensure Project activities do not lead to unauthorised access to rail infrastructure.

The use of rail for the transportation of pipe has not been assessed as part of this study but QGC considers it a potential method for reducing impacts on the road network.

## 13.6 CONCLUSION

A model has been developed to quantitatively predict, to the greatest extent possible, the likely transport impacts from the development of the Pipeline Component of the QCLNG Project. The model highlights those roads with the potential to be adversely impacted by the Project. A methodology for determining the overall impact and management strategies has been proposed.

A summary of the impacts outlined in this chapter is provided in *Table 4.13.7*.

***Table 4.13.7 Summary of Impacts for Transport***

| Impact assessment criteria | Assessment outcome |
|---|---|
| Impact assessment | Negative |
| Impact type | Direct |
| Impact duration | Short term |
| Impact extent | Local |
| Impact likelihood | High |

Overall assessment of impact significance: moderate, depending on strategies to be implemented and the final transport corridors selected. However, once transport options are better defined during the detailed design phase and roads identified in consultation with relevant government departments and agencies, it is expected that impacts from transport on roads will be minor to negligible.