14 TRANSPORT

14.1 INTRODUCTION

This chapter provides responses to submissions received on the draft EIS related to transport associated with the Gas Field.

Where changes to the project description, as detailed in *Volume 2, Chapters 7* and *11*, have impacted transport, these impacts, and measures to mitigate impacts are described.

14.2 RESPONSES TO SUBMISSIONS

A summary of the submissions received on transport associated with the Gas Field and a response to those submissions is provided in *Table 3.14.1*.

Table 3.14.1 Responses to Submissions on the Draft EIS

Issue Raised	QCLNG Response	Relevant Submissions(s)
QGC must account for road infrastructure upgrading, maintenance and other mitigation measures required by its activities.	Refer to *Section 14.3.5.3*	36
Conduct a traffic impact study and submit a Traffic Management Plan prior to construction.	Refer to *Section 14.3.5.6*	
Fund all road upgrades and maintenance necessitated by QGC activities based on studies before and after activities.	Refer to *Section 14.3.5.7*	
All weather roads required to access camps.	QGC will provide all weather roads as access to construction camps in the Gas Field	
Safety of roads is a concern, particularly Chinchilla-Tara Road	Refer to *Section 14.3.5.4*	19
The Supplementary EIS should include a Crash Assessment and Safety Review of the impacted state-controlled roads in accordance with Guideline for Assessment or Road Impacts of Development (GARID) 2006 or as amended. The proponent and their consultants should work closely with the relevant contacts.	Refer to *Section 14.3.5.4*	27
The supplementary EIS should clarify requirements and ability to comply with all permit requirements for works within the State Controlled Road (SCR) corridor in accordance with the *Transport Infrastructure Act (Qld) 1994*.	Refer to *Section 14.3.5.5*	27
Clarification of the general construction methods and standards that will be necessary for any pipe work under the SCR corridor such as the requirement to include	Refer to *Section 14.3.5.5*	27

Issue Raised	QCLNG Response	Relevant Submissions(s)
an enveloper pipe for all proposed and existing SCR crossings should also be detailed.		
The EIS states the proposal to stockpile Project-related material close to 'main roads'. Stockpiles of project-related material shall not be within the state-controlled road corridor or safety clear zones	QGC duly notes that stockpiles are not to be located within the state-controlled road corridor or safety clear zones. This will be factored into the logistics planning process.	27
The supplementary EIS should additionally detail that Traffic Management Plans (TMP) shall be prepared and submitted to the department for approval for traffic control of construction activities impacting on state-controlled roads. It should be noted that there have been recent changes to the requirements for training for persons preparing TMP's which require compliance.	Refer to *Section 14.3.5.6*	27
In order for WDRC to assess the level of operation and maintenance that will be required for the aerodromes that will be utilised, the WDRC requests that the proponent provides details of the types of planes to be used and number and frequency of flights. Should usage of these aerodromes be considered in excess of levels expected, WDRC will require a contribution towards the upgrading, operation and maintenance of these aerodromes.	Refer to *Section 14.3.4.4*	36
Carbon Energy shares some access roads and needs to be assured that access to their tenements will be unaffected	QGC has no intention of preventing access by Carbon Energy to its tenements.	38

14.3 CHANGES TO PROJECT DESCRIPTION

Due to a number of changes that have occurred in the Project description (refer to *Volume 2 Chapters 7* and *11*) the road impact assessment study has been revised for the pipelines and gas field components of the Project.

Key elements that have impacted the transport numbers are:

- Increased length of gas and water gathering pipelines
- Increase in the identified volume of quarry material required
- Increase in the construction workforce numbers and a doubling of the Gas Field accommodation camp requirements during construction
- Increase in the number of field compressor stations (FCSs) over the life of the Project
- Decrease in the number of units required for each central processing plant (CPP) due to a change in the type of compressor units proposed

- Decrease in the number of Tri-ethylene glycol (TEG) units due to the changes in relation to the CPPs
- Addition of water treatment plant equipment
- Addition of electrical power supply equipment.

A logistics study has been carried out and QGC is committed to using rail transport and developing a long-term relationship with Queensland Rail throughout the field life cycle. It is QGC's intention to make rail transport a central plank of its logistics network and to use all available rail paths as they become available. Consolidation centres will be set up to move as much freight as possible off the road and on to rail transport. To present a range of impacts, the transport study has analysed two cases:

- All transport by road
- 75% transport by rail from port to Miles.

Whilst multimodal transport (e.g. rail to Chinchilla or Miles and then by road) has not been assessed in detail an assumption that 75 per cent of the material being delivered to the Gas Field area during the construction phase (i.e. up to 2014) and 100 per cent post construction (i.e. from 2015 onward) can be transported by rail has been considered. This has been undertaken to provide a realistic comparison to the worst case loads and impacts on pavement life from road transport on the various routes.

This chapter addresses the revised transport numbers as they relate to the Gas Field component of the Project and that portion of the Pipeline Component material that will be transported within the Gas Field area. Of the Pipeline Component (refer to *Volume 4 Chapter 13*) approximately 60 per cent of the 1050 diameter pipe required for the Export Pipeline and the gas Collection Header will be transported from Brisbane via Miles (i.e. through the Gas Field area). All of the materials required for the water Collection Header will be transported through the Gas Field area. As this pipe transport and the Gas Field materials transport are cumulative for the regional transport networks they have been addressed jointly in this chapter.

14.3.1 Time Span of Haulage

The proposal is to develop 6,000 wells over a period of 23 years. Based on the current schedule this would equate to 500 wells developed in the peak year of construction (approximately 2012). The construction is due to commence in 2010 and wells, gathering lines, FCSs and trunkline construction will be ongoing until 2032.

Post 2014 generated traffic will reduce as the activities will include operating and maintaining the well heads, the field compressor stations (FCS) and the central processing plants (CPP), and construction activities will be at a reduced rate to that in the peak year of 2012.

14.3.2 Terminology and Approach

In this section the following terminology has been used:

- Trucks: the number of truck loads to transport the materials
- Vehicle: any other project vehicles (construction worker transport)
- Trips: one trip is the movement of a truck/vehicle from its origin to its destination. The return movement is counted as a separate trip.

A preliminary road impact assessment has been carried out for the pipelines and is provided in *Appendix 3.5.*

14.3.3 Methodology

The Gas Field development is considered in two phases:

- First gas – which is defined as the period up to and including 2014
- Remaining development – which is defined as the period post 2014

The first gas phase will cover:

- 1,500 gas wells and associated gas and water pipelines
- Four CPP's
- Twenty FCS's
- Gas and water trunk pipelines (connecting the FCSs and the CPPs)
- 3 WTPs
- Water balancing storages, brine evaporation basins and salt landfills
- Electricity transmission network
- Borrow pits
- Access tracks.

The remaining development will include the development of a further 4,000 wells and associated gas and water gathering pipelines a further 33 FCS's and associated electrical supply, gas and water trunklines, water storages, borrow pits and access tracks.

The original base case used in the draft EIS assumed all materials would be transported by road from Brisbane or other areas to the south. 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. This approach has again been used for the supplementary EIS.

However as previously stated it is QGC's intention to use rail where this is available. An assessment of the impacts resulting if 75 per cent of the material being delivered to the gas field area during the first gas phase (i.e. up to 2014) and 100 per cent during the remaining development (i.e. from 2015 onward)

were to be transported by rail between the Port of Brisbane and the town of Miles has been carried out as a realistic comparison to the worst case.

Potential vehicle numbers have been calculated to cover transport of all materials, mobilisation and demobilisation of plant, equipment and camps and construction worker movements.

The impact on the state-controlled network for the duration of the field development work has been reassessed 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. A list of the state-controlled roads potentially affected by the Project is provided in *Annex A-1.1*.

Once this impact assessment was conducted, the EIS significance assessment methodology as described in *Volume 1, Chapter 4* 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 (refer to *Annex A-1.1*) have been considered but will not be confirmed until a transport contractor is appointed prior to construction. These roads are unchanged from those given in the draft EIS.

14.3.4 Existing Environment

14.3.4.1 Existing Road Network

The key roads with the potential to be impacted were identified and described in the draft EIS. This has not changed.

14.3.4.2 Existing Road Traffic Volumes

Data was obtained for the draft EIS from the relevant DTMR regional offices (i.e. Darling Downs and South West) in relation to the existing traffic volumes on the potentially affected roads. New data has not been sourced at this stage but this will be done once the transport strategy has been finalised and the relevant roads and their actual loads have been finally determined. The revised studies therefore focus on changes in the Project traffic when compared to the original DTMR data used in the draft EIS.

14.3.4.3 Existing Rail Network

As discussed in the draft EIS there are no construction works for the Gas Field proposed in or adjacent to any rail reserve.

Management measures in place during construction will ensure that no unauthorised access to rail infrastructure occurs as a result of Project activities.

As stated QGC is committed to the use of rail for transport and is in negotiations with rail transport providers to try and maximise transport of all materials, plant and equipment by rail.

14.3.4.4 Existing Aerodromes

Six aerodromes/airfields have been identified within two to four hours driving distance of the potential camp locations for the Gas Field development. These are:

- Miles Airfield (uncertified)
- Chinchilla Aerodrome (registered)
- Dalby Airfield (uncertified)
- Taroom Aerodrome (registered)
- Toowoomba Aerodrome (certified)
- Roma Aerodrome (certified)

Chinchilla Aerodrome is already being used by QGC for charter flights to minimise personnel driving long distances to the Gas Field area.

Apart from Toowoomba and Roma, both of which are at least two hours drive to the nearest camp location, the other aerodromes/airfields would require some form of upgrade to cater for the volume of traffic needed to support the QCLNG Project. Upgrades that may be required could include:

- Pavement (Pavement Classification Number of 7.4 is required for a Dash 8 - 100)
- Runway dimension (length, width)
- Amenity (hangers, terminal, etc)
- Lighting (landing, taxi lights)
- Security
- Navigation (beacons, etc)
- Emergency (rescue, fire response, etc)
- Ground Services (fuelling, communications, etc)

QGC is considering all options in its logistics studies.

14.3.5 Potential Impacts and Mitigation Measures

14.3.5.1 Transport Methods

As previously discussed the transport of plant and materials for Gas Field development will be delivered by a combination of shipping, rail and road transport. The key items to be transported have been reviewed to take into account any Project changes as set out in *Volume 2 Chapters 7 and 11* (e.g. connection of grid power). The key traffic generation is expected to result from:

- Well site equipment (bore casings, separator units, drilling machinery)
- Transport of line pipe for the various pipelines (i.e. gas and water trunklines and gas and water gathering lines)
- Screw and centrifugal compressors
- Tri-ethylene glycol (TEG) units
- Campsite components (modular buildings)
- Fuel supplies
- Heavy plant for construction, e.g. bulldozers, graders, trucks, excavators, loaders, side boom tractors, padding machines, wheel ditching machines and water trucks
- Quarry materials for access tracks and hardstands around wells, facilities and camps
- Construction personnel; work based and non-work based trips
- General supplies (e.g. food, cleaning materials etc)
- Water treatment plant (WTP) and chemicals components
- Substations
- Powerlines.

All numbers given in this chapter relate to the total life of the Project (i.e. construction and operations).

Well site equipment

The transportation of well equipment is expected to add additional trucks as a result of the delivery of well skids, general well equipment, bore casings, separator units, compressors and drilling machinery. The truck numbers for this transport, based on the Project changes compared to those given in the draft EIS, are given in *Table 3.14.2.* There has been a marked decrease in the number of trucks required to transport bore casings as the original studies assumed that almost 2 trucks were required to transport bore casing and other equipment associated with the development of each well. The logistics studies have shown that this was inaccurate and that large quantities of material for each well could be transported on a single truck (e.g. the bore

casings for 13 wells can be carried on a single truck). However the number of trucks required to transport separator units were found to double. The net result however is approximately a 43 per cent reduction in the overall number of trucks required to transport materials for well production over the life of the Project.

Table 3.14.2 Transport volumes for well production

Equipment	Total trucks		Trips/day		Approximate number of days over the life of the project	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
General products	11,992	11,841	6	6	3997	3947
Bore casings	11,992	471	12	12	2004	79
Separators	1,008	1,929	2	2	1008	1929
Total	**24,992**	**14,241**	**20**	**20**		

Interconnecting pipes for gathering lines

The proposed pipelines in the Gas Field include the connection of wells to the FCS and the FCS to the CPPs. The truck numbers for this transport, based on the Project changes compared to those given in the draft EIS, are given in *Table 3.14.3*. Truck numbers for transport of other pipe (i.e. gas and water collection header and export pipeline) are given in *Volume 4 Chapter 13*. Due to the increase in gas and water gathering line required, the total number of trucks required to deliver gathering and trunk lines has increased by approximately 110 per cent.

Table 3.14.3 Transport volumes for pipe deliveries

Pipe description	Approximate length (km)		Pipe diameter (mm)		Total trucks		Approx. maximum trips/day over the life of the Project	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
Gas gathering pipe (HDPE)	1,000	6,716	315	315	3,586	7,462	4	4
Water gathering pipe (HDPE)	1,000	6,716	315	315	1,032	7,462	2	2
Water trunk pipe (HDPE/steel)	2,000	580	450	800	4,032	4,603	2	2
Gas trunk pipeline (FCS to CPP pipe (fibre reinforced plastic))	400	1,600	315	600-800	1,431	1,178	4	4
Total	**4,400**	**15,612**			**10,106**	**21,305**	**12**	**12**

Screw and reciprocating / centrifugal compressors

The construction of four CPP's and 53 FCS's (containing a maximum of eight screw compressors for some FCS), comprises a total of 8 centrifugal compressors and a total of 200 screw compressors between the 57 sites.

The screw compressors require one 7 tonne cooler unit each.

Haulage requirements by heavy vehicle are set out in *Table 3.14.4.* Changes in the number of trucks required resulted from changes in the Project description (refer to *Volume 2 Chapter 7*) which altered the number and type of compressors to be used.

Table 3.14.4 Transport volumes for FCS and CPP

Compressor type	Total trucks		Trips/day		Approximate number of days over the life of the project	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
Reciprocating (CPP)	270	N/A				
Centrifugal (CPP)	N/A	8	20	2	27	8
Screw (FCS)	648	318	16	24	81	53
Total	**918**	**326**			**108**	**61**

Triethylene Glycol (TEG) units

TEG units will be transported to the CPP's as an ancillary component where there will be one TEG unit per centrifugal compressor. Each TEG unit is transported on one multi axle platform vehicle. Eight TEG units are required during the development of the CSG fields. Traffic volumes generated by the delivery of the TEG units to the CPP's as they are developed have been estimated in *Table 3.14.5*. In the draft EIS it was assumed that one TEG unit would be required for every two reciprocating compressors. The change from reciprocating to centrifugal compressors has therefore reduced the number of TEG units required.

Table 3.14.5 Truck volumes delivering TEG units

Component	Total trucks		Trips/day		Approximate number of days over the life of the project	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
Tri-ethylene glycol unit	135	8	6	2	45	8

Campsite components (modular buildings)

It has been determined that up to 10 accommodation camps may be required for the Gas Field development work compared to five in the draft EIS. These camps would range in size depending upon their location and the activities being carried out. This has been discussed in *Volume 2 Chapter 11.* The transport numbers for the increased number of units for the camps are set out in *Table 3.14.6.*

Table 3.14.6 Truck volumes construction of Gas Field camp

Item	Quantity of item		Units required		Truck loads	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
Rooms	230	1286	12 m x 3 m	12 m x 3 m	230	1,286
Central ablution	7	20	12 m x 9 m	36 m x 9 m	21	180
Mess	2	37	12 m x 33 m	48 m x 12 m	22	592
Recreation room	1	37	12 m x 33 m	48 m x 12 m	11	592
Offices	3	43	12 m x 33 m	12 m x 3 m	33	43
Furniture and fittings					317	78
Total trucks per camp					**634**	**2,771**

Fuel transport for drilling operations

Based on the fuel usage for the wells currently under construction within existing approvals it is estimated that some 260 million litres of fuel will be required over the life of the project to support drilling operations. It is assumed that the fuel will be hauled from Brisbane in 25,000 litre tankers at an average rate of three tankers per day during the peak construction period. The haulage of the fuel is set out in *Table 3.14.7.*

Table 3.14.7 Fuel supplies

Equipment	Total trucks		Trips/day		Approximate number of days over the life of the Project	
	draft EIS	sEIS	draft EIS	sEIS	draft EIS	sEIS
General fuel	10,920	10,383	6	6	3,640	2,596
Total	**10,920**	**10,383**	**6**	**6**	**3,640**	**2,596**

Heavy plant

The well, pipeline and compressor site preparation requires the use of several different types of heavy plant equipment. The quantity of each specific type of plant expected within the gas field precincts is set out in *Table 3.14.8*. It is anticipated that the plant will be transported to site from south-east Queensland via state controlled roads initially, and remain within the QGC tenements for the duration of that site specific construction. There has been a marked increase in the total number of trucks carrying heavy plant as a result of a significant increase in the anticipated number of drill rig movements.

Table 3.14.8 Heavy plant required quantities

Plant item	Transported via	Quantity required		Truck loads	
		draft EIS	sEIS	draft EIS	sEIS
Bulldozers	Semitrailer	10	10	10	10
Graders	Independent	20	20	20	20
Rollers	Semitrailer	5	5	8	8
Excavators	Semitrailer	20	20	20	20
Boom cranes	Independent	4	4	4	4
Heavy cranes	Independent	2	2	2	2
Drill rigs	Independent	20	833 min.	20	833 min.
Total				**84**	**897 min.**

Quarry Material

The locations from where quarry products would be sourced have not been finalised but every effort will be made to keep the transport distance to a minimum. To this end it is anticipated that borrow pits will be set up within the tenement area. For the purpose of this assessment it has been assumed that the quarry material will be sourced from the existing quarry north of Dalby (53 per cent) and borrow pits within the area (47 per cent). The quantities of quarry material required for the development of the Gas Field are illustrated in *Table 3.14.9*. Due to the increase in the estimate of quarry material required the total number of truck movements has increased by approximately 120 per cent.

Table 3.14.9 Quarry material requirements

Item	Material		Volume (m^3)		Approximate weight (tonnes)		Truck loads(28 t/truck)	
	draft EIS	sEIS	draft EIS	suEIS	draft EIS	sEIS	draft EIS	sEIS
WTP's		Gravel/Soil/ Fill		15,360		30,720		1,098
Camps	Gravel	Gravel/Soil/ Fill	30,000	135,000	72,000	270,000	2,570	9,643
Access tracks	Gravel	Road Base	1,000,000	3,190,764	2,400,000	6,6062,452	85,720	216,516
CPPs	Gravel	Gravel/Soil/ Fill	47,000	150,400	113,200	300,800	4,040	10,743
FCSs	Gravel	Gravel/Soil/ Fill	101,000	556,500	242,600	1,113,000	8,660	39,750
Well heads	Gravel	Gravel/Soil/ Fill	2,250,000	4,876,200	5,400,000	9,752,400	193,000	348,300
Trunk/gathering lines		Sand		184,800		369,600		13,200
Total			**3,428,000**	**8,690,960**	**8,227,800**	**17,276,920**	**293,990**	**639,250**

Camp and Personnel Traffic

The draft EIS assumed that the peak workforce for the Gas Field would be approximately 2,000 personnel. The revised gas field construction workforce for the sEIS is assumed to peak at approximately 3,850. Personnel are expected to be accommodated in up to ten camps at four key locations. The breakdown of trips associated with this workforce in the draft EIS was based on an average per camp. The logistics study has enabled this to be broken down further into the potential trips for each of the four identified camp locations as set out in *Table 3.14.10.*

Table 3.14.10 Generated personnel traffic movements

Origin & Destination				Camp to Town	Camp to Site	Camp to Town	Camp to Airfield	Total Trips (vpd) Gas Fields
Purpose				Camp/ Workshop/ Office	Field Workers (Work based)	Field Workers (Non-Work based)	Roster on/off	
Person Trips/day				2	2	0.4	2	
Vehicle Occupancy				1	2	1.2	34	
Peak Camp total Personnel – Gas Field Development	Ruby Jo	1317	Personnel	132	1185	1317	439	1914
			Trips	264	1185	439	26	
	Jordan	912	Personnel	92	820	912	304	1326
			Trips	184	820	304	18	
	Woleebee Creek	1731	Personnel	174	1557	1731	577	2516
			Trips	348	1557	577	34	
	Bellevue	500	Personnel	50	450	500	167	727
			Trips	100	450	167	10	

Water Treatment Plant (WTP)

Plant and equipment for the water treatment plant would be transported in approximately 12 m long containers. It is estimated that six containers would be required per mega litre per day. Based on the assumption of a total of approximately 170 ML of water treatment plant this would equate to 1,050 truck loads or 2,100 trips over the construction phase of the Project. If all of the materials were delivered over the first two years of the construction phase this would average out to approximately three trips per day.

Power Supply

The provision of power to the CPPs and FCSs will require the transport of various pieces of equipment ranging from poles for carrying the cables to substation transformers. Transport numbers associated with the transport of power supply elements are set out in *Table 3.14.11.*

Table 3.14.11 Power supply elements

Item	Truck loads	Trips
Poles	2,463	4,926
Foundation Pile	175	350
Foundation Pile cap	175	350
Insulators	296	592
Conductors	315	630
Cross Arms	14	28
Transformers	366	732
Switches	49	98
Breakers	49	98
TOTAL	**3,902**	**7,804**

14.3.5.2 Traffic Generation

Assessing potential impacts on the road network at this early stage of the Project requires a number of assumptions in relation to the distribution of the activities described in *Section 14.3.5.1*. The assumptions adopted for this preliminary assessment were:

- generated traffic on each road assumes the peak year of construction (i.e. 500 wells per year)
- FCSs will be developed progressively in relation to the wells.

On the basis of the information set out in *Section 14.3.5.1* of this sEIS the number of trucks for each transport element, over the life of the Project, has been summarised in *Table 3.14.12*; where a truck will equate to two trips (i.e. in loaded and out empty).

Table 3.14.12 Transport Numbers – Gas Field

Item	Truck Numbers	
	Draft EIS	sEIS
Pipe transport		
Gas gathering	3,586	7,462
Water gathering	1,032	7,462
Gas trunklines	1,431	1,778
Water trunklines	4,032	4,603
Quarry transport		
Pipelines	4,937	8,674
Gas Field	293,990	639,250
Construction Camp components		
Pipelines	185 per camp	1,005
Gas Field	635 per camp	2,770
Camp and Personnel movements		
Pipelines	260 trips/day/camp	360 trips/day/camp average
Gas Field	880 trips/day/camp	1520 trips/day/camp

Item	Truck Numbers	
		average
Compressor unit transport		
CPPs	270	8
FCSs	648	318
Well equipment transport	24,990	14,240
TEG Units	135	8
Pipeline Facilities	140	105
Heavy Plant equipment		
Pipelines	144	72
Gas Field	84	897
Fuel	10,920	10,383
WTP	N/A	1,050
Power Supply	N/A	3,902

In addition to the above truck numbers there will also be a number of pipe transport trucks operating on the same routes as the gas field transport. These trucks have been set out in *Volume 4 Chapter 13*. The trucks that will operate in the gas field area are restated here for clarity (refer to *Table 3.14.13*).

Table 3.14.13 Transport Numbers – Pipeline component transported in Gas Field area

Item	Truck Numbers	
	Draft EIS	Supplementary EIS
Export Pipeline – Brisbane	0	5,500
Gas Collection Header	0	1,980
Water Collection Header	1,956	1,518
Field Joint Coating	134	97

An estimate of the potential Project-generated transport numbers per route has been made in *Appendix 3.5*. This has been summarised in *Figure 3.14.1*.

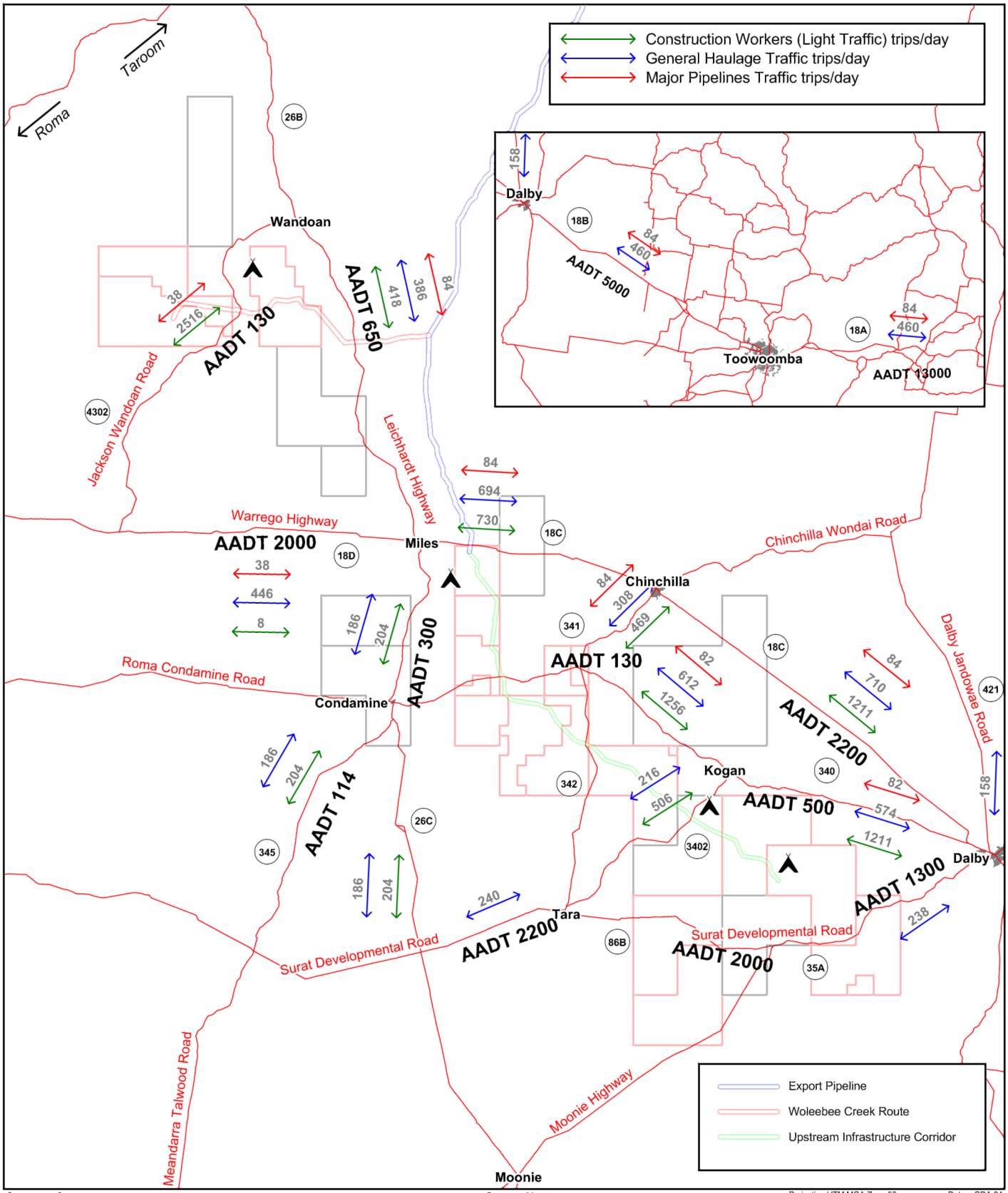
14.3.5.3 Road Impacts

Traffic Impacts

Annual Average Daily Traffic

Where the percentage increase in annual average daily traffic (AADT) as a result of a project exceeds 5 per cent of the current AADT the DTMR Guidelines deem this to be a significant effect. A summary of the existing AADT, projected project transport numbers and the calculated percentage increase is provided in *Table 3.14.14.*

A diagrammatic representation of the current AADT, truck loads, and construction worker vehicles long the state controlled network is given in *Figure 3.14.1*.



Legend:

Gas Fields - Authority to Prospect

Gas Fields - Petroleum Lease/Petroleum Lease Application

Proposed Camps

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 **Transport Routes Gas Field and Pipelines**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Mipela	sEIS Volume 3 Figure	s3.14.1
Approved	CDP	File No:	QC02-T-MA-00146
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It can be seen that if all of the materials are transported by road, 78 per cent of the roads along the routes would have an increase in AADT in excess of 5 per cent. However, this may only occur in sections of any one particular route and may not occur along the entire route. For example, the section of the Warrego Highway from Ipswich to Toowoomba is affected by less than 5 per cent whilst the section from Toowoomba to Dalby experiences a 10 per cent increase. It can also be seen (refer to *Table 3.14.14*) that the transport of quarry material is the single largest material transport item although modelling assumes 53 per cent is transported from Dalby and 47 per cent from a source local to the use and ways of reducing this impact are being investigated.

Table 3.14.14 AADT percentage increase on State-controlled roads

Road	Section	Current AADT	Generated traffic volumes (vpd)	Maximum impact
Logan Motorway	-	42,798	156	<5%
Gateway Motorway	Prebble Street	86,000	156	<5%
Port of Brisbane Motorway	-	14,840	156	<5%
Cunningham Arterial (Ipswich Motorway)	Rocklea	75,060	264	<5%
	Redbank	78,120	264	<5%
Warrego Highway	Ipswich–Toowoomba	13,000–20,500	460	<5%
	Toowoomba–Dalby	4500–17,500	460	10%
	Dalby–Miles	2100–6500	672–1883	27–79%
	Miles–Roma	1200–3000	446–454	17–36%
Leichhardt Highway	Taroom–Miles	600–700	590–804	90–126%
	Miles–Goondiwindi	300–1850	390	82%
Bruce Highway	Maryborough–Gin Gin	3290–4390	84	<5%
	Gin Gin–Benaraby	3050–5030	84	<5%
	Benaraby–Rockhampton	3500–4600	124–155	<5% – 16%
Leichhardt Highway	Taroom–Miles	600–700	590–804	90–126%
	Miles–Goondiwindi	300–1850	390	82%
Moonie Highway	Dalby–St George	1300–6400	238	<5% – 18%
Surat Developmental Road	Dalby–St George	1300–6400	238	<5% – 18%
Dalby–Kogan Road		300–500	1785	350–576%
Kogan–Condamine Road		130	1868	1437%
Condamine–Meandarra Road		114	186	163%
Chinchilla–Tara Road		350–720	593–653	91–169%
Tara–Kogan Road		160	722	229%
Jackson–Wandoan Road		70–200	2902–2966	2198–4494%
Dalby–Jandowae Road		600–800	258	32%

Level of Service

The increase in AADT can lead to some alterations in the 'level of service' (LOS) experienced on a road. 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.

The DMR *Road planning and design manual* (*Chapter 5*, August 2004) and 'Guide to traffic engineering practice–Part 2' (*Table 3.9*, *Austroads* 1988) [*GTEP -PT2*] sets out the maximum AADT's for various levels of service as shown in *Table 3.14.15*.

Table 3.14.15 Adopted maximum AADTs for various levels of service

Level of service				
A	**B**	**C**	**D**	**E**
Level terrain				
2000	4000	6550	11,200	19,000
Rolling terrain				
830	2300	4300	6600	12,300

The AADT increases as a result of the project transport have been compared for each route (refer to Appendix 3.5) to determine if there is a change in LOS as a result of the increases. Routes on which a change to level of service may be experiences are summarised here:

- Warrego Highway (Dalby–Miles) from LOS B–C to LOS B–D
- Jackson Wandoan Road from LOS A to LOS B–C.

The requirements for road improvement works as a result of any changes in LOS are being investigated in greater detail in the next phase of the Project.

Traffic Congestion

The volume of traffic generated through Toowoomba has been calculated at 460 vehicles per day. The impact of this at peak times has been assessed based on 10 per cent of the traffic occurring at this time. This would give an increase in traffic on the Warrego Highway through Toowoomba of 46 vehicles per hour. It has been assumed that this would be split 70 per cent/30 per cent in a given direction creating an increase in the major direction of 32 vehicles per hour. The assessment found that this would not have a negative impact on the operation of intersections through Toowoomba.

A short section of the Warrego Highway between the Moonie Highway and Dalby–Jandowae Road is expected to carry an increase of up to 1,883 vehicles per day (refer to *Appendix 3.5*). Adopting a 70 per cent/30 per cent directional split and assuming 10% of daily volume in the peak, this equates to

an approximate peak hourly increase of 130 vehicles per hour. This may have an impact on the operation of the intersections on this section of road which will be confirmed in consultation with the Department of Transport and Main Roads (DTMR).

The access to the construction camps will have the most impact on the road network. These accesses will affect roads with an AADT of less than 2000. The maximum numbers of vehicles leaving and entering the camp at any one peak hour period is expected to be 160 vehicles. As reported in the draft EIS the average delays to vehicles entering and leaving the camps either at the camp access itself or at intersections on the road network is, on average, expected to be less than two seconds. At present the definitive locations of these camps has not been decided, and assessment of the intersections with the road network will be conducted post confirmation.

For intersections in rural areas, the peak hour is based on 10 per cent of the daily heavy vehicle movement. This is expected to increase the hourly heavy vehicle volume in the peak hour, on roads with current AADT of less than 2000 (i.e. 200 vehicles in the peak hour), by between 6 and 30 vehicles, depending on the area.

Road Pavement Integrity

A revised study has been carried out to assess the potential impacts on assumed transport routes (refer to *Appendix 3.5*) based on the estimated Project traffic (refer to *Section 14.3.5.1)*).

DTMR requires that developments that result in a significant increase in heavy commercial vehicle traffic assess the potential impacts on the pavement life and the potential for increased maintenance of the road pavement. The proponent is then required to pay the cost of the increased maintenance resulting from their activities.

Road pavements are designed for a 20 year life and to carry a pre-determined level of traffic. The level of traffic is based on equivalent standard axles (ESA) which is a measure for relating all vehicles (i.e. cars, trucks, articulated lorries and road trains) back to a common design value for impacts to pavement life. 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.

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 DTMR regional offices for the draft EIS.

Pavement loading associated with the QCLNG Project transport has been calculated for the 20 year life of the pavement for each road unit (refer to *Appendix 3.5*).

Based on these calculations a list of the state controlled roads where the average daily produced ESA is greater than 5 per cent of the current ESA has been compiled (refer to *Table 3.14.16*). *Table 3.14.16* takes into account traffic generated for both the Gas Field Component of the Project and that portion of the Pipeline Component that will be transported on the same transport networks as the Gas Field materials. The increase in the 20-year pavement loading as a result of this impact is also summarised in *Table 3.14.16*.

Table 3.14.16 Pavement impact on state-controlled roads due to transport associated with the Gas Field area

Road	Section	Generated ESAs (ESA/year)	Maximum impact (ESA/year)	Number of days over the life of the Project	Increase in 20 year pavement loading
Port of Brisbane Motorway	Prebble Street	4.50×10^3	<5.0%	1992	<0.1%
Gateway Motorway		4.48×10^3		1992	
Logan Motorway		5.05×10^3		1992	
Ipswich Motorway		5.26×10^3	<5.0%	1992	<0.1%
Warrego Highway	Ipswich–Toowoomba	1.02×10^4	<5.0%	8077	0.4% – 0.7%
	Toowoomba City	1.02×10^4	<5.0%	8077	0.4% – 0.7%
	Toowoomba–Dalby	1.02×10^4	<5.0%	8077	0.6% – 3.9%
	Dalby–Miles	1.43×10^5 - 1.46×10^5	23.55% – 44.67%	2597 – 8077	9.62% – 23.0%
	Miles–Roma	1.48×10^5 – 1.50×10^5	37.1% – 59.9%	605 – 616	1.9% – 3.0%
Leichhardt Highway	Miles–Goondiwindi	1.39×10^5	141.9%	1198	13.6%
	Taroom–Miles	1.24×10^4 – 1.39×10^5	9.5% – 99.5%	68 – 1002	0.3% – 8.3%
Moonie Highway	Dalby–St George	1.40×10^5	59.4% – 95.7%	2352	15.4% – 25.8%
Surat Developmental Road	Tara–Dalby	1.39×10^5 – 1.40×10^5	140.3% – 206.61%	735 – 897	12.7% – 16.6%
Dalby–Kogan Road		1.43×10^5	202.8% – 340.1%	2930	49.4% – 89.94%
Kogan–Condamine Road		1.43×10^5	445.9%	2925	108.4%
Condamine–Meandarra Road		1.33×10^5	456.1%	357	20.51%
Chinchilla–Tara Road		8.30×10^2 – 1.33×10^5	<5.0% – 285.2%	5 – 409	<0.1% – 9.69%
Tara–Kogan Road		1.45×10^5	1422.3%	532	74.07%
Jackson–Wandoan Road		1.37×10^5 – 1.51×10^5	896.0% – 1799.0%	464 – 605	34.55% – 90.44%
Dalby–Jandowae Road		8.44×10^5	1204.5%	1272	184.34%

The impact of the haulage on the Warrego Highway over the sections from Ipswich to Toowoomba and Toowoomba to Dalby is less than the 5 per cent stated in the DMR Guidelines and is therefore considered not to be significant.

Past Dalby the impact of the haulage on the 20 year pavement loading on sections of the Warrego Highway is significant (e.g. Dalby–Miles and Miles–Roma). Other routes that also potentially have significant impacts on the 20 year pavement loading are:

- Leichhardt Highway (Miles–Goondiwindi)
- Moonie Highway (Dalby–St George)
- Surat Developmental Road (Tara–Dalby)
- Dalby–Kogan Road
- Kogan–Condamine Road
- Jackson–Wandoan Road
- Dalby–Jandowae Road.

The proposed transport of all Project materials on these roads would exceed the usage of the 20 year design load by 5 per cent or greater as specified by the DTMR Guidelines.

If 75 per cent of the construction phase and 100 percent of the post construction phase materials brought into the Gas Field area can be transported by rail this would reduce the project impacts on routes up to Miles (refer *Appendix 3.5*). The tables set out in *Appendix 3.5* show that there is the potential to reduce the pavement impacts on the Warrego Highway between Toowoomba and Dalby by up to 48 percent over the life of the project. Similarly the pavement impacts on the Warrego Highway between Dalby and Miles may be reduced by up to 16 percent over the same period.

Past Dalby the materials would still require movement via the road network centred around Miles, and therefore the impact on local government roads would not be altered by the use of rail. As stated in the draft EIS the majority of the local government roads are unsealed and mitigation measures will need to be addressed on a road by road basis once the actual transport routes have been confirmed.

A road condition audit will be carried out in consultation with Council prior to the cartage of any materials on Council's roads. The audit will be carried out once a final transport strategy has been determined.

Any identified road improvements or maintenance requirements will be agreed with DTMR or Council and will be carried out in accordance with DTMR or Council design standards and maintenance regimes.

Any alterations or repairs will be carried out in accordance with DTMR or Council's design specifications.

14.3.5.4 Crash Assessment and Safety Review

A crash assessment of the impacted state-controlled roads in accordance with *Guideline for Assessment or Road Impacts of Development (GARID) 2006* or as amended will be carried out once a transport contractor has been appointed and the transport routes and modes finalised.

The proponent and their consultants will work closely with the relevant DTMR contacts in carrying out this assessment.

14.3.5.5 Construction within Road and Rail Reserves

There may be localised traffic disruption associated with constructing a gas or water-gathering pipeline across a road corridor. This work would mainly be on unsealed local roads which are typically open cut, and can take up to six hours to complete. Traffic delays may occur. However, QGC and its contractors will have bypass or detour options agreed with the local road manager (e.g. DTMR, regional council) in place prior to the commencement of these crossings.

Any construction within a road reserve will be agreed with the relevant authority and conform to statutory requirements. If the road is state controlled, an application for an Ancillary Works and Encroachment Permit will be made to the DTMR with supporting documentation detailing the proposed crossing method and depth of cover. Works within state-controlled road corridors will be in accordance with the *Transport Infrastructure Act (Qld) 1994.*

All sealed state-controlled roads will be crossed using trenchless techniques with the boreholes located outside of the road or rail reserve (refer to *Volume 2 Section 12.8*). This should reduce impacts on traffic flow and ensure no damage to road pavement or rail lines.

The feasibility of using trenchless techniques is limited by site conditions including depth required, width of crossing, geology, landform, soil type and service / infrastructure. However, this technique is usually well adapted to both road and rail crossings.

In general crossings of roads will be perpendicular to the centreline of the infrastructure.

Under state-controlled roads all water pipe will be encased in an enveloper for the full width of the crossing. For gas pipelines the pipeline will either be encased in an enveloper or buried at greater depth to ensure no interference to road or rail maintenance techniques. This will be agreed with the relevant authority prior to construction at the time of application for the appropriate permits to construct.

The pipe will be buried to a minimum 1.8 m below the natural surface, or 1.5 m below the bottom of a table drain, whichever is the greater, for the entire width of any state-controlled road reserve. Depth of burial under local government controlled roads will be in accordance with the requirements of the Western Downs Regional Council.

At this stage it is not anticipated that gas field development will intersect with any rail line. If this should change in the future, construction activity adjacent to or across a rail reserve would be carried out in a similar manner to that for state-controlled roads (i.e. crossings would be perpendicular to the rail line, bored with bore pits outside the rail reserve). Any pipe crossing of a rail line will be a minimum of two metres below the rail and 1.2 m below the rail corridor for the full width of the rail corridor.

14.3.5.6 Transport and Traffic Management Measures

Traffic management plans will be prepared and implemented by suitably qualified personnel in accordance with the *Manual of uniform traffic control devices* (MUTCD).

Any works carried out within state-controlled road corridors will be in accordance with DTMR requirements.

14.3.5.7 Procedures for Assessing and Agreeing Mitigation

The studies have considered the worst case whereby all of the Gas Field materials and equipment are transported by road. To give perspective to the potential variation in the impacts a case has also been modelled whereby 75 per cent of the transport is carried out by rail up to 2014 and then 100 per cent post 2014. This has shown that impacts on state-controlled roads between Toowoomba and Dalby could vary greatly (*refer to Figure 3.14.1)*.

QGC considers that it would be highly misleading to use this transport assessment to calculate development contributions as a result of impacts of Project transport at this stage. Rather the assessment has been carried out to identify the areas of most concern for transport and potential road impacts. QGC proposes the following program for finalisation of the road impact assessment:

- Agreement with DTMR that the methodology used for assessing road impacts is appropriate and that the correct factors for calculating ESA loadings is in accordance with the regional offices requirements
- Regular meetings (e.g. 2 monthly) with the relevant road authority (e.g. DTMR regional offices, Western Downs Council) to review the status of the logistics planning and potential rail use
- Upon confirmation of QGC's transportation plan, which would include having reached contractual agreement with a rail transport contractor, QGC will have an appropriately qualified engineering firm recalculate the

AADT, ESA loadings and required development contribution for each of the state-controlled roads identified for transport of materials

- Conduct an audit of condition of all roads in conjunction with the relevant road authority (i.e. DTMR or local government)
- Agree the existing condition of roads
- Agree with the relevant road authority any road works required to be carried out by QGC or its construction contractor prior to the commencement of construction or transportation in a given area
- Agree with the relevant road authority who would undertake any such identified road works.

14.3.6 Conclusion

The model for transport impacts has been reviewed in light of submissions received on the draft EIS and discussions with DTMR. Logistics studies have further refined the transport volumes and confirmed the potential transport routes. The final impact on the road network is still uncertain and will not be finalised until the completion of negotiations with rail transport providers. The model (refer to *Appendix 3.5*) does quantitatively predict, to the greatest extent possible, the likely transport impacts from the development of the Gas Field component of the QCLNG Project should all components need to be transported by road. The model highlights those roads which have the potential to be adversely impacted by the Project. A methodology for determining the overall impact and management strategies has been proposed. No additional mitigation measures have been identified at this stage of the Project.

Depending upon the final transport strategy the overall assessment of impact significance remains moderate to major.

A-1 TRANSPORT ROUTES FOR EXPORT PIPELINE

A-1.1 State Controlled Roads

- Port of Brisbane Road 904
- Gateway Motorway (South) U13A
- Cunningham Arterial U16 (Ipswich Motorway)
- Cunningham Highway 17A (Ipswich Motorway)
- Warrego Highway 18A (Ipswich–Toowoomba) including Cohoe Street and Jones Street, Toowoomba
- Warrego Highway 18B (Toowoomba–Dalby) including James Street, Tor Street and Bridge Street, Toowoomba
- Warrego Highway 18C (Dalby–Miles) and 18D (Miles–Roma)
- Leichhardt Highway 26B (Taroom–Miles) and 26C (Miles–Goondiwindi)
- Moonie Highway 35A (Dalby–St George)
- Surat Developmental Road 86B (Tara–Dalby)
- Dalby–Kogan Road 340
- Chinchilla–Tara Road 341
- Kogan–Condamine Road 342
- Condamine–Meandarra Road 345
- Tara–Kogan Road 3402
- Jackson–Wandoan Road 4302

A-1.2 Local Government Roads

- Aerodrome Road (Chinchilla)
- Amcintyres Road
- Archers Crossing Road
- Avenue Road
- Bakers Road
- Banana Bridge Road
- Bellbird Road
- Bennetts School Road
- Billabong Lane
- Blackburns Road
- Bob Blacks Road
- Boonara Invern Road
- Booral Road
- Boort Koi Road
- Braemar Boundary Road
- Bridles Road
- Brigalow Canaga Creek Road
- Bright Lane
- Broadwater Road
- Brownlies Road
- Bundi Road
- Burunga Lane
- Butlers Road
- Butterfly Road
- Carmodys Lane
- Cartens Lane
- Chances Plain Road
- Chinchilla Kogan Road
- Chinchilla Sixteen Mile Road
- Chinchilla South Road
- Chinchilla Tara Road
- Christopher Road
- Church Road
- Clarke Creek Road
- Clarkes Road
- Coates road
- Community Lane
- Crowders Creek Road
- Crystal Creek Road
- Cunningham Street
- D McIntyres Road
- Dahikes Road
- Dalby Kogan Road
- Davies Road
- Dawson Street
- Daybreak Road
- Ducklo Gulera Road
- Ducklo School Road
- Duleen Daandine Road
- Dunns Road
- Ellerslie Land Road
- Emu Parade
- Eys Road
- Fagans Road
- Farm Lane
- Fletts Road
- Forest Road
- Forestry Road
- Fortune Drive
- Freemans Road
- Frees Road
- Gadsby's Road
- Gales Road
- Gilligulgul Road
- Glen Mona Road
- Glenaubyn Road
- Glenlea Road
- Golden Glow Road
- Goombi Fairymeadow Road
- Goranba Lane
- Grahams Road
- Grosmont Road
- Gulera Road
- Gurulmundi Road
- Hallifo Road
- Happiness Road
- Happy Lane
- Harphams Road
- Harwoods Road
- Healys Crossing Road
- Healys Road
- Heeney Street
- Henrys Road
- Hubbard Road
- Jackson Wandoan Road
- Jenkins Road
- Jones Road
- Joseph Road
- K Road
- K Two Road
- Kentara Road
- Kerrs Road
- Kerswells Road
- Kogan Condamine Road
- Kookaburra Drive
- Kumbarilla Forest Road
- Kumbarilla Lane
- Kumbarilla Road
- Kummerows Road

- L Road off Bundi Road
- Lawton Street
- Leichardt Highway
- Lewington Road
- Lucky Downs Road
- Lucky Road
- Marian Street
- Martins Road
- Mary Road
- McIntyre Street
- McKee Driveive
- McLeods Road
- Miegunyah Court
- Millbank Boundary Road
- Mount Myrtle Road
- Mullers Road
- Myranga Road
- N E Robinsons Road
- Nauschutzs Road
- Neates Road
- North Dulacca Hall Road
- Oak Park Road
- Old Cameby Road
- Old Moonie Road
- Old Perth Road
- Orchard Road
- Paradise Downs Road
- Paradise Road
- Peakes Road
- Quires Road
- Rabbit Board Paddock Access Road
- Redgum Road
- Redmarley Road
- Reserved Road
- Robbos Road
- Rocky Crescent
- Ross Road
- Royd Street
- Ryders Road
- Sandy Creek Road
- Scoullers Road
- Sixteen Mile Hall Road
- Smiths Road
- South Drillham Road
- South Road
- Steinohrts Road
- Sundown Road
- Sunnyglen Road
- Tara Kogan Road
- Terese Road
- The Wallaby Track
- Thompsons Road
- Tomalou Lane
- Unnamed Road Heading East off Kogan Condamine Road
- Vanrenans Road
- Vanrenes Road
- Wains Road
- Warrego Highway
- Wattle Driveive
- Webb Road
- Webers Road
- Weir Lane
- Weir Road
- Weitzels Road
- Weldons Road
- Weranga North Road
- Whyalla Road
- Wieambilla Road
- Wildflower Road
- Willetts Mill road
- Willetts Road
- Winfield Road
- Wintons Road
- Yellowstone Road
- Yeovil Road
- Zupp Road