19. ROADS AND TRANSPORT

This section provides a summary of the road and transport values within and surrounding the project development area and an assessment of the potential for these values to be affected by direct and indirect impacts associated with the construction, operation and decommissioning phases of the project.

For the detailed findings of the project's roads and transport impacts, refer to Appendix M, Road Impact Assessment. Environmental protection objectives have been developed and the avoidance, mitigation and management measures to achieve these objectives identified. The residual impact assessment assumes that the proposed mitigation and management measures have been applied.

19.1 Legislative Context

The following legislation, policy and guidelines are relevant to identifying values and to providing guidance for avoidance, mitigation and management of impacts on roads and transport.

Transport Infrastructure Act 1994. This act sets out the powers of the Department of Transport and Main Roads (DTMR) for managing the state-controlled road network and includes powers to assess the impacts of development. This applies to impacts associated with the Surat Gas Project on the state-controlled road network that traverses the project development area.

Transport Infrastructure (State Controlled Roads) Regulation 2006*.* This regulation relates to access, road works and ancillary works affecting state-controlled roads.

Transport Operations Act 1995. The Transport Operations Act provides broad powers for signage placed on roads. The act involves processes to determine what the safety and infrastructure rules are, relevant for the vehicle type, in the application of official traffic signs.

Transport Operations (Road Use Management – Mass, Dimensions and Loading) Regulation 2005*.* This regulation covers management of vehicles by type on state-controlled roads, including the issue of permits for oversized vehicles.

Transport Operations (Road Use Management – Fatigue Management) Regulation 2008. This regulation provides for the management of driver fatigue for drivers using heavy vehicles.

Road Transport – Heavy Vehicle Driver Fatigue Act 2006. This act provides the basis for laws relating to responsibility for prevention of driver fatigue.

Petroleum and Gas (Production and Safety) Act 2004. Under this act, a holder of a petroleum authority must notify the road authority prior to use of a public road for a 'notifiable road use'. A notifiable road use includes the use of public roads within the project development area for transport relating to a seismic survey or drilling activity, and the use of a public road to haul more than 50,000 t/a of petroleum produced or processed in the area or in the construction of a pipeline. DTMR may give the proponent a 'road use direction' detailing how the petroleum authority holder may use the road for the proposed use.

Guidelines for Assessment of Road Impacts of Development (DMR, 2006)**.** These DTMR guidelines provide advice for assessing potential road impacts of a proposed development and appropriate mitigation measures relevant to roads. The intent of the guidelines has been followed

in conducting the traffic and transport assessment to ensure relevant legislative requirements are taken into consideration.

***Land Protection (Pest and Stock Route Management) Act 2002*.** The Queensland Stock Route Network Management Strategy was developed in accordance with s. 98 of the Land Protection (Pest and Stock Route Management) Act, which requires the chief executive of DERM to prepare a state strategy to direct and coordinate management of the stock route network.

Environmental Protection Act 1994 (EP Act). Under the EP Act, DTMR can be an 'affected person' if the land affected by development is on or adjacent to a state-controlled road and, as an 'affected person', can comment on both the terms of reference and environmental impact statement (EIS). DTMR will assess the impact of the proposed development on affected state-controlled roads during the EIS public exhibition period.

***Sustainable Planning Act 2009*.** This act is the primary planning instrument for Queensland and manages the development process to deliver sustainable outcomes. Under the act, a development permit may be required from DTMR where roads are impacted by a project.

19.2 Assessment Methods

Roads are anticipated to be the main mode of transport used for the Surat Gas Project. The assessment established the current conditions of roads and road networks that are likely to be used for project activities and assessed the predicted impacts on the road values from project-related activities.

19.2.1 Identifying Existing Road Conditions

To establish the current conditions of the roads and road network throughout the project development area, a desktop study and a qualitative assessment were conducted including:

- Review of existing data and information to identify volumes of traffic, construction standard (e.g., sealed or unsealed), rail crossings, stock routes, school bus routes and safety record.
- Characterisation of road types within the project development area and the associated values of each.
- Classification of sensitivity for each road type in relation to its vulnerability to changed traffic conditions.

19.2.2 Impact Assessment Method

This impact assessment was conducted through strategic traffic modelling using the TransCAD transport model.

19.2.3 Strategic Traffic Modelling

Once the existing conditions were established, the traffic volumes expected to be generated during each year of the project were determined. Strategic traffic modelling considered the type of vehicles likely to be used by the project, conceptual travel routes, the period over which each travel route would be used and the anticipated volume of traffic.

Conceptual travel routes, referred to as 'road links' were identified within the project development area. For each road link, a nominal origin and destination were established. For example, one conceptual road link might connect a construction camp where workers are accommodated (the origin) and an integrated processing facility construction site (the destination). The road link between any two points was based on the shortest travel time. DTMR's Darling Downs regional

boundary was used as the source location from which equipment and materials were transported to the conceptual depots at Dalby, Miles and Millmerran.

Traffic generated by workforce personnel during the construction phase has been considered for traffic travelling to and from Toowoomba or Brisbane and traffic travelling to and from production facilities and wells to the construction camps.

Further details on the assumptions used in modelling, including workforce shifts and rosters are provided in Appendix M, Road Impact Assessment.

Once the road links were identified, the level of activity along each road link was established for the life of the project based on the conceptual development schedule. A nominal continuation of project activities past the 35-year project life was conservatively assessed, based on the assumption that wells commissioned near the end of the project life will remain in operation.

With an understanding of the existing conditions of the roads and the predicted traffic volumes, the following were determined:

- Magnitude and significance of the project-related impacts on the road values.
- Measures by which adverse impacts on the roads could be minimised through avoidance, mitigation and management.
- Amenity of roads (Chapter 18, Landscape and Visual Amenity).
- Mechanical vehicle risk of injury (Chapter 25, Preliminary Hazard and Risk).
- Likelihood and nature of spills of products or hazardous materials that can occur during transport, and prevention and response measures for dealing with spills (Chapter 15, Surface Water and Chapter 16, Aquatic Ecology).

19.2.4 Alternate Modes of Transport

Roads have been identified as the key mode of transport for the Surat Gas Project. Three other modes of transport (rail, air and sea) were also considered but for the following reasons have not been assessed further:

- At the time of writing, Arrow did not anticipate the use of rail as a mode of transport for project materials. Potential impacts associated with rail would be limited to the construction of any new roads or pipelines that cross rail lines.
- Arrow has no plans to establish fly-in fly-out operations and intends to employ construction workers based on a hierarchy that prioritises a locally sourced workforce.
- Project-related materials that require freight by sea will be shipped as general freight and no project-specific cargo ships will be required. Therefore, any impacts on ports are expected to be negligible.

19.3 Existing Environment and Environmental Values

This section describes the existing road environment, including functional road types and the existing condition of roads, road safety records, rail crossings, stock routes and school-bus routes within the project development area. The environmental value of each road type is described.

19.3.1 Functional Road Types

Functional road types within each development region are shown in Figure 19.1. Functional road types are classified as follows:

- **Highway.** Highways are high-order roads of a high standard, facilitating connectivity between regional centres.
- **Regional Connecting Road.** Regional connecting roads are high-order roads of a high standard, facilitating connectivity between townships.
- **Rural Connecting Road.** Rural connecting roads are lower-order roads facilitating connectivity between higher-order roads.
- **Rural Access Road.** Rural access roads are low-order roads predominately facilitating access to local uses.

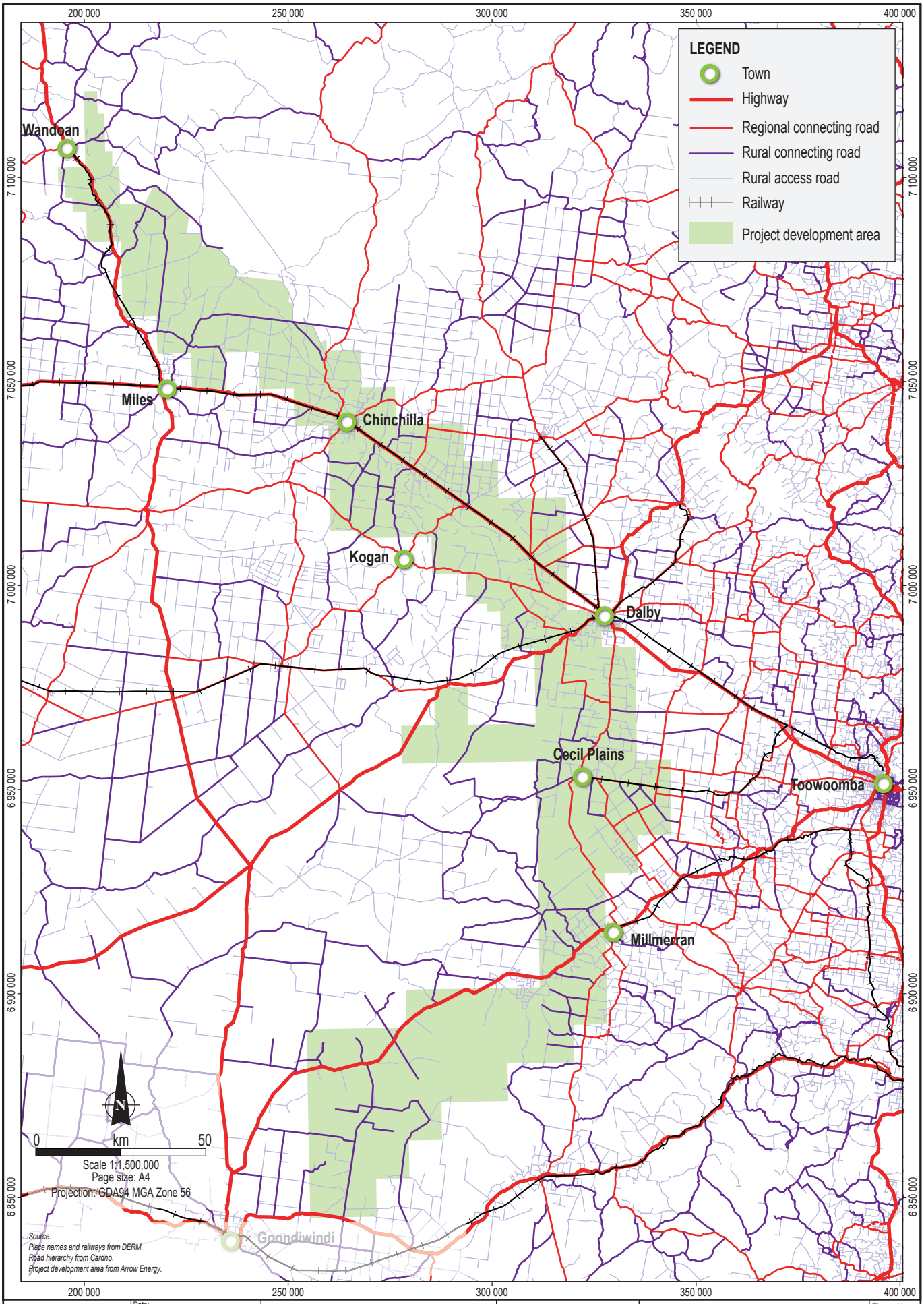
19.3.2 Traffic Growth and Volumes

Traffic growth on roads within the project development area has varied widely depending on proximity to Dalby and other urban areas and on the period over which the observation has been made, with higher growth generally observed in recent years. The volume of traffic on roads within the project development area has typically changed by between -1% per annum (decline) and 3% per annum (growth) over the past 10 years. Higher annual traffic growth rates of between 4% and 8% have, however, been observed at a few isolated locations.

Annual average daily traffic volumes (based on 2009 data) for state-controlled roads within the project development area vary, with highest volumes (1,000 to 2,999 vehicles per day) on roads servicing the main townships (i.e., Chinchilla, Dalby and Millmerran).

19.3.3 Road Conditions

Such features as the standard of road construction, bridge construction (load ratings) and risk of flooding on individual sections of road vary across the project development area. Road-section-specific features, and specific impact of installation of infrastructure on such features as stock routes, will be assessed in greater detail during preparation of road use management plans after the locations of production facilities and associated infrastructure are finalised.



coffey environments	Date: 12.12.2011 MXD: 7040AC_04_GIS113_v1_4 File Name: 7040_04_F19.01_GIS_GL	Arrow Energy Surat Gas Project	arrow energy go further	Functional road type in the project development area	Figure No: 19.1

19.3.4 Road Safety

Crash data sourced from DTMR from April 2004 to March 2009 shows that the crash rate for key rural roads within the project development area varied from 9 crashes per 100 million vehicle kilometres travelled to 67 crashes per 100 million vehicle kilometres travelled. Millmerran Cecil Plains Road reported the highest crash rate, and is the only key road in the project development area that displayed a crash rate above that typically observed in Queensland for its function and construction standard.

19.3.5 Rail Crossings

The few rail lines that intersect the project development area are typically passively-controlled (e.g., through use of signage) and tend to run parallel to highways and regional connecting roads linking major centres. The most significant rail line in the project development area runs parallel to the Warrego Highway.

19.3.6 Stock Routes

Stock routes, established to facilitate the movement of livestock on foot, between grazing areas and markets are abundant throughout the project development area. Stock routes appear to follow watercourses but generally traverse all levels of roads. The stock-route network has evolved and now also caters for animal agistment (contract grazing), recreational horse riding and for the provision of services such as electricity or telecommunications.

19.3.7 School-bus Routes

A number of school-bus routes radiate from the townships within and near the project development area. School-bus routes are typically found around the major towns and use highways and higher-order local roads, such as regional connecting roads.

19.3.8 Public Transport and Infrastructure

Most towns within the project development area have basic pedestrian and bicycle infrastructure. Roads outside of the townships typically do not include dedicated bicycle facilities such as on-road bicycle lanes. Long-distance commercial bus services service the towns; however, no intra-city public transport facilities are provided. A number of other road features exist within the project development area, including motorist rest areas.

19.3.9 Road Attributes

Three key aspects of each functional road type have been identified as important to various users, neighbours and road authorities of the road network:

- **Efficiency.** Efficiency relates to aspects of the road network that facilitate the efficient operation of the network, e.g., linkages between higher-order roads, overall volumes of traffic and types of intersection.
- **Safety.** Safety includes aspects of the physical road infrastructure that relate to safety, e.g., bridges, rail crossings, cattle grids and standard of road construction.
- **Amenity.** Amenity relates to aspects of the experience afforded to the passive participants of the road network (users of adjacent land), e.g., light, dust and noise nuisance due to changes in traffic volumes or road function.

19.3.10 Environmental Values

The road environment identified within the project development area comprises unique characteristics. These characteristics dictate the overarching value of the road environment and form the basis of an assessment from which the sensitivity of the value was determined.

Table 19.1 summarises the typical characteristics of each road type in further detail as they relate to efficiency, safety and amenity.

Table 19.1 Environmental characteristics of functional road types (typical observations)

	Characteristic	Highway	Regional Connecting Road	Rural Connecting Road	Rural Access Road
Efficiency	Volumes per day	1,000+ vehicles	300+ vehicles	50+ vehicles	1 to 100 vehicles
	Pavement	Sealed	Sealed	Sealed/unsealed	Unsealed
	Standard of intersection control	High order	Varies	Low order	Low order
Safety	Bridges	Common	Common	Uncommon	Uncommon
	Cattle grids	Uncommon	Uncommon	Common	Common
	Standard of rail-crossing control	Active	Passive	Passive	Passive
	School-bus route presence	Present	Present	Present	Present
	Composition of traffic	High proportion heavy vehicles	Moderate proportion of heavy vehicles	Low number of heavy vehicles	Low number of heavy vehicles
	Driver-fatigue controls	Present	Uncommon	Uncommon	Uncommon
Amenity	Stock-route co-location	Present	Present	Present	Present
	Sensitivity of adjacent land uses	Low	Low	Moderate	Moderate
	Potential for dust-nuisance issues	Low	Low	Potential	Potential
	Potential for light-glare issues	Low	Low	Potential	Potential
Overall sensitivity of value to change		**Low**	**Moderate**	**High**	**High**

The environmental values of highways have been identified as having a low sensitivity to changes in traffic and transport conditions due to their high construction standard suited to a higher-order purpose. Regional connecting roads display a moderate sensitivity to change in road conditions, and rural connecting roads and rural access roads display a high sensitivity due to lower construction standard and lower existing usage.

19.4 Issues and Potential Impacts

Increases in traffic volumes across the road network within the project development area can potentially impact the efficiency, safety and amenity of roads. The key traffic-generating activities that will occur during each phase of the project are as follows:

- **Construction.** Haulage of materials and equipment to depots and distribution from depots to works sites within the project development area, installation of production wells, gas and water gathering infrastructure, construction of production facilities, roads to production facilities, dams associated with production facilities and construction camps.
- **Operations.** Operation and maintenance of well sites, gathering infrastructure and production facilities.
- **Decommissioning.** Decommissioning and rehabilitation of well sites, gathering infrastructure and production facilities.

Due to the staged development approach, there will be points in time when the construction, operations and decommissioning phases will be occurring concurrently across the project development area. Table 19.2 provides a summary of the expected traffic volume associated with each key project activity. High-pressure gas pipelines from the production facilities to the sales gas pipelines will be relatively short in comparison with gathering lines and medium-pressure gas pipelines. The number of vehicle trips anticipated for the construction of up to 12 high-pressure gas pipelines from each of the central gas processing and integrated processing facilities are considered negligible and have not been assessed.

Table 19.2 Estimated traffic generation by key project activities

Activity	Quantity	Activity Duration	Traffic Generation (Two-way Trips)		
			Heavy Vehicle	Bus	Light Vehicle*
Construction Phase					
Production wells	7,500 wells	10 days	50/well	-	91/well
Gathering infrastructure	7,500 sections	3 days	13/section	-	14/section
Integrated processing facilities	6 facilities	55 weeks	1,700/facility	1,048/facility	3,491/facility
Central gas processing facilities	6 facilities	50 weeks	1,130/facility	798/facility	2,660/facility
Field compression facilities	6 facilities	28 weeks	500/facility	212/facility	706/facility
Construction camps	5 facilities	4 weeks	600/camp	-	-
Operational Phase					
Production wells	7,500 wells	20 years	9/well/year	-	17/well/year
Gathering infrastructure	7,500 sections	20 years	-	-	-
Integrated processing facilities	6 facilities	25 years	2,345/ facility/year	-	5,200/facility/year
Central gas processing facilities	6 facilities	25 years	260/facility/year	-	3,900/facility/year

Table 19.2 Estimated traffic generation by key project activities (cont'd)

Activity	Quantity	Activity Duration	Traffic Generation (Two-way Trips)		
			Heavy Vehicle	Bus	Light Vehicle*
Field compression facilities	6 facilities	25 years	156/facility/year	-	156/facility/year
Construction camps	5 facilities	3 years	936/camp/year	-	5,200/camp/year
Decommissioning Phase					
Production wells	7,500 wells	2 days	10/well	-	10/well
Gathering infrastructure	7,500 sections	2 days	2/section	-	-
Integrated processing facilities	6 facilities	8 months	600/facility	784/facility	2,613/facility
Central gas processing facilities	6 facilities	8 months	600/facility	490/facility	1,633/facility
Field compression facilities	6 facilities	4 months	201/facility	119/facility	397/facility
Construction camps	5 facilities	4 weeks	600/camp	-	400/camp

* Light vehicles are considered to include sedans, wagons, vans, utilities, 4WDs and motorcycles.

The predicted vehicle kilometres that will be travelled over the project lifetime are shown in Table 19.3.

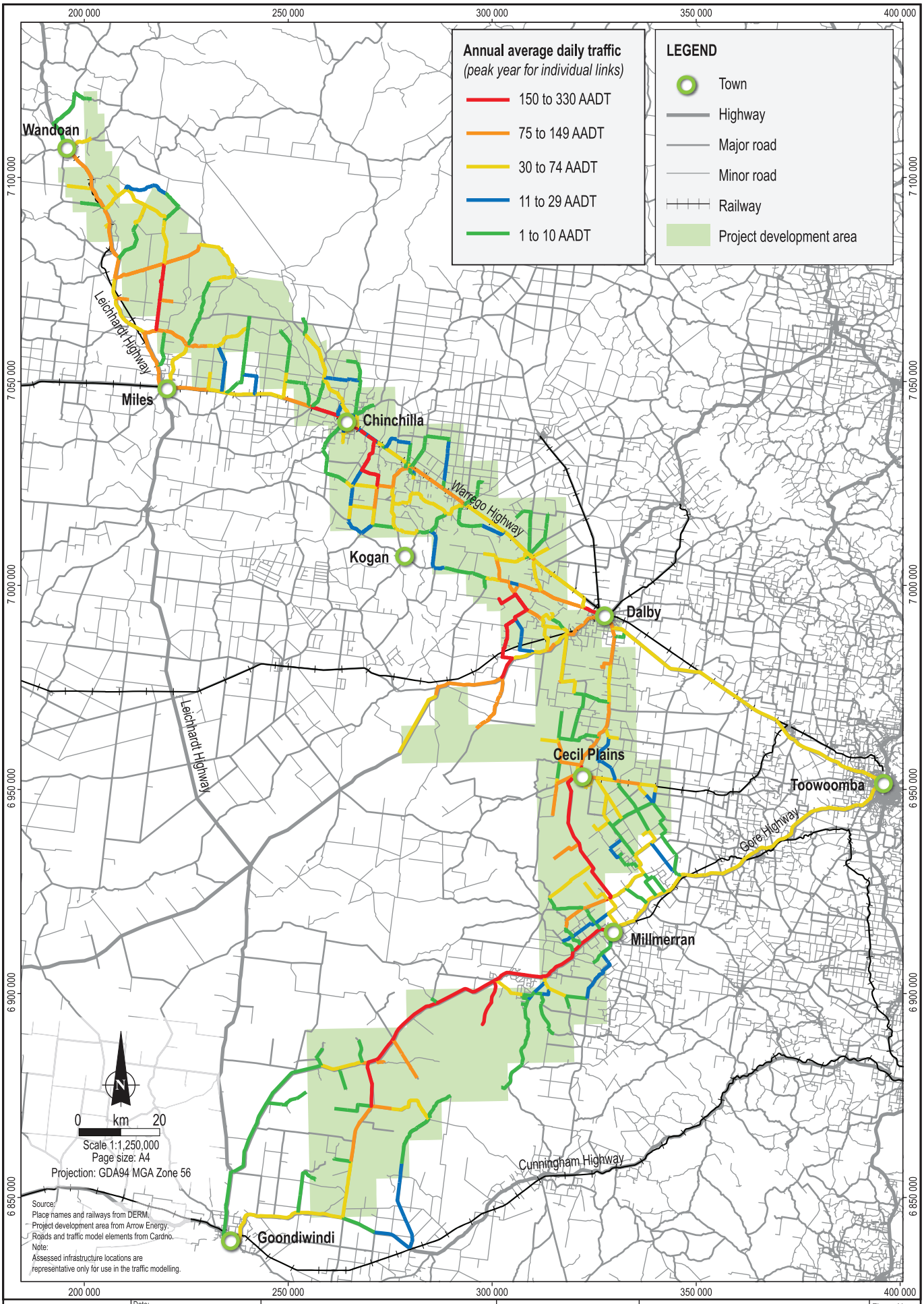
Table 19.3 Total vehicle kilometres travelled over the project life

Vehicle	Distance Travelled (km)
Light vehicles	224 million
Heavy vehicles including buses	392 million
Total	**616 million**

The estimated project-generated traffic for key roads within the project development area indicates that the greatest vehicle movements are associated with the main roads servicing townships.

Modelling of annual average daily traffic shows average daily traffic of up to 104 vehicles per day. The highest volumes of project-related traffic occur on roads that link depots to production facilities and construction camps. The project's maximum annual average daily traffic is expected to be up to 330 vehicles per day, as shown in Figure 19.2, in comparison to the region's maximum annual average daily traffic volume of 1,000 to 5,000 vehicles per day servicing the main townships.

The significance of the potential impact caused by an increase in traffic is dependent on the percentage increase in volume occurring on individual sections of road and the sensitivity of the functional road type. Highways are designed for higher volumes of traffic and are more resilient to impacts related to increased traffic volumes than lower-order roads.



coffey environments	Date: 12.12.2011 MXD: 7040AC_04_GIS118_v1_2 File Name: 7040_04_F19.02_GIS_GL	Arrow Energy Surat Gas Project	arrow energy go further	Maximum project annual average daily traffic (peak year for individual links)	Figure No: 19.2

Project-generated traffic is anticipated to peak in 2035 with approximately 29,130,000 vehicle kilometres travelled. Strategic modelling estimated project-generated travel in the peak year (2035) is likely to be less than 1% of the total travel that occurred across DTMR's Darling Downs district road network in 2009. At its peak, the project is anticipated to increase the extent of heavy-vehicle travel occurring on the district's road network by less than 2% of the existing (2009) levels and the extent of light-vehicle travel by less than 1% of existing (2009) levels.

The significance of potential impacts has been assessed using the sensitivity of the value for each functional road type and the magnitude of the potential impact (as described in Chapter 7, Impact Assessment Method). Potential impacts on the road values from project activities include:

- Reduction in the efficiency of roads, e.g., disruptions to flow.
- Reduction in the safety of roads, e.g., increased traffic turning onto access roads increasing the likelihood of traffic accidents, increased risk to pedestrians and increased vehicle exposure at rail crossings.
- Reduction in the amenity of roads, e.g., disruptions to the stock-route network and associated vegetation.

Other impacts addressed elsewhere within the EIS could include vehicle generation of dust and emissions, erosion and sedimentation from vehicle movements and changes to the physical form and hydrology of watercourses through the construction of road watercourse crossings (see Chapter 9, Air Quality; Chapter 10, Greenhouse Gas Emissions; Chapter 12, Geology, Landform and Soils; Chapter 15, Surface Water; Chapter 16, Aquatic Ecology and Chapter 17, Terrestrial Ecology).

Based on modelled traffic volumes, the magnitude and significance of project-related impacts on highways, regional connecting roads and rural connecting roads/rural access roads in each development region are shown in Tables 19.4 to 19.6.

The magnitude of impact on individual roads is variable across the project development area and depends on the predicted traffic volumes in each development region. Predicted impacts are those expected pre-application of effective mitigation and management measures.

Highways in the project development area are built and operated at a standard that is likely to accommodate changed traffic conditions and; therefore, exhibit **low** sensitivity. The magnitude of impact varies from **low** to **high** across the project development area, and the overall significance of impact ranges from **negligible** to **moderate**.

Table 19.4 Impacts on highways in each development region

Region	Sensitivity	Magnitude of Impact	Significance of Impact
Wandoan	Low	Moderate to high	Moderate
Chinchilla	Low	High	Moderate
Kogan/Millmerran	Low	Moderate to high	Low to moderate
Dalby	Low	Moderate	Low
Goondiwindi	Low	Low to moderate	Negligible to low

Regional connecting roads are of **moderate** sensitivity. The magnitude of impact ranges from **low** to **high** across the project development area, and the overall significance of impact ranges from **low** to **high**.

Table 19.5 Impacts on regional connecting roads in each development region

Region	Sensitivity	Magnitude of Impact	Significance of Impact
Chinchilla	Moderate	Low to high	Low to high
Kogan/Millmerran	Moderate	Low to high	Low to moderate
Dalby	Moderate	Low to moderate	Low to moderate

Lower-order roads are constructed for and operate with lower traffic volumes than higher-order roads and exhibit **high** sensitivity to increases in traffic volumes. The magnitude of impact ranges from **low** to **moderate**, with a generally smaller increase in traffic volumes on these roads compared to higher order roads in the project development area. The significance of impact ranges from **moderate** to **high**.

Table 19.6 Impacts on rural connecting roads and rural access roads in each development region

Region	Sensitivity	Magnitude of Impact	Significance of Impact
Wandoan	High	Low to moderate	Moderate to high
Chinchilla	High	Low to moderate	Moderate to high
Dalby	High	Low to moderate	Moderate to high
Goondiwindi	High	Low to moderate	Moderate to high

19.5 Environmental Protection Objective

The environmental protection objective for roads and transport is to avoid or minimise and manage adverse effects on the efficiency, safety and amenity of existing road networks.

19.6 Avoidance, Mitigation and Management Measures

Avoidance, mitigation and management measures have been proposed to achieve the identified environmental protection objective. The primary means by which avoidance is achieved is through site selection. Arrow's environmental framework focuses on early identification of sensitive locations that should be avoided by project activities, as described in Chapter 7, Environmental Framework.

19.6.1 General Mitigation Measures

General mitigation measures applicable to all functional road types identified within the five development regions are described below:

- Develop journey management plans in consideration of high-risk roads. [C291]
- Assess and identify works required to manage the increased traffic volumes and road safety issues associated with the project in road use management plans prepared and regularly reviewed in consultation with the relevant council or the DTMR. [C284]
- Where assessed necessary, provide protected turning lanes for entry to permanent facilities to address road safety issues. [C293]
- Develop project logistics plans to provide safe movement of people and materials, as well as to minimise traffic volumes. [C290]

- Use heavy-vehicle routes that avoid unsuitable bridges. [C292]
- Coordinate with local law enforcement for movement of heavy or oversized loads. [C298]
- Schedule roster changes to avoid peak traffic times. [C289]
- Implement driver training and fatigue awareness for employees and contractors. [C287]
- Implement an in-vehicle monitoring system for project vehicles. [C288]
- Implement traffic controls, including signage (e.g., reduced speed limits, warning signs) and restrictions of movements (e.g., no travel during school bus pick-up and drop-off times). [C295]

19.6.2 Efficiency, Safety and Amenity of Regional Connecting, Rural Connecting and Rural Access Roads

Regional connecting roads, rural connecting roads and rural access roads display a higher sensitivity than highways. Further mitigation commitments relating to the efficiency, safety and amenity of these lower-order roads are as follows:

- Assess and identify the need to upgrade unsealed roads or widen sealed roads where project activities and traffic will create road safety issues. Such works will be done in consultation with the relevant council (if a local government road) or DTMR (if a state road). [C285]
- Implement journey management plans. [C299]
- Confine project traffic to designated roads and access tracks, where practicable. [C033]
- Maintain the integrity of private roads and tracks and minimise dust generation, where appropriate, in consultation with relevant landowners and council. [C031]
- Ensure access driveways to project facilities and infrastructure have appropriate sight distances. [C294]
- Undertake threshold assessments to determine whether upgrading of rail crossings is warranted. [C286]
- Limit project traffic on school bus routes during pick-up and drop-off times on school days or install appropriate school bus infrastructure, e.g., signage or pull-over areas where necessary. [C296]
- Make workers aware of school bus routes, as well as typical pick-up and drop-off times in the vicinity of the work sites. [C297]
- Manage project-related activities in the vicinity of existing stock routes in accordance with the Land Protection (Pest and Stock Route Management) Act. [C300]

19.7 Residual Impacts

The avoidance, mitigation and management measures outlined above will avoid or reduce the significance of potential adverse impacts on highways, regional connecting roads, rural connecting roads and rural access roads, as well as avoid and minimise the risk of traffic-related accidents to workers and the general public.

To assess the effectiveness of the proposed avoidance, mitigation and management strategies, sensitivity values of the road network were re-assessed, taking into consideration management measures. The magnitude of impacts associated with project activities are not expected to

change with the implementation of management strategies as it is intrinsically linked to the extent of gas production and the volumes of traffic necessary to complete associated tasks. Magnitude of impacts, therefore, remains variable depending on road type (highway, regional connecting road, rural connecting road/rural connecting road) and location/predicted traffic volume.

Table 19.7 summarises the potential impacts prior to mitigation, along with proposed avoidance, mitigation and management measures and the subsequent residual impacts assuming implementation of these measures. Due to reduced sensitivity of road values through implementation of avoidance, mitigation and management measures, the significance of potential impacts shifts from a range of **negligible** to **high** (depending on road type and location/predicted traffic volumes) to a range of **negligible** to **moderate**. Residual impacts are likely to be managed effectively within the typical road authority planning framework and through infrastructure agreements.

There may also be a number of ongoing positive benefits from the improved transport infrastructure, including intersection and general road upgrades and improvements that offer safety benefits to the community.

19.8 Inspection and Monitoring

The requirements for inspection or monitoring will be described in specific traffic management plans following confirmation of exact location of project infrastructure and facilities. Inspection or monitoring will be carried out in a manner and frequency that will ensure legislative requirements for all relevant aspects of roads and traffic are met.

Monitoring and inspection will include:

- Routinely monitoring integrity and amenity on project-related roads. [C308]
- Monitoring of compliance with the project's road safety requirements through regular review of reports generated by the in-vehicle monitoring system. [C314]
- Conducting regular safety inspections of project vehicles. [C315]

Table 19.7 Summary of roads and transport impact assessment

Cause of Potential Impacts	Existing Environment	Premitigated Impact			Summary of Mitigation Measure	Residual Impact		
		Values Sensitivity	Magnitude	Significance		Values Sensitivity	Magnitude	Significance
Reduced Efficiency, Safety and Amenity of the Highways								
Increased traffic volume through all project phases	Highways (efficiency, safety, amenity)	Low	Low to high	Negligible to moderate	• Avoidance of high-risk roads where possible. • Road use management plans. • Protected turning lanes. • Journey management and project logistics plans. • Heavy vehicle routes that avoid unsuitable bridges. • Driver training and fatigue awareness. • In-vehicle monitoring systems. • Coordination with local law enforcement regarding heavy or oversized loads. • Traffic controls.	Low	Low to high	Negligible to moderate
Reduced Efficiency, Safety and Amenity of Regional Connecting Roads								
Increased traffic volume through all project phases	Regional connecting roads (efficiency, safety, amenity)	Moderate	Low to high	Low to high	As above for highways and including: • Upgrade intersections where required. • Road integrity management. • Warning or signage on approach to facility entrance. • Consider roster changes to avoid peak traffic times. • Limit project traffic on school bus routes during pick-up and drop-off times on school days, where possible.	Low	Low to high	Negligible to moderate
Reduced Efficiency, Safety and Amenity of Rural Connecting Roads and Rural Access Roads								
Increased traffic volume through all project phases	Rural connecting roads/Rural access roads	High	Low to moderate	Moderate to high	As above for regional connecting roads and highways.	Moderate	Low to moderate	Low to moderate