Supplementary Roads and Transport Assessment

Surat Gas Project SREIS

CEB06413

Prepared for
Arrow Energy Pty Ltd via Coffey Environments Pty Ltd

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Cardno
Shaping the Future

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Contact Information

Cardno (Qld) Pty Ltd
ABN 57 051 074 992

Level 11 Green Square North Tower
515 St Paul's Terrace
Locked Bag 4006
Fortitude Valley Qld 4006

Telephone: 07 3369 9822
Facsimile: 07 3369 9722
International: +61 7 3369 9822

transportqld@cardno.com.au
www.cardno.com.au

Document Control

Version	Date	Author	Author Initials	Reviewer	Reviewer Initials
V1		Damien Scutt Jessica Peters		Jeffrey Baczynski	
V2		Damien Scutt Jessica Peters		Shane Healey	
V3		Damien Scutt Jessica Peters		Jeffrey Baczynski Shane Healey	
FINAL		Damien Scutt Jessica Peters	DGS/JJP	Jeffrey Baczynski Shane Healey	JDB/SRH

Executive Summary

Arrow Energy Pty Ltd (Arrow) is proposing an expansion of its coal seam gas operations in the Surat Basin through the Surat Gas Project. As part of the Environmental Impact Statement (EIS) preparation, Cardno (Qld) Pty Ltd (Cardno) was commissioned to undertake a Road Impact Assessment (RIA) to assess the significance of the potential traffic impacts associated with the project. Following submission of the EIS, Arrow has now reviewed and in turn revised project planning which requires that additional assessment be completed to validate the previously reported road impacts. Given this, Cardno has now been commissioned to revise the RIA by undertaking the Supplementary Roads and Transport Assessment to form part of the Supplementary Report to the Environmental Impact Statement (SREIS). The Supplementary Roads and Transport Assessment is referred to hereafter as the SREIS RIA.

Consistent with the previous RIA, the purpose of the SREIS RIA has been to establish a representative development scenario to inform a reasonable understanding of the significance of the project's impacts on the road network at all stages of the project. While the outcomes from the RIA are considered strategic given that facility and infrastructure locations, and the roads leading to and from these locations, are yet to be finalised, it provides a high level overview of the expected traffic volumes and impacts.

The SREIS RIA establishes if there are likely to be any road impacts that cannot be effectively managed through either the application of appropriate approval conditions, or through the application of the planned management strategies. The SREIS RIA seeks to confirm if there are likely to be any residual road impacts so significant post implementation of approval conditions and the planned management strategies that they should preclude approval of the project. To provide an additional level of assessment, the Road Impact Assessment includes consideration of case studies for specific areas to demonstrate the application of the management strategies proposed.

Based upon the work previously undertaken as part of the EIS, the SREIS RIA expands upon this by applying both an environmental values assessment approach and a more traditional traffic engineering assessment approach. Both assessment approaches undertaken seek to determine the significance of residual road impacts post implementation of the planned management strategies. The inclusion of both approaches within the EIS RIA provides road authorities greater certainty that the planned management strategies will preserve key road environmental values whilst also meeting or exceeding typical traffic engineering practice requirements.

The SREIS provides an update to the existing traffic conditions that were previously reviewed to include more recent data where available. This involved obtaining data regarding the existing traffic volumes, multi-combination vehicle routes, school bus routes, rail crossings, stock routes, pedestrian, cycle and public transport networks, motorist rest areas and a road safety assessment of historical crash rates. Other projects that will increase traffic demands in the region were also considered to ensure that traffic growth forecasts accommodated these increases.

With regards to the potential traffic generation of the project, the assessed project infrastructure broadly includes:

> Production wells and gathering infrastructure
> Central gas processing facilities
> Field compression facilities
> Temporary worker accommodation facilities
> Water treatment facilities co-located with central gas processing facilities.

Based on an understanding of the activities associated with the construction, operation and decommissioning of production facilities, wells and gathering lines, the traffic generating potential was determined including assignment of origins and destinations to inform the modelling process.

Using a strategic modelling process, combined with the estimated traffic generation potential associated with the construction, operation and decommissioning of project facilities and infrastructure, the volume of project traffic on each road link over the project life was estimated. This process identified an average Annual

Average Daily Traffic (AADT) volume and a peak year AADT volume on each link over the project life. This process identified the increase in traffic on the road network as a result of project activities.

Broadly the strategic modelling indicates that the total travel generated by the project in its peak year is likely to be equal to or less than 1.5% of the total travel currently (2011) occurring across TMR's former Darling Downs Region road network. 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 4.2% of the existing (2011) levels.

The management strategies included in the EIS RIA were reviewed with regards to minimising the significance of project impacts on the assessed road environmental values of safety, efficiency and amenity. Two additional strategies were included based on current best practice which are undertaking a Fit-For-Use road inspection to identify if road assets are appropriate for the proposed project traffic and entering into agreement with Councils to hand roads in no worse a state of repair compared with the condition at the start of construction activities. The management strategies are considered to provide the principles upon which future Road Use Management Plans and infrastructure agreements will be developed in consultation with the relevant road authorities.

To ascertain the effectiveness of the management strategies, both an environmental values approach and a traditional traffic engineering approach were then applied. Consistent with the environmental values approach previously adopted, roads typically defined as Rural Connecting Roads and Rural Access Roads were identified as more susceptible to potential impacts of high significance on efficiency, safety and amenity. Roads defined as Regional Connecting Roads and Highways were identified in having moderate and low significance of impacts respectively on efficiency, safety and amenity. Post implementation of the management strategies, the sensitivity of the various road types to changed traffic conditions is reduced.

Based on the environmental values approach, through the application of management strategies it was determined that the overall significance of the project's road impacts would be reduced from a range of negligible-to-high to a range of negligible-to-moderate. The developed management strategies are therefore considered effective at reducing the significance of the project's impact on the safety, efficiency and amenity of the road network. Hence, the environmental values assessment has identified that there are unlikely to be impacts so significant (high or major) that they cannot be effectively managed through the implementation of the planned management strategies.

Further to the environmental values approach, the SREIS RIA expands upon the work previously undertaken by applying a more traditional traffic engineering assessment approach. To support the traditional traffic engineering assessment approach, case study sites were identified at which it is likely, but not certain, that major project facilities will ultimately be located subject to further constraints analysis. The identification of case study sites allowed the effectiveness of the planned management strategies to be assessed through undertaking Fit-For-Use assessments, intersection assessments and a pavement impact assessment. Applying the planned management strategies to the case study locations confirmed that for these sample sites, the implementation of the strategies would ultimately result in proponent funded road works and contributions which address any significant project impacts. Importantly, the likely proponent funded road works and contributions will meet or exceed typical traffic engineering practice requirements.

The intent of the traditional traffic engineering assessment was not to identify an exhaustive list of the proponent funded works and contributions ultimately required to support the project. Identification of such a list is premature as the specific location and delivery timing of project infrastructure is yet to be finalised. Identification of an exhaustive list will ultimately occur as part of the RIAs prepared post assessment of the EIS to inform the road authority infrastructure agreements. The assessment undertaken confirms that the planned management strategies will ultimately result in any significant project impacts being addressed in accordance with typical traffic engineering practice requirements.

Arrow will prepare revised RIAs for each of the road authority road networks utilised by project traffic following assessment of the EIS. The RIAs will inform the identification of the specific road works and contributions required to support the project. The proponent funded road works and contributions identified through the future RIAs will be included in future infrastructure agreements entered into with the relevant road authorities.

This RIA constitutes a strategic assessment of the significance of the road impacts associated with the Surat Gas Project. Through the environmental values and traffic engineering approaches, it is identified that no high or major residual impacts are foreseen on the safety, efficiency and amenity of the assessed road networks following the application of appropriate approval conditions and planned management strategies.

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Abbreviations

Abbreviation	Description
AADT	Annual Average Daily Traffic
AUL	Auxiliary lane turn treatment
AUL(S)	Auxiliary (Short)
BAL	Basic Left turn treatment
BAR	Basic Right turn treatment
CHR	Channelised Right turn treatment
CHR(S)	Channelised Right (Short) turn treatment
CGPF	Central Gas Processing Facility.
CV	commercial vehicle
DOS	Degree of Saturation
EIS	Environmental Impact Statement
ESAs	Equivalent Standard Axles
FCF	Field Compression Facility
GARID	Guidelines to Assessment of Road Impacts of Development
GRC	Goondiwindi Regional Council
HV	heavy vehicle
LNG	Liquefied Natural Gas
LV	light vehicle
Mtpa	Million tonnes per annum.
MW	Megawatt = one million (10^6) watts
QTRIP	Queensland Transport and Roads Investment Program
RIA	Road Impact Assessment
RMP	Road-use Management Plan
SPA	Sustainable Planning Act 2009
SREIS	Supplementary Report to the Environmental Impact Statement
TJ	Terajoule
TJ/d	Terajoules per day
TOR	Terms of Reference
TMR	Department of Transport and Main Roads
TRC	Toowoomba Regional Council
TWAF	Temporary Workers Accommodation Facility
VKT	vehicle kilometres travelled
vpd	vehicles per day
vph	vehicles per hour
VT	exposure score
WDRC	Western Downs Regional Council

Glossary

Word, Phrase or Term	Definition
Annual Average Daily Traffic	The average traffic volume expected over a 24-hour period in a given year.
Austroads	The association of Australian and New Zealand road transport and traffic authorities that aims to promote improved road transport outcomes and produces nationally accepted guidelines.
Auxiliary lane	The portion of the carriageway adjoining the through traffic lanes, used for speed change or for other purposes supplementary to through-traffic movement.
Background traffic	The expected volume of traffic at a particular point without the addition of the traffic associated with the project under consideration.
Commercial Vehicles	See heavy vehicles.
Council	Western Downs Regional Council (WDRC), Goondiwindi Regional Council (GRC) or Toowoomba Regional Council (TRC) as appropriate.
Council-controlled road	Roads which are administered, funded and maintained by local government.
Crash rate	A crash rate is a ratio of the number of crashes to some common denominator, usually vehicle kilometres travelled, head of population or period of time. Crash rates allow more meaningful comparisons to be made between crash locations.
Department of Transport and Main Roads	Queensland government department responsible for planning, managing and delivering Queensland's integrated transport environment.
Environmental Impact Statement	A structured document which is prepared to identify and assess the environmental impacts of a proposed activity which is either designated as development or 'likely to significantly affect the environment'. It also outlines safeguards to mitigate or control such impacts.
Exposure score	The product of the daily traffic volume and the daily train volume utilising the rail crossing.
Gathering line	A small diameter pipeline through which either coal seam gas or produced water moves through on a petroleum lease from the wellhead to the processing facility.
Growth rate	The annual percent change in the number of vehicles passing a given point on a road.
Heavy Vehicles	A heavy vehicle is defined as any vehicle with three or more axles or with dual tyres on the rear axle. Also referred to as commercial vehicles (CV).
Intersection capacity	The maximum sustainable traffic flow rate at which vehicles can reasonably be expected to traverse an intersection under given roadway, geometric, traffic, environmental and control conditions; usually expressed as vehicles per hour.
Interrupted traffic flow	Where the flow of traffic is stopped or interrupted periodically by fixed external elements, such as traffic signals or signage, irrespective of the traffic volume. This traffic engineering term does not describe operating conditions.
Light vehicles	Cars, motorcycles and cars towing caravans.
Permanent infrastructure	Any infrastructure (roads, tracks, bridges, culverts, dams, bores, buildings, fixed machinery, hardstands areas, airstrips, helipads, pipelines etc), which is to be left by agreement with the landowner.
Priority-controlled intersection	An intersection where the movement of vehicles is controlled by road rules and traffic signs only, for example stop or give way signs, as opposed to traffic signals or a roundabout.
Project	Surat Gas Project.
Project development area	The area for which Arrow is seeking approval to develop through the EIS assessment process.
Quantitative	An assessment based on the amount or number of something.
Queensland Stock Route	Network of facilities established to facilitate the movement of livestock on foot between grazing areas and markets. The network consists of areas for stock to travel along (often within existing road corridors, adjacent to roadways) as well as areas for

Word, Phrase or Term	Definition
	livestock to rest overnight including water facilities and holding yards.
Road Impact Assessment	An assessment which identifies the potential road impacts of a proposed development and appropriate mitigation measures in accordance with the requirements of the Department of Transport and Main Roads *Guidelines for Assessment of Road Impacts of Development*.
Sealed Road	Generic terminology adopted within the Road Impact Assessment to identify a road that has generally been constructed using a bituminous material to form a protected road surface.
Sensitive place	A sensitive place means any of the following places: ▪ A dwelling ▪ A library, childcare centre, kindergarten, school, college, university or other educational institution ▪ A hospital, surgery or other medical institution ▪ A protected area or an area identified under a conservation plan as a critical habitat or an area of major interest, under the Nature Conservation Act 1992 ▪ A marine park under the Marine Parks Act 1982 ▪ A park or garden that is open to the public.
State-Controlled Road	A road declared to be controlled by the Department of Transport and Main Roads, including all AusLink National Roads in Queensland.
Uninterrupted traffic flow	Where the flow of traffic is not stopped or interrupted by any fixed external elements, such as traffic signals. This traffic engineering term does not describe operating conditions.
Unsealed road	Generic terminology adopted within the Road Impact Assessment to identify roads that have been generally constructed to a formed and gravelled standard or a higher quality formed but ungravelled standard. In the context of this assessment the adopted terminology relates to the construction standard of the road not the ownership of the road (i.e. gazetted road versus private access road).
Unsealed track	Generic terminology adopted within the Road Impact Assessment to identify roads that have been generally constructed to an unformed standard. In the context of this assessment the adopted terminology relates to the construction standard of the road not the ownership of the road (i.e. gazetted road versus private access road).
Vehicle Kilometres of Travel	A measure of traffic demand and is the length of a section of road in kilometres multiplied by the AADT on it. The yearly VKT is the daily VKT multiplied by the number of days in that year (365 or 366 days).
Vehicles per day	The number of vehicles associated with a given location or activity during a 24-hour period.
Vehicles per hour	The number of vehicles associated with a given location or activity during a one hour period.

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1 Proponent and Project Overview

1.1 Proponent Introduction

Arrow Energy Pty Ltd (Arrow) is an integrated energy company with interests in coal seam gas field developments, pipeline infrastructure, electricity generation and proposed liquefied natural gas (LNG) projects.

Arrow has interests in more than 65,000 km^2 of petroleum tenures, mostly within Queensland's Surat and Bowen basins. Elsewhere in Queensland, the company has interests in the Clarence-Moreton, Coastal Tertiary, Ipswich, Styx and Nagoorin Graben basins.

Arrow's petroleum tenures are located close to Queensland's three key energy markets; Townsville, Gladstone and Brisbane. The Moranbah Gas Project in the Bowen Basin and the Tipton West, Daandine, Kogan North and Stratheden projects in the Surat Basin near Dalby comprise Arrow's existing coal seam gas production operations. These existing operations currently account for approximately 20% of Queensland's overall domestic gas production.

Arrow supplies gas to the Daandine, Braemar 1 and 2, Townsville and Swanbank E power stations, which participate in the National Electricity Market. With equity in Braemar 2, Daandine and Townsville power stations, Arrow has access to up to 600 MW of power generation capacity.

Arrow and its equity partner for the Moranbah Gas Project, AGL Energy have access rights to the North Queensland Pipeline, which supplies gas to Townsville from the Moranbah Gas Project. They also hold the pipeline licence for the proposed Central Queensland Gas Pipeline between Moranbah and Gladstone.

Arrow is currently proposing to develop the Arrow LNG Project, which is made up of the following aspects:

- Arrow LNG Plant: the proposed development of an LNG Plant on Curtis Island near Gladstone, and associated infrastructure, including the gas pipeline crossing of Port Curtis
- Surat Gas Project: the proposed upstream gas field development in the Surat Basin, subject of this assessment
- Arrow Surat Pipeline Project (formerly the Surat Gladstone Pipeline): the proposed 450km transmission pipeline that will connect Arrow's Surat Basin coal seam gas developments to Gladstone
- Bowen Gas Project: the proposed upstream gas field development in the Bowen Basin
- Arrow Bowen Pipeline: the proposed transmission pipeline that will connect Arrow's Bowen Basin coal seam gas developments to Gladstone.

1.2 Project Overview

Arrow proposes expansion of its gas operations in the Surat Basin through the Surat Gas Project. The need for the project arises from the growing demand for gas in the domestic market, global demands and the associated expansion of LNG export markets.

The project development area is shown on Figure 1-1. The spatial extents of the road network assessed are those bound by the former Darling Downs Region Department of Transport and Main Roads (TMR) shown on Figure 1-1. This boundary has been adopted as it is considered appropriate to inform the assessments in relation to the significance of the project's potential impact and as it ensures consistency with the spatial definitions adopted for the Environmental Impact Statement (EIS) Road Impact Assessment (RIA).

The main changes to the project description presented in the EIS, which have the potential to affect the EIS RIA, include changes to the size of the project development area, the number of facilities and wells, the development sequence and timing, and workforce numbers. Details of these changes are provided below.

Due to the relinquishment of parcels of land within Arrows' exploration tenements, the project development area has reduced from 8,600 km^2 to 6,100 km^2. The majority of these relinquishments were made in the Goondiwindi development region. With a smaller project development area, there has been a reduction in the number of production wells anticipated to be drilled, from 7,500 to approximately 6,500.

In addition to single wells, multi-well pads will also be drilled. Multi-well pads will comprise up to 12 wells per pad with an average of nine wells per pad, spaced approximately 8m apart.

The field development sequence planning has advanced and the project development area is now described in terms of eleven drainage areas, as opposed to the five development regions that were presented in the EIS project description. Drainage areas correspond with the gas reserves that will be fed into each central gas processing facility (CGPF). It is currently expected that eight of these drainage areas will be initially developed for the Surat Gas Project with each drainage area containing wells, a water and gas gathering network and a CGPF. The location of the eleven drainage areas is shown on Figure 1-2.

This constitutes a reduction in the number of CGPFs from 12 described in the EIS to eight. A further three drainage areas may be developed with favourable reservoir outcomes and future market conditions. Integrated processing facilities, which were referred to in the EIS, are referred to in the SREIS as a water treatment facility co-located with a CGPF.

Arrow has identified properties on which to site four CGPFs. A fifth site has been identified by Arrow to locate a temporary workers accommodation facility (TWAF). It is intended that all properties identified for major facilities (i.e. CGPFs, water treatment facilities, TWAFs) will either be owned by Arrow, or leased under a long-term arrangement. The specific locations of the CGPFs and TWAF within these sites have not been determined and the final location of infrastructure will be guided by site-specific technical, environmental and social features. The number of TWAFs has been revised from five to approximately six. Sites for the remaining five TWAFs are yet to be determined but will likely be located adjacent to CGPFs, as presented in the EIS.

The number of water treatment facilities has been reduced from six described in the EIS to two. These will be co-located with CGPFs. Arrow has committed not to dispose of brine (salt), stored at water treatment facilities, to the registered landfill site at Swanbank. However, disposal to landfill remains the base case for the management of brine. Arrow expects other landfill sites to be developed in response to the demand created by the coal seam gas industry and to be available to accept brine (salt) produced in its operations. For the purposes of assessing the maximum expected vehicle movements, the EIS assumed transport and disposal of brine to Swanbank, originating from six indicative water treatment (and storage) facilities. Arrow will not use Swanbank for disposal of brine (as a salt concentrate) and proposes to use a new (suitably licensed) facility in the region. Vehicle movements associated with the transport of brine to landfill are however assessed in the supplementary assessment as originating from each of the two water treatment facilities. A conceptual landfill location east of Toowoomba produces the worst case for transport and disposal of brine and has therefore been adopted for the supplementary roads and transport assessment.

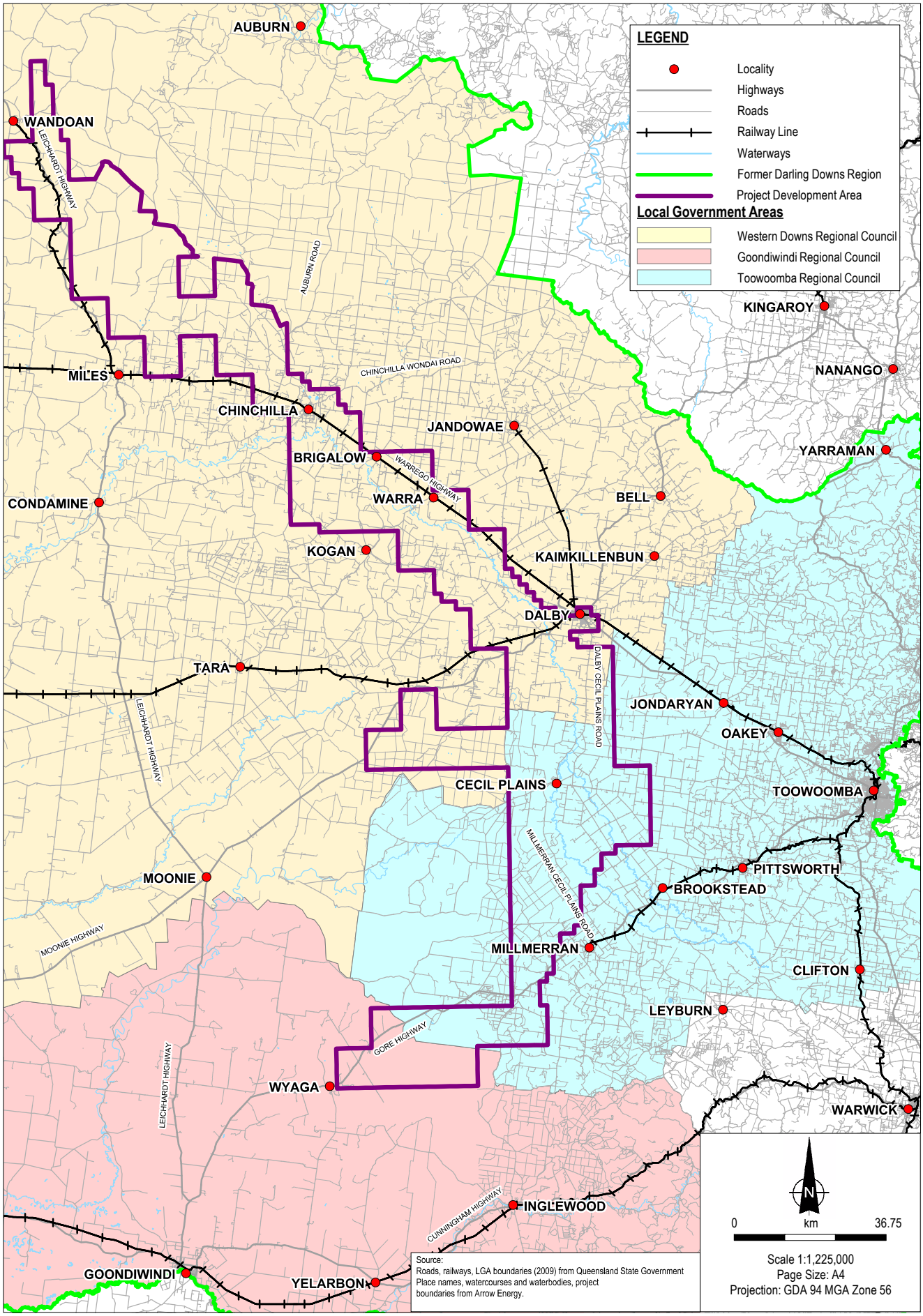
The number of depots, which accommodate administration, engineering and production, stores, workshops, laboratories and associated personnel, has also reduced from three described in the EIS, to two. The depots are likely to be located in the township of Dalby, and the township of Miles. A depot is not expected to be required in Millmerran as originally considered.

The project construction activities will require foundation aggregate for the construction of camps, access tracks, wells and facilities. The estimated aggregate volume has been revised to capture updates to the project design (e.g. the reduction in the anticipated total number of wells), temporary aggregate requirements for construction (which expand on the hardstand material footprint), multi-well pads and provision for access roads based on nominal lengths and widths (which will be verified once well and facility locations are known).

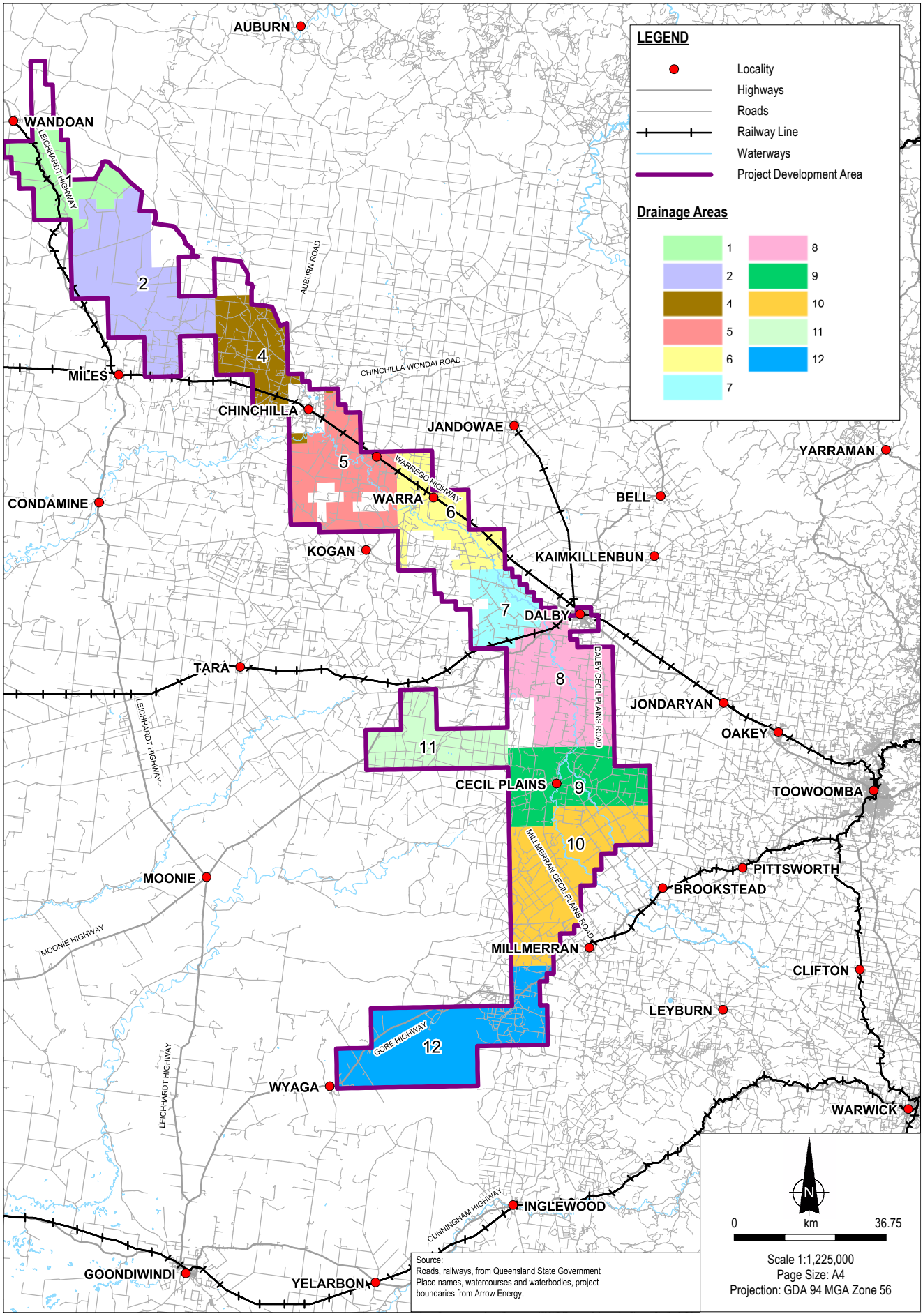
1.3 Project Schedule

For the purposes of the SREIS RIA, Arrow has developed a project schedule which details the potential establishment, operation periods and decommissioning dates for all production wells and facilities supporting the project. The assessed schedule has been formulated to present a worst case development scenario from a traffic engineering perspective. It assumes rapid development of the production wells and facilities resulting in the most intense forecast of peak traffic demands. In addition, it assumes that all 6,500 production wells potentially required to support the project are ultimately established, operated and decommissioned.

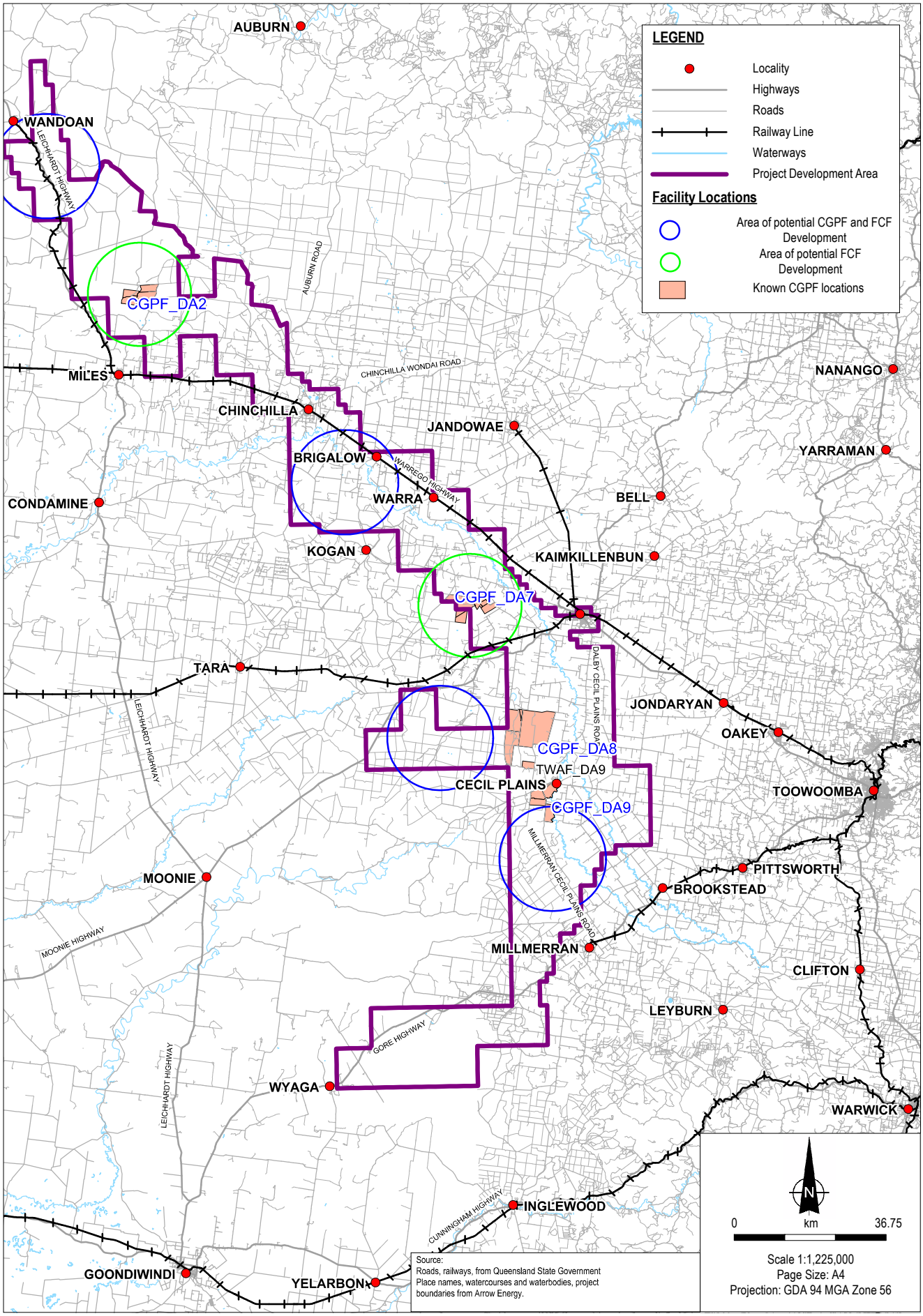
Use of the assessed project schedule therefore provides conservative estimates of both the project's total transport task and the peak traffic demands generated by the project. The utilisation of the formulated project schedule provides road authorities greater confidence that the traffic impacts that ultimately eventuate are unlikely to be worse than that reported herein.



Cardno Shaping the Future	Date: 31.05.2013 WOR: Figure 1.1 File Name: 6413_Figure 1.1.wor	Arrow Energy Surat Gas Project	arrow energy go further	Locality Map	Figure No: 1.1



Cardno Shaping the Future	Date: 31.05.2013 WOR: Figure 1.2 File Name: 6413_Figure 1.2.wor	Arrow Energy Surat Gas Project	arrow energy go further	Drainage Areas	Figure No: 1.2



Cardno Shaping the Future	Date: 13.05.2013 WOR: Figure 1.3 File Name: 6413_Figure 1.3.wor	Arrow Energy Surat Gas Project	arrow energy go further	Representative Facility Locations	Figure No: 1.3

2 Assessment Overview

2.1 Objectives of the Road Impact Assessment

Cardno (Qld) Pty Ltd (Cardno) has been commissioned by Coffey Environments Pty Ltd (Coffey) on behalf of Arrow, to prepare an updated RIA for the proposed Surat Gas Project as part of the SREIS.

Since lodgement of the EIS in December 2011, Arrow has reviewed and in turn revised project planning from that presented in the EIS. The recent changes to project planning require that additional assessment be completed to validate the previously reported road impacts associated with the project. Furthermore, additional assessment is required to confirm that the conclusions previously made in relation to the effectiveness of the proposed road management strategies also remain valid. The recent changes to project planning therefore warrant the preparation of an updated RIA to inform the SREIS.

The objectives of the SREIS RIA are to:

> Fulfil the requirements of the Terms of Reference (TOR) for the Surat Gas Project EIS
> Reconfirm existing baseline road conditions and the key environmental values to be protected
> Determine the potential impact of project traffic on the key road values utilising an environmental values assessment approach
> Determine the potential impact of project traffic on the safety and efficiency of the road network utilising a traditional traffic engineering assessment approach
> Confirm that the planned management strategies remain effective at avoiding, minimising or mitigating the potential road impacts associated with the project
> Present the findings of the revised assessment in a technical report to be included as an appendix to the Surat Gas Project SREIS.

The SREIS RIA addresses only the project's road-based transport impacts. Impacts associated with other transport modes (for example pipeline, air, rail or sea) are beyond the scope of this assessment.

2.2 SREIS RIA Context

The SREIS RIA presents a strategic assessment of the intensity and context of the potential road impacts associated with the Surat Gas Project. The SREIS RIA has been undertaken to inform assessment of the project's EIS. As typical for major projects with dispersed activity, detailed planning including the selection of all project sites has not yet been finalised. Generally EIS assessment is required to enable sufficient commercial certainty for detailed planning, including site acquisition, to be finalised.

The SREIS RIA seeks to establish if there are likely to be any road impacts that cannot be effectively managed through either the application of appropriate approval conditions, or through the application of the planned management strategies. That is, the SREIS RIA seeks to confirm if there are likely to be any residual road impacts so significant post implementation of approval conditions and the planned management strategies that they should preclude approval of the project.

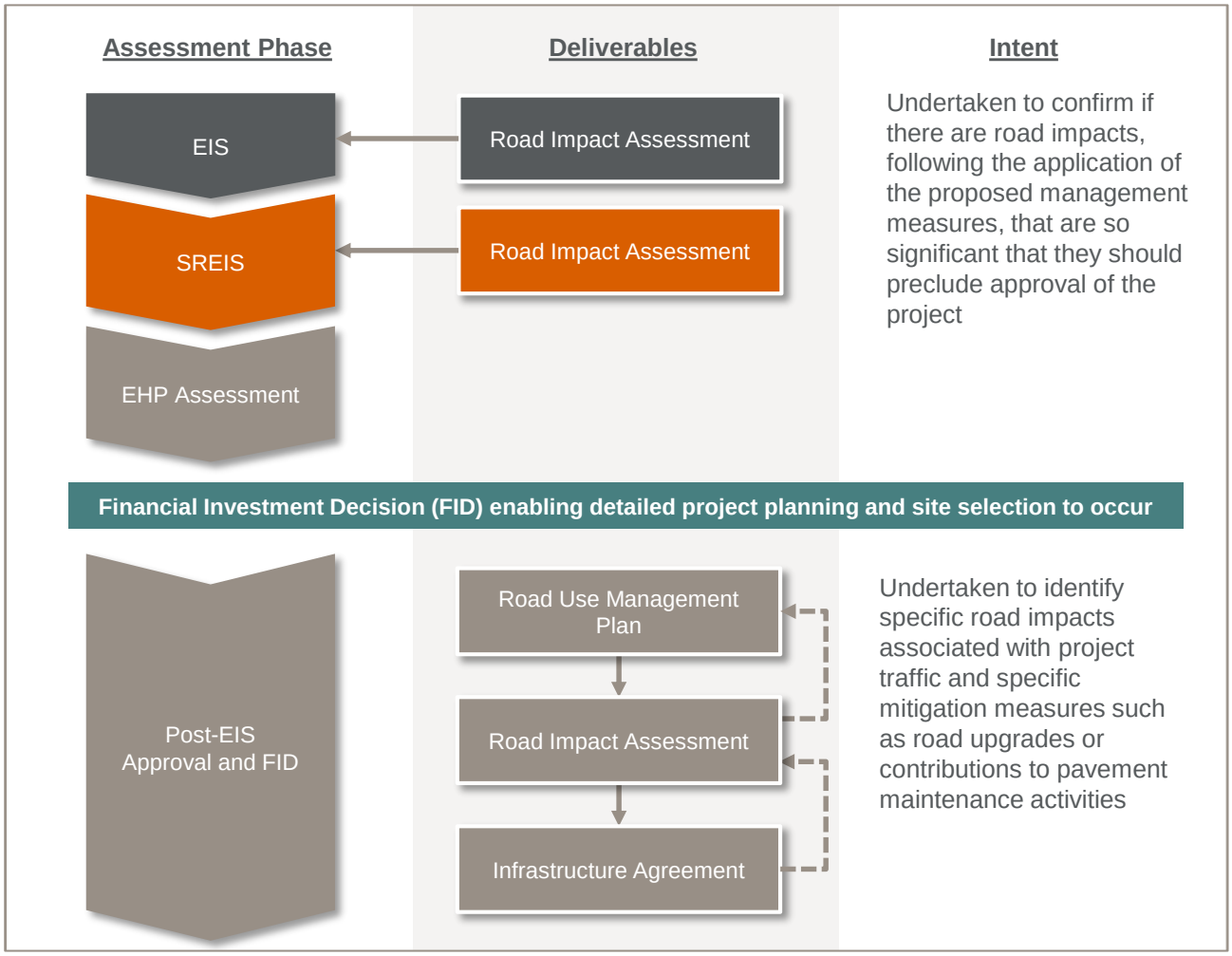
Importantly, consistent with the intent of the SREIS assessment phase, the SREIS RIA does not seek to identify a comprehensive list of the proponent funded road works or monetary contributions ultimately required to support the project. Instead the SREIS RIA seeks to confirm if the planned management strategies will be effective at avoiding, minimising or mitigating the road impacts associated with the project. The SREIS RIA has been prepared to inform the establishment of appropriate approval conditions and management strategies which will enable specific proponent funded road works and contributions to be ultimately identified.

Arrow will prepare revised RIA's for each of the road authority road networks utilised by project traffic following assessment of the EIS. The RIA's prepared following assessment of the EIS and finalisation of project facility sites will inform the identification of the specific road works and contributions required to support the project. The proponent funded road works and contributions identified through the future RIA's will be included in future infrastructure agreements entered into with the relevant road authorities. This approach is consistent with typical practice for large, geographically dispersed projects in Queensland.

It is reinforced that it is pre-emptive to undertake the future RIA's as part of the current SREIS assessment phase given there is still a degree of uncertainty in relation to the exact location of all project sites and as this level of detail is not required to inform the development of appropriate EIS approval conditions.

The context and intent of the current SREIS RIA and future assessments is summarised on Figure 2.1.

Figure 2-1 Context of the SREIS RIA



2.3 SREIS RIA Methodology

The following key steps were undertaken in preparing the SREIS RIA:

- Collection of updated data from road authorities pertaining to existing road conditions including for example, traffic volumes, stock routes, vehicle crash history, and school bus routes
- Inspection of the road network at selective sites to further characterise road conditions
- Review of historical traffic growth patterns and consideration of potential future traffic growth
- Estimation of the number and type of vehicles likely to be generated by the activities associated with establishment, operation and decommissioning of each of the different project facilities
- Estimation of the project's traffic generation based upon the project activities scheduled to occur in any given year and the traffic generation potential of each of the individual activities
- Development of management strategies to avoid, minimise and mitigate the potential impacts associated with project traffic
- Assessment of the effectiveness of the planned management strategies utilising both an environmental values and a traditional traffic engineering assessment approach supported by case study assessments.

The methodology undertaken for the SREIS RIA is appropriate to inform review of the effectiveness of the planned management strategies and to inform development of appropriate EIS conditions.

2.4 SREIS RIA Assessment Approaches

The TOR for the Surat Gas Project requires both the intensity and context of impacts to be assessed to establish the significance of potential impacts. Consistent with other technical studies prepared for the EIS, the EIS RIA utilised an environmental values assessment approach to determine the effectiveness of the planned management strategies and the residual impacts which may remain post their application.

The SREIS RIA expands upon the work previously undertaken as part of the EIS applying both an environmental values assessment approach and a more traditional traffic engineering assessment approach. The inclusion of both approaches within the SREIS RIA provides road authorities greater certainty that the planned management strategies will preserve key road environmental values whilst also meeting or exceeding typical traffic engineering practice requirements.

2.4.1 Environmental Values Assessment Approach

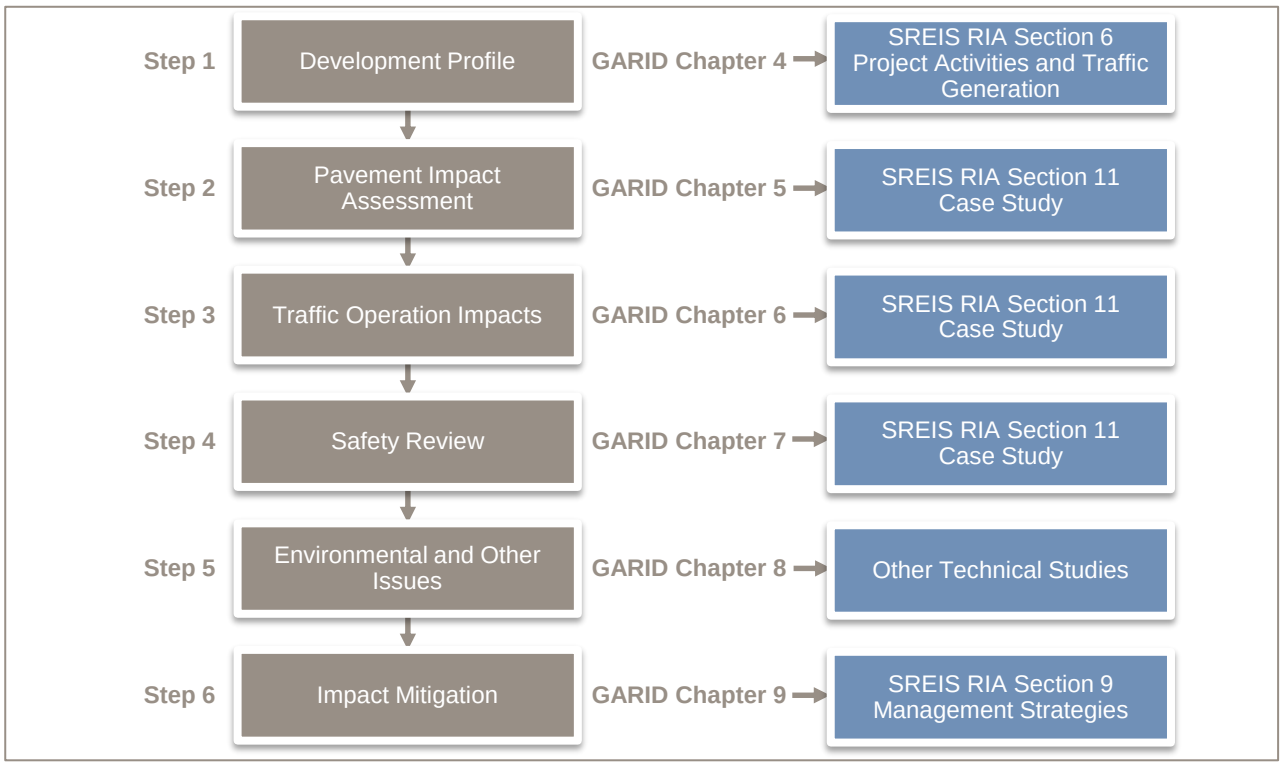
The environmental values assessment approach establishes the significance of the project's potential impacts through consideration of the sensitivity of each environmental value and the magnitude of the project's potential impact upon the value. The sensitivity of an environmental value is determined based upon consideration of its susceptibility or vulnerability to threatening processes or as a consequence of its intrinsic value. The magnitude of a project impact is determined based on consideration of the impact's severity. The significance of the project's impact has been considered both pre and post the implementation of the planned management strategies.

2.4.2 Traditional Traffic Engineering Assessment Approach

The traditional traffic engineering assessment approach is based upon the principles established within TMR's *Guidelines for Assessment of Road Impacts of Development* (GARID). The GARID assessment approach is utilised in Queensland to identify the specific management strategies such as intersection upgrades and proponent contributions towards pavement maintenance that are relevant to a proposed development and can reasonably be conditioned. Figure 2-2 details the generic assessment process detailed within GARID and shows the sections of the SREIS RIA that they correspond to. Both the EIS and SREIS RIA included consideration for Step 1 of the GARID process, with additional steps being considered in the SREIS RIA.

Arrow has identified several sites at which it is likely, but not certain, that major project facilities will ultimately be located. Case study assessments have been undertaken for these likely sites to confirm the effectiveness of the planned management strategies at avoiding, minimising and mitigating the impacts associated with project traffic. The intent of this assessment approach is to establish that the planned management strategies will ultimately result in proponent funded road works and contributions which meet or exceed typical traffic engineering practice requirements. The case study assessments are documented in Section 11.

Figure 2-2 GARID Process Flowchart and References



3 Legislative Context

The legislative context for the SREIS RIA was detailed in the EIS RIA. The legislative processes and powers utilised by State and local government road authorities presented within the EIS RIA remain current and therefore consideration of the processes and powers has not been reproduced herein to aid brevity. Should readers require information in relation to relevant legislative processes and powers they are directed to refer to the EIS RIA.

Whilst it is understood and recognised that State government legislation and TMR polices relating to assessment of development are currently under review, the published guidance is still unchanged from that in place at the time of the EIS RIA.

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4 Existing Road Environment Conditions

4.1 Functional Road Hierarchy

Figure 4.1 summarises the Highways, Regional Connecting Roads, Rural Connecting Roads and Rural Access Roads within proximity to the project study area. The adopted functional road hierarchy definitions are consistent with that identified within the EIS RIA. The updated functional road hierarchy presented on Figure 4.1 remains very similar to that presented within the EIS RIA, and therefore confirms the continued validity of the condition data relied upon in preparing the EIS RIA.

4.2 Road Construction Standard

Figure 4.2 summarises the existing construction standard of all roads within proximity to the project study area where the data has been previously made available by road authorities. The generic terminology for road construction standards used for this assessment is as follows:

> Sealed road has been generally constructed using a bituminous material to form a protected road surface
> Unsealed road has been generally constructed to a formed and gravelled standard or a higher quality formed but un-gravelled standard
> Unsealed track has been generally constructed to an unformed standard.

4.3 Traffic Volumes

Figure 4.3 summarises the 2011 Average Annual Daily Traffic (AADT) volume data supplied by TMR for all State-controlled roads within the project study area. This is provided as an update to the 2009 AADT volume data included in the EIS RIA which was the most current at the time of the previous assessment.

4.4 Multi-Combination Vehicle Routes

Figure 4.4 identifies the designated multi-combination routes within proximity to the project study area based upon data supplied by TMR in March 2013. Multi-combination vehicle routes include roads on which the use of B-Doubles or Road Trains is specifically approved. The updated multi-combination routes presented on Figure 4.4 are very similar to that presented within the EIS RIA, and therefore confirm the continued validity of the road condition data relied upon in preparing the EIS RIA.

4.5 School Bus Routes

Figure 4.5 summarises the school bus routes within proximity to the project study area based upon data supplied by the Queensland Government in February 2013. The updated school bus routes presented on Figure 4.5 are generally similar to the routes presented within the EIS RIA. The updated data continues to indicate that the various school bus routes radiate from the townships of Dalby, Chinchilla, Miles, Tara, Pittsworth, Millmerran, Wandoan and Goondiwindi where education facilities are located. The updated data also continues to identify that the school bus routes in proximity to the project study area typically utilise Highways and the higher-order local roads such as Regional Connecting Roads. The updated school bus route data therefore confirms the continued validity of the condition data relied upon in preparing the EIS RIA.

4.6 Rail Crossings

Figure 4.6 summarises the public rail crossings in proximity to the project study area based upon data supplied by Queensland Rail in February 2013. The updated rail crossing data continues to indicate that the majority of rail crossings incorporate passive control systems such as signage. The updated rail crossing data therefore confirms the continued validity of the condition data relied upon in preparing the EIS RIA.

4.7 Stock Routes

Figure 4.7 summarises the stock routes in proximity to the project study area based upon data supplied by the Queensland Government in March 2013. The updated stock routes presented on Figure 4.7 are very similar to the routes presented within the EIS RIA. The updated stock route data therefore confirms the continued validity of the condition data relied upon in preparing the EIS RIA.

4.8 Road Safety

Figure 4.8 summarises the calculated crash rates per 100 million vehicle kilometres travelled (VKT) for the State-controlled roads in proximity to the project study area based upon raw crash data supplied by TMR in February 2013. The reported crash data covers the following time periods dependent on the reporting and processing timeframes for the different crash severities:

> Fatal crashes: 1 January 2005 to 31 October 2012
> Hospitalisation crashes: 1 January 2005 to 30 September 2012
> Non serious crashes: 1 January 2005 to 30 June 2010.

The reported crash rates are based on AADT and hence are only able to be calculated for State-controlled roads for which AADT data is readily available in a spatial format.

As a means of comparison, Austroad's *Road Safety Engineering Risk Assessment Part 7: Crash Rates Database* indicates that a crash rate of 52 crashes per 100 million VKT is typical for rural roads with undivided sealed carriageways in Queensland. The crash data summarised on Figure 4.8 indicates that the majority of State-controlled roads in proximity to the study area have generally experienced lower than typically expected crash rates. The link sections presented in Figure 4.8 are more disaggregated than presented in the EIS RIA and as a result, there tends to be greater variability in the calculated crash rates as there is a reduced averaging effect.

4.9 Motorist Rest Areas

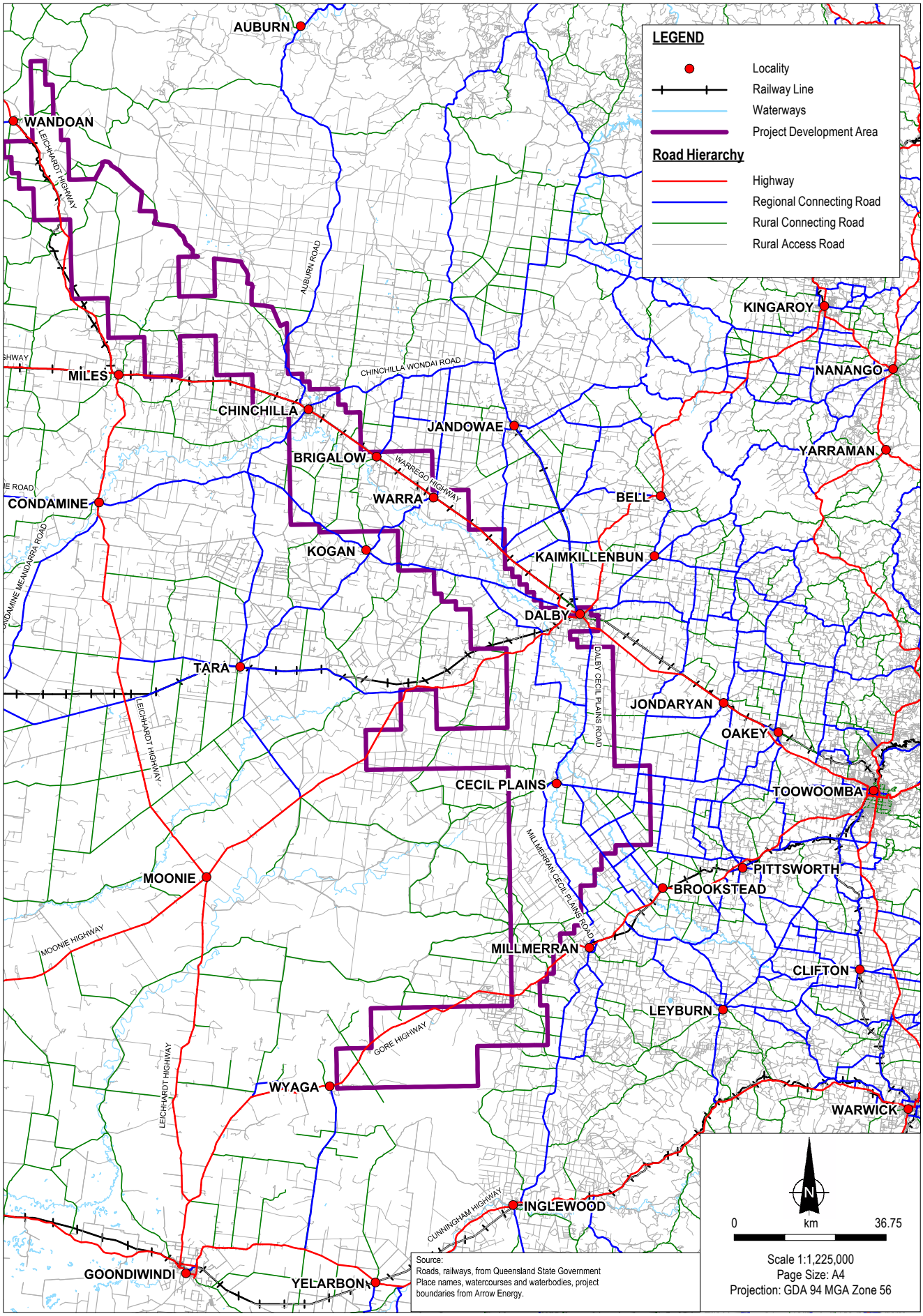
Figure 4.9 summarises the motorist rest areas in proximity to the project study area based upon data supplied by TMR in February 2013. The identified rest areas allow drivers to stop and rest before continuing a drive. Some areas also allow extended rest times including overnight. Additionally, during school holidays and public holiday periods some rest stops operate as 'Driver Reviver' stops. The stops shown also include heavy vehicle rest areas and heavy vehicle stopping places. The updated data presented on Figure 4.9 is generally consistent with that presented in the EIS RIA. The updated motorist rest area data therefore confirms the continued validity of the condition data relied upon in preparing the EIS RIA.

4.10 Pedestrian and Cycle Networks

The majority of towns within the project development area have basic pedestrian and cycle infrastructure. Roads outside of the townships typically do not include dedicated cycle facilities such as designated on-road cycle lanes.

4.11 Public Transport Networks

The Queensland Government provides financial support to Greyhound and Bus Queensland to operate long-distance passenger services throughout Queensland with certain routes covering major towns within proximity to the project study area. Stops are located in Miles, Chinchilla, Brigalow, Warra, Dalby, Tara, Millmerran and Goondiwindi, with connections to Toowoomba, Rockhampton, Mt Isa, Lightening Ridge and Brisbane. These services travel on highways (i.e. Warrego Highway, Moonie Highway and Gore Highway) within the project area and bus frequencies vary from twice per week (Toowoomba to Lightning Ridge) to daily (Brisbane to Mt Isa).



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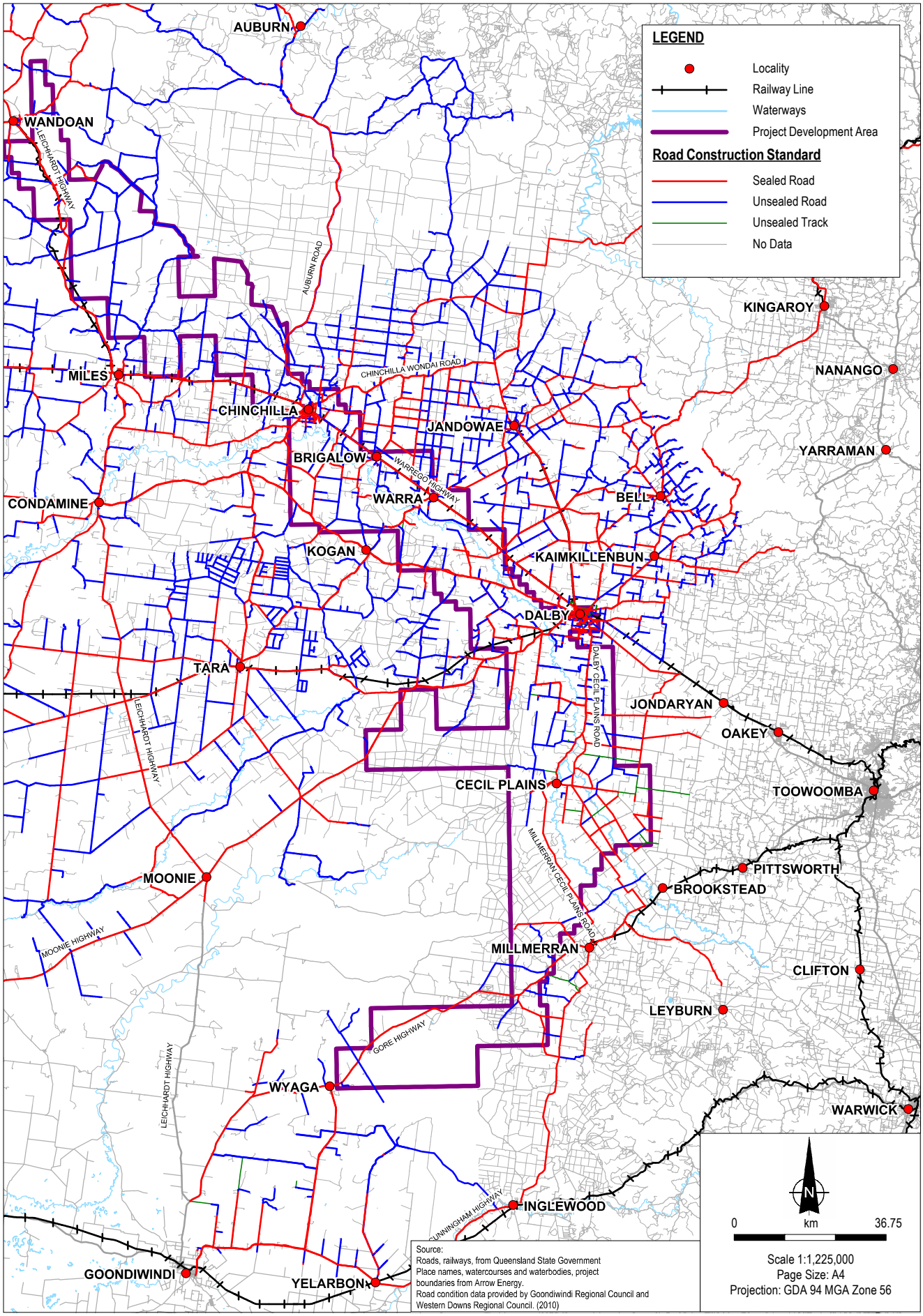

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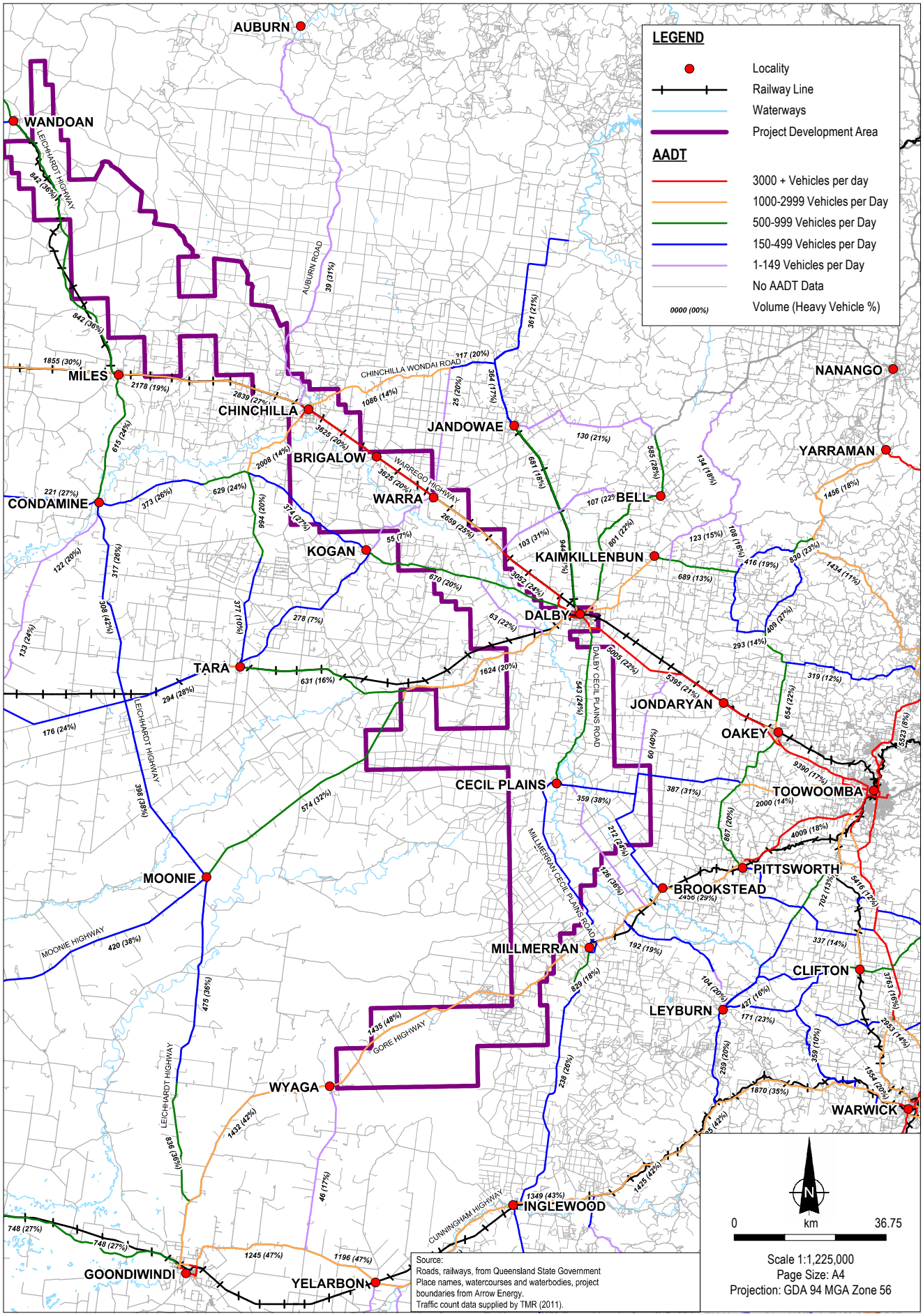
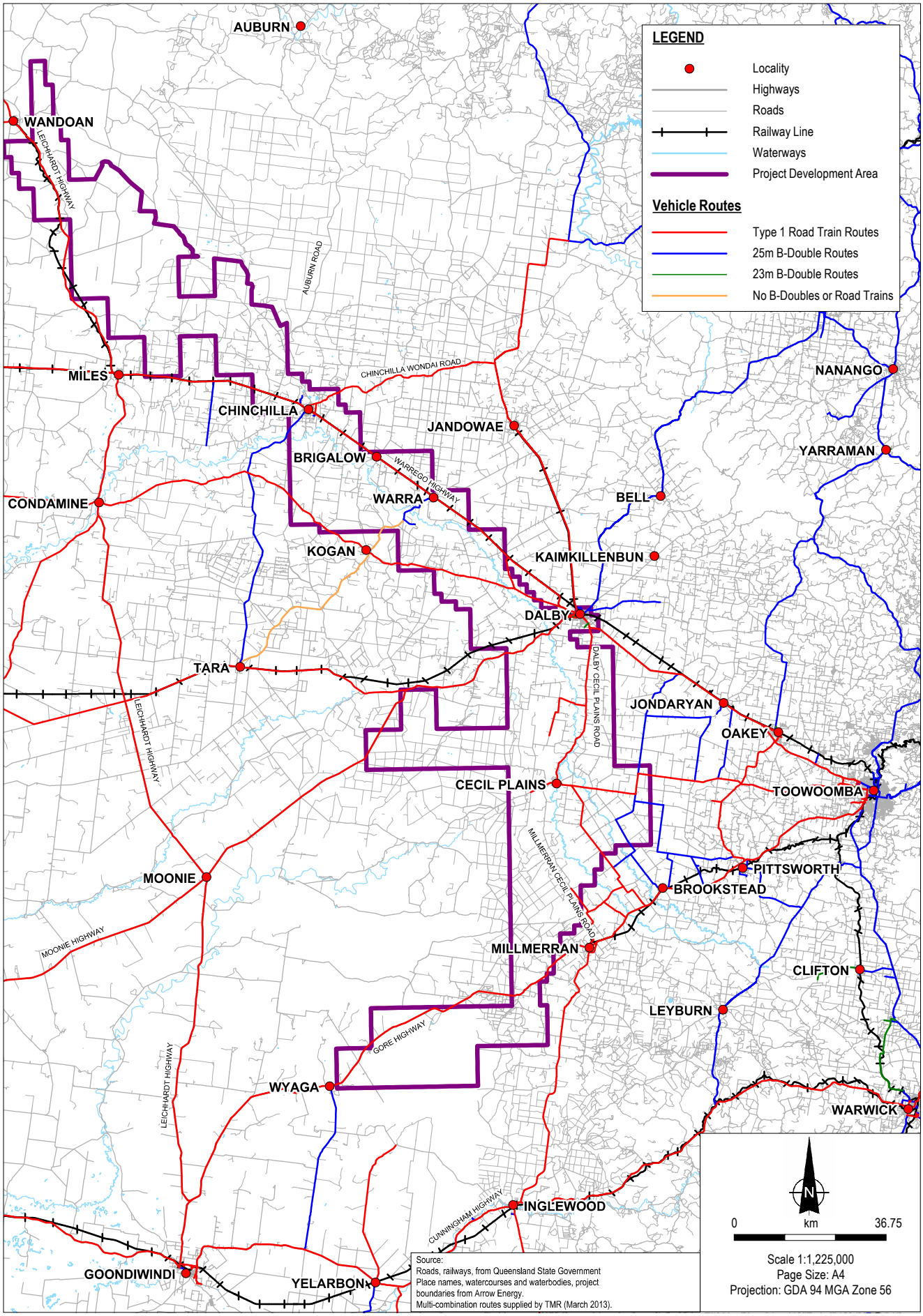
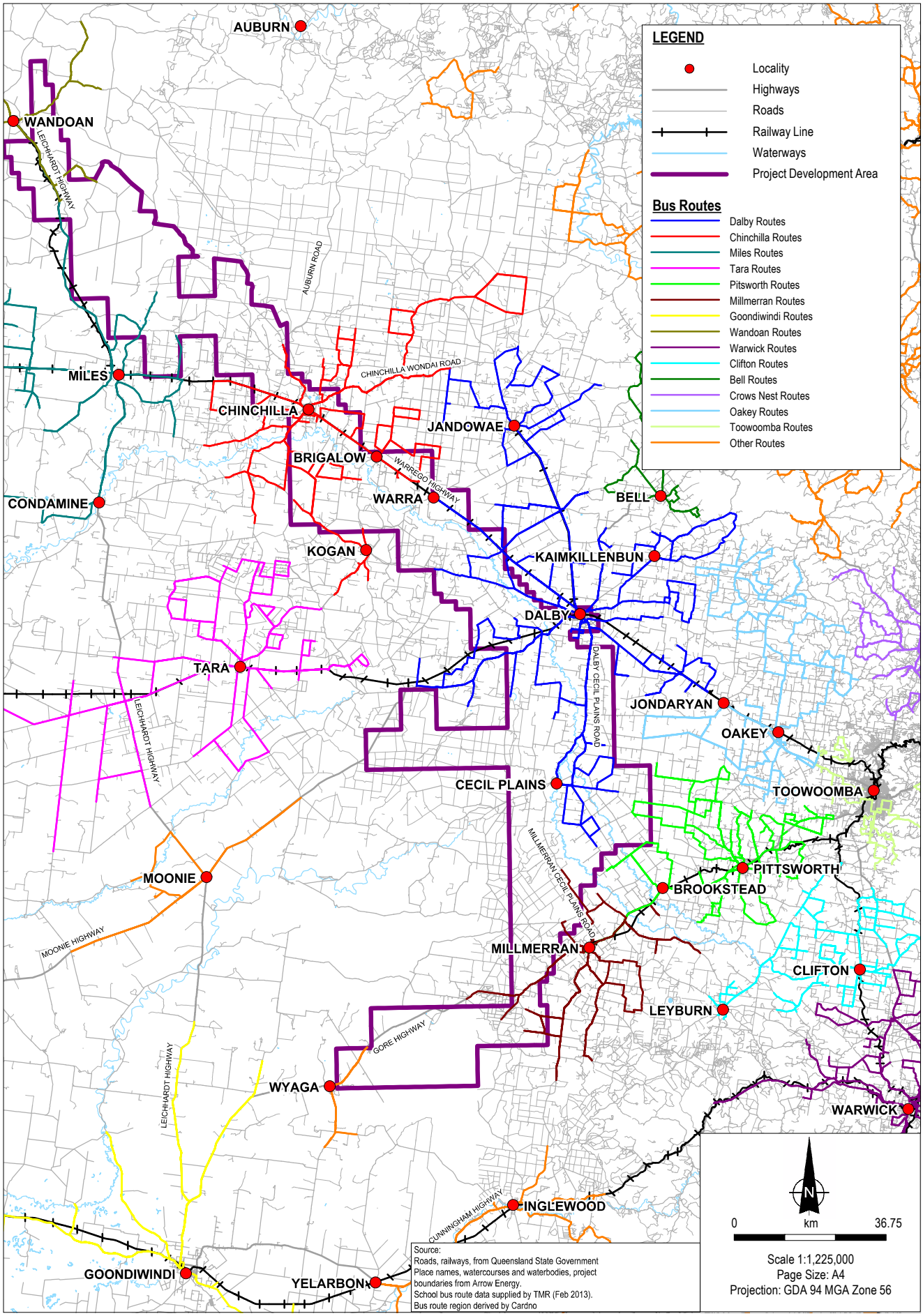


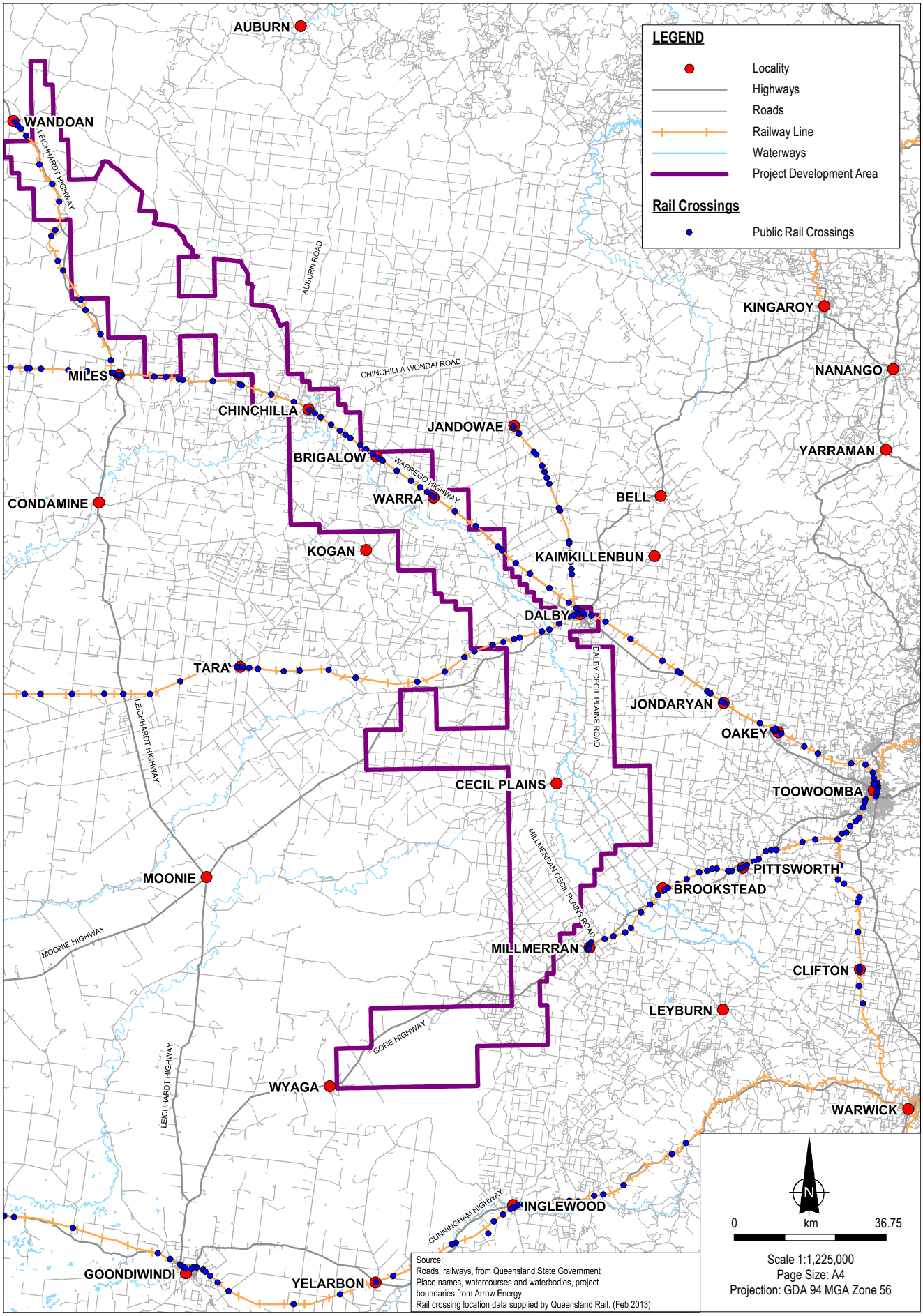
Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.3 File Name: 6413_Figure 4.3.wor	Arrow Energy Surat Gas Project	arrow energy go further	2011 Annual Average Daily Traffic Volumes	Figure No: 4.3



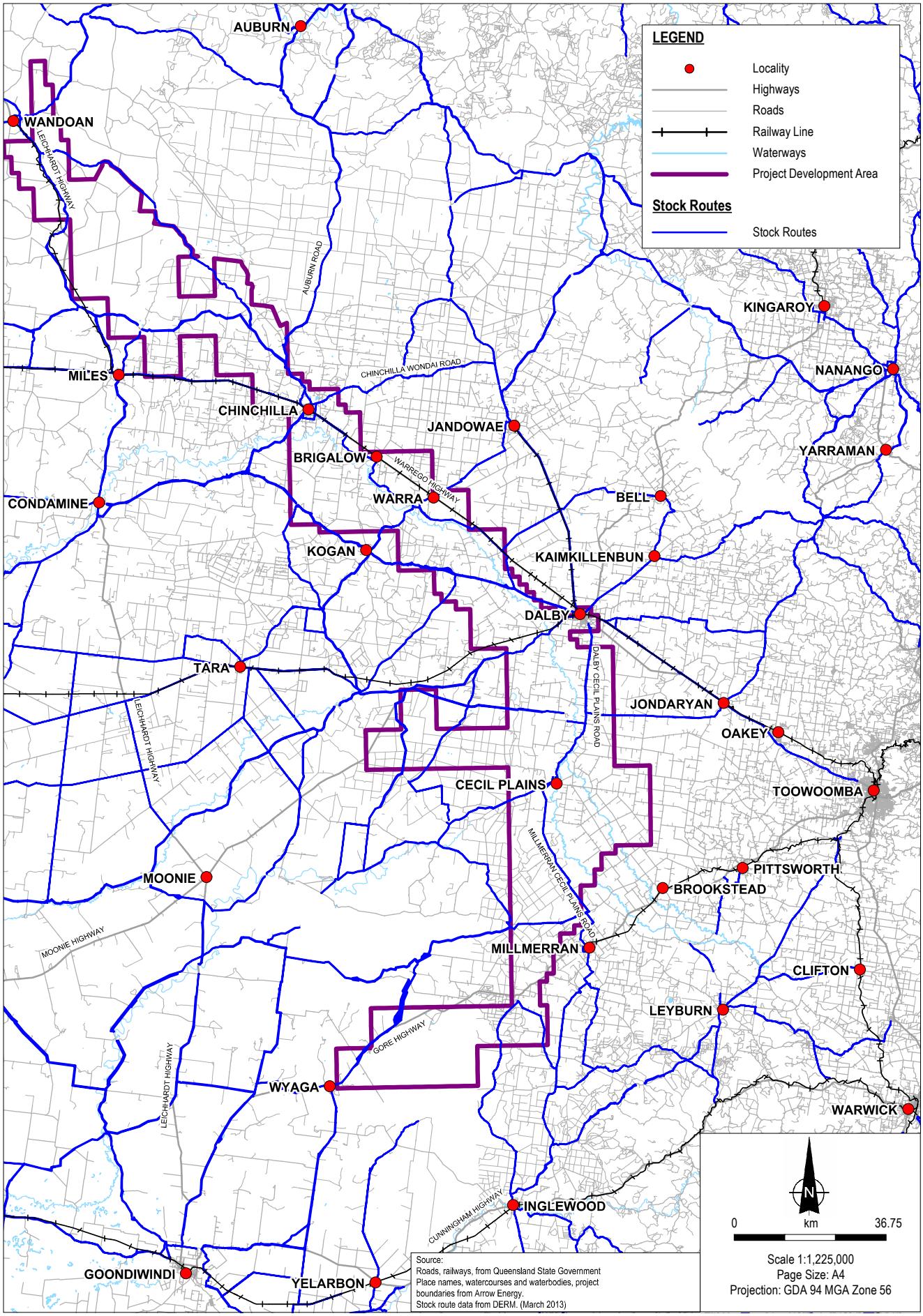
Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.4 File Name: 6413_Figure 4.4.wor	Arrow Energy Surat Gas Project	arrow energy go further	Multi-Combination Vehicle Routes Figure No: 4.4



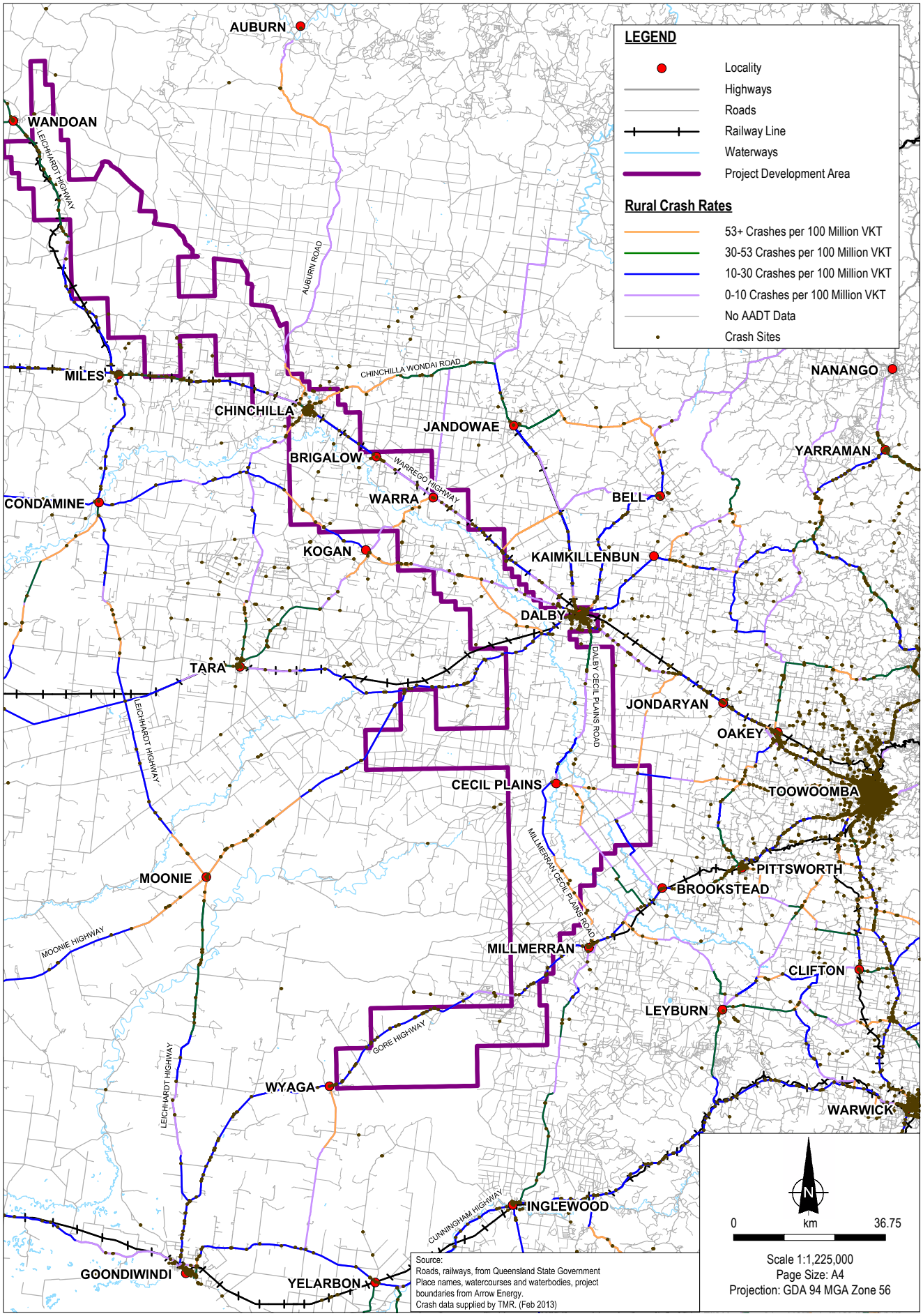
Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.5 File Name: 6413_Figure 4.5.wor	Arrow Energy Surat Gas Project	arrow energy go further	School Bus Routes	Figure No: 4.5



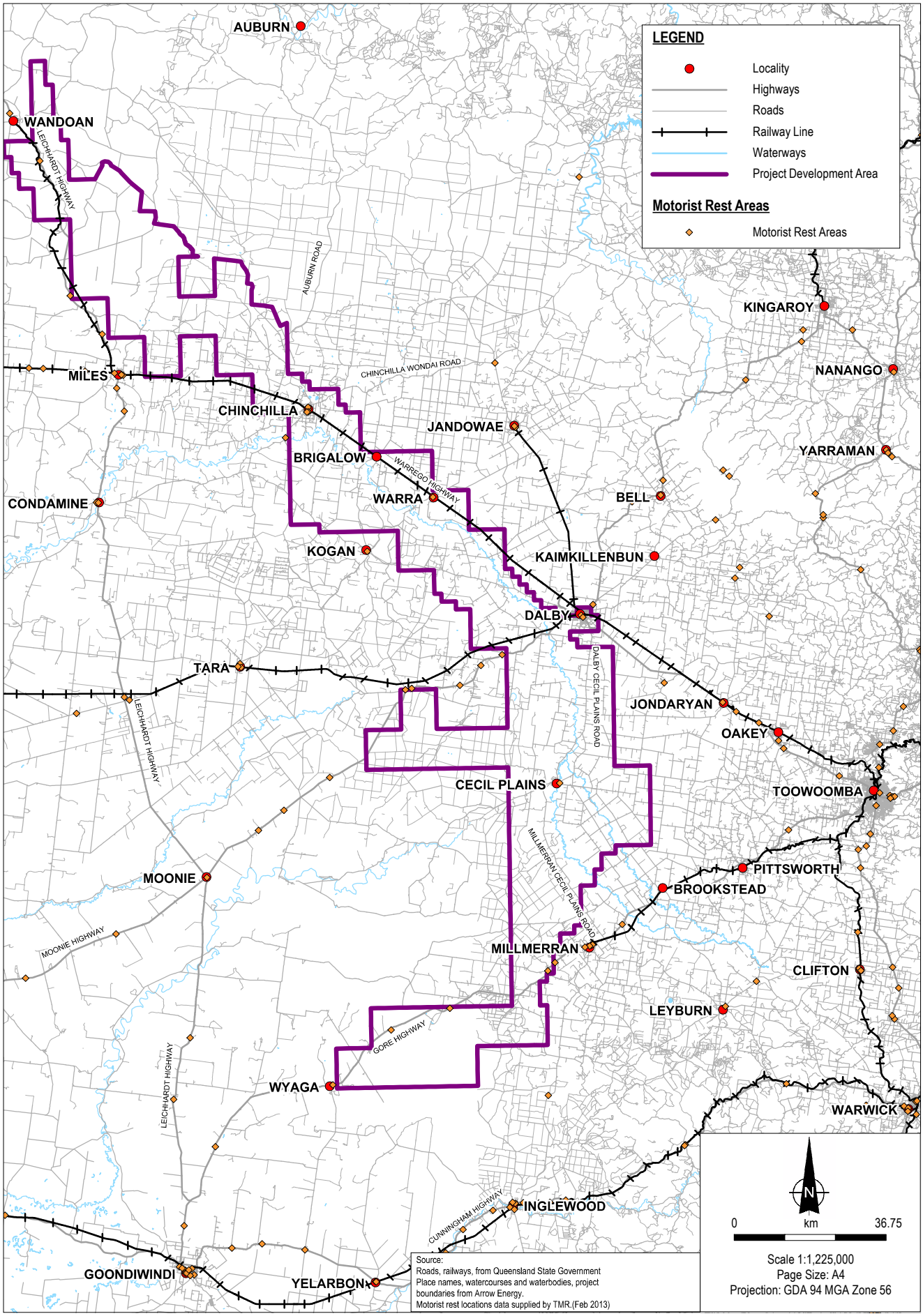
Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.6 File Name: 6413_Figure 4.6.wor	Arrow Energy Surat Gas Project	arrow energy go further	Rail Crossings	Figure No: 4.6



Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.7 File Name: 6413_Figure 4.7.wor	Arrow Energy Surat Gas Project	arrow energy go further	Stock Routes	Figure No: 4.7



Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.8 File Name: 6413_Figure 4.8.wor	Arrow Energy Surat Gas Project	arrow energy go further	Historic Crash Locations And Rates (2005 to 2012)	Figure No: 4.8



Cardno Shaping the Future	Date: 13.5.2013 WOR: Figure 4.9 File Name: 6413_Figure 4.9.wor	Arrow Energy Surat Gas Project	arrow energy go further	Motorist Rest Areas	Figure No: 4.9

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5 Future Baseline Traffic Volumes

5.1 Historic Traffic Growth

Annual traffic volumes on the roads likely to service the project have varied depending on the proximity to Dalby and other urban areas and on the period over which the observations have been made, with higher growth generally observed in recent years. Traffic volumes on the roads servicing the project have typically changed by between -1%p.a. (decline) and 3%p.a. (increase) over the past ten years. While higher long term annual growth rates ranging between 4% and 8% have been observed at a few isolated locations this is not typical of the long term traffic volume growth generally observed across the region.

5.2 Cumulative Impacts

Table 5-1 provides a summary of other projects currently underway or under investigation in the vicinity of the Surat Gas Project. The location of these projects is shown at Appendix A. Whilst the majority of these projects were listed in the EIS RIA, a number of additional projects have since been identified, including:

> Bundi Coal Project
> Ironbark Project
> North Surat – Collingwood Coal Project
> North Surat – Taroom Coal Project
> Norwood Coal Project
> The Range Project
> Woori Coal Project.

Table 5-1 Other Projects in Proximity to Project Study Area

Proposed Project	Proponent	Estimated Start Date	Estimated Duration of Project
Arrow Surat Pipeline	Arrow Energy Pty Ltd	2013	35 years
Australia Pacific LNG Project (APLNG)	Origin Energy and Conoco Phillips	2012	35 years
Bloodwood Creek Queensland Stage 2	Carbon Energy (Operations) Pty Ltd.	Unknown	40–50 years
Bundi Coal Project	Metro Coal Limited	2013	20 years
Cameby Downs Expansion Project	Syntech Resources Pty Ltd	2014	30 years
CS Energy Kogan Creek Solar Boost Project	CS Energy Qld AREVA Solar	2013	Unknown
Elimatta Coal Project	Taroom Coal Proprietary Limited	2013	25 years
Emu Swamp Dam Project	Southern Downs Regional Council	Unknown	18 months
Gladstone Liquefied Natural Gas (GLNG) Project	Santos Limited	2011	35 years
Ironbark Project	Origin Energy Pty Ltd	2015	40 years
Nathan Damand Nathan Pipeline	Sunwater	2012	2 years
New Acland Coal Mine Stage 3 Expansion Project	New Hope Coal Australia	2010	30 years
North Surat – Collingwood Coal Project	Cockatoo Coal Limited	2013	30 years
North Surat – Taroom Coal Project	Cockatoo Coal Limited	2013	30 years
Norwood Coal Project	Metro Coal Limited	2015	20 years
Queensland Curtis LNG Project (QCLNG)	QGC Pty Ltd (BG Group Business)	2011	35 years
Queensland Hunter Gas Pipeline Project	Hunter Gas Pipeline Pty Ltd	2012	Unknown
'The Range Project'	Stanmore Coal Limited	2013	23 years
Wandoan Coal Project	Xstrata Coal Queensland Pty Ltd	2012	Unknown

Proposed Project	Proponent	Estimated Start Date	Estimated Duration of Project
Woori Coal Project	Surat Coal Pty Ltd	Unknown	30 years

Of the projects listed in Table 5-1, those with a higher traffic generating potential over an extended period of time are generally the larger resource projects (predominately gas and coal production). These projects typically have 20 to 40 year timeframes and will contribute to background growth on the road network over the longer term.

As identified in the EIS RIA, it is expected that for the subset of projects with a large traffic generation potential each of these projects may individually increase traffic volumes by a percentage in the order of 1.0% to 4.0%. Since preparation of the EIS RIA, an additional two years of traffic data has been obtained which includes the traffic associated with the establishment and operation of other recent projects within the region. The recent additional traffic count data generally confirms the previous assumption documented in the EIS RIA that overall network volumes will steadily increase.

To provide context, Figure 5-1 and Figure 5-2 compare the historical and projected daily traffic volumes on various segments of the Warrego Highway. The graphs demonstrate that in the context of the historical growth, a 3% traffic growth rate over the longer term is a reasonable assumption to inform the assessment presented herein. This assumed growth rate is considered to provide sufficient allowance for increased traffic including the cumulative demands potentially associated with other projects and is generally consistent with the range outlined in the EIS RIA (i.e. 2% to 8%).

It is acknowledged that the future RIA undertaken post EIS assessment to inform identification of specific proponent funded works, will likely need to include consideration for the localised impacts that other projects in the vicinity may have. This level of localised consideration is however not warranted at this stage to inform review of the effectiveness of the planned management strategies and to inform development of appropriate EIS conditions.

Figure 5-1 Traffic Growth – Warrego Highway (Toowoomba – Dalby)

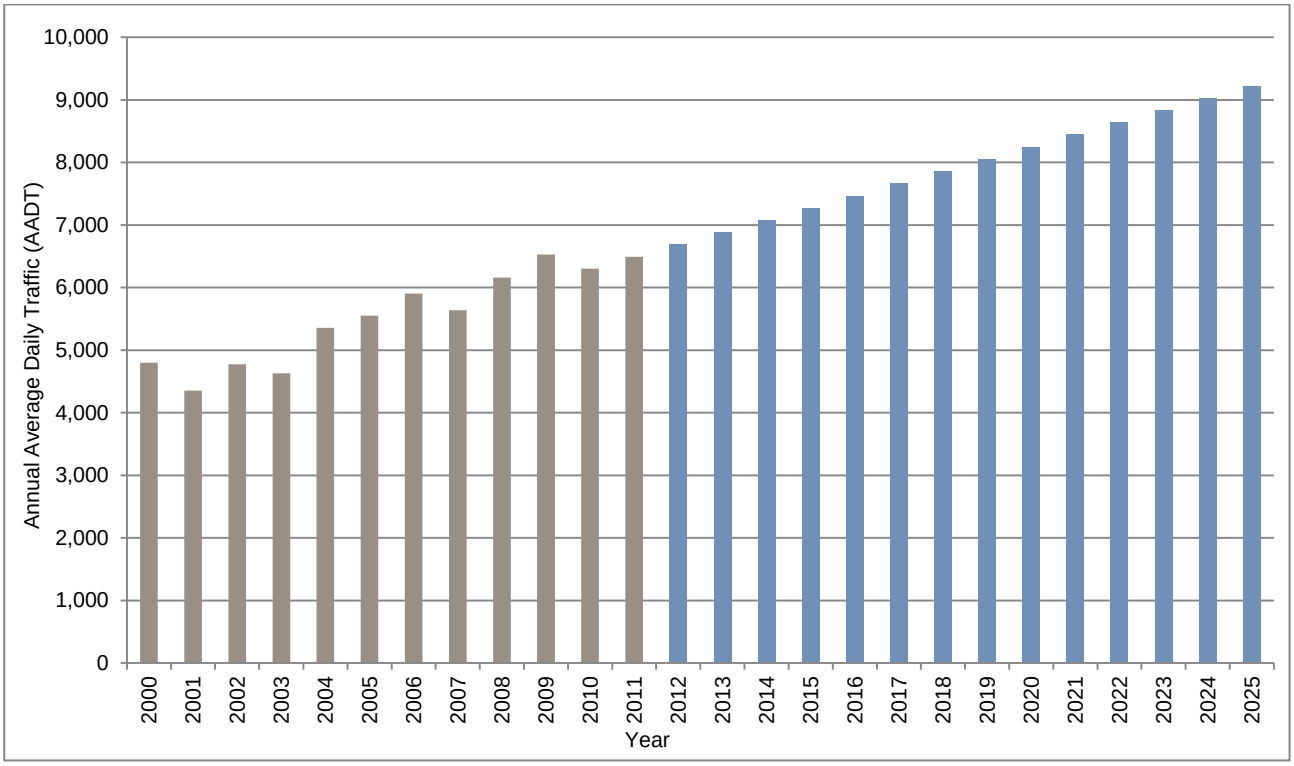
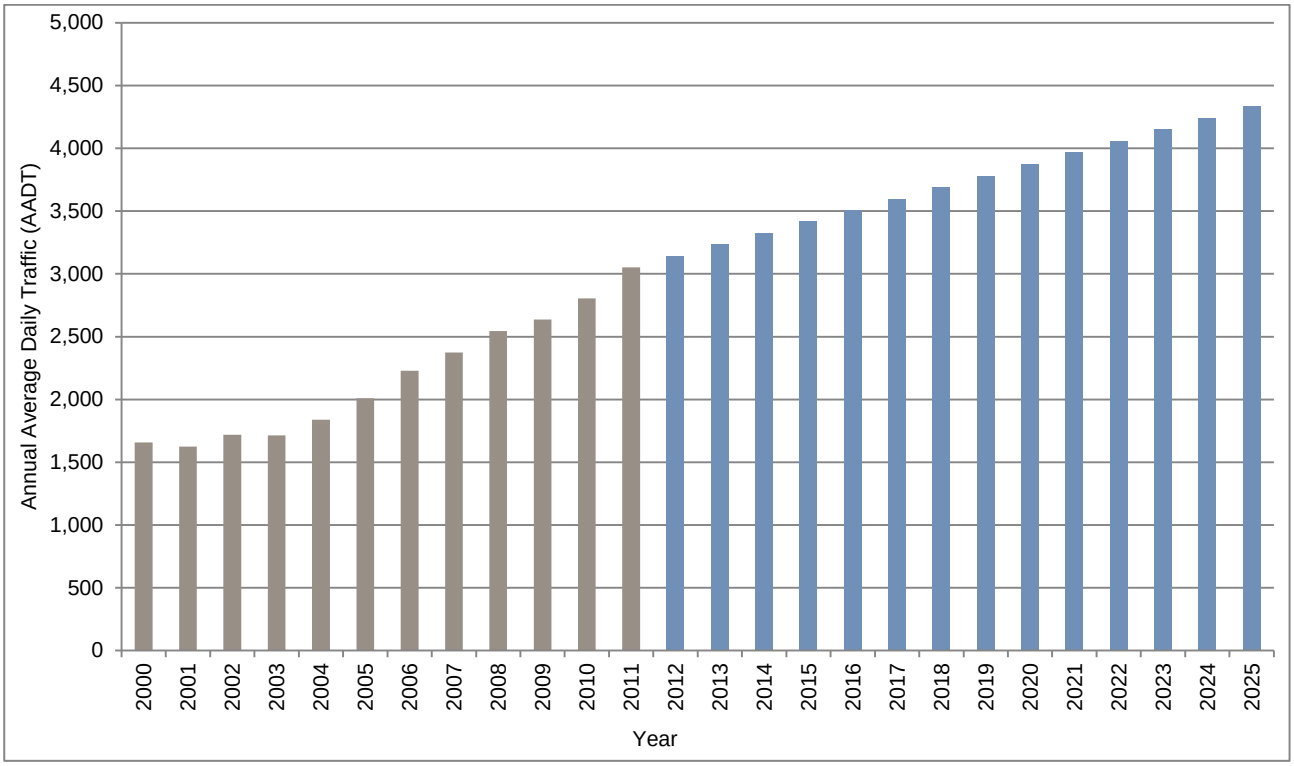


Figure 5-2 Traffic Growth – Warrego Highway (Dalby - Miles)



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6 Project Activities and Traffic Generation

6.1 Project Activities

The key traffic generating activities undertaken as part of the project have been classified by grouping activities into the three phases of the project's lifecycle. Activities associated with different phases are likely to be undertaken concurrently across the project development area. For example, early in the project's lifecycle production wells will likely be operating adjacent to activity associated with the establishment of additional production wells. Similarly, later in the project's lifecycle operation of major facilities will likely occur adjacent to activity associated with the decommissioning of nearby production wells.

Based upon Arrow's existing operations and strategic planning, the key traffic generating activities likely to be associated with the project are as follows:

- Construction phase
  - Production well installation
  - Gathering infrastructure installation
  - Production facility construction
- Operation phase
  - Production well operation and maintenance including well workovers
  - Gathering infrastructure operation and maintenance
  - Production facility operation and maintenance
- Decommissioning phase
  - Production well decommissioning and rehabilitation
  - Gathering infrastructure decommissioning and rehabilitation
  - Production facility decommissioning and rehabilitation.

A detailed breakdown of the traffic generating potential of each project activity is summarised at Appendix B. It is anticipated that the majority of delivery types will be co-ordinated from two marshalling yards located in Dalby and Miles with materials transported from these locations to each of the project activity sites. As identified in Appendix B it is anticipated that some bulk materials such as quarry product and concrete will be transported direct from suppliers to project activity sites rather than via the marshalling yards to avoid inefficient double handling.

6.2 Project Traffic Generation

Table 6-1 provides a summary of the traffic expected to be generated by each project activity. Detailed descriptions of each phase and associated assumptions made are included at Appendix B.

For this assessment, the classification of light vehicles (LVs) includes sedans, wagons, vans, utilities, 4WDs and motorcycles. Buses have been classified as all vehicles larger than a light vehicle van which transport people. All LV and bus movements are associated with staff movements. All other vehicles have been classified as heavy vehicles (HVs).

The estimated traffic generation of each of the activities presented in Table 6-1 is generally higher than that assessed as part of the EIS RIA. The updated traffic generation has been developed by Arrow to present a worst case scenario. In addition, the estimates have been informed by logistics planning recently undertaken by Arrow for the various materials anticipated to be handled by the two marshalling yards.

Table 6-1 Summary of Traffic Generation Potential of Project Activities

Activity	Quantity	Activity Duration	External Traffic Generation		
			HV Movements	Bus Movements	LV Movements
Construction Activities (movements are per facility for duration of construction of each facility)					
Production Wells	6,500 wells	15 days	142	-	444
Gathering Infrastructure	6,500 sections	8 days	22	-	182
CGPFs	6 facilities	55 weeks	3,760	27,720	46,200
CGPF with Water Treatment Facility	2 facilities	60 weeks	4,380	30,240	50,400
FCFs	6 facilities	28 weeks	556	1,100	1,830
TWAF	6 facilities	4 weeks	8,186	-	-
Operation and Maintenance Activities (movements are per facility for each year of operation of each facility)					
Production Wells	6,500 wells	15 years	12	-	48
Gathering Infrastructure	6,500 sections	15 years	-	-	-
CGPFs	6 facilities	18-31 years	624	-	7,800
CGPF with Water Treatment Facility	2 facilities	41 years	9,384	-	10,400
FCFs	6 facilities	12-34 years	20	-	104
TWAF	6 facilities	26-43 years	5,616	1024	27,302
Decommissioning and Rehabilitation Activities (movements are per facility for duration of decommissioning of each facility)					
Production Wells	6,500 wells	2 days	48	-	32
Gathering Infrastructure	6,500 sections	2 days	8	-	-
CGPFs	6 facilities	8 months	3,760	244	14,700
CGPF with Water Treatment Facility	2 facilities	8 months	4,280	720	43,008
FCFs	6 facilities	4 months	556	60	3,570
TWAF	6 facilities	3 months	8,186	-	3,734

The *Project Description* for the *Supplementary Report to the Surat Gas Project EIS* (Project Description) states that CGPFs, FCFs and Water Treatment Facilities are expected to be operational for approximately 25 years. However, for the purpose of this SREIS RIA, an 'operational activity range' has been identified to ensure that the respective facility is operational for the full life of all production wells in the adjacent drainage area. In some instances, the operational life of a facility in the SREIS RIA is greater than what is stated in the Project Description.

7 Strategic Traffic Modelling

7.1 Traffic Modelling Methodology

A strategic traffic model was developed to forecast the traffic demands likely to be associated with the project. This tool was used to inform categorisation of the magnitude of the project's potential impact in order to facilitate an informed assessment of the significance of the project's potential impacts.

The forecasting methodology adopted for this assessment utilises similar principles to that typically adopted for strategic modelling of urban areas. When developing an urban strategic model, the precise land parcels that will be developed during the assessed period are typically unknown. Instead, land with similar characteristics is grouped together such that reasonable predictions can be made about the level of activity likely to be generated in aggregate at the future design horizon. By aggregating the land parcels, it is possible to make reasonably accurate predictions about the level of development likely to occur and in turn the likely traffic generation of the aggregated land parcels at the future design year.

A similar situation exists for the Surat Gas Project. While Arrow has a reasonable understanding of the total extent of infrastructure likely to be developed across the project development area, the precise location for each component of project infrastructure is still to be finalised post EIS assessment and finalisation of detailed constraints analysis. It is known however that the production wells will have a relatively constant spacing and that all other project infrastructure will effectively service the wells. It is therefore possible to make fairly accurate predictions about the level of activity likely to be generated by the project across a broad area. The principals of this approach are consistent with that applied when strategically modelling urban areas.

The following methodology has been utilised to forecast future design horizon traffic volumes:

- The infrastructure likely to be constructed, operated and decommissioned within each activity zone (i.e. well parcel or facility) was identified for each year of the project life based on the development schedule provided by Arrow
- The traffic generation of each activity zone was forecast utilising the traffic generation rates identified in Section 6
- The generated traffic from each activity zone was assigned to the external road network consistent with the origin/destination data presented in Appendix B. Traffic from each activity zone was loaded onto the external road network at a single point nearest the centroid of the activity zone using a representative centroid connector
- Traffic volumes on each road link were identified for each year of the project.

Figure 7.1 illustrates the adopted representative locations of project infrastructure. The representative locations have a relatively high level of disaggregation, which facilitates reasonably accurate forecasts particularly on higher order road links where fewer route choice options exist. The adopted forecasting approach is appropriate to inform decisions in relation to the effectiveness of the planned management strategies and development of appropriate conditions.

7.2 Forecast Project Traffic Demands

The total transport task associated with the project represents the total number of vehicle kilometres likely to be travelled by traffic associated with the project on the State controlled road network, Council controlled road network and the access networks internal to private land over the full life of the project. The total transport task statistic provides a strategic overview of the extent of traffic activity potentially generated by the project over its life.

Table 7.1 summarises the total VKT estimated for the project life and Figure 7.1 summarises the profile of VKT across the project life. The project traffic demands for each year of the project for each assessed link are summarised on Figures C1 to C45 at Appendix C.

Table 7-1 Project Transport Task

Vehicle	Transport Task (VKT)
Light Vehicle	595 Million
Heavy Vehicle including Buses	513 Million
TOTAL	1,108 Million

Figure 7-1 VKT Across Assessed Road Network by Vehicle Type

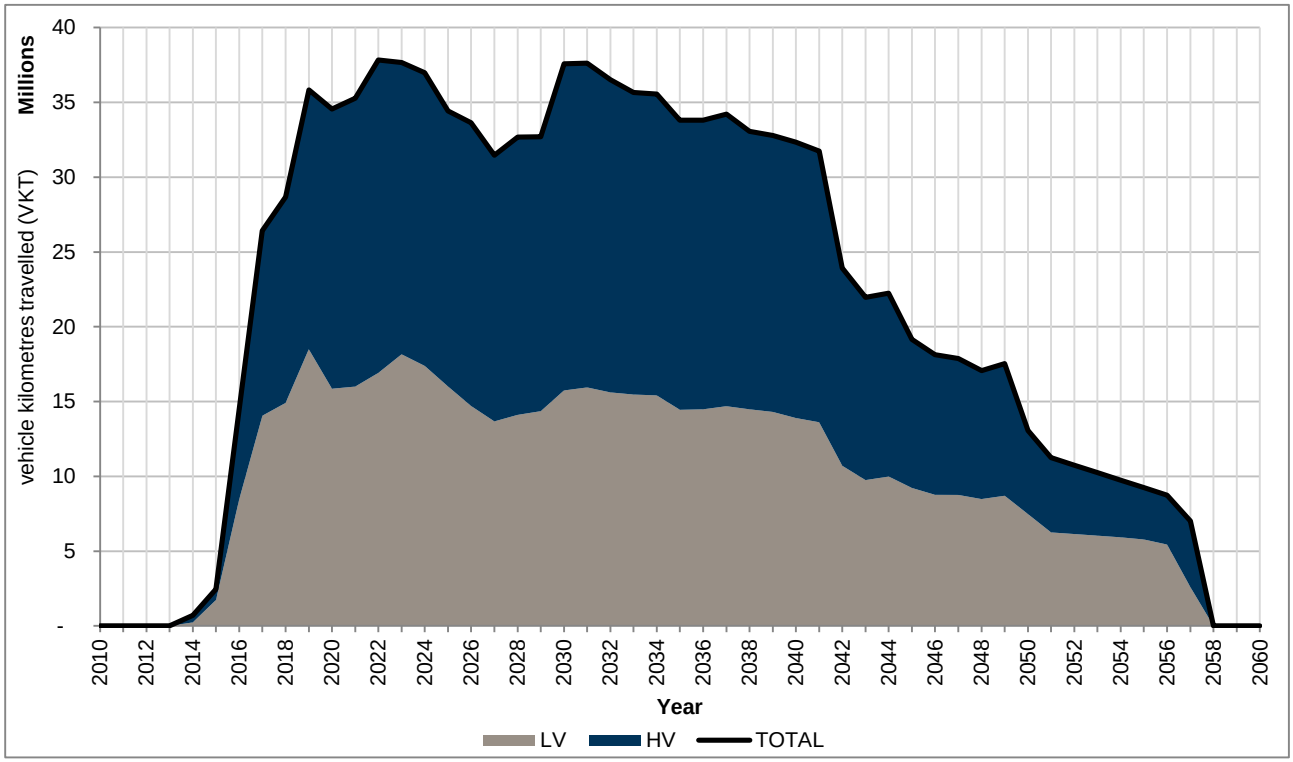
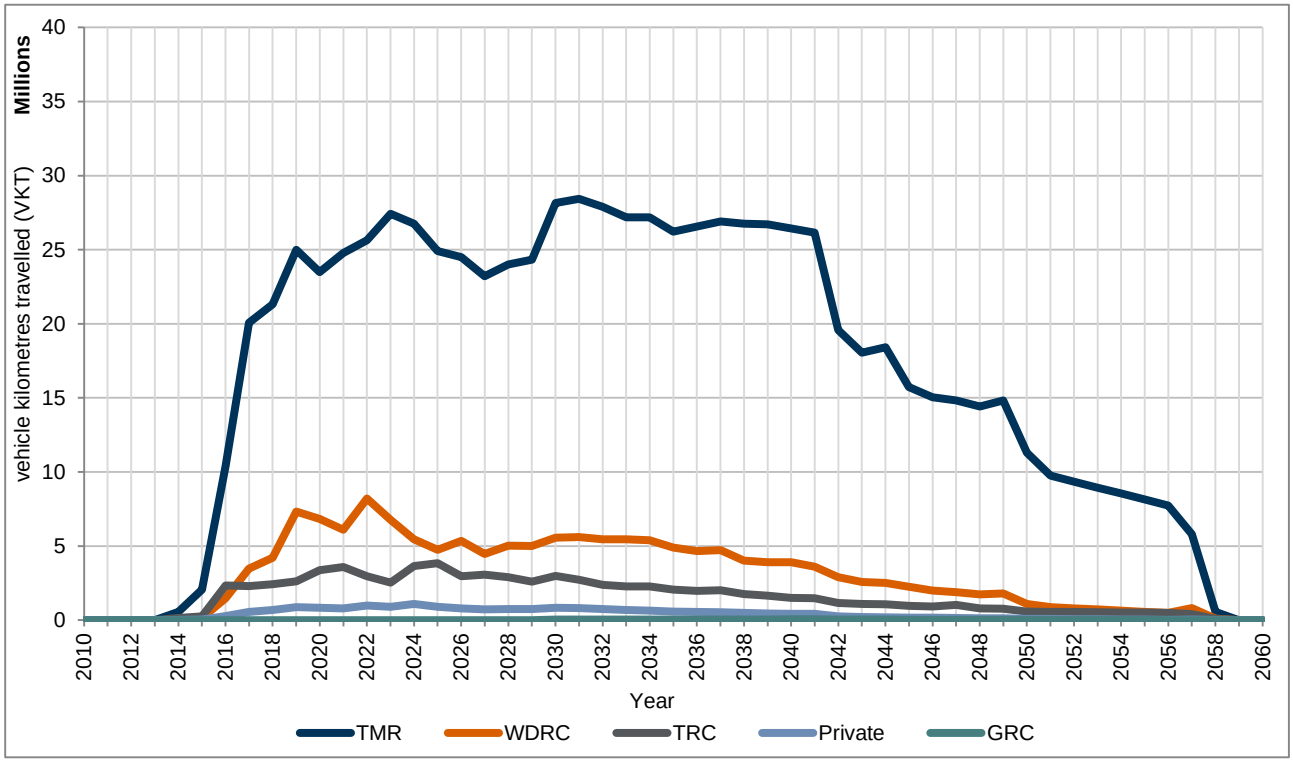


Table 7-1 indicates that the project is anticipated to generate approximately 1,108 Million VKT over the project life comprising 595 Million LV VKT and 513 Million HV VKT within the extents of the former Darling Downs Region. Figure 7-1 indicates that the project's annual VKT generation is anticipated to peak at 38 Million VKT during 2022.

Figure 7-2 summarises the VKT that is anticipated to occur on TMR's, Western Downs Regional Council's (WDRC), Goondiwindi Regional Council's (GRC) and Toowoomba Regional Council's (TRC) road networks as well as on private access roads.

Figure 7-2 VKT Across Assessed Road Network by Road Authority



The results presented in Figure 7-2 indicate that approximately:

- 854 Million VKT or 77% of the total project travel is anticipated to occur on TMR's network
- 155 Million VKT or 14% of the total project travel is anticipated to occur on WDRC's network
- 78 Million VKT or 7% of the total project travel is anticipated to occur on TRC's network
- 20 Million VKT or 2% of the total project travel is anticipated to occur on private access roads
- 0.7 Million VKT or less than 1% of the total project travel is anticipated to occur on GRC's road network.

Figure 7-3 provides a summary of the project generated VKT on TMR's road network over the project life by vehicle type (i.e. HV and LV) within the extents of TMR's former Darling Downs Region.

Figure 7-3 VKT on TMR Roads Across Assessed Road Network by Vehicle Type

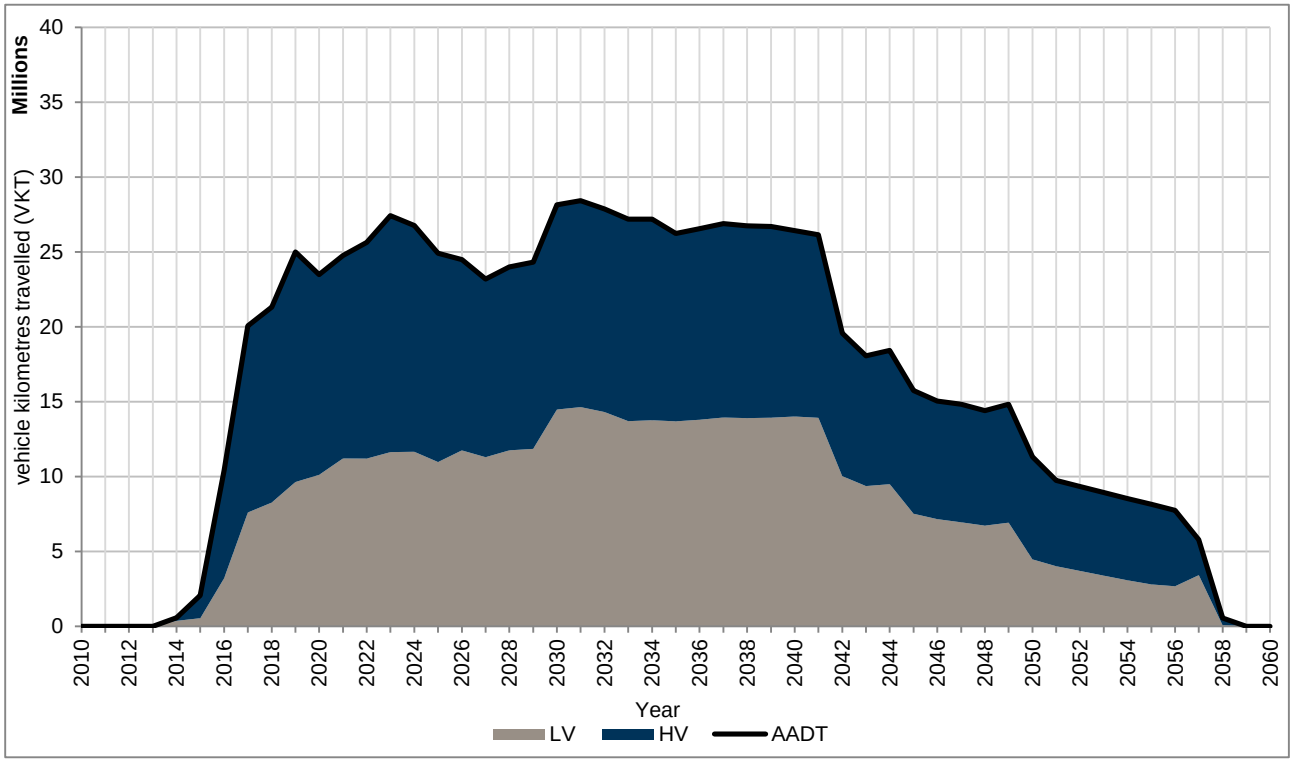


Figure 7-3 indicates that around 2031 the project is anticipated to generate 28 Million VKT on TMR's road network comprising approximately 15 Million LV VKT and 14 Million HV VKT. To provide context to this travel forecast, the total VKT that occurred on TMR's former Darling Downs Region road network during 2011 has been estimated based on data supplied by the district. This data indicates that in 2011 approximately 1,892 Million VKT occurred across the district's road network. Of this approximately 376 Million VKT was associated with HV travel while the remaining 1,516 Million VKT was associated with LV travel.

Figure 7-4 summarises the project's forecast VKT generation on TMR's road network for each project year as a percentage of the travel which occurred on the district's road network in 2011 by vehicle class. This provides an indication of the broad proportional impact of travel associated with the project on the district's road network by vehicle class.

Figure 7-4 VKT on TMR Roads Across Assessed Road Network as Percentage of 2011 VKT in former Darling Downs Region

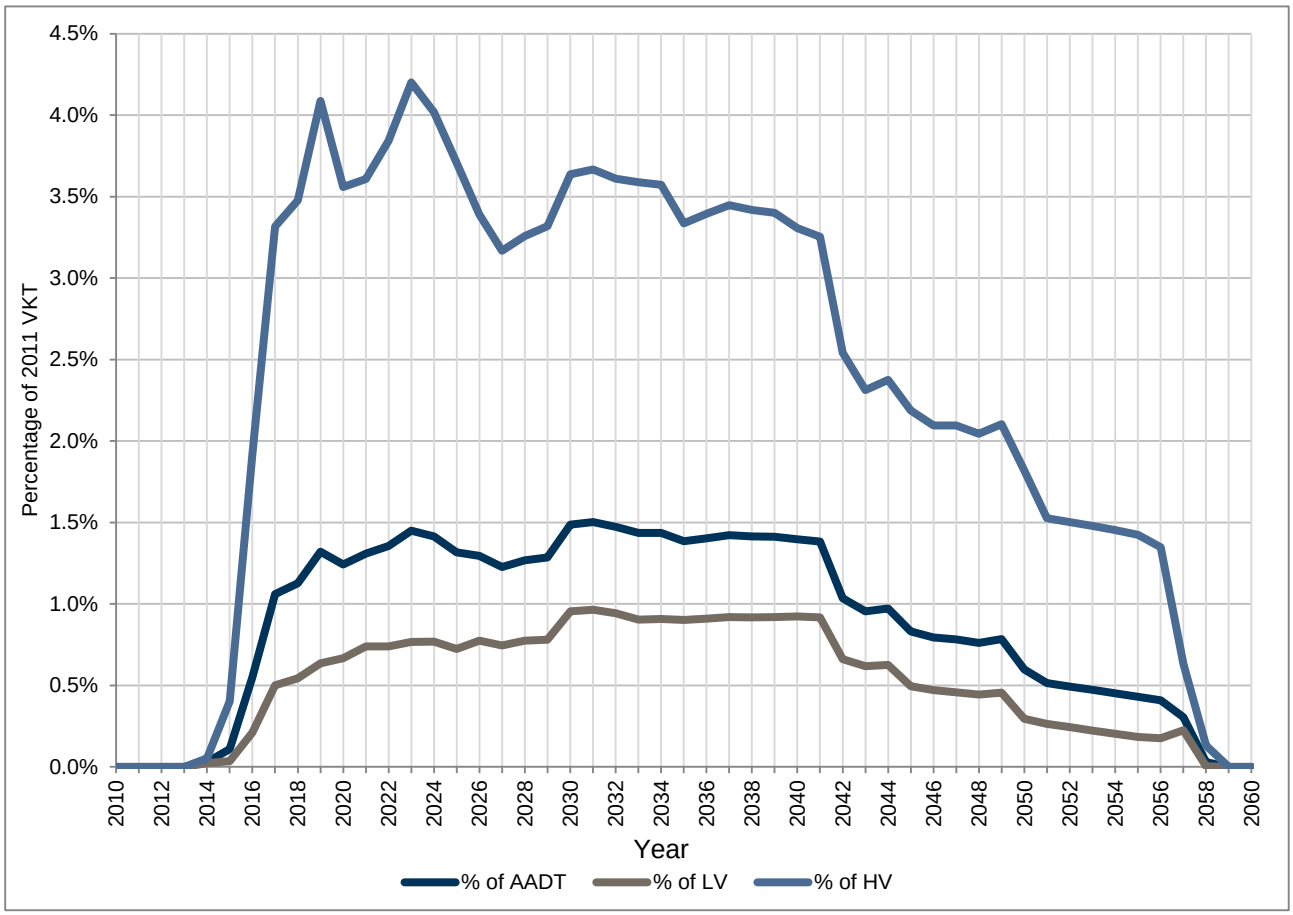


Figure 7-4 indicates that at its peak (around 2031) the project is anticipated to increase the level of total travel occurring on TMR's former Darling Downs District road network by approximately 1.5% beyond the level of total travel that occurred on the district's road network in 2011. Figure 7-4 also indicates that the extent of HV travel generated by the project across the district is likely to peak in 2023 at approximately 4.2% of the HV travel that occurred on the district's road network in 2011.

These findings are very important as they indicate that at the district level the total travel generated by the project is likely to be equal to or less than 1.5% of the total travel currently (2011) occurring on the district's road network. Furthermore, even at its peak the project is anticipated to increase the extent of HV travel occurring on the district's road network by less than 4.5% of existing (2011) levels.

With regards to the spatial traffic volumes, Figure 7.2 summarises the transport task performed by each road link for the full life of the Surat Gas Project. Figure 7-3 indicates the AADT generated by the project on each link on average for the full project life. Figure 7-4 summarises the highest AADT increase anticipated to be experienced in any year of the project on each link.

The implications of the AADTs shown on Figures 7-2 to 7-4 are discussed in Section 10 of the report with response to the magnitude and therefore significance of impact.

7.3 Comparison to EIS Traffic Demands

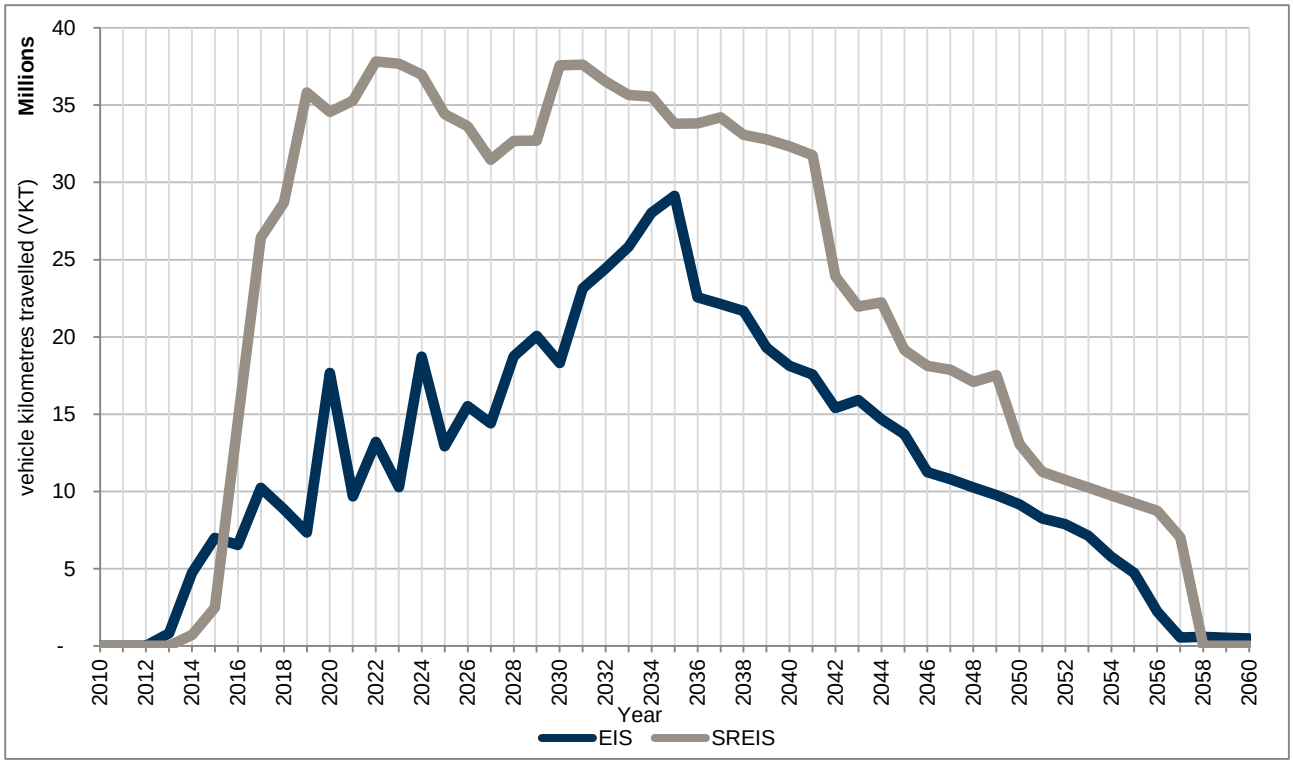
7.3.1 Vehicle Kilometres Travelled

Table 7-2 compares the total project VKT estimated for the project life during the preparation of the EIS RIA with that estimated as part of the SREIS RIA. Figure 7-5 illustrates the profile of VKT across the project life.

Table 7-2 Project Transport Task - VKT (EIS vs. SREIS)

Vehicle	EIS Transport Task (VKT)	SREIS Transport Task (VKT)
Light Vehicle	224 million	595 million
Heavy Vehicle including Buses	392 million	513 million
TOTAL	616 million	1,108 million

Figure 7-5 VKT Across Assessed Road Network (EIS vs. SREIS)



The results presented above suggest that the estimated total project VKT has increased by approximately 492 Million VKT compared to the EIS (i.e. 616 Million VKT to 1,108 Million VKT). In addition, the anticipated peak annual VKT has increased by approximately 9 Million VKT compared to the EIS (i.e. 29 Million VKT to 38 Million VKT). The total transport task statistic provides a strategic overview of the extent of traffic activity generated by the project over its life. Whilst the results indicate an increase in the estimated total project VKT compared to the EIS, the net increase in daily traffic volumes at a road link level is typically relatively minor.

The estimated increase in total project VKT is fundamentally a result of recent changes in project planning from that presented in the EIS and a refined understanding of the material requirements for of project. At a high level, the following changes in project planning have influenced the total project VKT estimates:

> Changes to the intensity, duration and sequencing of the project
> Reduction in the number of water treatment facilities and marshalling yards
> Increased aggregate requirements etc.

As stated previously, the assessed schedule has been formulated to present a worse case development scenario from a traffic engineering perspective. It assumes rapid development of the production wells and facilities resulting in the most intense forecast of peak traffic demands. Therefore, the revised VKT estimates for the project are considered conservative and should provide road authorities greater confidence that the traffic impacts that ultimately eventuate are very unlikely to exceed that reported herein.

7.3.2 Strategic Routes

The recent changes in project planning have resulted in a shift in project traffic demands from the Gore Highway to Toowoomba-Cecil Plains Road. The EIS RIA, envisaged a depot in Millmerran as well as at Dalby and Miles. It was assumed that all materials would be transported from these locations to project activity sites. As a result, all trips between Toowoomba and Cecil Plains utilised the Gore Highway for movement to the depot in Millmerran and then along Millmerran-Cecil Plains Road to Cecil Plains.

In the SREIS RIA, it is anticipated that the majority of deliveries will be co-ordinated from two marshalling yards located in Dalby and Miles with materials transported from these locations to each of the project activity sites. It is anticipated that some bulk materials such as quarry product and concrete will be transported direct from suppliers to project activity sites rather than via the marshalling yards to avoid double handling. As a result of the project changes there is a desire line between Toowoomba and Cecil Plains via Toowoomba-Cecil Plains Road. The traffic modelling indicates that peak project traffic demands using Toowoomba-Cecil Plains Road will be in the order of 61 vehicles per day (vpd).

7.3.3 Annual Average Daily Traffic

Table 7-3 compares the peak average and peak maximum AADT on an individual link for the project life estimated during the preparation of the EIS RIA with that estimated as part of the SREIS RIA.

Table 7-3 Peak Project AADT Comparison (EIS vs. SREIS)

AADT for an Individual Link	EIS	SREIS
Peak Average AADT	104	323
Peak Maximum AADT	330	697

Figure 7-6 illustrates the percentile range of maximum project AADT on individual links for the life of the project. In summary, Figure 7-6 highlights that approximately:

> 75% of links impacted by the project will have a maximum project AADT less than 130 vpd
> 85% of links impacted by the project will have a maximum project AADT less than 215 vpd
> 95% of links impacted by the project will have a maximum project AADT less than 315 vpd
> 99% of links impacted by the project will have a maximum project AADT less than 375 vpd.

Figure 7-6 Percentile of Maximum Project AADT on Individual Links (SREIS)

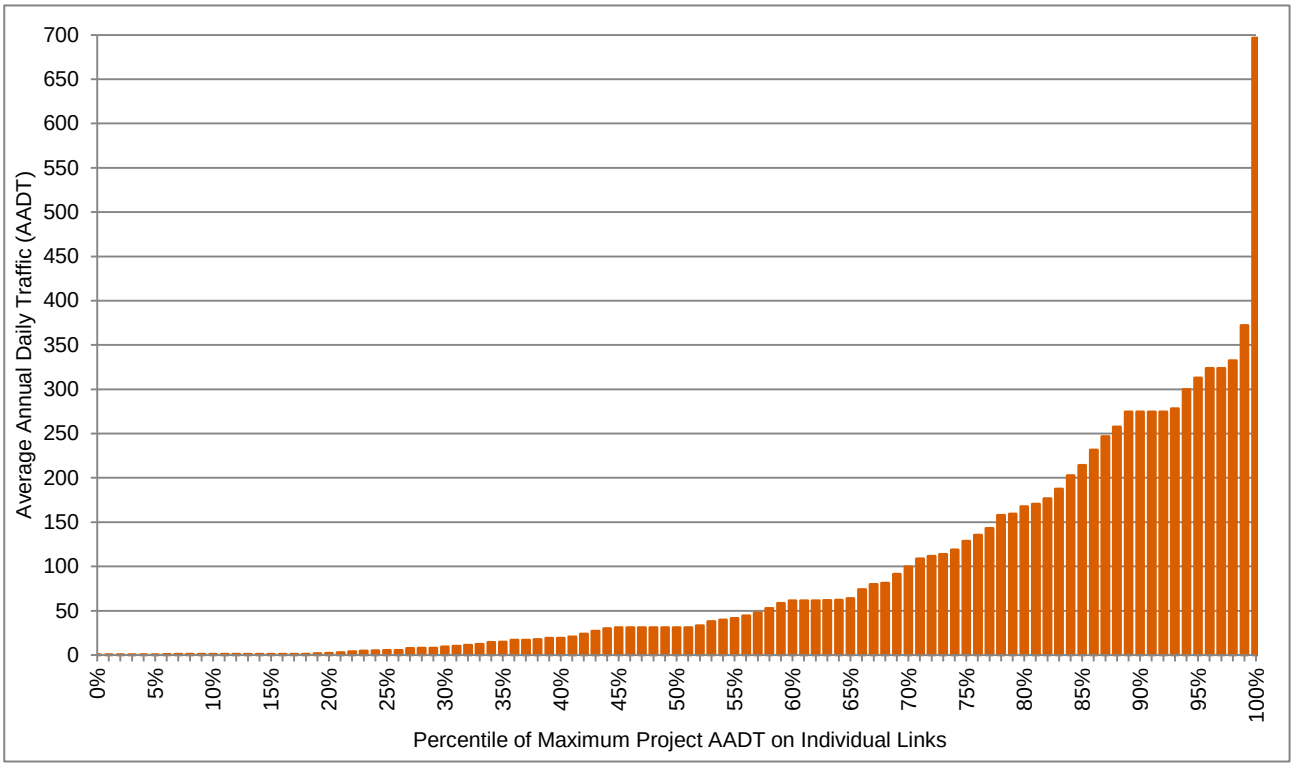
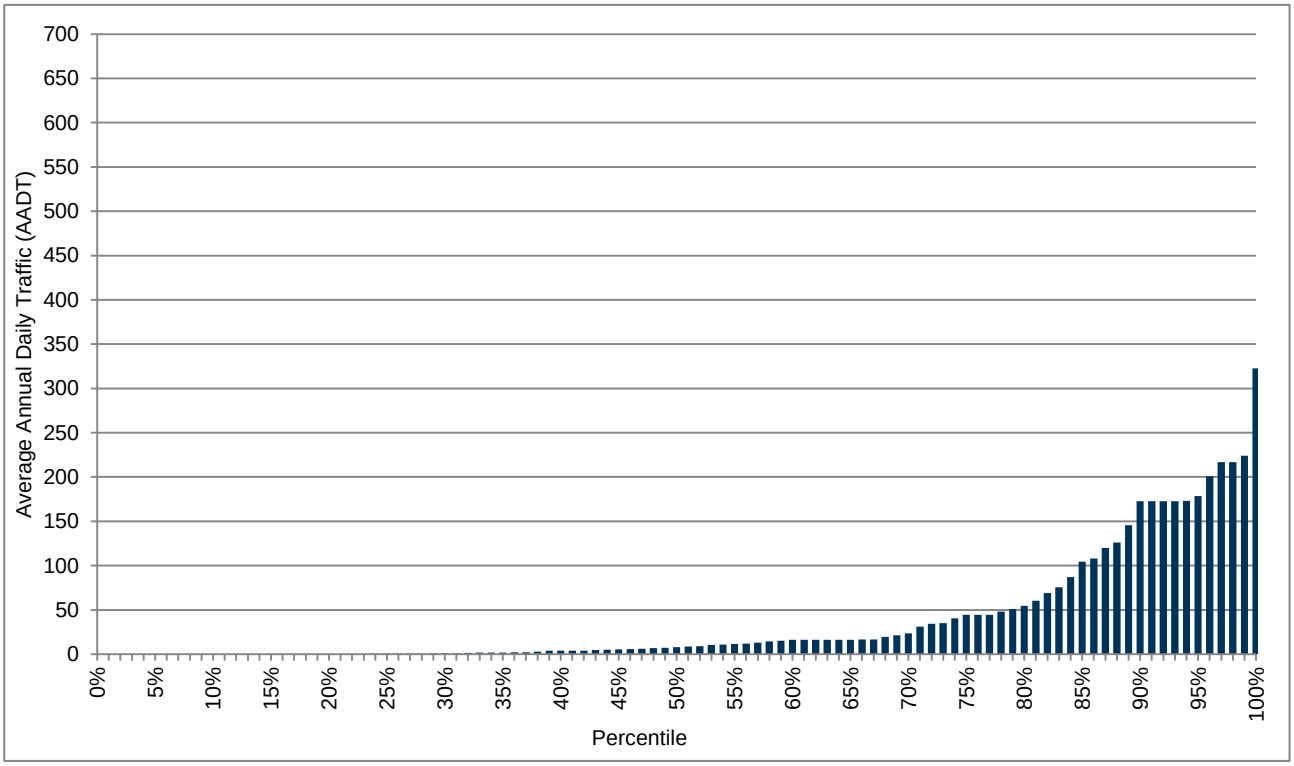


Figure 7-7 illustrates the percentile range of average project AADT on individual links for the life of the project. In summary, Figure 7-7 highlights that approximately:

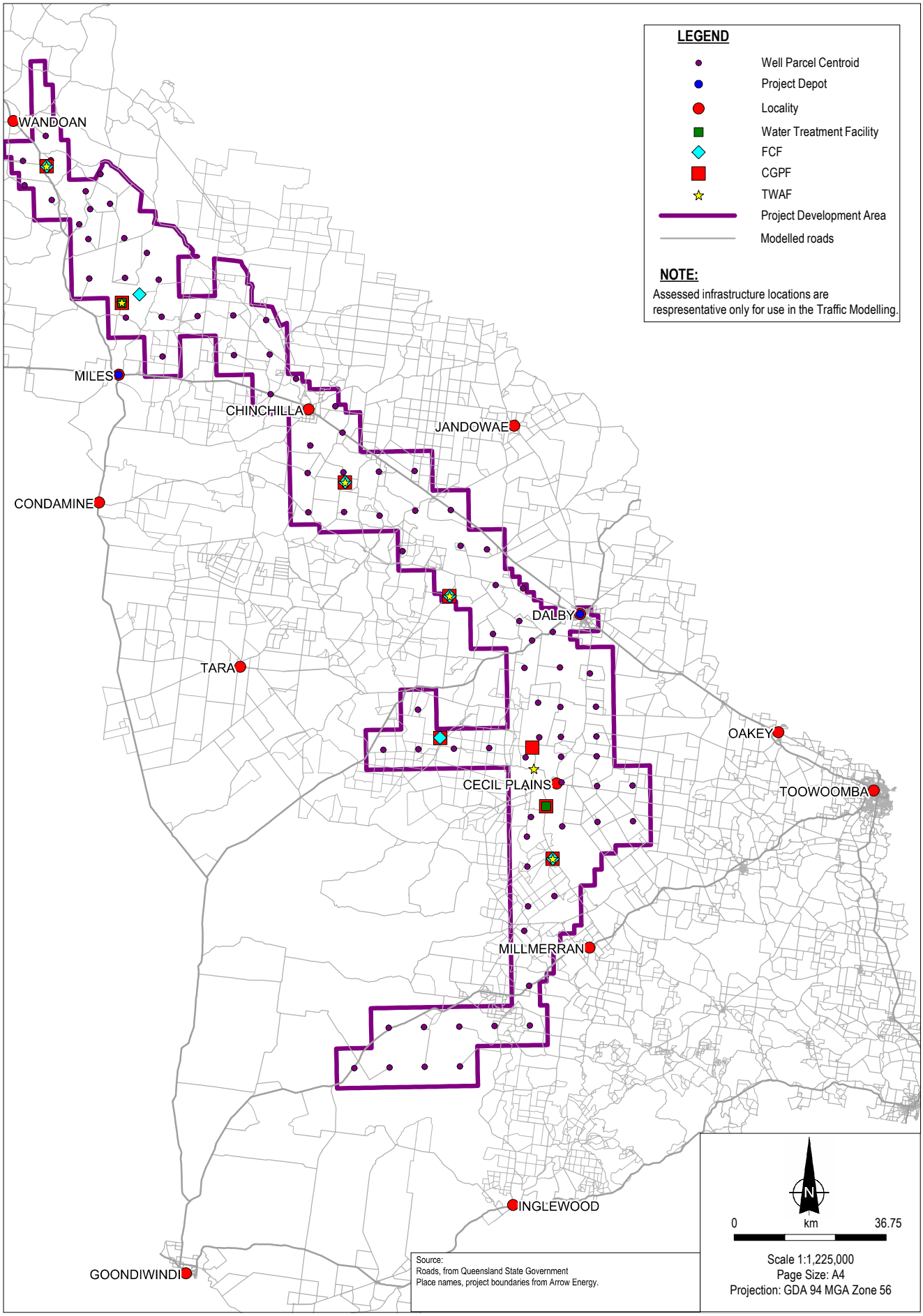
> 75% of links impacted by the project will have an average project AADT less than 45 vpd
> 85% of links impacted by the project will have an average project AADT less than 105 vpd
> 95% of links impacted by the project will have an average project AADT less than 180 vpd
> 99% of links impacted by the project will have an average project AADT less than 225 vpd.

Figure 7-7 Percentile of Average Project AADT on Individual Links (SREIS)

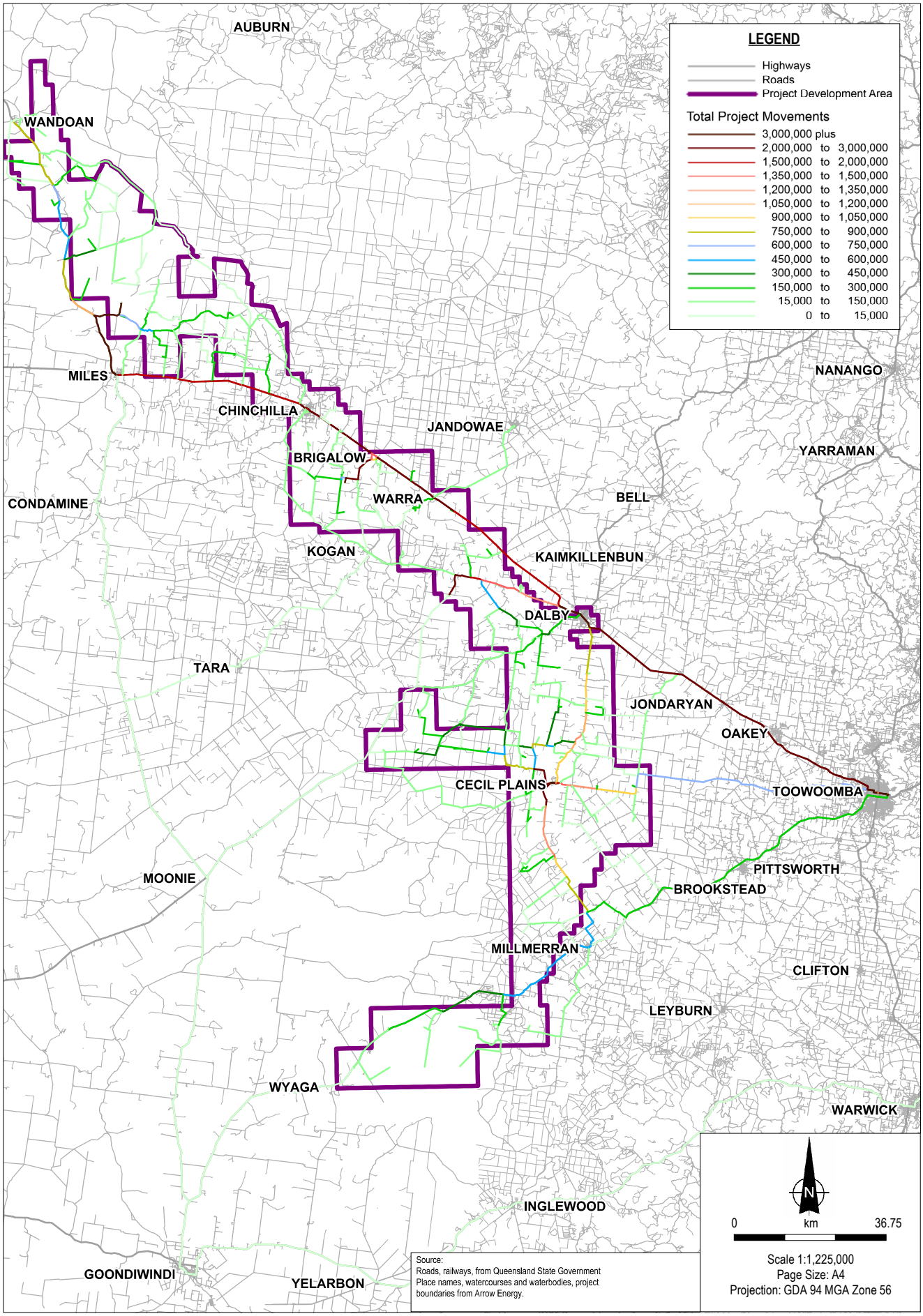


7.4 Forecast Pedestrian and Cyclist Volumes

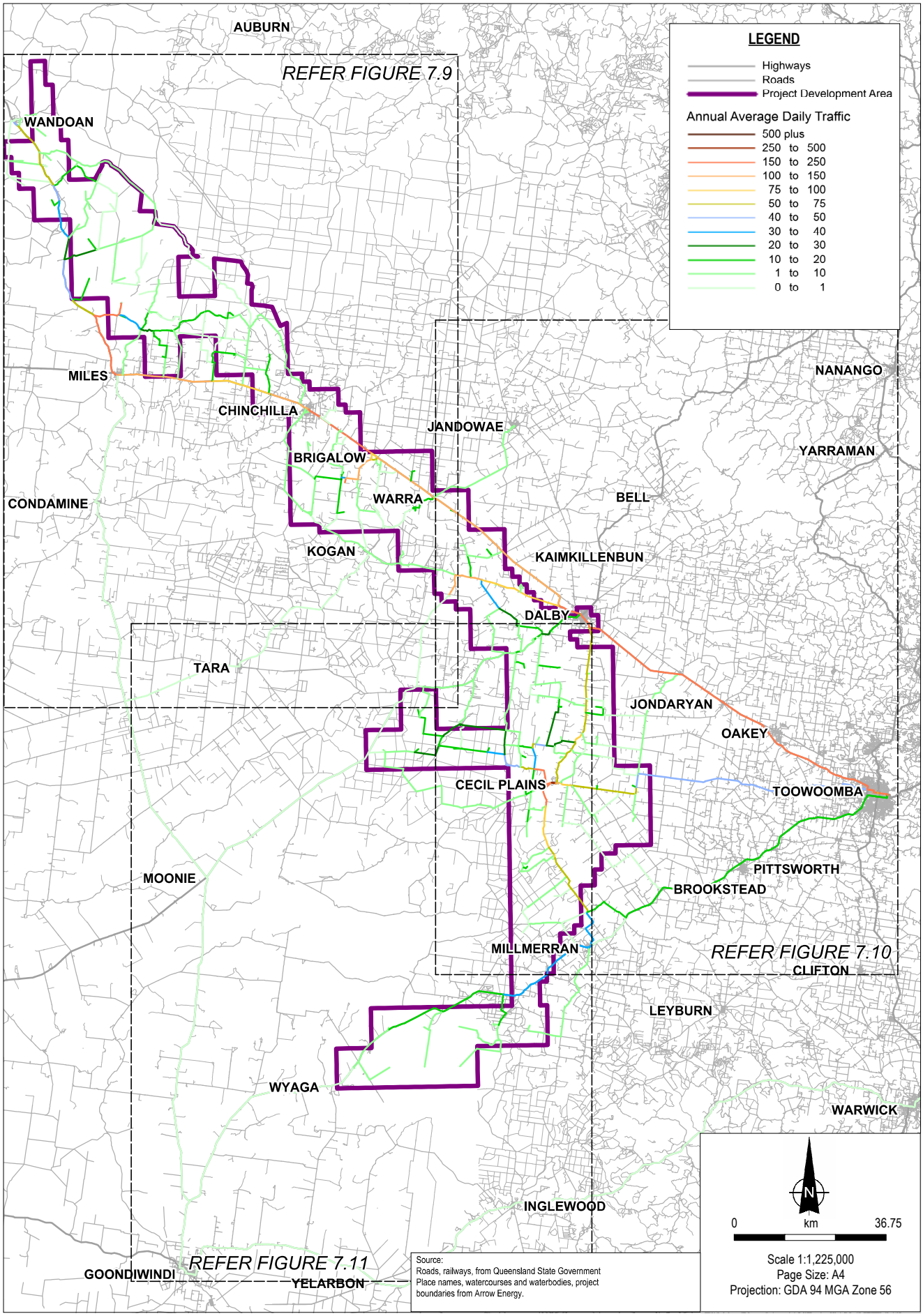
The Surat Gas Project is not anticipated to increase existing pedestrian or cycle demands on a broad scale and therefore modelling of pedestrian or cycle demands associated with the project has not been undertaken.



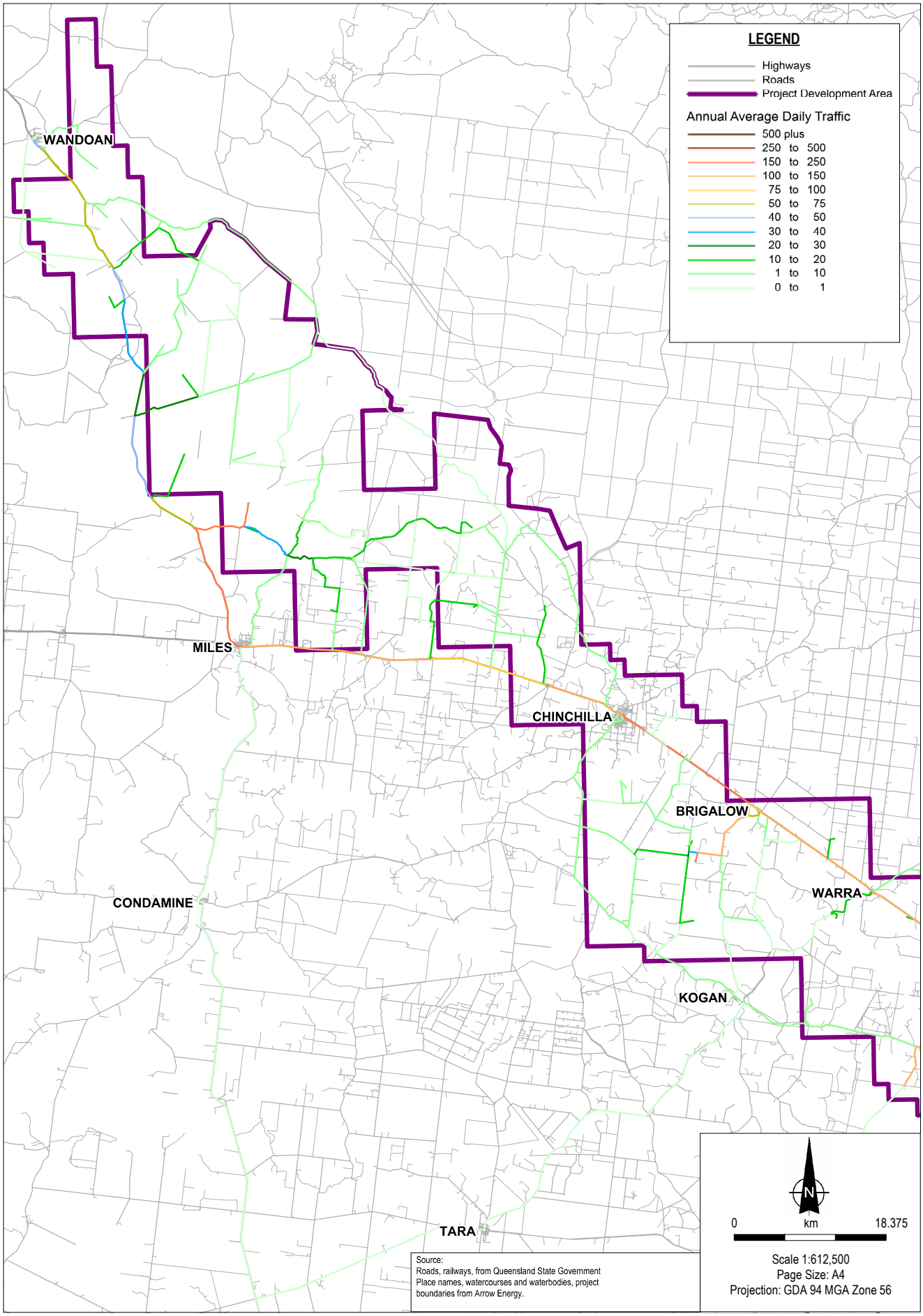
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.8 File Name: 6413_Figure 7.8.wor	Arrow Energy Surat Gas Project	arrow energy go further	Traffic Model Elements	Figure No: 7.8



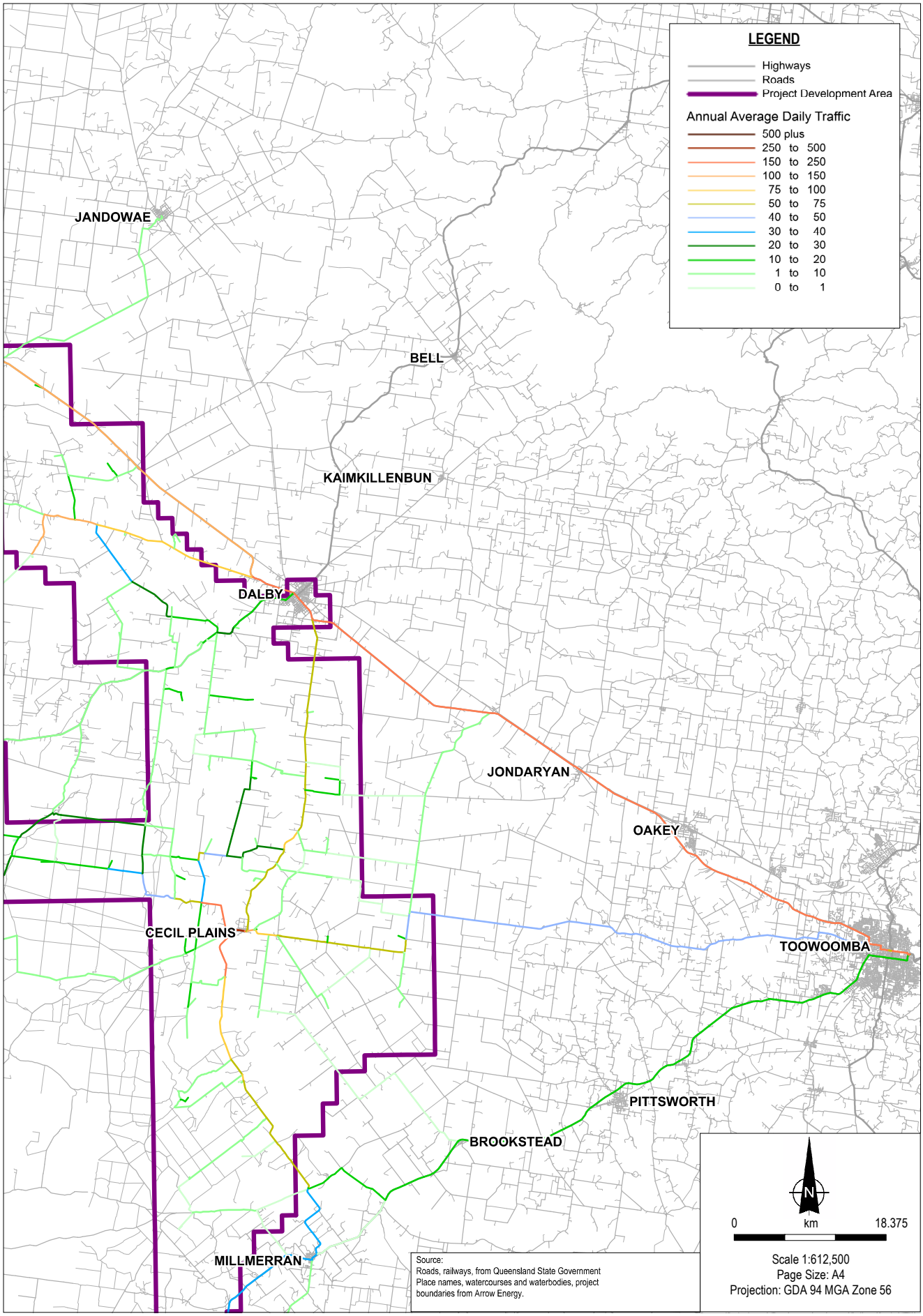
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.9 File Name: 6413_Figure 7.9.wor	Arrow Energy Surat Gas Project	arrow energy go further	Total Transport Task (Full Project Life)	Figure No: 7.9



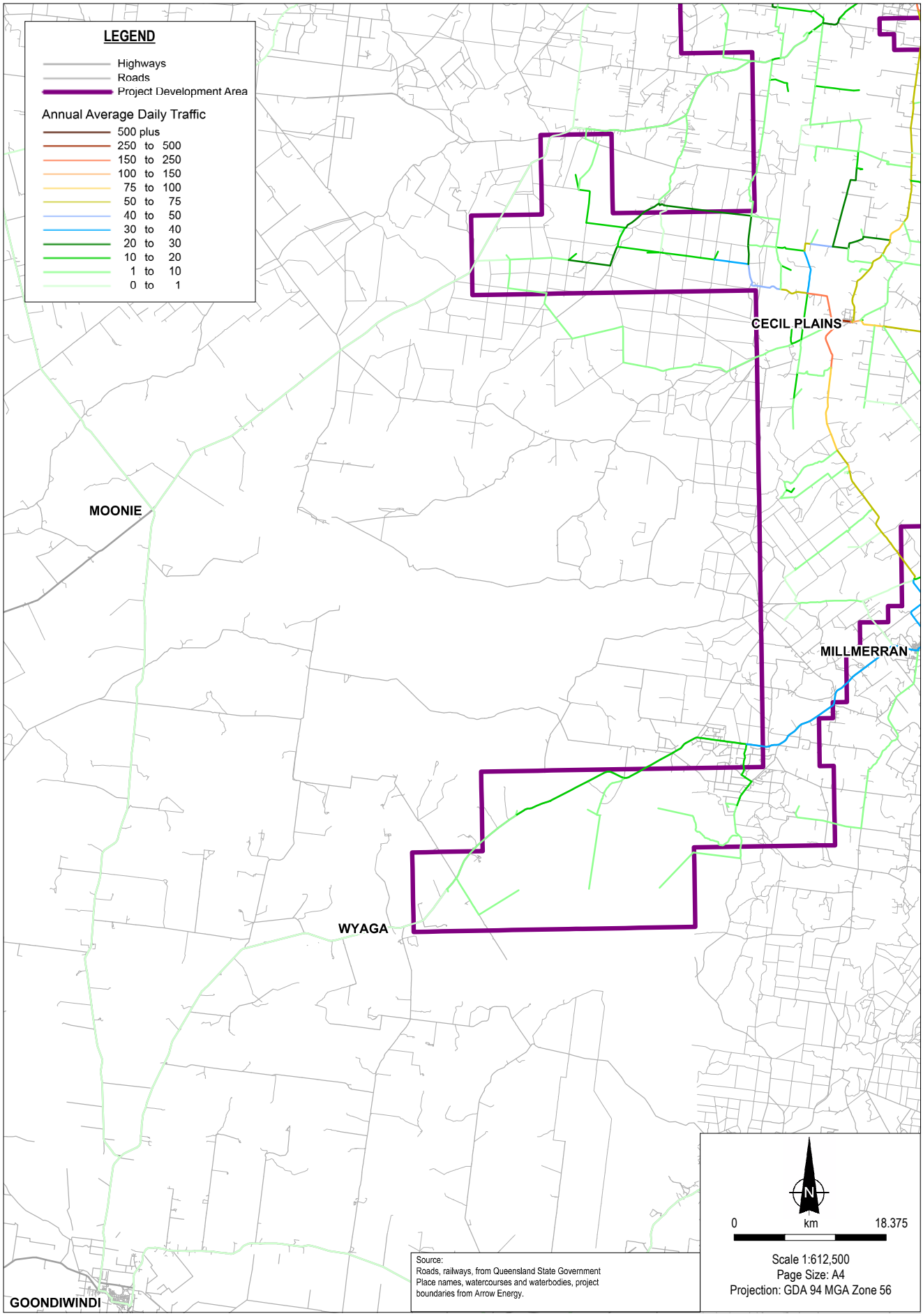
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.10 File Name: 6413_Figure 7.10.wor	Arrow Energy Surat Gas Project	arrow energy go further	Average Project Life AADT	Figure No: 7.10



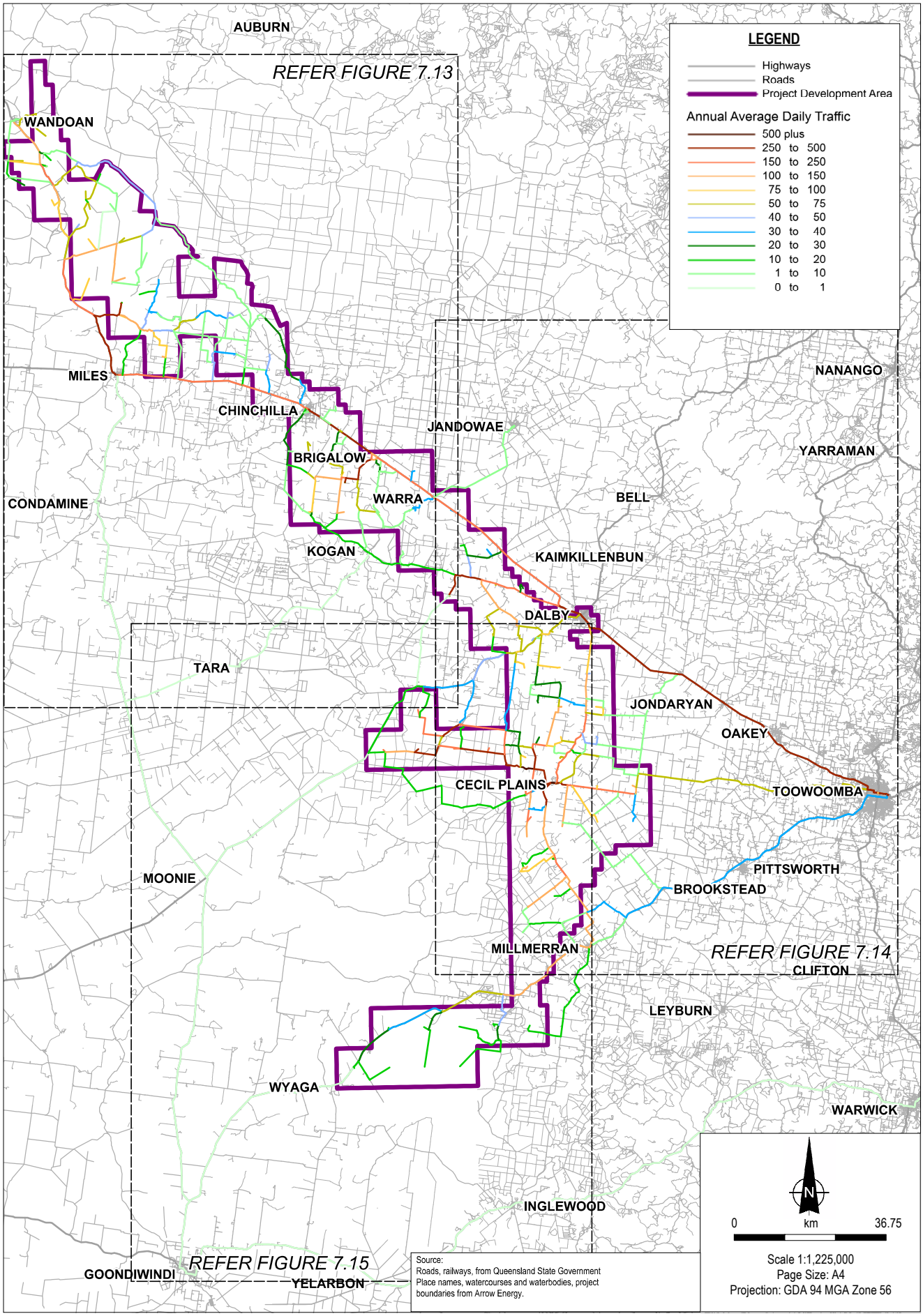
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.11 File Name: 6413_Figure 7.11.wor	Arrow Energy Surat Gas Project	arrow energy go further	Average Project Life AADT (Northern)	Figure No: 7.11



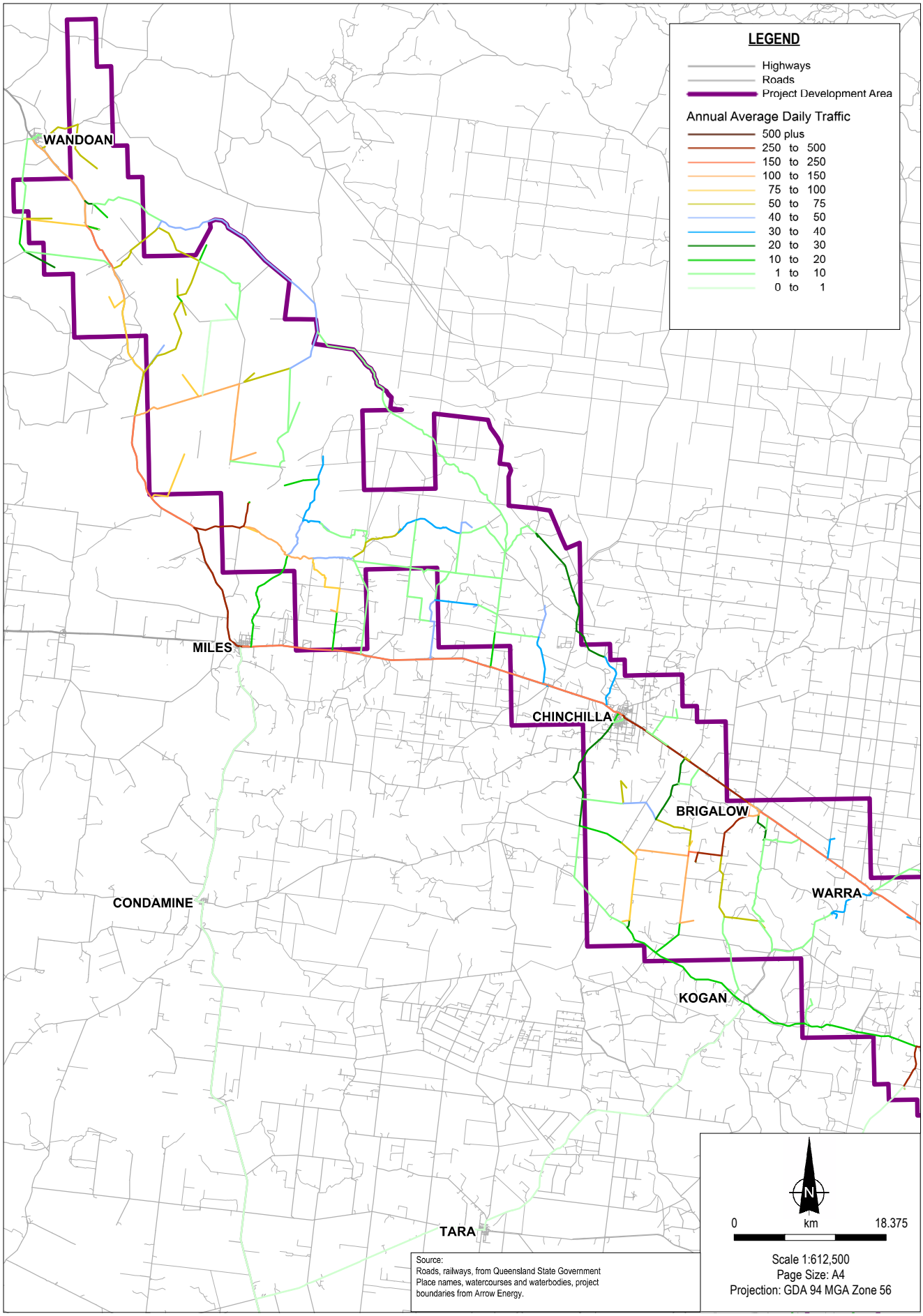
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.12 File Name: 6413_Figure 7.12.wor	Arrow Energy Surat Gas Project	arrow energy go further	Average Project Life AADT (Central)	Figure No: 7.12



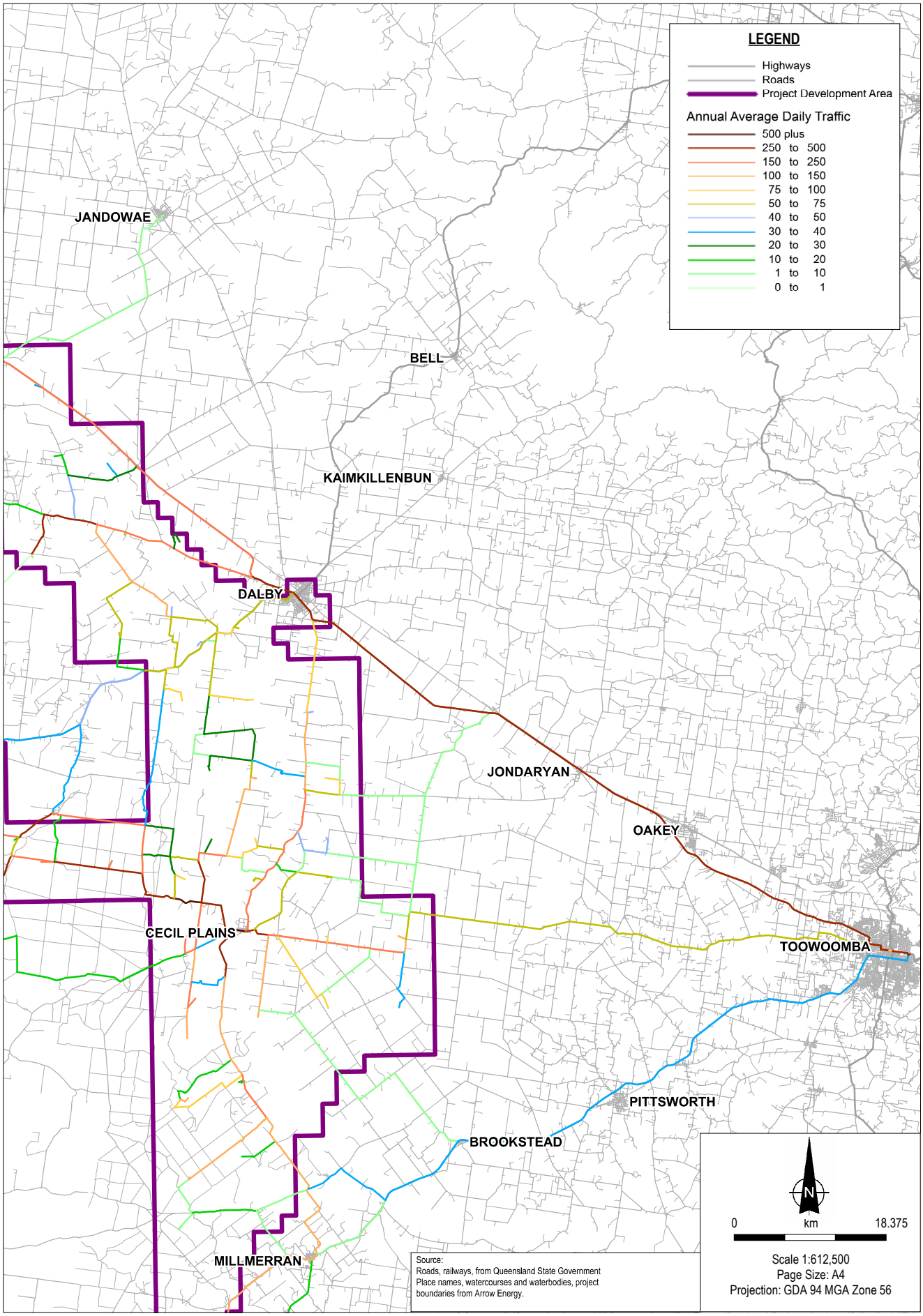
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.13 File Name: 6413_Figure 7.13.wor	Arrow Energy Surat Gas Project	arrow energy go further	Average Project Life AADT (Southern)	Figure No: 7.13



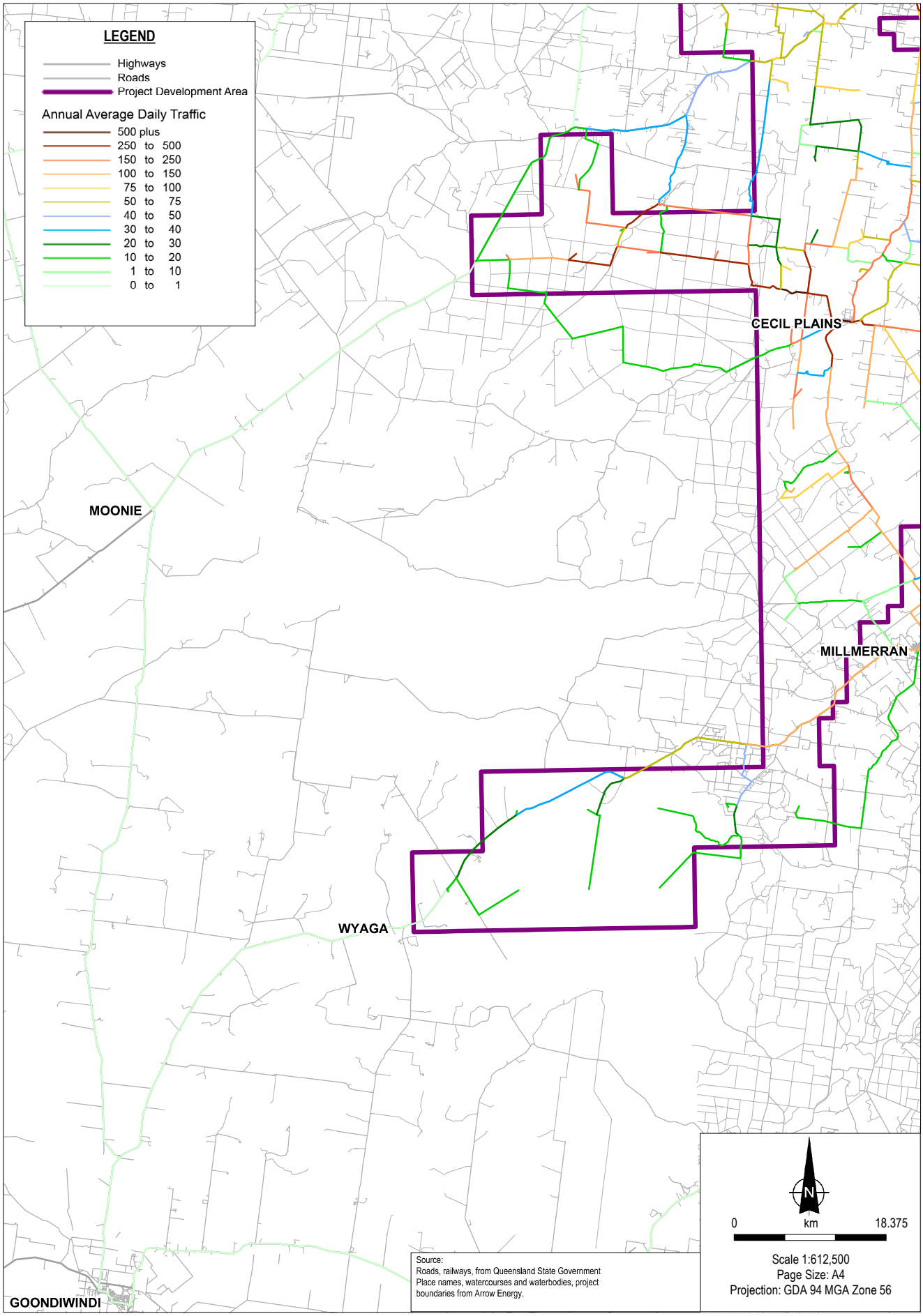
Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.14 File Name: 6413_Figure 7.14.wor	Arrow Energy Surat Gas Project	arrow energy go further	Maximum Project AADT (Peak Year for Individual Links)	Figure No: 7.14



Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.15 File Name: 6413_Figure 7.15.wor	Arrow Energy Surat Gas Project	arrow energy go further	Maximum Project AADT (Peak Year for Individual Links) (Northern)	Figure No: 7.15



Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.16 File Name: 6413_Figure 7.16.wor	Arrow Energy Surat Gas Project	arrow energy go further	Maximum Project AADT (Peak Year for Individual Links) (Central)	Figure No: 7.16



Cardno Shaping the Future	Date: 5.6.2013 WOR: Figure 7.17 File Name: 6413_Figure 7.17.wor	Arrow Energy Surat Gas Project	arrow energy go further	Maximum Project AADT (Peak Year for Individual Links) (Southern)	Figure No: 7.17

8 Literature Review

The literature review documented in the EIS report was reviewed for currency given the passage of time since the time of preparation. While the information included within the section remains current, some changes have been made to the guidelines and standards in which the information is contained. This is primarily due to the continuing effort for the adoption of Austroads as a national benchmark to consolidate varying standards across Australia and New Zealand. Specific instances of updates are as follows:

> *Rural Road Design: A Guide to the Geometric Design of Rural Roads* is now also contained within Austroads *Guide to Road Design Part 3: Geometric Design*
> *Guide to Traffic Engineering Practice Part 2: Roadway Capacity* is now included in *Guide to Traffic Management Part 3: Traffic Studies and Analysis*
> Elements of TMR's *Road Planning Design Manual* are now reproduced in the Austroads *Guide to Road Design* series.

It is reiterated that the engineering guidance contained within the original report remains current and still provides best practise standards towards road standards to be adopted for the Surat Gas Project.

8.1 Intersection Thresholds

8.1.1 Performance Criteria

The performance of an intersection is typically analysed using SIDRA Intersection 5.1 (SIDRA) for assessments conducted in Queensland. SIDRA is an industry recognised analysis tool that estimates the capacity and performance of intersections based on input parameters, including geometry and traffic volumes, and provides estimates of an intersection's Degree of Saturation (DOS), queues and delays. Simplistically, DOS is a measure of the proportion of traffic entering an intersection relative to the intersection's capacity.

Table 8-1 provides the TMR defined DOS thresholds for intersections.

Table 8-1 TMR Thresholds for Intersection Performance

Level of Service Description	DOS Threshold
Signalised intersections	less than or equal to 0.90
Roundabouts	less than or equal to 0.85
Priority controlled intersections	less than or equal to 0.80

Source: TMR *Guidelines for Assessment of Road Impacts of Development*

The guideline notes that a DOS exceeding the values indicated in Table 8-1 indicates that an intersection is nearing its practical capacity and upgrade works may be required. Above these threshold values, users of the intersection are likely to experience rapidly increasing delays and queuing.

Importantly, it is noted that DOS is not the only performance indicator and that other measures such as critical delay should also be considered when assessing the performance of an intersection. Other authorities such as the New South Wales (NSW) Roads and Maritime Services (RMS) recommend the use of the critical movement delay for assessing the performance of priority-controlled intersections.

The RMS *Guide to Traffic Generating Developments* states that the average delay statistic for the critical movement provides a better indication of intersection performance and safety for priority-controlled intersections than DOS. A summary of the delay thresholds recommended by the RMS is provided in Table 8-2. Although these thresholds are not documented within Queensland guidelines, they are still considered to provide another informative performance indicator and were therefore considered for the SREIS RIA.

Table 8-2 RMS Level of Service (LOS) Criteria for Priority Controlled Intersections

LOS	Level of Service Description	Critical Delay per Vehicle (sec/veh)
A	Good operation	less than 14 sec
B	Acceptable delays and spare capacity	15 to 28 sec
C	Satisfactory	29 to 42 sec
D	Near capacity	43 to 56 sec
E	At capacity, requires other control mode	57 to 70 sec

Source: RMS *Guide to Traffic Generating Developments*

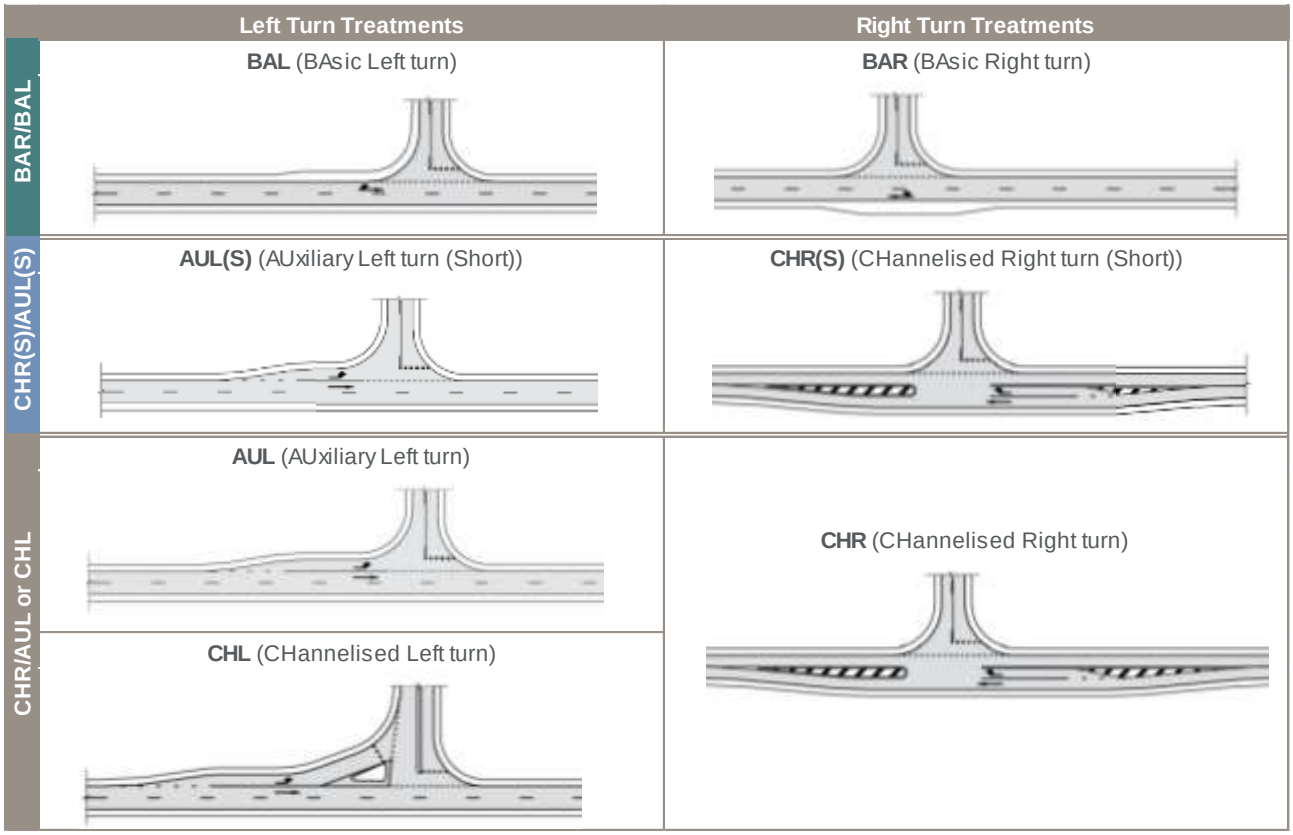
8.1.2 Safety Criteria

While DOS and critical delay measurements provide an indication on the operational performance of an intersection, the Austroads turn warrants for turn treatments offers an indication of which turn treatments will likely provide an appropriate level of safety. There are generally three types of turn treatments available at intersections, including:

> Basic turn treatment
> Auxiliary turn treatment
> Channelised turn treatment.

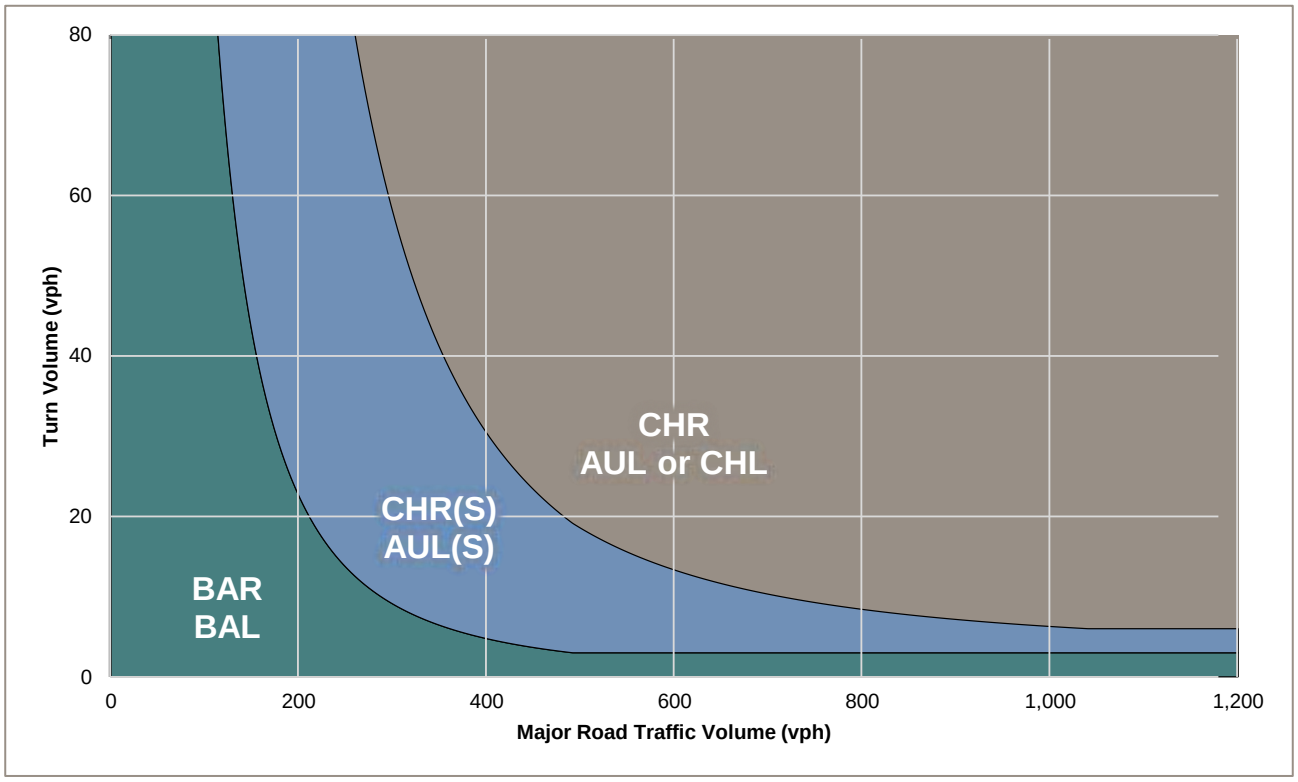
The available left and right turn treatments are illustrated on Figure 8-1.

Figure 8-1 Intersection Turn Treatments



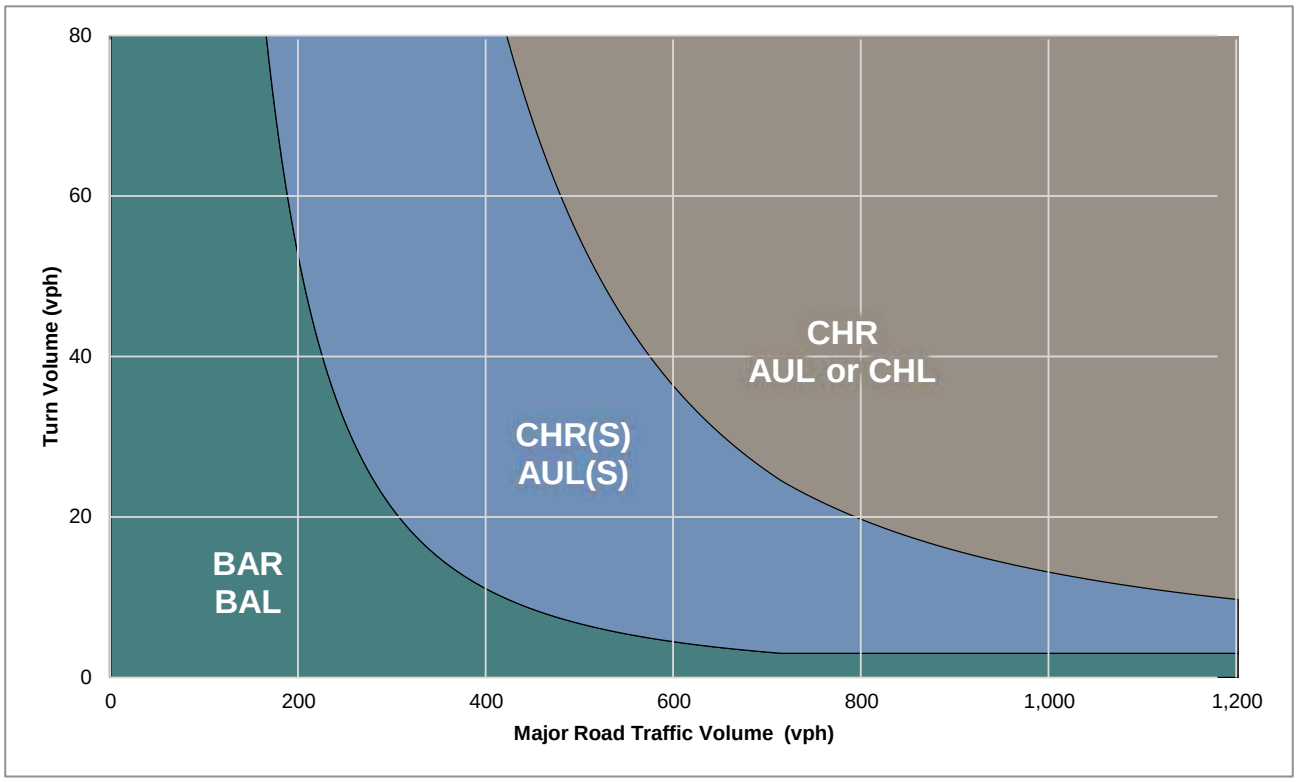
The Austroads turn warrants provide guidance on where deceleration lanes and turning lanes should be used based on traffic volumes. The warrants were developed by Arndt, Troutbeck, Handley & Slattery (2006) and were produced by identifying the location at which the benefits of providing a higher-level treatment (the reduction in estimated accident costs) are equal to the additional construction costs associated with the treatment. The benefits and costs of a higher-level treatment were compared to the base case (minimum turn treatments) to develop the curves demonstrated on Figures 8-2 and 8-3. The turn treatment acronyms (i.e. BAL, BAR etc.) and colours in the Figures 8-2 and 8-3 directly relate to the turn treatments illustrated on Figure 8-1 above.

Figure 8-2 Turn Warrants for Higher Speed Rural Roads (>= 100km/h)



vph = vehicles per hour

Figure 8-3 Turn Warrants for Lower Speed Rural Roads (< 100km/h)



vph = vehicles per hour

8.2 Sight Distance

Sight distance requirements are outlined in Austroads *Guide to Road Design Part 4A: Unsignalised Intersections* which require three types of sight distance to be provided at intersections:

- Approach Sight Distance (ASD): is the minimum sight distance which must be available on the minor road approach to ensure that drivers are aware of the presence of an intersection. Is also desirable on major road approaches so that drivers can see the pavement and markings within the intersection
- Safe Intersection Sight Distance (SISD): provides sufficient distance for a driver of a vehicle on the major road to observe a vehicle on a minor road approach moving into a collision situation
- Minimum Gap Sight Distance (MGSD): relates to the distances corresponding to the critical acceptance gap that drivers are prepared to accept, for both turning out from the minor road, and turning in from the major road.

9 Management Strategies

9.1 Management Strategies

Table 9.1 to Table 9.8 summarise the management strategies developed to manage the project's potential impacts on the road network. The planned management strategies establish generic responses to common situations which are likely to occur throughout the life of the project. For example Table 9.2 identifies that typically it is expected that Arrow will need to construct sealed roads to major facilities such as CGPF's. It is identified that the management strategies are typical responses only and that consideration of site specific constraints will ultimately need to occur for each location to ensure appropriate engineering outcomes. Nevertheless the management strategies establish the framework upon which future infrastructure agreements with road authorities will ultimately be based.

The management strategies presented herein are consistent with the strategies presented in the EIS RIA. However, two additional management strategies have been identified within the SREIS to provide further clarity to the strategy presented within the EIS. These include:

> Undertake a FFU inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed
> Enter into agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities.

The abovementioned management strategies are consistent with best practice principals and are therefore considered appropriate to manage the project's potential impacts on the road network.

The effectiveness of the planned management strategies is assessed in Section 10 and Section 11.

Table 9-1 Efficiency: Sealed Roads Management Strategies

Facility	All Road Classifications
CGPFs, CGPFs with Water Treatment Facilities, TWAFs	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Road may require widening to two lane seal width with sealed shoulders and centre and edge line marking ▪ Contribution may be required towards more frequent pavement maintenance as a result of increased heavy vehicle movements ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
FCFs	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Turn lanes may be required at field compression facility access points ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
Well Sites and Gathering Infrastructure	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Temporary road management measures to be implemented, for example temporary road signs advising of reduced speed limits ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-2 Efficiency: Unsealed Roads Management Strategies

Facility	All Road Classifications (Excluding Highways)
CGPFs, CGPFs and Water Treatment Facilities, TWAFs	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Typically preferred strategy is sealing of unsealed roads however well maintained gravelled road may be adequate in certain instances if mutual agreement is reached with Council ▪ Likely sealed form would be two lane seal width with sealed shoulders and centre and edge line marking ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project ▪ **Enter into agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities**
FCFs	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits ▪ Unsealed road surface may require more frequent maintenance as a result of increased traffic, particularly during the construction and rehabilitation ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project ▪ **Enter into agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities**
Well Sites and Gathering Infrastructure	▪ **Undertake fit for use inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed** ▪ Temporary traffic management to be implemented, for example road signs stipulating reduced speed limits ▪ Unsealed road surface may require more frequent maintenance as a result of increased traffic, particularly during the construction and rehabilitation ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project ▪ **Enter into agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities**

Table 9-3 Safety: Access Roads Management Strategies

Facility	Highway	Regional Connection Road	Rural Connecting Road	Rural Access Road
CGPFs, CGPFs and Water Treatment Facilities, TWAFs	▪ Turn lanes and acceleration lanes may be required at facility accesses ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Turn lanes and acceleration lanes may be required at facility accesses ▪ Upgrades at nearest highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Turn lanes and acceleration lanes may be required at facility accesses ▪ Upgrades at nearest regional connecting road or highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Upgrades at nearest rural connecting road or highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
FCFs	▪ Turn lanes and acceleration lanes may be required at access ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Turn lanes and acceleration lanes may be required at accesses ▪ Upgrades at nearest highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Turn lanes and acceleration lanes may be required at accesses ▪ Upgrades at nearest regional connecting road or highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Upgrades at nearest rural connecting road or highway intersection may be necessary (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
Well Sites and Gathering Infrastructure	▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Upgrades at nearest highway intersection may be necessary during construction phase (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Upgrades at nearest regional connecting road or highway intersection may be necessary during construction phase (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.	▪ Ensure appropriate sight distance at access driveway. ▪ Upgrades at nearest connecting road or highway intersection may be necessary during construction phase (turn lanes, signage, line marking, etc.) ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-4 Safety: Bridges Management Strategies

Facility	All Road Classifications
CGPFs, CGPFs and Water Treatment Facilities, TWAFs	▪ Facilities may require frequent and long-term use of heavy vehicles, it is recommended that routes avoid substandard bridges ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
FCFs	▪ Alternative routes may need to be investigated to avoid use of sub standard bridges ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
Well Sites and Gathering Infrastructure	▪ Alternative routes may need to be investigated to avoid use of sub standard bridges ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-5 Safety: School Bus Routes Management Strategies

Facility	All Road Classifications
CGPFs, CGPFs and Water Treatment Facilities, FCFs	▪ High volumes of heavy vehicles may be associated with the facilities and therefore use of school bus routes should be avoided if possible, or carefully managed to avoid conflicts ▪ Consideration should be given to limiting facility traffic on school bus routes during pick-up and set-down times on school days, alternatively appropriate school bus infrastructure could be installed ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
TWAFs	▪ High volumes of vehicles are associated with the temporary workers accommodation facility therefore use of school bus routes needs to be avoided if possible, or carefully managed to avoid conflicts ▪ Consideration should be given to limiting camp traffic on school bus routes during pick-up and set-down times on school days ▪ Workers residing at temporary workers accommodation facility should be made aware of school bus routes as well as typical pick-up and drop-off times in the vicinity of the temporary workers accommodation facility ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
Well Sites and Gathering Infrastructure	▪ Consideration should be given to limiting project traffic on school bus routes during pick-up and set-down times on school days ▪ Workers should also be made aware of school bus routes as well as typical pick-up and drop-off times in the vicinity of the work sites ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-6 Safety: Rail Crossings Management Strategies

Facility	Al Road Classifications
CGPFs, CGPFs and Water Treatment Facilities, TWAFs	▪ Increase in traffic associated with the project is likely to increase vehicle exposure at rail crossings ▪ Thresholds assessment to be undertaken to determine if upgrading of the rail crossing is warranted ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.
Well Sites and Gathering Infrastructure	▪ Increase in traffic associated with the project is likely to increase vehicle exposure at rail crossings ▪ Thresholds assessment to be undertaken to determine if upgrading of the rail crossing is warranted. Given the short-term duration of the impact, temporary traffic control may be an alternative mitigation measure ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-7 Safety: Drive Fatigue Management Strategies

Facility	All Road Classifications
CGPFs, CGPFs with Water Treatment Facilities, TWAFs, Well Sites and Gathering Infrastructure	▪ Fatigue management measures should be introduced and enforced for all workers ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

Table 9-8 Amenity: Stock Routes Management Strategies

Facility	All Road Classifications
CGPFs, CGPFs and Water Treatment Facilities, TWAFs, Well Sites and Gathering Infrastructure	▪ Where there are to be permanent disruptions to the stock route network, DERM requires realignment or replacement of corridors of similar width and suitable country type to allow for the uninterrupted flow of travelling stock ▪ The stock route network (all or part) disturbed or affected by the proposed works should be rehabilitated upon completion of the project. Where revegetation is required, native vegetation, including pastures, must be used to return the area to its natural state ▪ Any required works to be identified in ongoing Road Use Management Plans prepared to support the project.

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10 Environmental Values Assessment

10.1 Assessment Approach Overview

The environmental values assessment approach establishes the level of significance of the project's potential impacts through consideration of the sensitivity of each environmental value and the magnitude of the project's potential impact upon the value. To enable the effectiveness of the mitigation strategies to be assessed, the level of significance of the potential impacts has been considered both pre and post implementation of the planned mitigation strategies.

The significance of impacts are a function of the sensitivity of the values themselves to change and the magnitude of the changes experienced. Table 10.1 summarises the significance of impact given the sensitivity of an environmental value and the magnitude of impact experienced. Further details in relation to the adopted environmental values assessment approach is provided in Section 6 of the EIS RIA readers should refer to this material if they require further details.

Table 10-1 Assessment of Significance of Impacts

		Sensitivity of Environmental Value		
		High	**Moderate**	**Low**
Magnitude of Impact	**High**	Major	High	Moderate
	Moderate	High	Moderate	Low
	Low	Moderate	Low	Negligible

Consistent with other technical studies undertaken to support the SREIS the following significance of impact definitions have been utilised when applying the environmental values assessment approach:

- Major Impact: Occurs when impacts will potentially cause irreversible or widespread harm to an environmental value
- High Impact: Occurs when the proposed activities are likely to exacerbate threatening processes affecting the intrinsic characteristics and structural elements of the environmental value
- Moderate Impact: Occurs where, although reasonably resilient to change, the environmental value would be further degraded due to the scale of the impacts or its susceptibility to further change
- Low Impact: Occurs where an environmental value is of local importance and temporary and transient changes will not adversely affect its viability provided standard environmental controls are implemented
- Negligible Impact: A degraded (low sensitivity) environmental value exposed to minor changes (low magnitude impact) will not result in any noticeable change in its intrinsic value and hence the proposed activities will have negligible impact.

10.2 Adopted Magnitude of Impact Thresholds

For the SREIS RIA environmental values assessment the following magnitude of impact definitions have been adopted.

- High Magnitude: greater than 1,000 AADT increase
- Moderate Magnitude: 251 to 1,000 AADT increase
- Low Magnitude: 1 to 250 AADT increase.

10.3 Adopted Sensitivity of Environmental Value Thresholds

The road environmental values to be protected were described in detail in Section 6 of the EIS RIA. For brevity, the content previously presented in the EIS RIA has not been reproduced in detail herein.

Instead Table 10-2 and Table 10-3 have been reproduced within the SREIS RIA as a quick reference. These tables summarise the adopted environmental values and their sensitivities both pre and post implementation of the planned management strategies respectively.

Table 10-2 Sensitivity Values Pre-Management Strategies Implementation

	Characteristic	Value			
		Highway	Regional Connecting Road	Rural Connecting Road	Rural Access Road
Description	Function	A high order road of a high standard facilitating connectivity between regional centres	A high order road of a high standard facilitating connectivity between townships	Lower order road facilitating connectivity between higher order roads	Low order road predominately facilitating access to local uses
Typical Observations					
Efficiency	Volumes	1000+ vehicles	300+ vehicles	50+ vehicles	1-100 vehicles
	Pavement	Sealed	Sealed	Sealed/unsealed	Unsealed
	Standard of intersection control	High order	Varies	Low order	Low order
Sensitivity of Efficiency		**Low**	**Moderate**	**High**	**High**
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
Sensitivity of Safety		**Low**	**Moderate**	**High**	**High**
Amenity	Stock route co-location	Present	Present	Present	Present
	Sensitivity of adjacent land uses	Low	Moderate	Moderate	Moderate
	Potential for dust nuisance issues	Low	Low	Potential	Potential
	Potential for light glare issues	Low	Low	Potential	Potential
Sensitivity of Amenity		**Low**	**Moderate**	**High**	**High**

Table 10-3 Sensitivity Values Post-Management Strategies Implementation

	Characteristic	Value			
		Highway	Regional Connecting Road	Rural Connecting Road	Rural Access Road
Description	Function	A high order road of a high standard facilitating linkage between regional centres	A high order road of a high standard facilitating linkage between townships	Lower order road providing links between higher order roads	Low order road providing access to local uses
Typical Observations					
Efficiency	Volumes	1000+ vehicles	300+ vehicles	50+ vehicles	1-100 vehicles
	Pavement	Sealed with improvements	Sealed with improvements	Sealed with improvements	Sealed with improvements
	Standard of intersection control	High order	High order	Low order with improvements	Low order with improvements
Sensitivity of Efficiency		**Low**	**Low**	**Moderate**	**Moderate**
Safety	Bridges	Frequent and high standard	Frequent and high standard	Infrequent and high standard	Infrequent and some works
	Cattle grids	Uncommon	Uncommon	Frequent and higher standard	Frequent and higher standard
	Standard of rail crossing control	Active	Investigate exposure threshold	Investigate exposure threshold	Investigate exposure threshold
	School bus route presence	Present with improved awareness	Present with improved awareness	Present with improved awareness	Present with improved awareness
	Composition of traffic	High proportion of heavy vehicles	Moderate proportion of heavy vehicles	Higher number of heavy vehicles	Higher number of heavy vehicles
	Driver fatigue controls	Present plus driver fatigue management plan	Uncommon plus driver fatigue management plan	Uncommon plus driver fatigue management plan	Uncommon plus driver fatigue management plan
Sensitivity of Safety		**Low**	**Low**	**Moderate**	**Moderate**
Amenity	Stock route co-location	Present but disturbances managed	Present but disturbances managed	Present but disturbances managed	Present but disturbances managed
	Sensitivity of adjacent land uses	Low	Low	Moderate	Moderate
	Potential for dust nuisance issues	Low but managed	Low but managed	Potential but managed	Potential but managed
	Potential for light glare issues	Low but managed	Low but managed	Potential but managed	Potential but managed
Sensitivity of Amenity		**Low**	**Low**	**Moderate**	**Moderate**

10.4 Adopted Significance of Impact Thresholds

Table 10-4 and 10-5 summarise the adopted significance of impact thresholds utilised for the environmental values assessment both pre and post implementation of the planned management strategies respectively.

Table 10-4 Significance of Impacts: Pre-Management Strategies Matrix

		Sensitivity of Environmental Value		
		High (Rural Connecting Roads & Rural Access Roads)	**Moderate** (Regional Access Roads)	**Low** (Highways)
Magnitude of Impact	**High** (1,000+ AADT)	Major	High	Moderate
	Moderate (251-1,000 AADT)	High	Moderate	Low
	Low (1-250 AADT)	Moderate	Low	Negligible

Table 10-5 Significance of Impacts: Post-Management Strategies Matrix

		Sensitivity of Environmental Value		
		High	**Moderate** (Rural Connecting Roads & Rural Access Roads)	**Low** (Regional Access Roads & Highways)
Magnitude of Impact	**High** (1,000+ AADT)	Major	High	Moderate
	Moderate (251-1,000 AADT)	High	Moderate	Low
	Low (1-250 AADT)	Moderate	Low	Negligible

10.5 Significance of Impacts Pre-Management Strategies

Figure 10-1 to Figure 10-4 spatially summarises the level of significance of the project's potential road impacts based upon the environmental values assessment approach prior to the implementation of the planned management strategies. The figures identify that the project's potential impacts are anticipated to range from negligible to high level of significance, with the highest level impacts typically forecast to occur on the lower order roads providing access to the major facilities. Table 10-6 provides a summary of the roads in each drainage area with a 'high' or 'major' significance of impact prior to the implementation of the planned management strategies.

Table 10-6 Roads with Significant Impact: Pre-Management Strategies

Drainage Area	High	Major
1	Nil	Nil
2	Leichhardt Creek Taroom Road	Nil
4	Nil	Nil
5	Banana Bridge Road, Crees Road	Nil
6	Nil	Nil
7	Kumbarilla Lane	Nil
8	Nil	Nil
9	Duntroon Road, Wilkins Road	Nil
10	Nil	Nil
11	Halliford Road	Nil

10.6 Significance of Impacts Post-Management Strategies

Figure 10-5 to Figure 10-8 spatially summarises the level of significance of the project's potential road impacts based upon the environmental values assessment approach after the implementation of the planned management strategies. The figures identify that the project's potential impacts are anticipated to range from negligible to moderate level of significance, with the highest level impacts typically forecast to occur on the lower order roads providing access to the major facilities. Table 10-7 provides a summary of the roads in each drainage area with a 'high' or 'major' significance of impact post to the implementation of the planned management strategies.

Table 10-7 Roads with Significant Impact: Post-Management Strategies

Drainage Area	High	Major
1	Nil	Nil
2	Nil	Nil
4	Nil	Nil
5	Nil	Nil
6	Nil	Nil
7	Nil	Nil
8	Nil	Nil
9	Nil	Nil
10	Nil	Nil
11	Nil	Nil

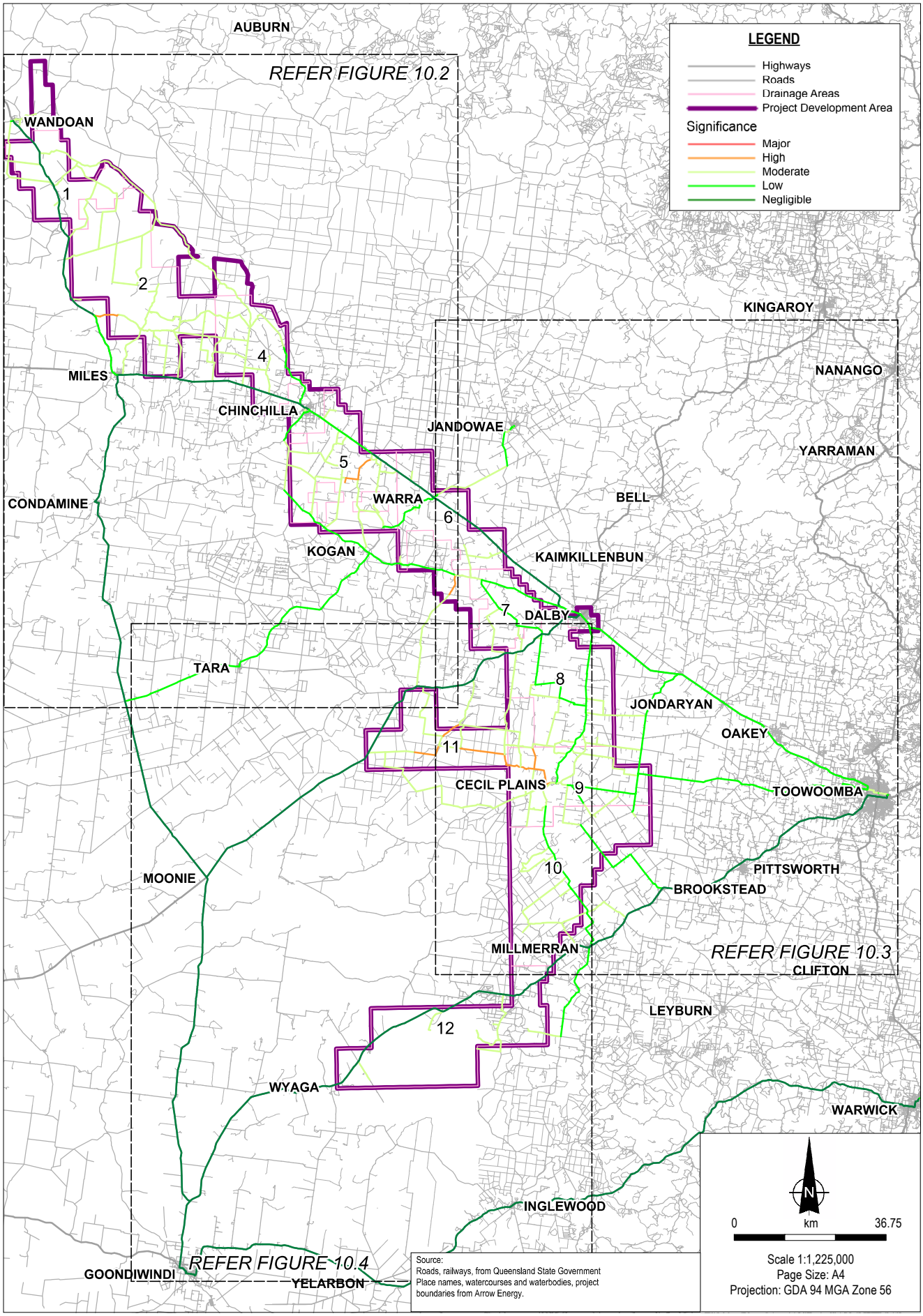
10.7 Summary of Environmental Values Assessment

Figure 10-1 and Table 10-6 confirm that in the absence of the planned management strategies being implemented the traffic demands associated with the project could result in negligible to high impacts on the road environment values. The highest levels of impacts are typically forecast to occur on the lower order roads providing access to major facilities (i.e. CGPFs, TWAFs etc.).

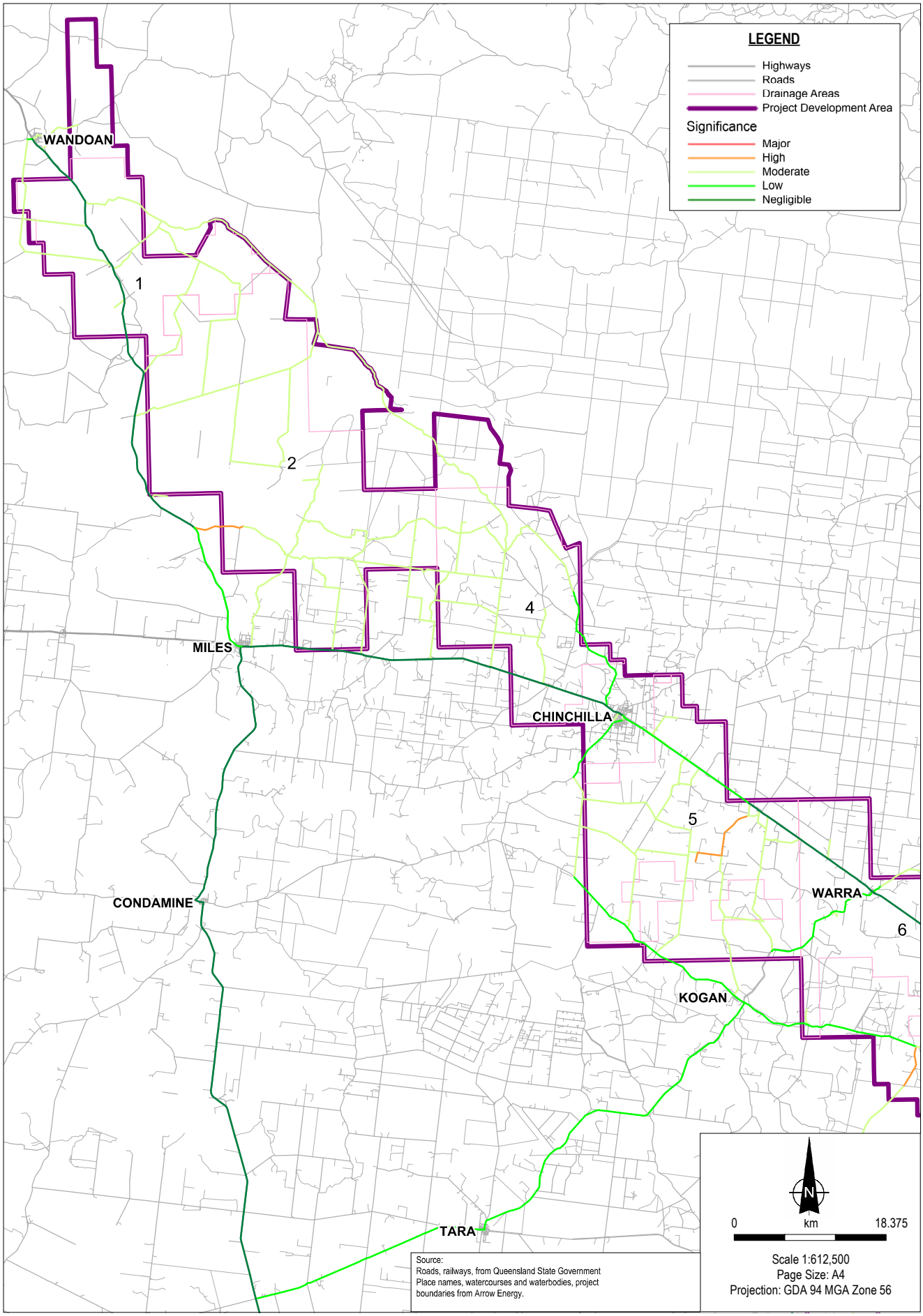
Figure 10-5 and Table 10-7 confirm that if the planned management strategies are implemented, the traffic demands associated with the project could result in negligible to moderate impacts on the road environment values. Therefore, the environmental values assessment has identified that there are unlikely to be impacts so significant (high or major) that they cannot be effectively managed through the implementation of the planned management strategies.

It is expected that the magnitude of the project's impacts will not change as a result of implementation of the planned management strategies as the magnitude is intrinsically linked to the extent of production activities which the planned management strategies do not influence. Instead it is expected that through the implementation of the planned management strategies, the sensitivity of the road environmental values will typically reduce, thereby resulting in typically reduced significance of impacts.

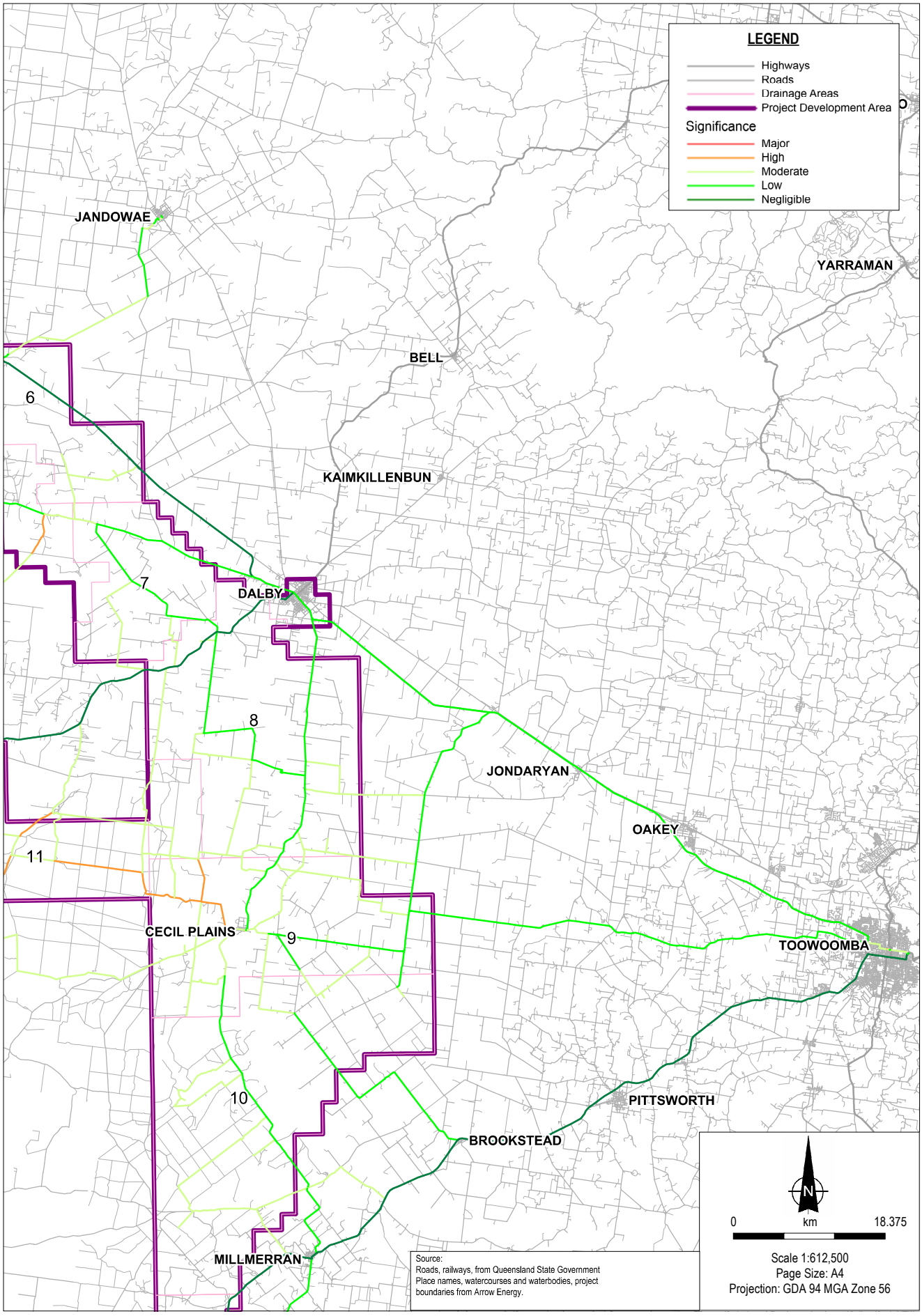
Importantly, consistent with the intent of the SREIS assessment phase, the SREIS RIA does not seek to identify a comprehensive list of the proponent funded road works or monetary contributions ultimately required to support the project. Instead the SREIS RIA seeks to confirm if the planned management strategies are likely to be effective at avoiding, minimising or mitigating all road impacts with a higher order significance associated with the project. The environmental values assessment presented confirms that the planned management strategies will be effective at avoiding, minimising or mitigating road impacts of major and high significance associated with the project.



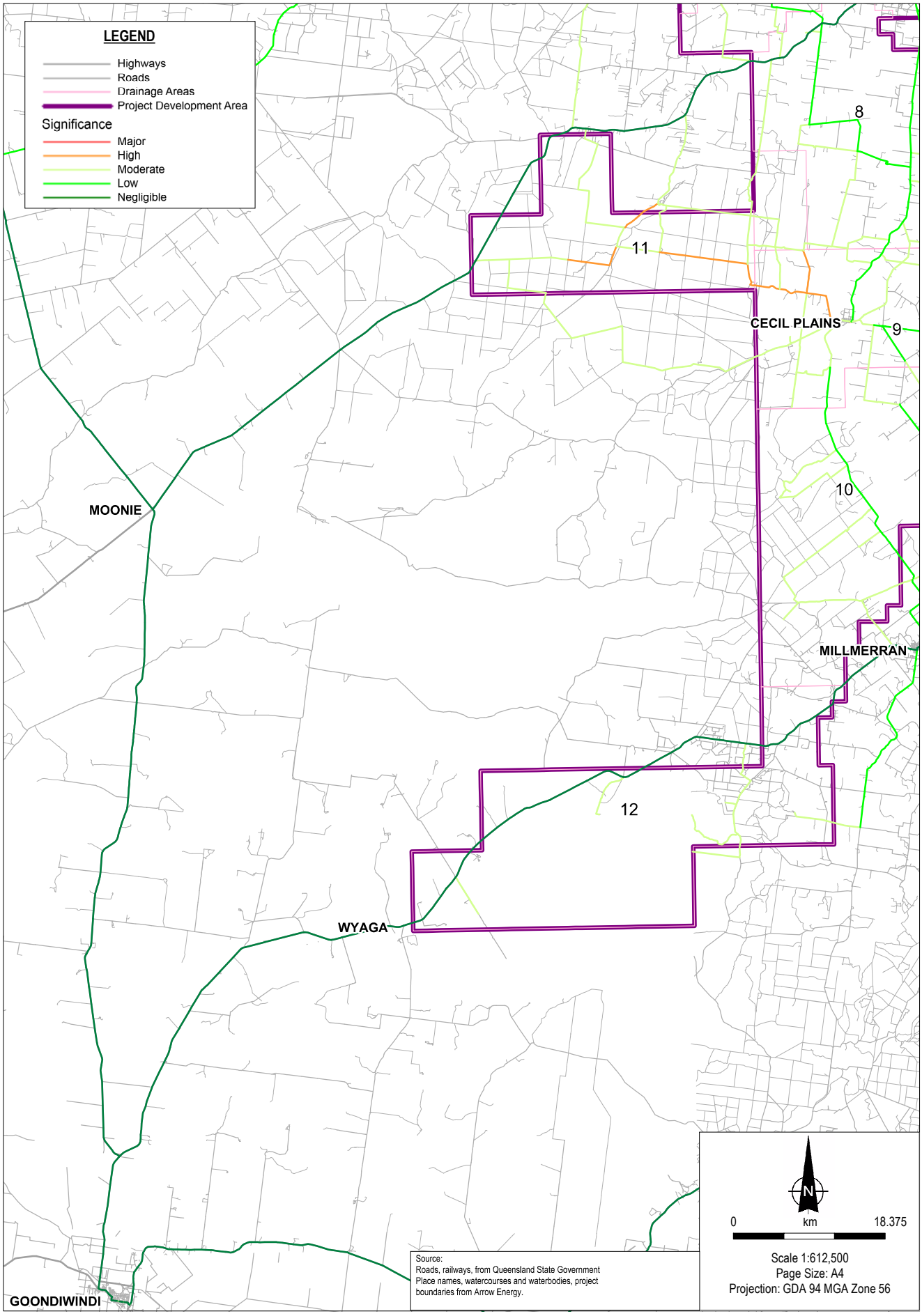
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.1 File Name: 6413_Figure 10.1.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Pre-Management Strategy	Figure No: 10.1



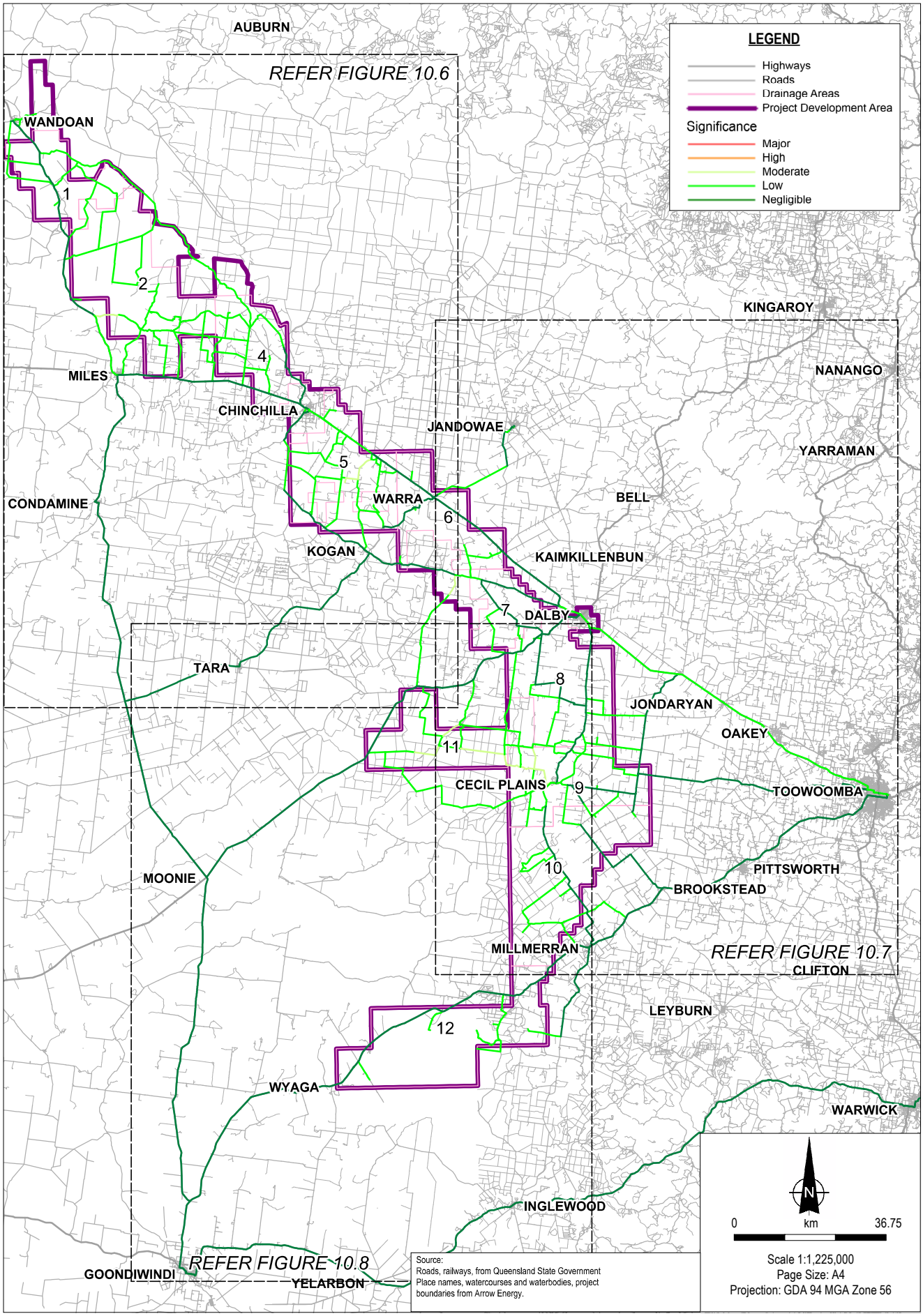
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.2 File Name: 6413_Figure 10.2.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Pre-Management Strategy (Northern)	Figure No: 10.2



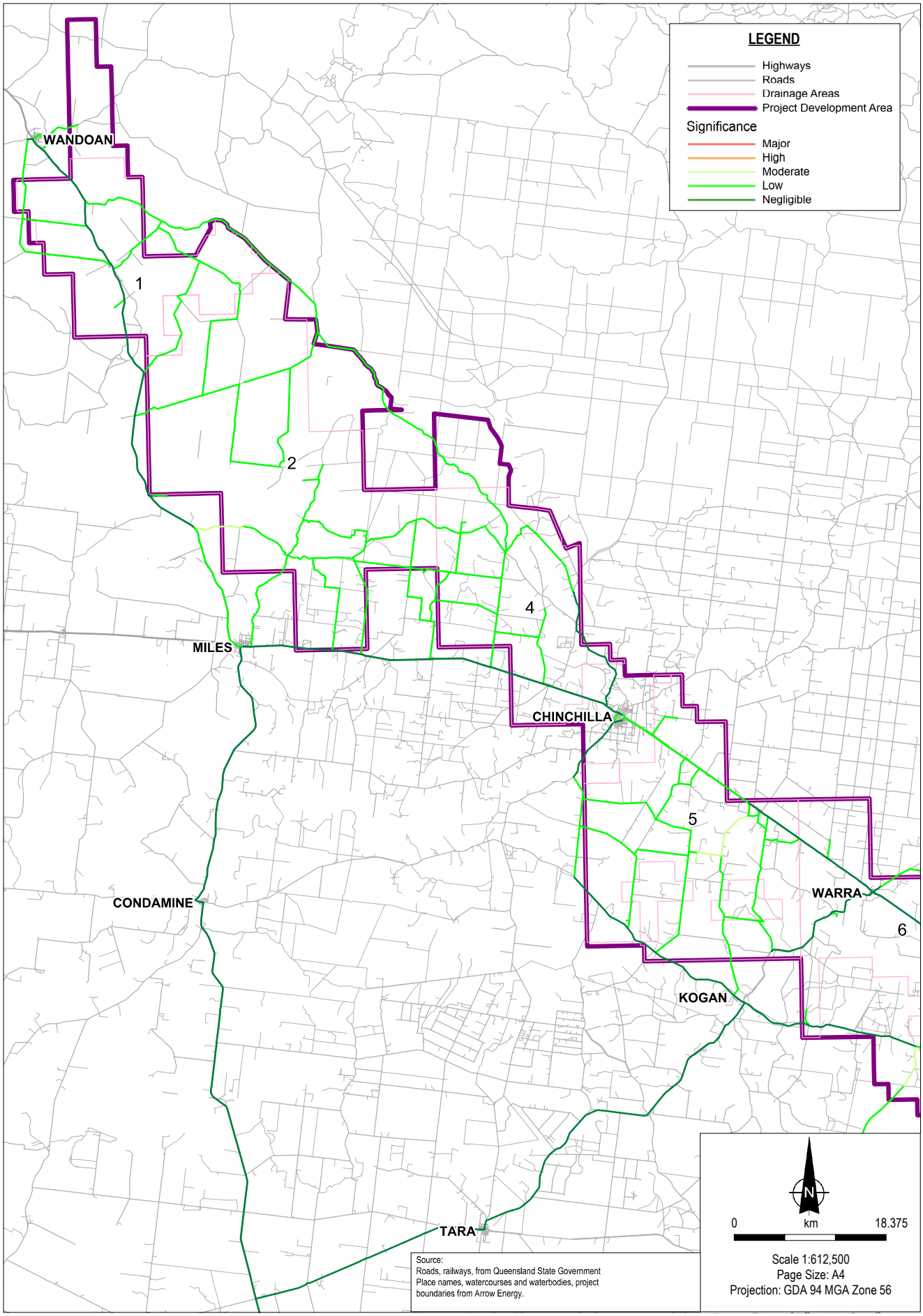
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.3 File Name: 6413_Figure 10.3.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Pre-Management Strategy (Central)	Figure No: 10.3



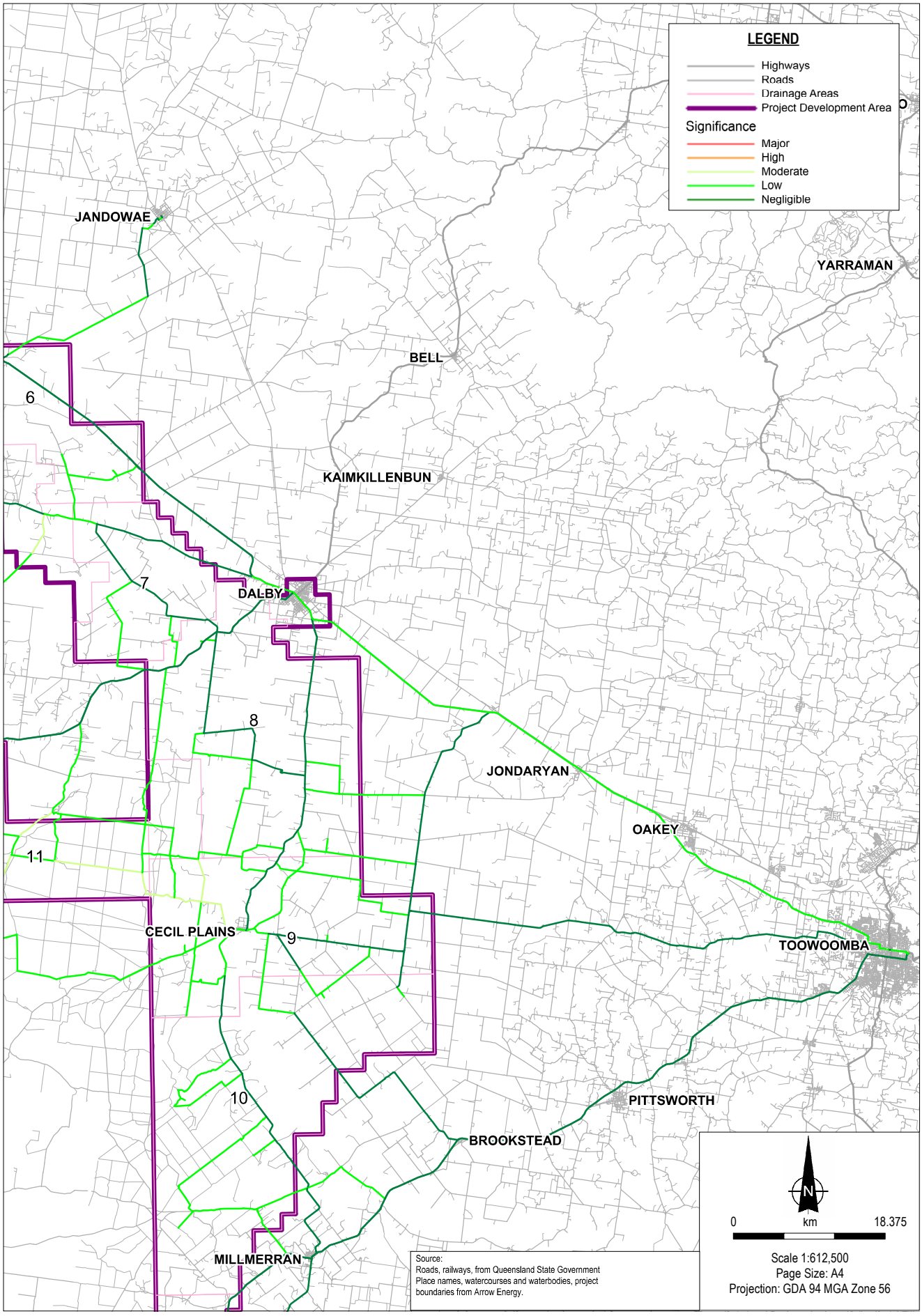
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.4 File Name: 6413_Figure 10.4.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Pre-Management Strategy (Southern)	Figure No: 10.4



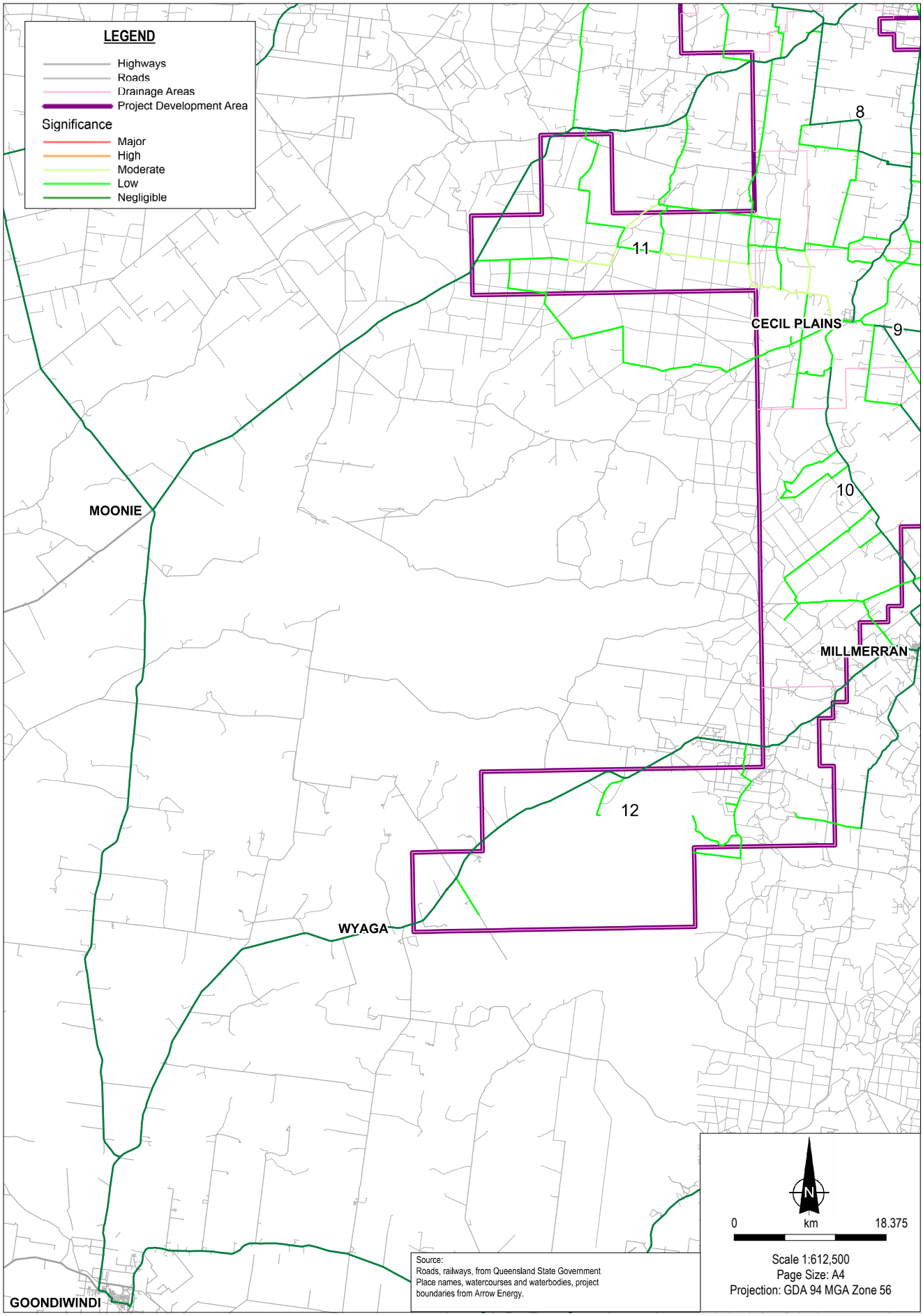
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.5 File Name: 6413_Figure 10.5.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Post-Management Strategy	Figure No: 10.5



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.6 File Name: 6413_Figure 10.6.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Post-Management Strategy (Northern)	Figure No: 10.6



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.7 File Name: 6413_Figure 10.7.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Post-Management Strategy (Central)	Figure No: 10.7



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure 10.8 File Name: 6413_Figure 10.8.wor	Arrow Energy Surat Gas Project	arrow energy go further	Significance of Impacts Post-Management Strategy (Southern)	Figure No: 10.8

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11 Case Study

11.1 Overview

The SREIS RIA expands upon the work previously undertaken as part of the EIS applying both an environmental values assessment approach and a more traditional traffic engineering assessment approach. Both assessment approaches undertaken to support the SREIS RIA seek to determine the significance of residual road impacts post implementation of the planned management strategies. The inclusion of both approaches within the EIS RIA provides road authorities greater certainty that the planned management strategies will preserve key road environmental values whilst also meeting or exceeding typical traffic engineering practice requirements.

Arrow has identified case study sites at which it is likely, but not certain, that major project facilities will ultimately be located subject to further detailed environmental, social, engineering and commercial constraints analysis. For the case study sites the effectiveness of the planned management strategies has been assessed. This approach enables the planned management strategies described in the EIS to be applied to real world locations to confirm that for these sample sites the implementation of the strategies would result in outcomes that demonstrate that the impacts are manageable potentially involving proponent works or contributions that meet or exceed typical traffic engineering practice requirements.

The intent of the traditional traffic engineering assessment presented herein is not to identify an exhaustive list of the proponent funded works and contributions ultimately required to support the project. Identification of such a list at this time is premature as the specific location and delivery timing of all project infrastructure is yet to be finalised. Identification of an exhaustive list will ultimately occur as part of the RIAs prepared post assessment of the EIS to inform the road authority infrastructure agreements.

11.2 Case Study Facility Locations

Arrow has identified four sites for locations of CGPFs and a fifth site for location of a TWAF. As stated previously the exact locations of the CGPFs and the TWAF within these sites have not been determined and the final location of infrastructure will be informed by further detailed environmental, social, engineering and commercial constraints analysis post assessment of the EIS. The five facilities for which Arrow has identified likely ultimate sites include:

> Case Study 1 (Miles) - CGPF DA2
> Case Study 2 (Kumbarilla) - CGPF DA7
> Case Study 3 (Cecil Plains) - CGPF DA8, CGPF DA9 and TWAF DA9.

The locations of the five case study facilities are illustrated on Figure 11-1.

11.3 Case Study Assessments

For the purposes of the SREIS RIA and to confirm the effectiveness of the planned management strategies, the following assessments have been undertaken in proximity to the five project facility sites:

> Fitness for Use Assessment
> Intersection Assessment
> Pavement Assessment.

As mentioned previously, the case study assessments have been undertaken applying both an:

> Environmental Values Assessment Approach
> Traditional Traffic Engineering Assessment Approach.

The results of the case study assessment are discussed in detail below.

11.4 Scoping Assessment

A scoping assessment was undertaken to identify the locations at which project traffic may potentially significantly increase existing traffic demands in accordance with GARID requirements. The GARID states

that traffic impacts should be considered at all accesses to the State-controlled road network (i.e. where the development has direct access to/from a State-controlled road). In addition, the GARID stipulates that all State-controlled intersections and links where project traffic demands exceed 5% of existing traffic demands should also be assessed.

Figure 11-2 identifies the locations at which project traffic is anticipated to increase existing AADT traffic demands (2011) by 5% or more. The figure identifies the likely extent of the road network over which project traffic demands may significantly increase existing traffic volumes. It is expected that the RIAs, which will be prepared post EIS assessment, would likely need to consider the identified extents (i.e. all roads where project traffic demands exceed 5% of existing traffic demands).

For the purposes of the SREIS RIA, a case study 'Fitness for Use' (FFU) and 'Intersection Assessment' has been undertaken for the road network in close proximity to each of the case study facility location. For the Pavement Assessment, three representative higher order road segments have been assessed as a case study application of the planned management strategies.

The limited extent of the case study assessments is appropriate as the intent of the SREIS RIA is not to identify the exhaustive list of proponent funded road works and contributions ultimately required to support the project. Instead the intent is to assess a sufficient extent of real world case study locations to provide confidence that the planned management strategies will result in outcomes such as proponent works or contributions that meet or exceed typical traffic engineering practice requirements.

11.5 Fitness for Use Assessment

Arrow has committed to the preparation of a Road-use Management Plan (RMP), in consultation with road authorities, as part of the infrastructure agreement process undertaken following assessment of the EIS. A RMP would typically include a FFU Roads Register. The FFU Roads Register will identify the roads currently suitable or suitable after the application of management measures to accommodate project traffic demands.

For the case study locations listed previously, a high level review was undertaken for the potential routes connecting the sites to the highways as shown in Appendix D. The high level FFU review identified a preferred route for access to each facility based on the existing road characteristics. The preferred routes are summarised in Table 11-1 and illustrated on Figure 11-3.

Table 11-1 Case Study: Preferred Routes

Case Study	Facility	Preferred Routes	Functional Road Hierarchy	Existing Road Surface Condition
1	CGPF DA2	Leichhardt Creek Taroom Road	Rural Connecting Road	Unsealed
2	CGPF DA7	Kumbarilla Lane	Rural Connecting Road	Sealed
3	CGPF DA8	Wanka Road	Rural Connecting Road	Unsealed
	TWAF DA9	Duntroon Road/Wilkins Road	Rural Access Road	Unsealed
	CGPF DA9	Millmerran-Cecil Plains Road	Regional Connecting Road	Sealed

11.5.2 Planned Management Strategies Approach

Table 9-1 outlines the following planned sealed roads management strategies for sealed routes to project infrastructure (i.e. CGPFs and TWAFs):

> Undertake a FFU inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed
> Potentially widen the road to two lane seal width with sealed shoulders and centre and edge line marking
> Identify required works in ongoing RMPs prepared to support the project.

Table 9-2 outlines the following planned unsealed roads management strategies for unsealed routes to project infrastructure (i.e. CGPFs and TWAFs):

> Undertake a FFU inspection to identify if existing condition of road asset is appropriate for levels of traffic proposed

> Typically seal road to a two lane seal width with sealed shoulders and centre and edge line marking. However, well maintained gravelled road may be adequate in certain instances if mutual agreement is reached with Council
> Enter into agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities
> Identify required works in ongoing RMPs prepared to support the project.

Table 11-2 provides a summary of the theoretical infrastructure works for each of the case study preferred routes, based upon application of the abovementioned planned management strategies. However, it is important to note that for the unsealed case study roads (i.e. Leichhardt Creek Taroom Road, Wanka Road, Duntroon Road and Wilkins Road) a mutual agreement could be obtained with Council for a well maintained gravelled road. Alternatively, Arrow could enter into an agreement with Council to hand back roads in no worse a state of repair compared with the condition at the start of construction activities.

Table 11-2 Case Study: Preferred Routes – Planned Management Strategies Approach

Case Study	Facility	Preferred Routes	Theoretical Road Upgrade Requirements
1	CGPF DA2	Leichhardt Creek Taroom Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking
2	CGPF DA7	Kumbarilla Lane	Widen to a two lane sealed road with sealed shoulders and appropriate line marking
3	CGPF DA8	Wanka Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking
	TWAF DA9	Duntroon Road/Wilkins Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking
	CGPF DA9	Millmerran-Cecil Plains Road	Widen to a two lane sealed road with sealed shoulders and appropriate line marking

11.5.3 Traditional Traffic Engineering Approach

Table 11-3 provides a summary of the existing, peak project and peak design AADT on each of the identified case study preferred routes. The peak design AADT represents the anticipated peak AADT on each route during the life of the project, including project and background traffic volumes.

Table 11-3 Case Study: Preferred Routes – Peak Traffic Demands

Case Study	Facility	Preferred Routes	Existing AADT*	Peak Project AADT	Peak Design AADT
1	CGPF DA2	Leichhardt Creek Taroom Road	80	300	390
2	CGPF DA7	Kumbarilla Lane	785	312	1,217
3	CGPF DA8	Wanka Road	65	10	100
	TWAF DA9	Duntroon Road/Wilkins Road	40	351	396
	CGPF DA9	Millmerran-Cecil Plains Road	220	260	610

** Existing AADT derived from peak hour intersection surveys undertaken by Cardno in March 2013*

The EIS RIA outlined best practice standards for likely road upgrade requirements on sealed and unsealed roads. The road upgrade requirements are generally based on traffic volume thresholds. Table 11-4 provides a summary of the theoretical infrastructure works for each of the case study routes, based on a traditional traffic engineering approach (i.e. traffic volume thresholds).

Table 11-4 Case Study: Road Upgrades – Traditional Traffic Engineering Approach

Case Study	Facility	Preferred Routes	Theoretical Road Upgrade Requirements
1	CGPF DA2	Leichhardt Creek Taroom Road	Sealing typically warranted
2	CGPF DA7	Kumbarilla Lane	Sealed traffic lane width of 7.0m plus 2.0m total shoulder width (1.0m sealed shoulder)

Case Study	Facility	Preferred Routes	Theoretical Road Upgrade Requirements
3	CGPF DA8	Wanka Road	Economic benefit assessment of sealing warranted
	TWAF DA9	Duntroon Road/Wilkins Road	Sealing typically warranted
	CGPF DA9	Millmerran-Cecil Plains Road	Sealed traffic lane width of 7.0m (desirable) plus 1.5m total shoulder width (0.5m sealed shoulder)

11.5.4 Fitness for Use Assessment Summary

Table 11-5 compares the theoretical infrastructure works required for each of the case study routes based on each of the assessment approaches. In summary, the planned management strategies for sealed and unsealed roads presented in both the EIS and SREIS, meet or exceed typical traffic engineering practice requirements.

Table 11-5 Case Study: Comparison of Theoretical Road Upgrade Requirements

Case Study	Facility	Preferred Routes	Planned Management Strategies Approach	Traditional Traffic Engineering Approach
1	CGPF DA2	Leichhardt Creek Taroom Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking	Sealing typically warranted
2	CGPF DA7	Kumbarilla Lane	Widen to a two lane sealed road with sealed shoulders and appropriate line marking	Sealed traffic lane width of 7.0m plus 2.0m total shoulder width (1.0m sealed shoulder)
3	CGPF DA8	Wanka Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking	Economic benefit assessment of sealing warranted
	TWAF DA9	Duntroon Road/Wilkins Road	Upgrade to a two lane sealed road with sealed shoulders and appropriate line marking	Sealing typically warranted
	CGPF DA9	Millmerran-Cecil Plains Road	Widen to a two lane sealed road with sealed shoulders and appropriate line marking	Sealed traffic lane width of 7.0m (desirable) plus 1.5m total shoulder width (0.5m sealed shoulder)

11.6 Intersection Assessment

Arrow has committed to the preparation of a RMP, in consultation with road authorities, as part of the infrastructure agreement process undertaken following assessment of the EIS. The RIAs, undertaken following approval where necessary, will typically include consideration of specific impacts on intersection performance and will be undertaken in accordance with the scoping identified previously (that is, at intersections where traffic volumes increase by 5% or more as a result of project related traffic).

For the purposes of the SREIS RIA, intersection impacts associated with potential project infrastructure locations were identified for the sites previously. Based on the FFU assessment and the identification of the preferred access routes, the first point of access to the State-controlled road network was considered. The identified case study intersections are summarised in Table 11-6 and illustrated on Figure 11-3. The detailed review for each intersection is included at Appendix E.

Table 11-6 Case Study: Intersection Assessment – Existing Treatments

Case Study	Facility	Intersection	Existing Treatment
1	CGPF DA2	Leichhardt Highway/Leichhardt Creek Taroom Road	Priority/No Turn Treatment
2	CGPF DA7	Dalby-Kogan Road/Kumbarilla Lane	Priority/No Turn Treatment
3	CGPF DA8	Dalby-Cecil Plains Road/Wanka Road	Priority/No Turn Treatment
	TWAF DA9	Cecil Plains-Moonie Road/Duntroon Road	Priority/No Turn Treatment
	CGPF DA9	Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road	Priority/No Turn Treatment

11.6.2 Planned Management Strategies Approach

Table 9-3 outlines the following planned access roads management strategies for access roads to project infrastructure (i.e. CGPFs and TWAFs):

> Turn lanes and acceleration lanes may be required at facility accesses
> Upgrades at nearest highway or regional connecting road intersection may be necessary (i.e. turn lanes, signage, line marking etc.)
> Identifying required works in ongoing RMPs prepared to support the project.

The geometry of priority controlled intersections is typically driven by safety and design vehicle considerations as opposed to capacity constraints. For example, protected short turn lanes are usually provided to reduce the incidence of rear end crashes, rather than to allow more vehicles to pass through the intersection (i.e. to allow greater capacity). As a result, it is likely that each intersection to major project facilities (i.e. CGPFs, CGPFs with Water Treatment Facilities, FCFs and TWAFs) from a State-controlled road will require both an auxiliary left turn lane (AUL) and a channelised right turn lane (CHR). This is consistent with the intent of the planned access roads management strategies outlined in Table 9-3.

Table 11-7 provides a summary of the likely required infrastructure works for each of the case study intersections, based on the abovementioned planned management strategies.

Table 11-7 Case Study: Intersection Upgrades – Planned Management Strategies Approach

Case Study	Facility	Intersection	Theoretical Infrastructure Upgrade Works
1	CGPF DA2	Leichhardt Highway/Leichhardt Creek Taroom Road	AUL/CHR
2	CGPF DA7	Dalby-Kogan Road/Kumbarilla Lane	AUL/CHR
3	CGPF DA8	Dalby-Cecil Plains Road/Wanka Road	AUL/CHR
	TWAF DA9	Cecil Plains-Moonie Road/Duntroon Road	AUL/CHR
	CGPF DA9	Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road	AUL/CHR

Note: AUL = Auxiliary Left Turn, CHR = Channelised Right Turn

11.6.3 Traditional Traffic Engineering Approach

Consistent with the key findings of the literature review presented in Section 8 of this SREIS, the following assessments have been undertaken for each of the case study intersections:

> Safety Assessment
> Operational Assessment
> Turn Warrant Assessment.

Key findings are summarised below with detailed outputs included at Appendix E.

The safety assessment included a detailed review of available sight distances as well as a historical crash data at each of the study intersections. The intent of the safety assessment was to identify if there are existing safety deficiencies which would prohibit the intersection from being utilised by project traffic or would trigger the need for improvements prior to being utilised by project traffic. This assessment confirmed that no safety upgrades would be required at each of the case study intersections to accommodate peak anticipated project traffic demands.

The operational assessment included detailed analysis of the potential impacts on the performance at each study intersection (i.e. vehicular delays and queues etc.) as a result of the increased project traffic demands. The intent of the operational assessment was to identify if intersection upgrades would be required to accommodate the increase in traffic demands generated by the project. It is important to note that the turn warrant assessment assumed that all daily project traffic demands would occur in the peak hour periods. Therefore the results presented herein are considered to be conservative. Nevertheless, this assessment confirmed that no intersection upgrades would be required at each of the case study intersections to accommodate peak anticipated project traffic demands.

A detailed turn warrant assessment was undertaken for each of the case study intersections based on the methodology and volume thresholds outlined in Section 8.1.2. The intent of the turn warrant assessment was to identify if additional turn lanes and deceleration lanes would be required to accommodate the increase in traffic demands generated by the project. It is important to note that the turn warrant assessment utilises daily project traffic demands rather than peak hour demands. Therefore the results presented in Table 11-8 are considered to be conservative.

Table 11-8 Case Study: Intersection Upgrades – Traditional Traffic Engineering Approach

Case Study	Facility	Intersection	Theoretical Infrastructure Upgrade Works
1	CGPF DA2	Leichhardt Highway/Leichhardt Creek Taroom Road	BAL/CHR
2	CGPF DA7	Dalby-Kogan Road/Kumbarilla Lane	BAL/CHR(s)
3	CGPF DA8	Dalby-Cecil Plains Road/Wanka Road	BAL/BAR
	TWAF DA9	Cecil Plains-Moonie Road/Duntroon Road	BAL/BAR
	CGPF DA9	Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road	BAL/CHR(s)

Note: BAL = Basic Left Turn, BAR = Basic Right Turn, CHR = Channelised Right Turn, CHR(s) = Short Channelised Right Turn

11.6.4 Intersection Assessment Summary

Table 11-9 compares the theoretical infrastructure works required for each of the case study intersection based on each of the assessment approaches. In summary, the planned management strategies for access roads presented in both the EIS and SREIS, meet or exceed typical traffic engineering practice requirements.

Table 11-9 Case Study: Comparison of Theoretical Intersection Upgrade Requirements

Case Study	Facility	Preferred Routes	Planned Management Strategies Approach	Traditional Traffic Engineering Approach
1	CGPF DA2	Leichhardt Highway/ Leichhardt Creek Taroom Road	AUL/CHR	BAL/CHR
2	CGPF DA7	Dalby-Kogan Road/ Kumbarilla Lane	AUL/CHR	BAL/CHR(s)
3	CGPF DA8	Dalby-Cecil Plains Road/ Wanka Road	AUL/CHR	BAL/BAR
	TWAF DA9	Cecil Plains-Moonie Road/ Duntroon Road	AUL/CHR	BAL/BAR
	CGPF DA9	Cecil Plains-Moonie Road/ Millmerran-Cecil Plains Road	AUL/CHR	BAL/CHR(s)

11.7 Pavement Assessment

Arrow has committed to the preparation of a RMP, in consultation with road authorities, as part of the infrastructure agreement process undertaken following assessment of the EIS. The RIAs, undertaken following approval where necessary, will typically include consideration of specific impacts on pavement rehabilitation and maintenance and will be undertaken in accordance with the scoping identified previously (that is, on State-controlled road segments where traffic volumes increase by 5% or more as a result of project related traffic).

For the purposes of the SREIS RIA, three representative road sections have been utilised to demonstrate the application of the pavement impact methodology. The adopted representative sections are illustrated on Figure 11-3 and summarised below:

> Warrego Highway (Chinchilla to Miles) (TMR Ref: 18C: 80.175km to 126.754km)
> Millmerran-Cecil Plains Road (TMR Ref: 3251: 0.000km to 35.610km)
> Moonie Highway (Dalby to Nandi) (TMR Ref: 35A: 0.000km to 11.000km).

Detailed methodology and results are included at Appendix F.

11.7.1 Planned Management Strategies Approach

Table 9-1 outlines the following planned sealed road management strategies for sealed roads to project infrastructure (i.e. CGPFs and TWAFs):

> Contribution may be required towards more frequent pavement maintenance as a result of increased heavy vehicle movements.

11.7.2 Traditional Traffic Engineering Approach

Table F4 and Figure F-2 in Appendix F summarises the reduction in estimated service life of the assessed pavement on each of the case study road segments as a result of the project. In accordance with TMR's GARID, the project is defined as having a significant impact on the timing of pavement rehabilitation only where the acceleration time exceeds one year.

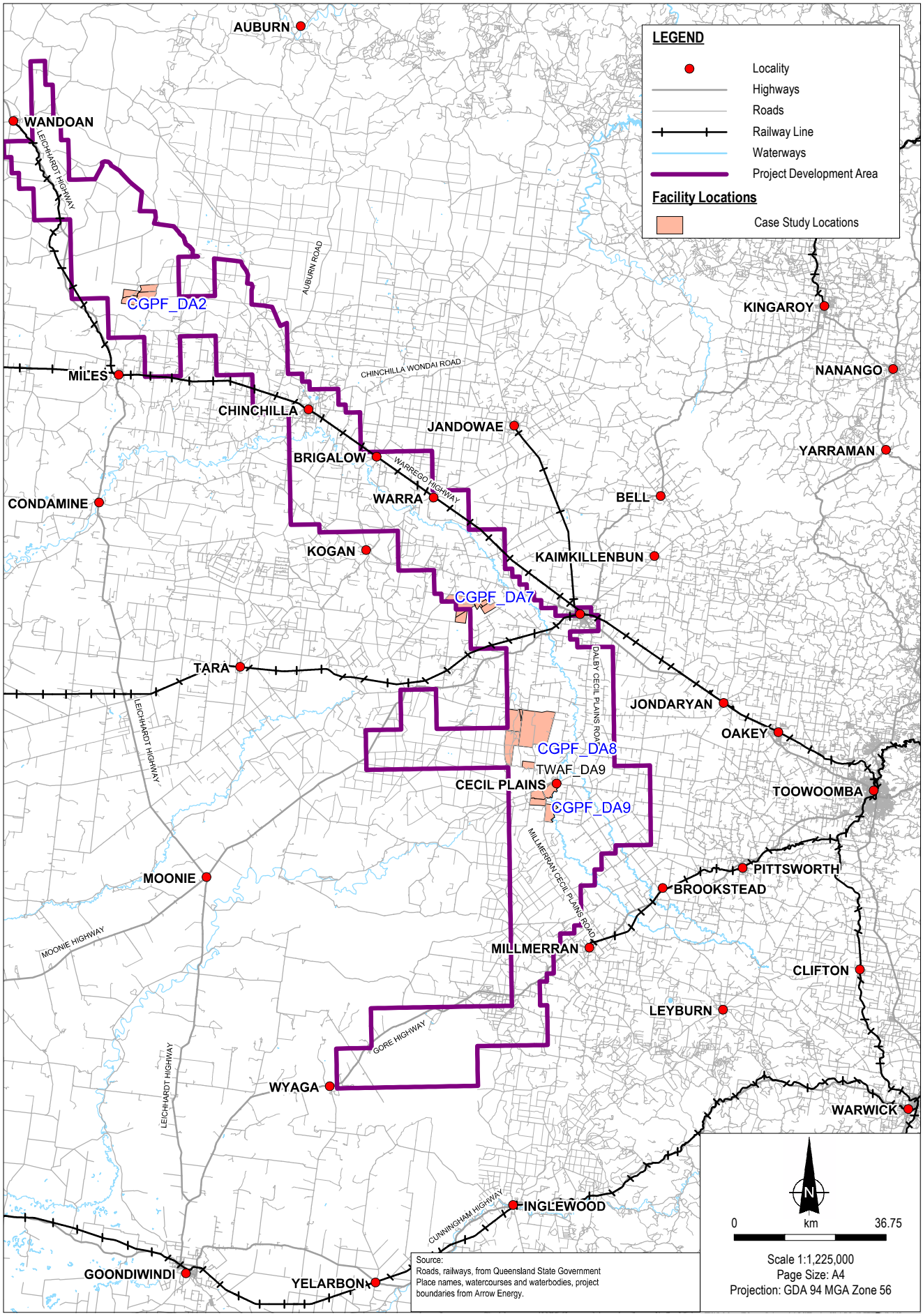
This assessment has identified those sections where a significant impact is anticipated on the timing of rehabilitation based on the project case modelled. Typically the proponent contributes to the cost difference required in bringing the pavement rehabilitation forward from that planned in consultation with road authorities. Typically the proponent contributes to the additional maintenance costs associated with increases in heavy vehicles in consultation with road authorities. Monetary contributions have not been identified as part of the SREIS assessment as this can most accurately be determined during the detailed design stage following assessment of the EIS.

11.7.3 Pavement Assessment Summary

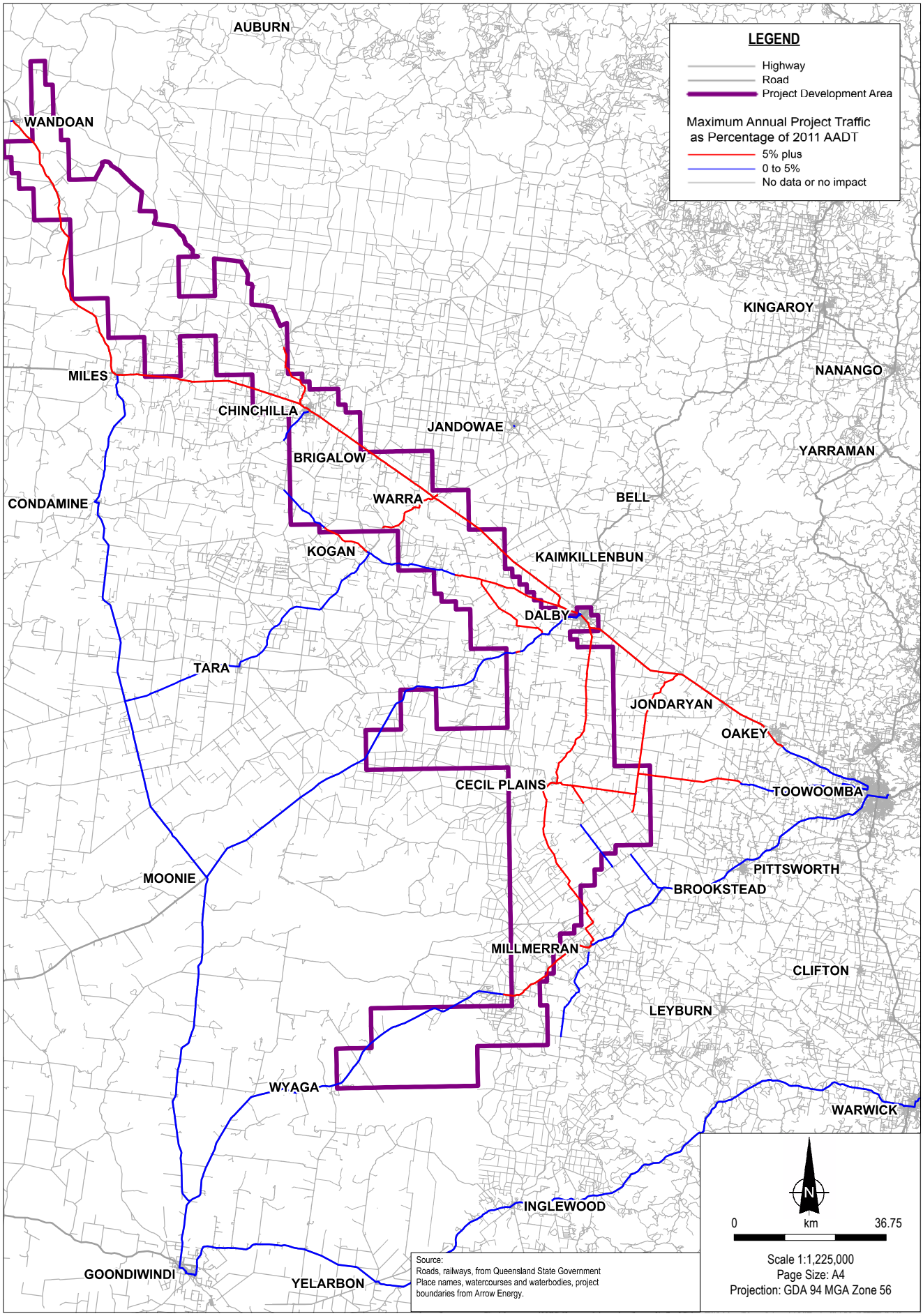
Table 11-10 compares the theoretical infrastructure works required for each of the case study intersection based on each of the assessment approaches. In summary, the planned management strategies for sealed roads presented in both the EIS and SREIS, meet or exceed typical traffic engineering practice requirements.

Table 11-10 Case Study: Comparison of Theoretical Pavement Rehabilitation Requirements

TMR Ref	Road	Segment	Planned Management Strategies Approach	Traditional Traffic Engineering Approach
18C	Warrego Highway (Chinchilla to Miles)	80.175km to 126.754km	Contributions may be required towards more frequent pavement maintenance as a result of increased heavy vehicle movements	This assessment identified that there are road segments along the case study routes where the proponent would need to contribute to pavement rehabilitation and maintenance.
3251	Millmerran-Cecil Plains Road	0.000km to 35.610km		
35A	Dalby to Nandi	0.000km to 11.000km		



Cardno Shaping the Future	Date: 17.5.2013 WOR: Figure 11.1 File Name: 6413_Figure 11.1.wor	Arrow Energy Surat Gas Project	arrow energy go further	Case Study Facility Locations	Figure No: 11.1



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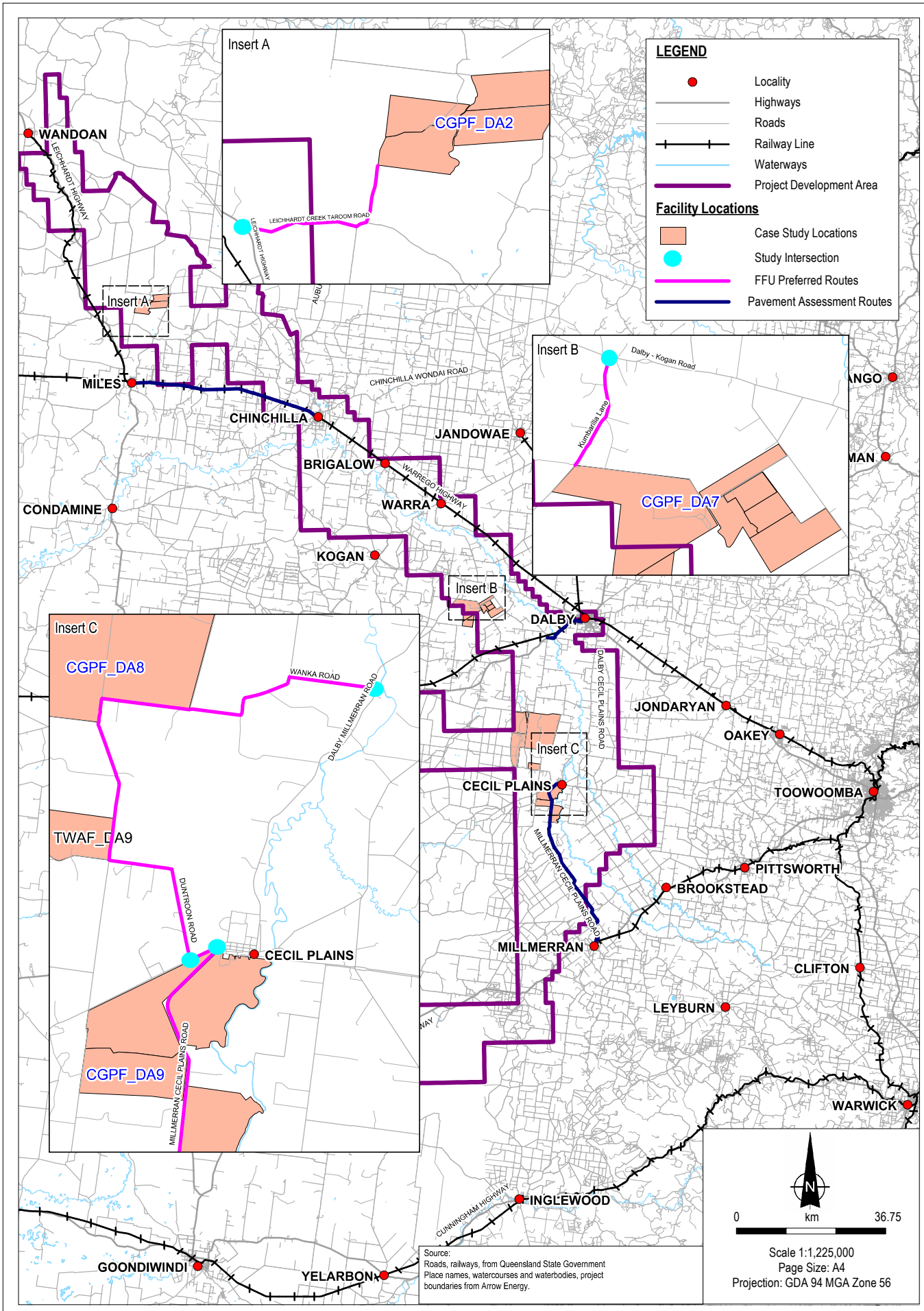

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12 Conclusions

The SREIS RIA has been undertaken to assess the road based transport impacts associated with the Surat Gas Project. The SREIS RIA has sought to establish if there are likely to be any road impacts that cannot be effectively managed through either the application of appropriate approval conditions, or through the application of the planned management strategies. The assessment has identified the following:

- Existing traffic conditions such as traffic volumes, traffic growth, school bus and stock routes remain generally consistent with that assessed in the EIS RIA.
- The traffic generation of the various activities associated with the project has been refined from that presented within the EIS RIA based upon more detailed logistics planning undertaken since the EIS RIA was prepared.
- A strategic traffic model has been developed to forecast the traffic demands associated with the project to inform the assessment presented within the SREIS RIA.
- The strategic traffic modelling identifies that as a result of the revised traffic generation assumptions and updated project planning that the extent of travel likely to be associated with the project has increased from that presented in the EIS RIA. The updated modelling also identifies that there is likely to be a strong desire line between Toowoomba and Cecil Plains via Toowoomba-Cecil Plains Road which was not previously identified in the EIS RIA.
- The best practice traffic engineering guidance presented within the EIS RIA remains current.
- The management strategies presented within the EIS RIA are still considered appropriate however two additional strategies are now proposed to support these. The additional strategies include a commitment to undertake fit for use road inspections and to enter into agreements with road authorities to hand back roads in no worse state of repair following their use by project traffic.
- An environmental values assessment has been undertaken as part of the SREIS RIA to confirm the effectiveness of the planned management strategies to effectively avoid, minimise and mitigate all higher order significance impacts associated with project traffic. The assessment has identified that the planned management strategies will be effective at avoiding, minimising or mitigating impacts.
- Case study assessments have been undertaken to present “real world” examples of the outcomes to achieve via the application of the planned management strategies and how these outcomes compare to standard traffic engineering practice. The case studies identified that application of the planned management strategies results in intersection works, link works and pavement contributions that meet or exceed typical traffic engineering practice requirements. The assessment therefore confirms that the planned management strategies are appropriate.

The SREIS RIA has established that there is unlikely to be any residual road impacts so significant post implementation of approval conditions and the planned management strategies that they should preclude approval of the project. The SREIS RIA has confirmed that the planned management strategies will result in intersection, link and pavement works which meet or exceed standard traffic engineering practice requirements. The planned management strategies establish the framework which will inform future assessments of the project’s impacts. A comprehensive list of works ultimately required to accommodate project traffic can most appropriately be determined during the detailed design stage as part of RIAs prepared to inform any required infrastructure agreements with road authorities.

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APPENDIX A
Approximate Locations of Other Projects

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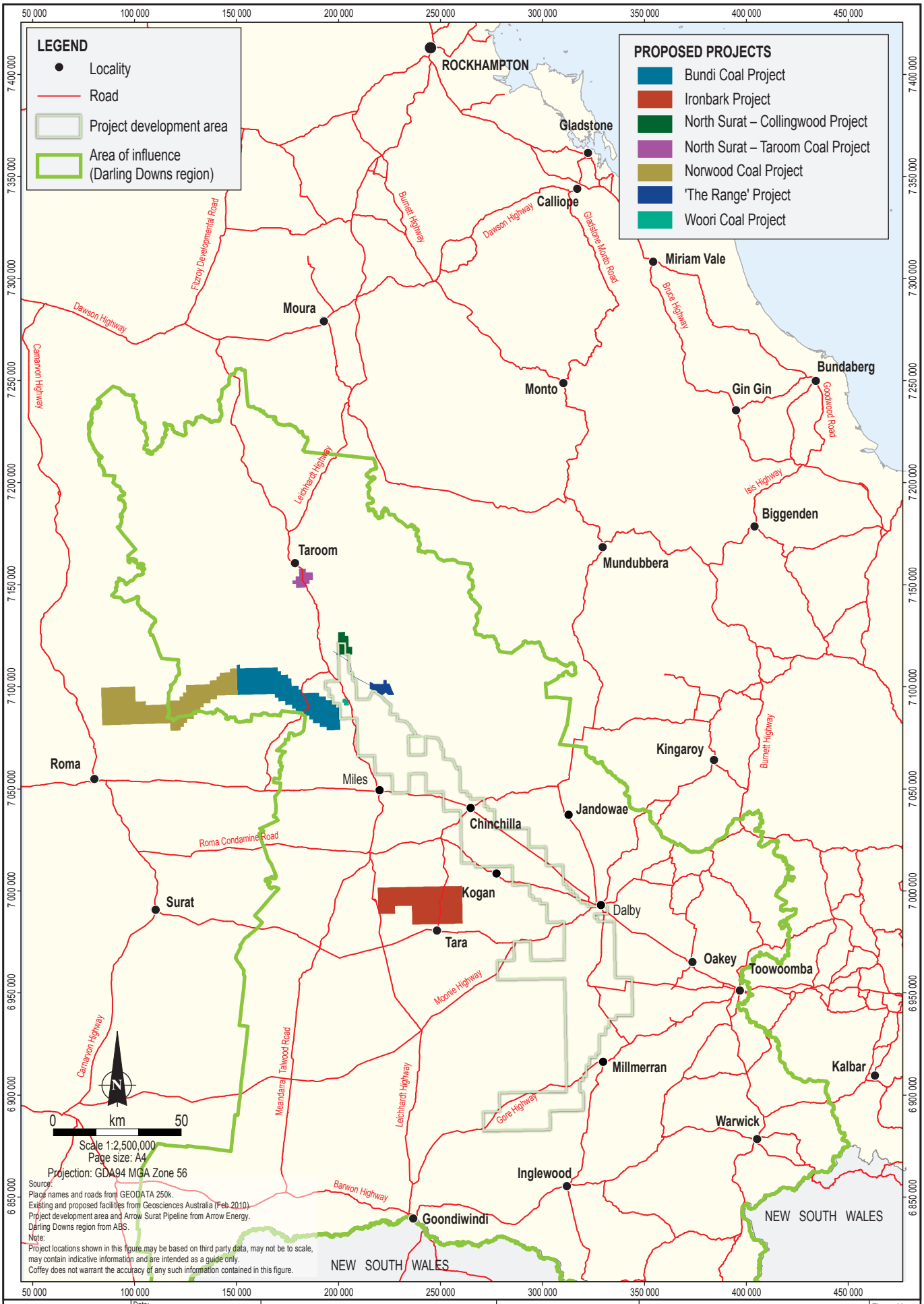

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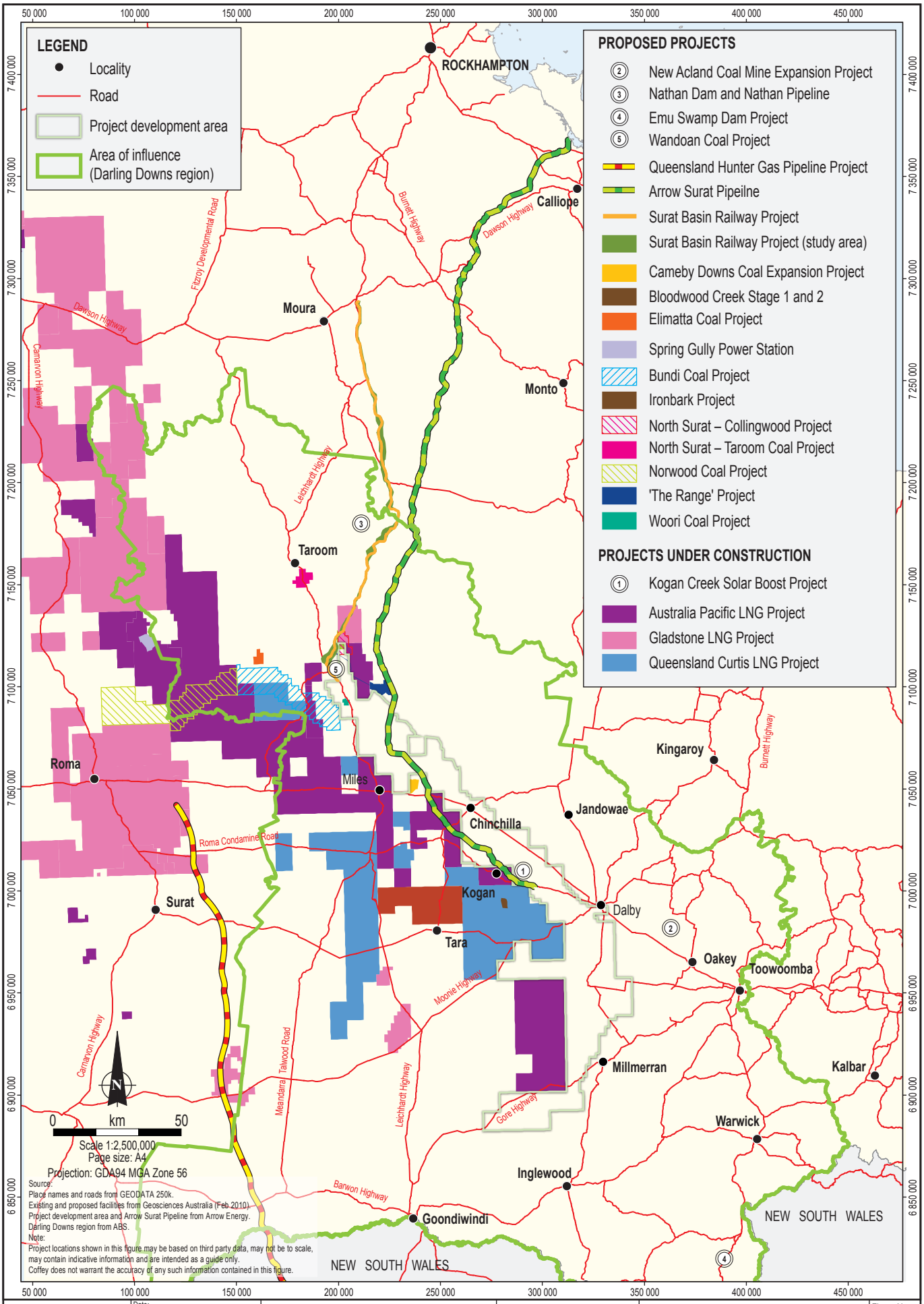

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Figure No: 2

Surat Gas Project SREIS

APPENDIX B

Project Activities and Traffic Generation

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[Appendix B is available on request]

Surat Gas Project SREIS

APPENDIX C

Annual Project Traffic Volume Forecasts

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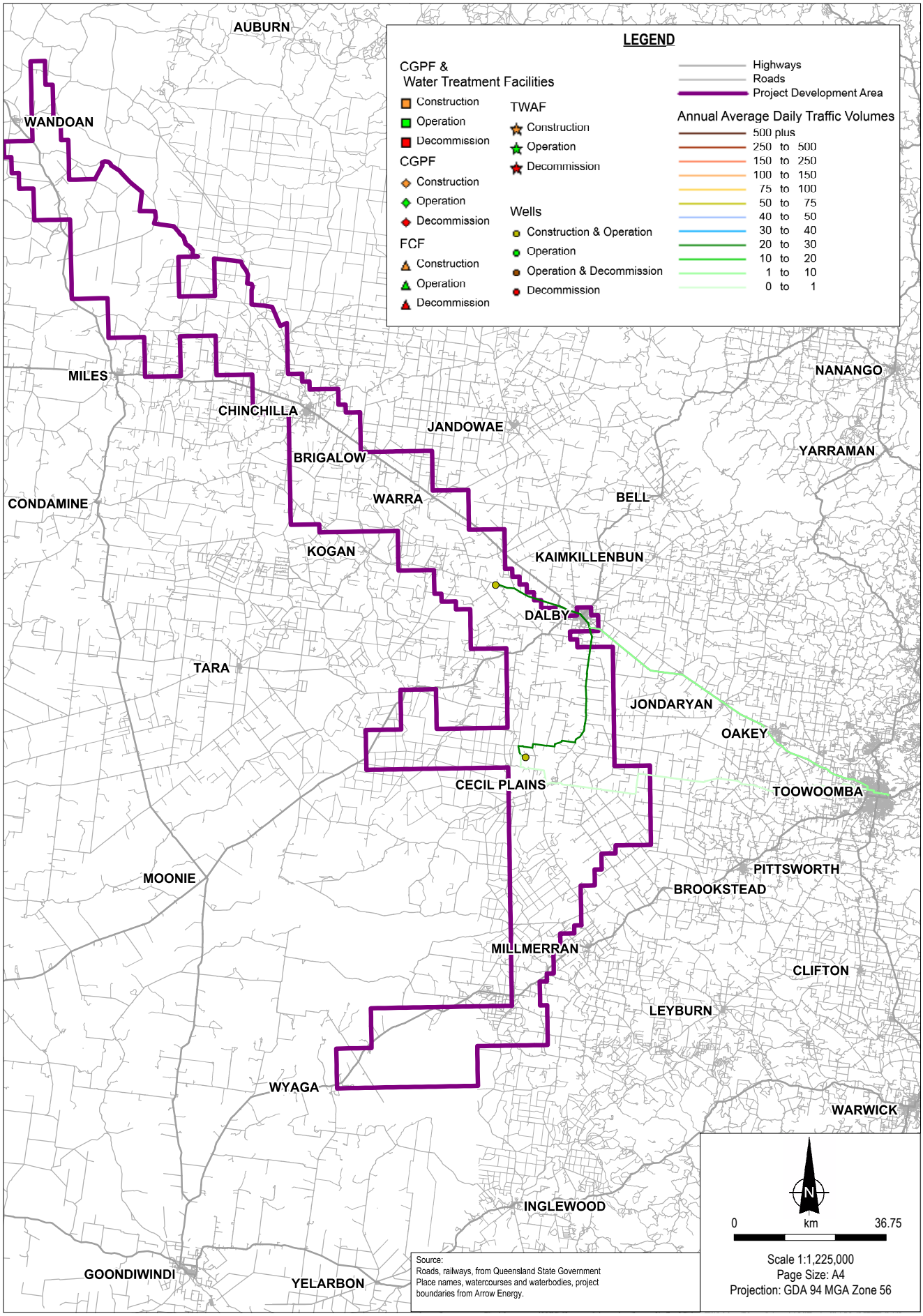

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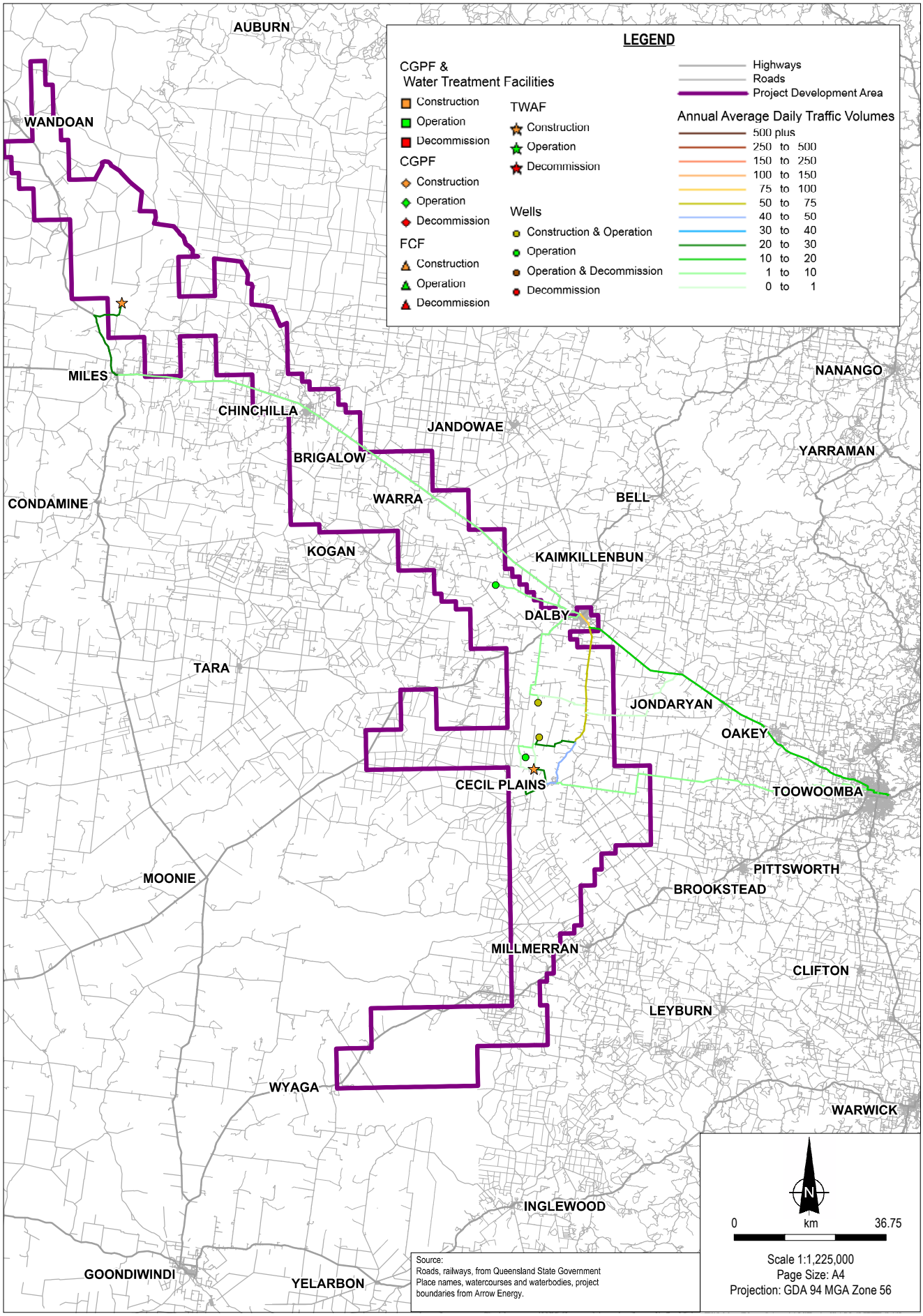

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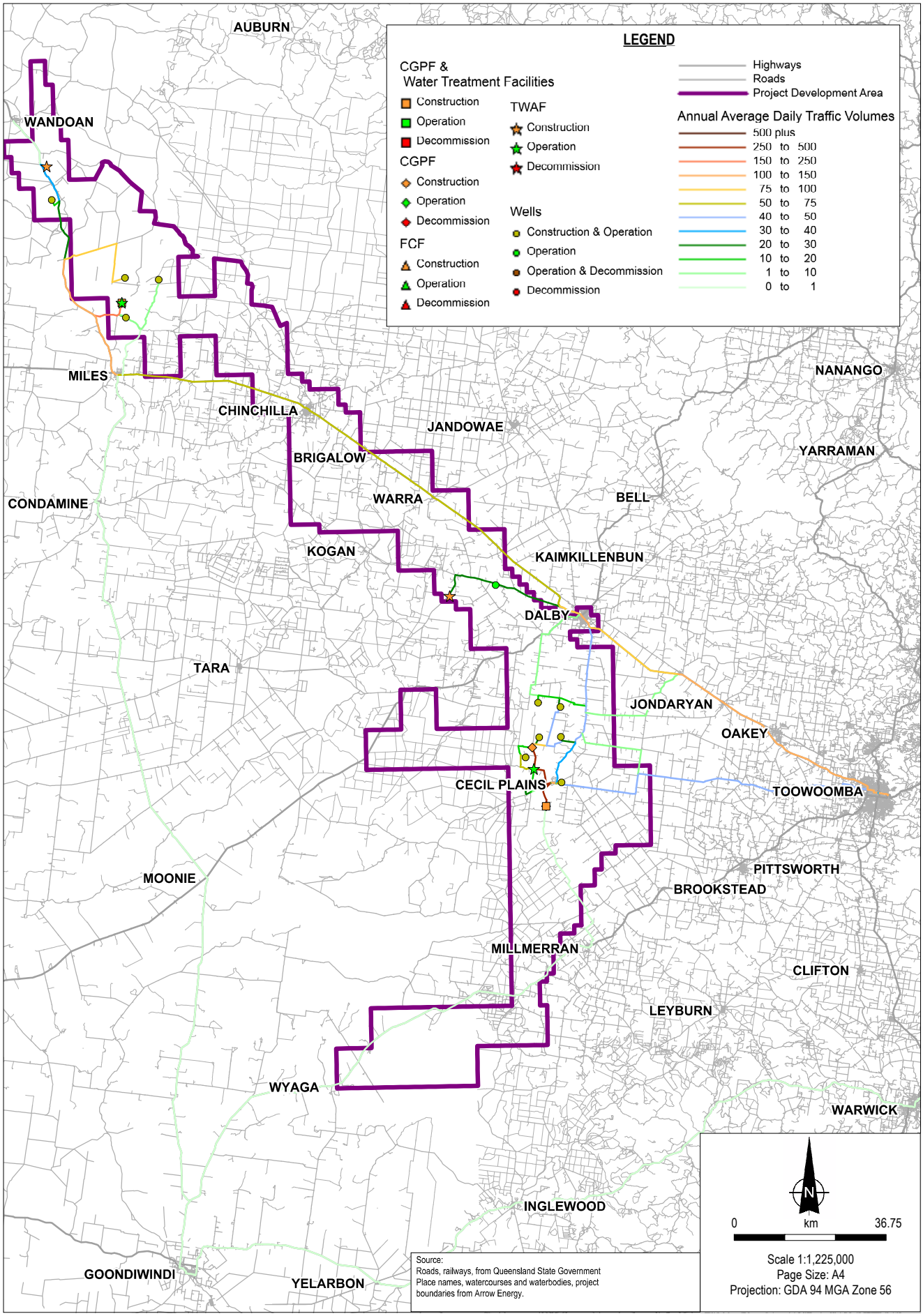

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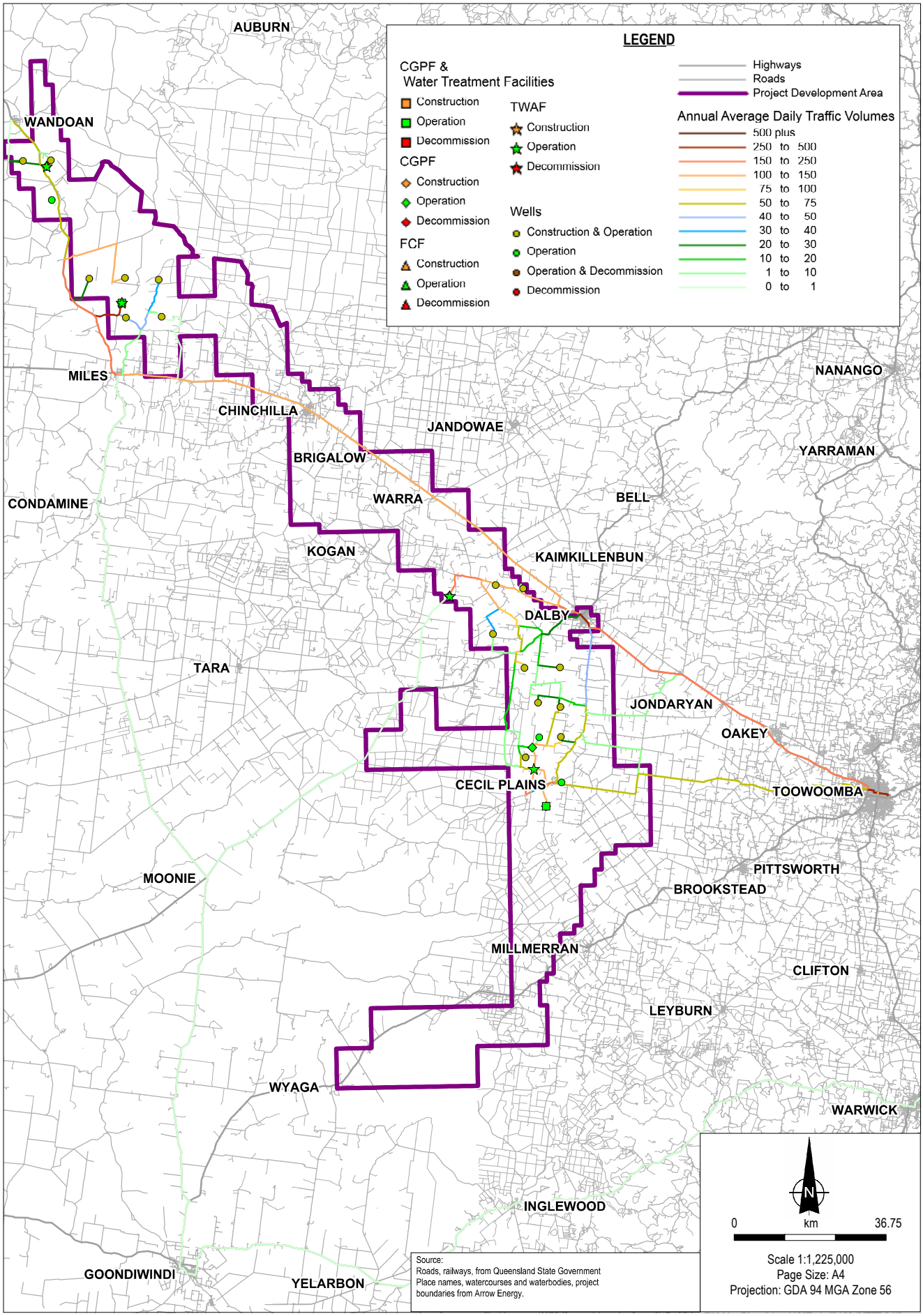

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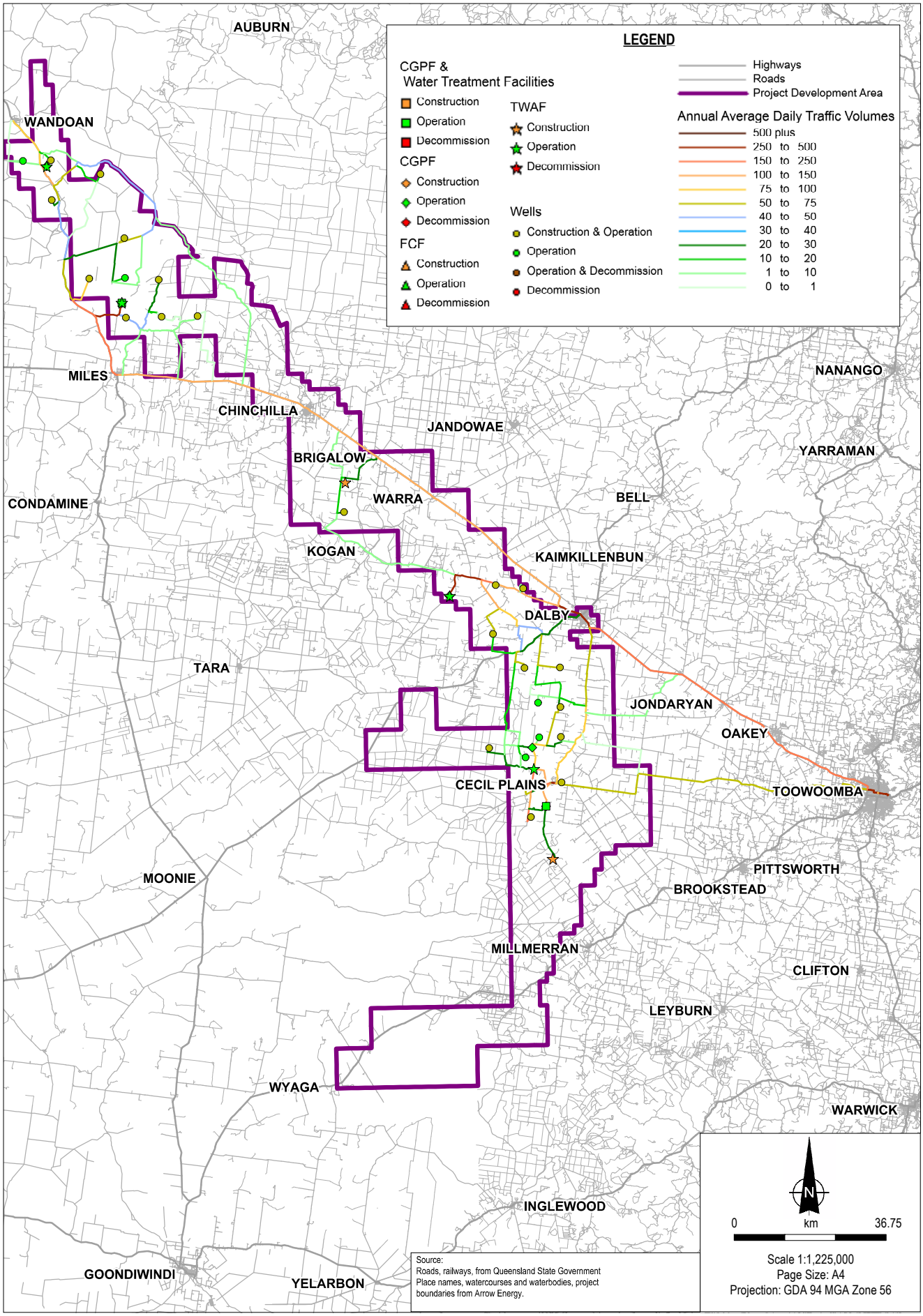

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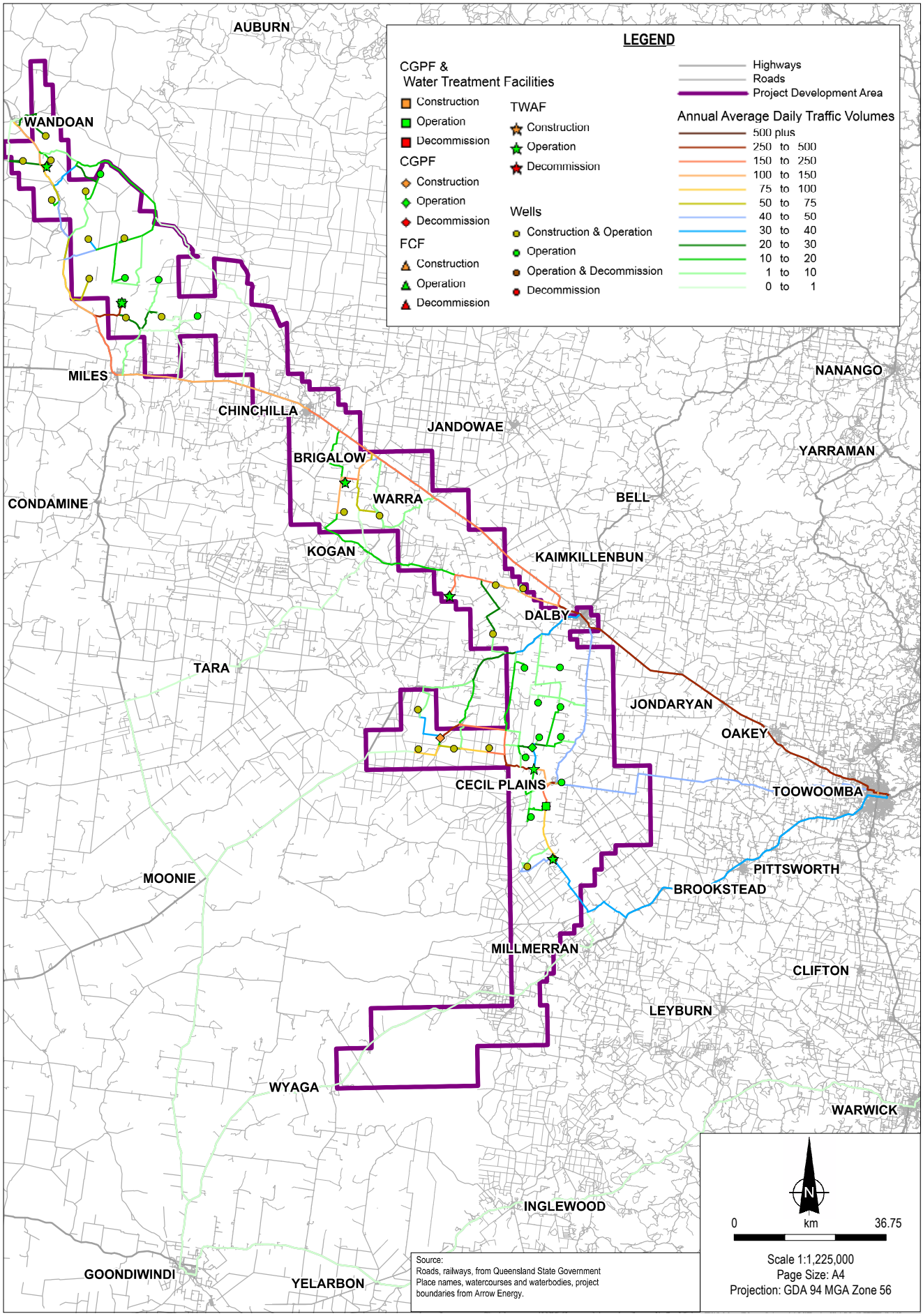

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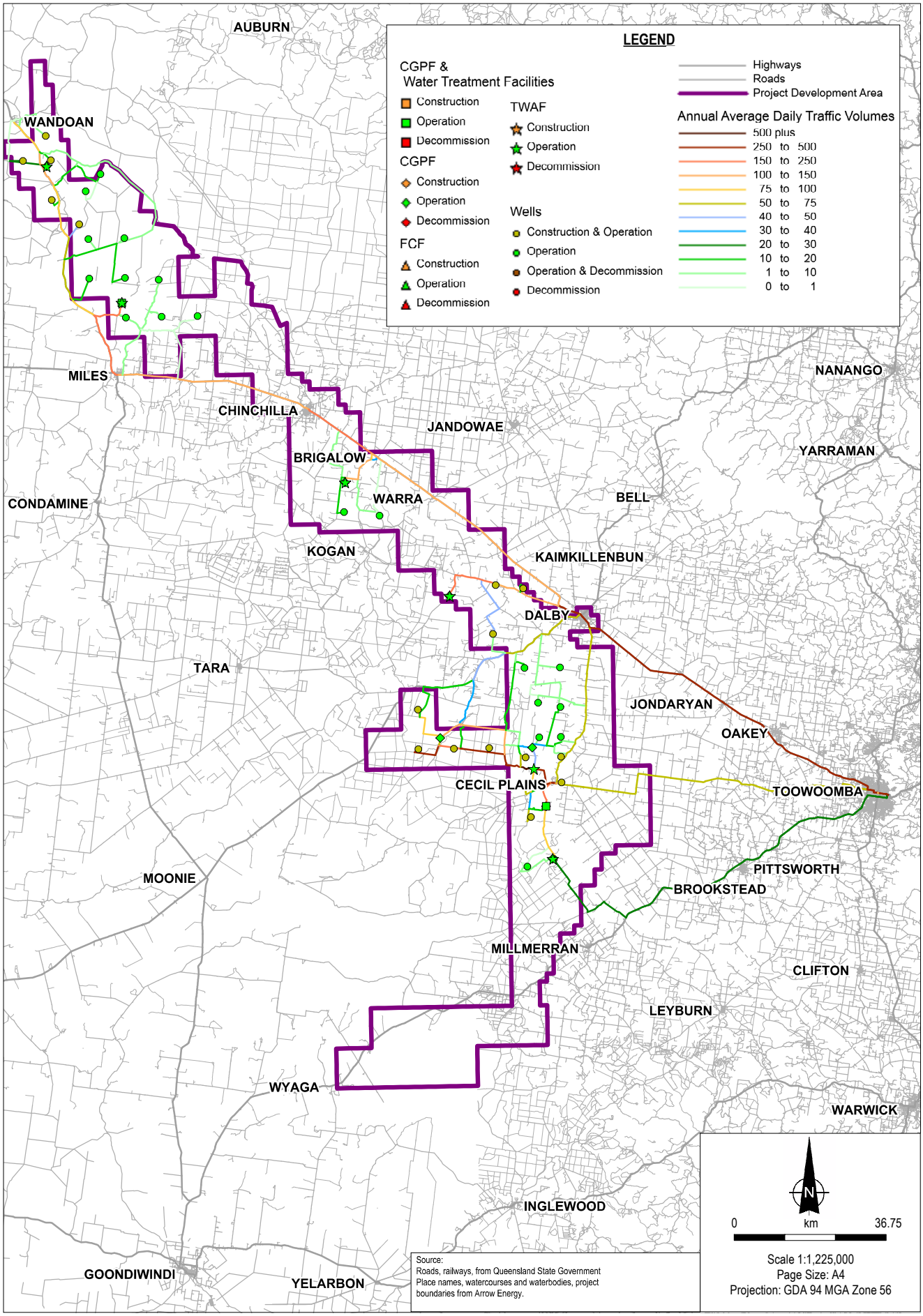

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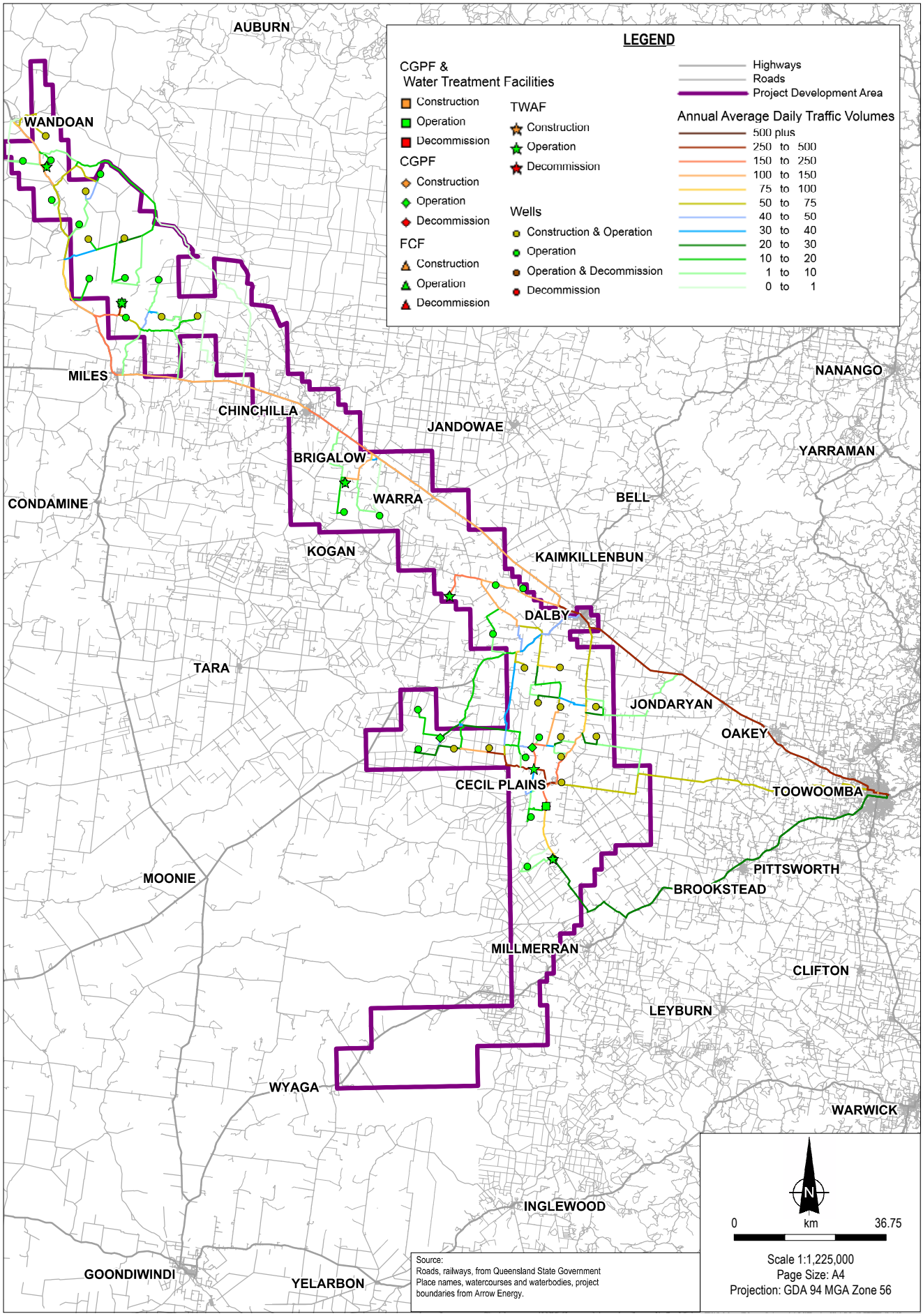

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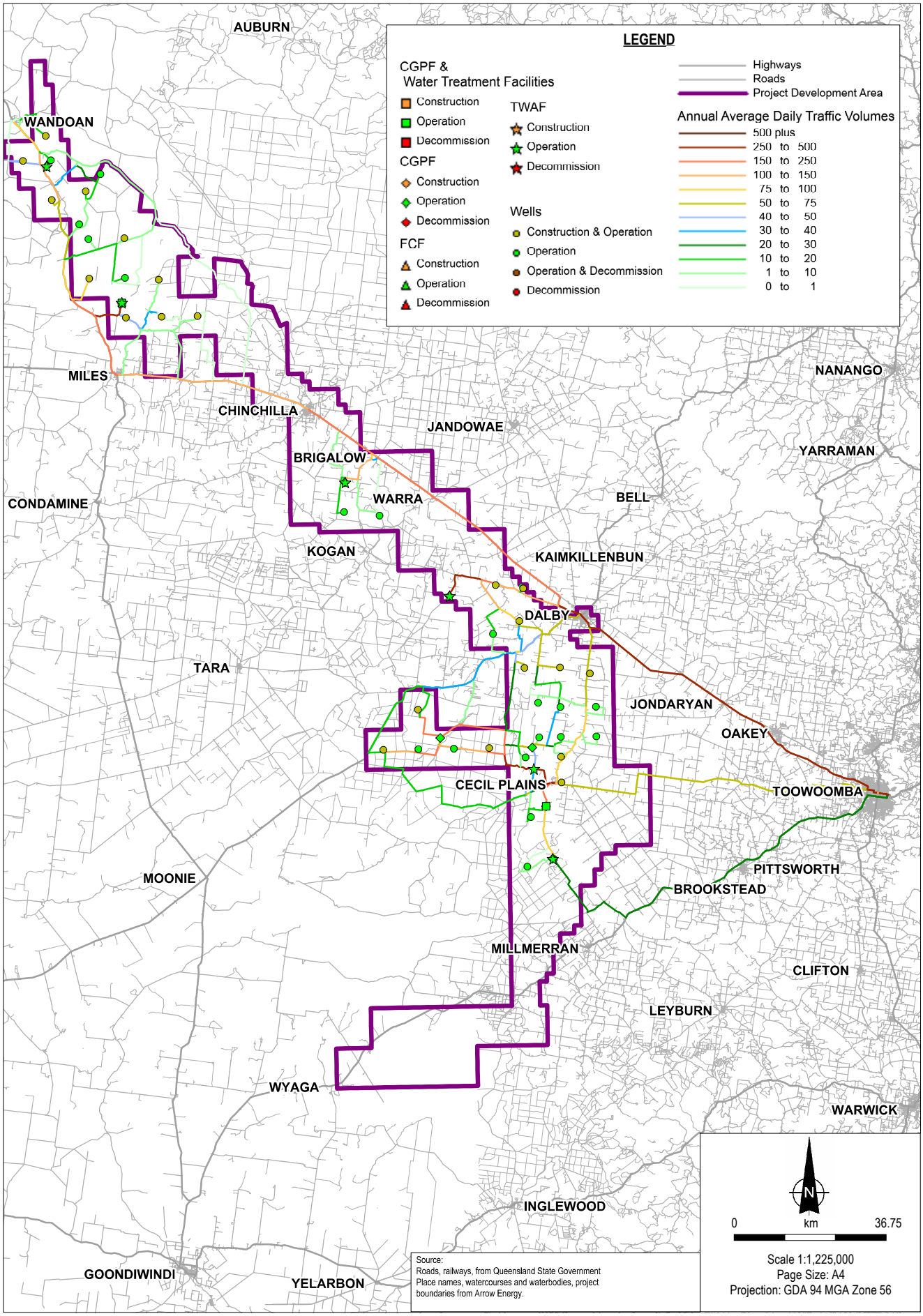

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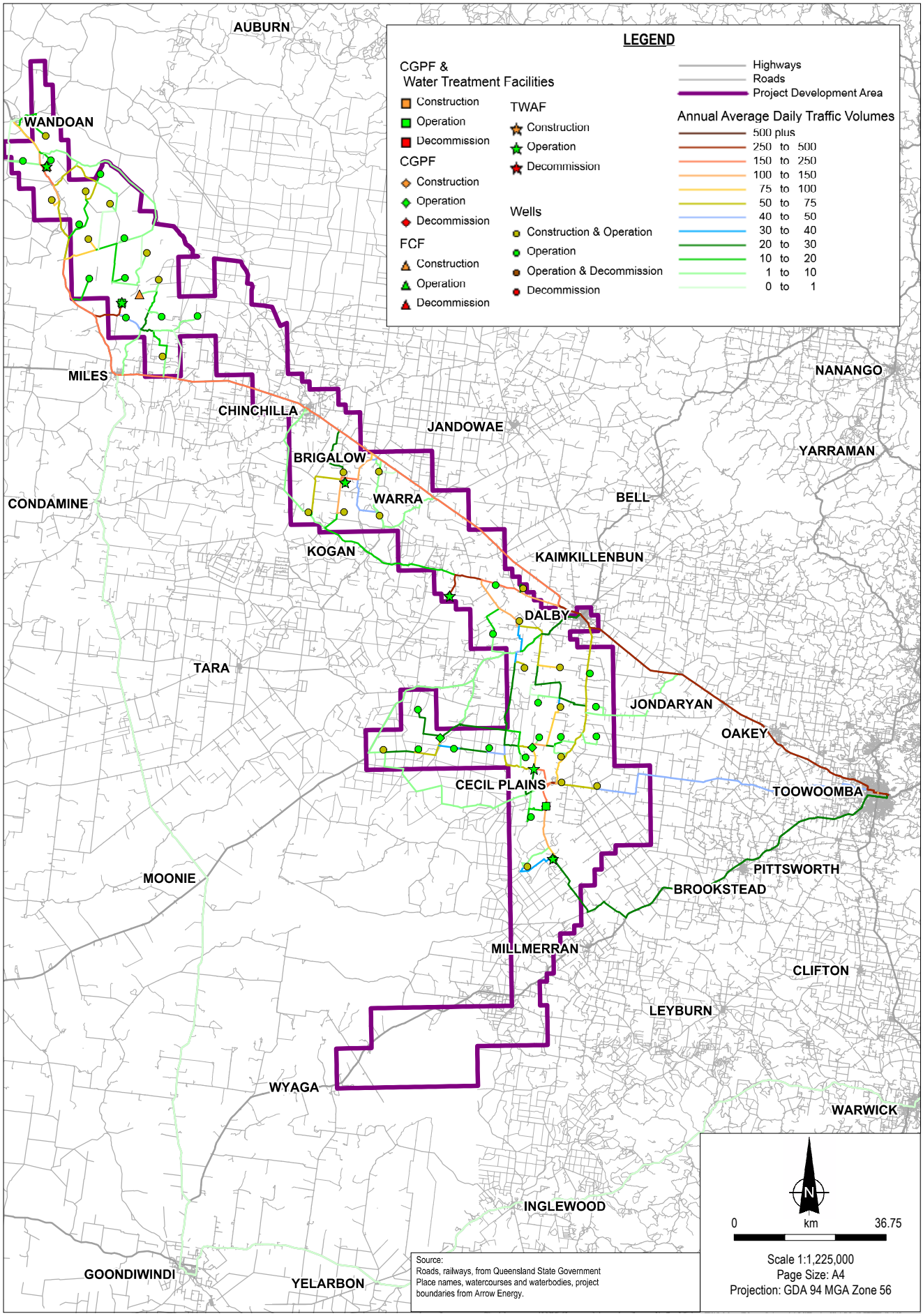

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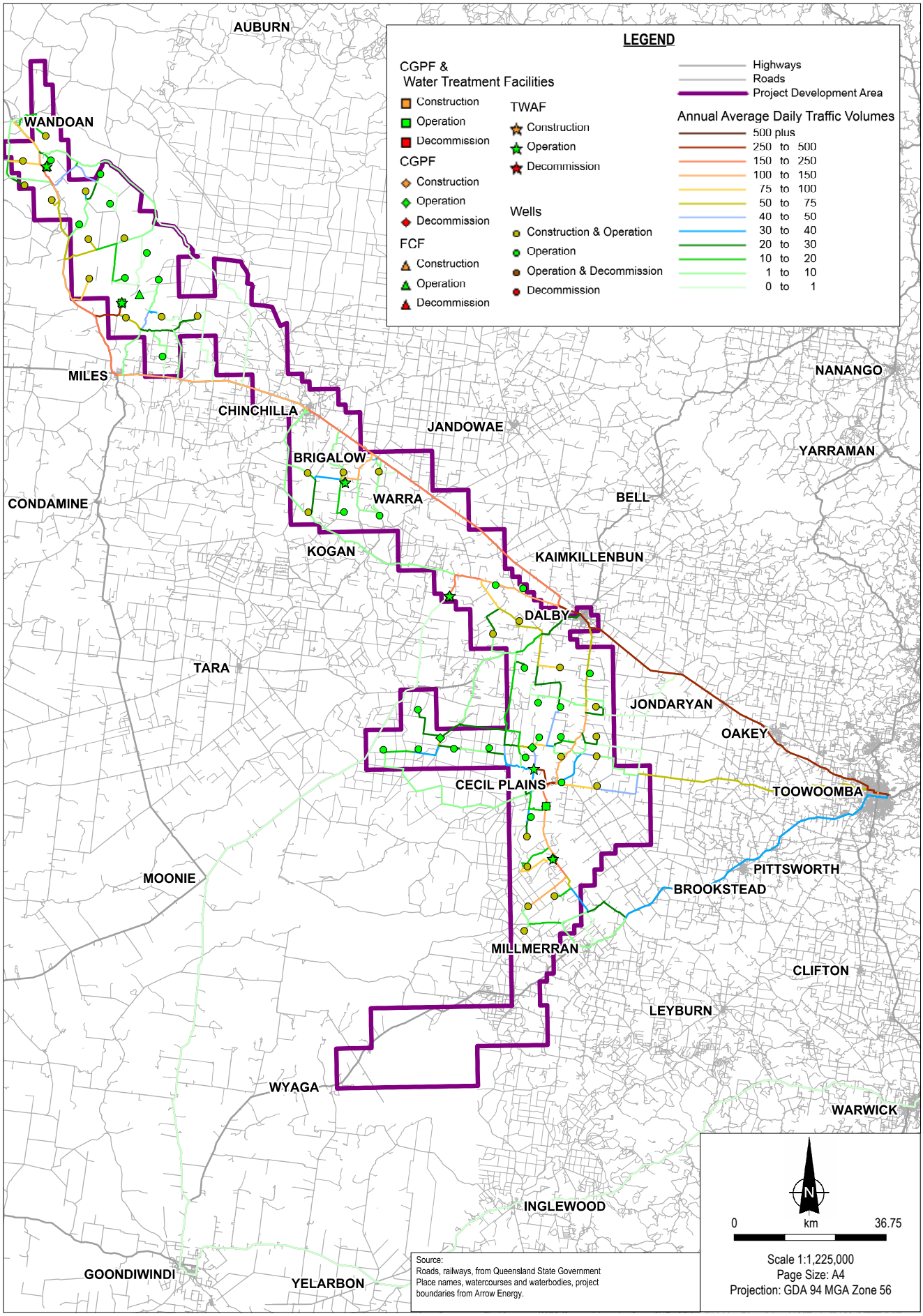

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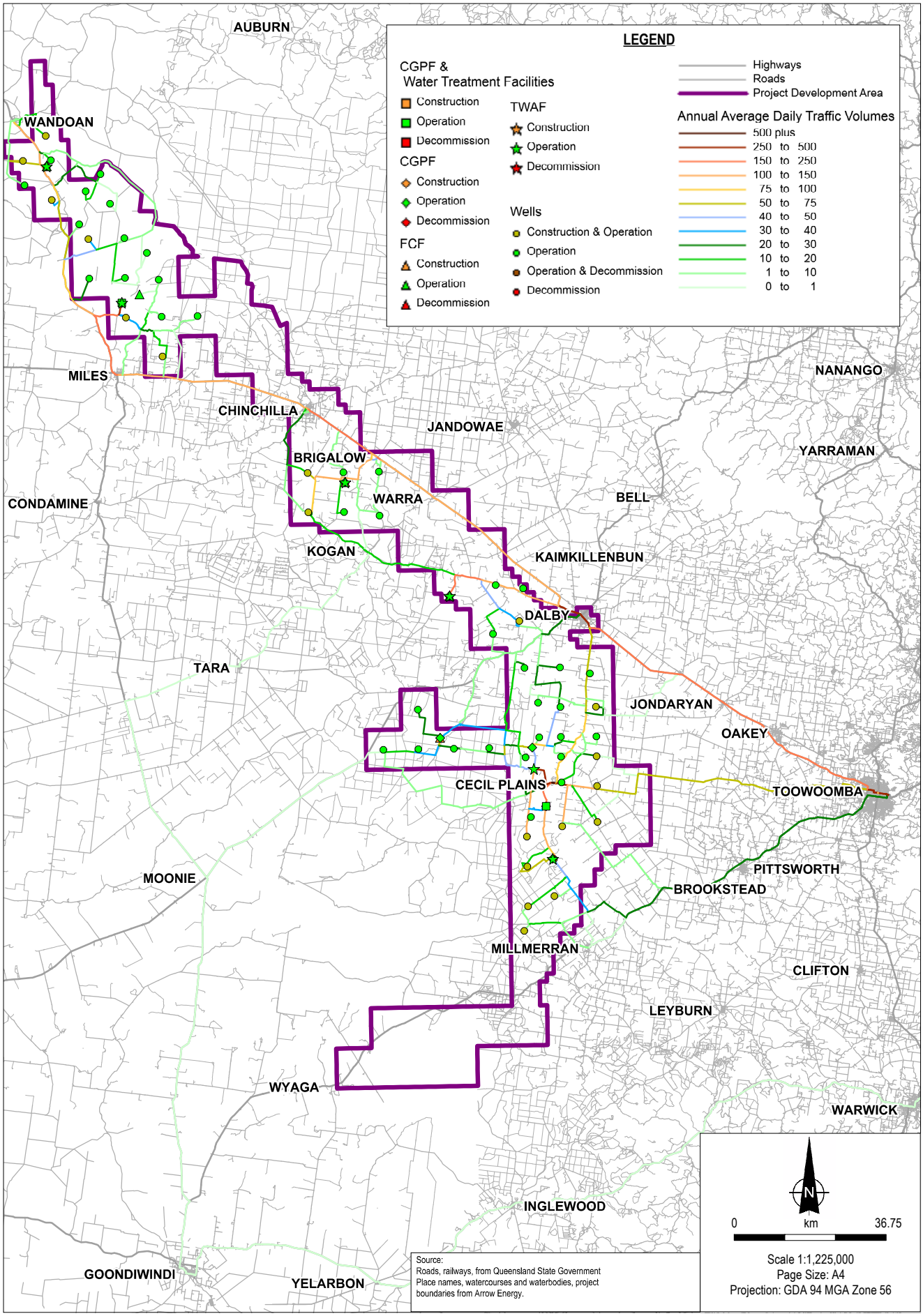

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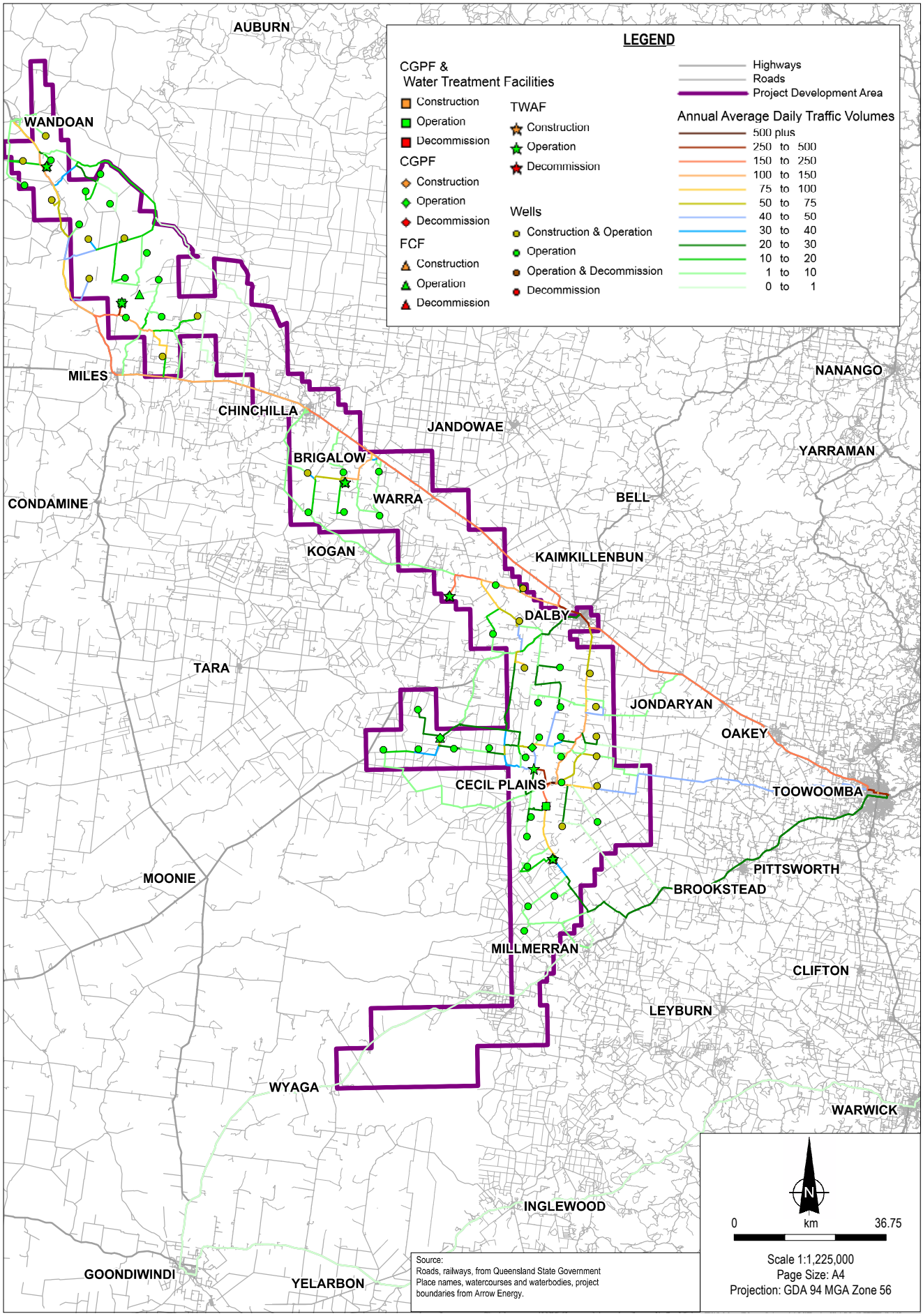

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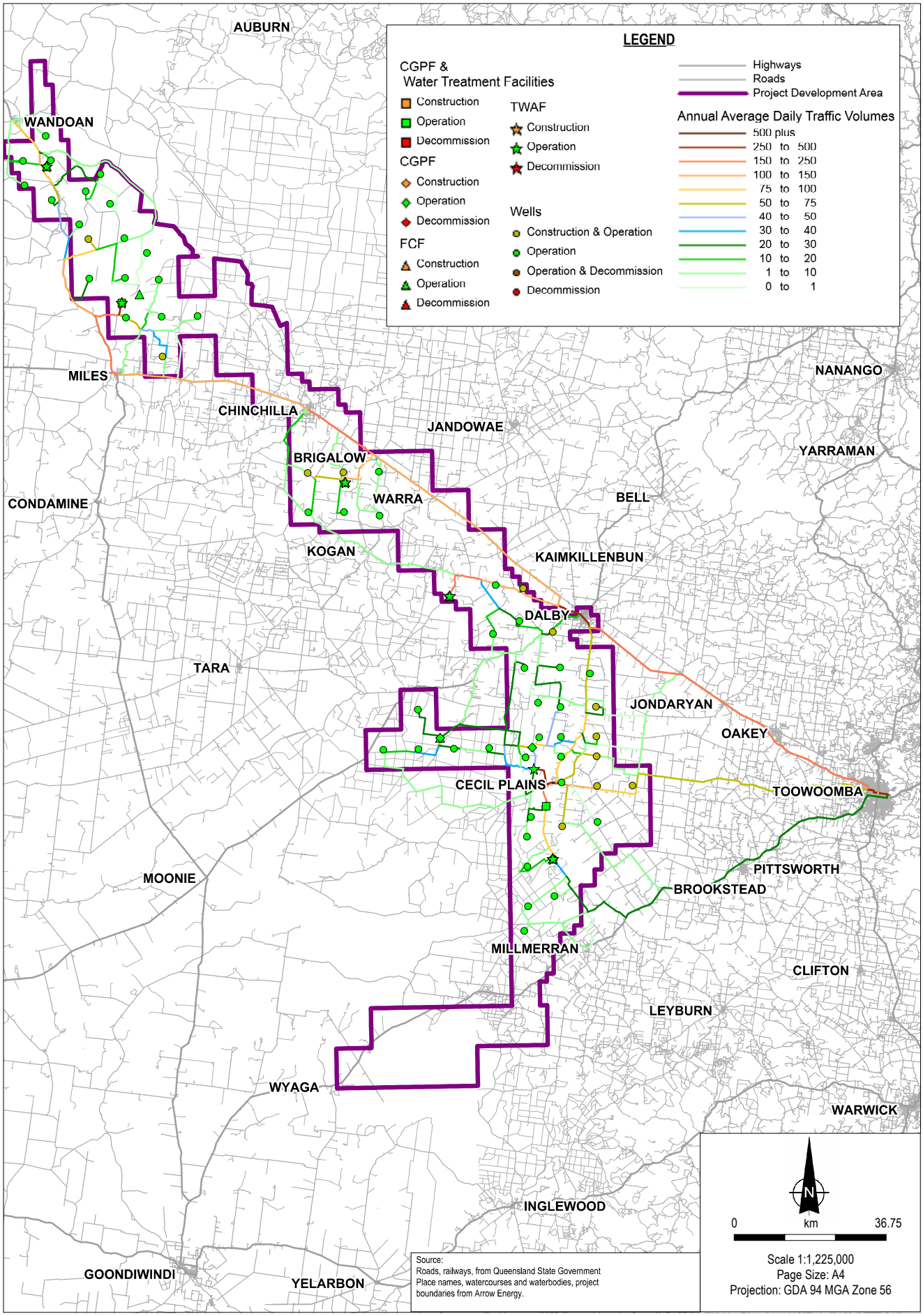

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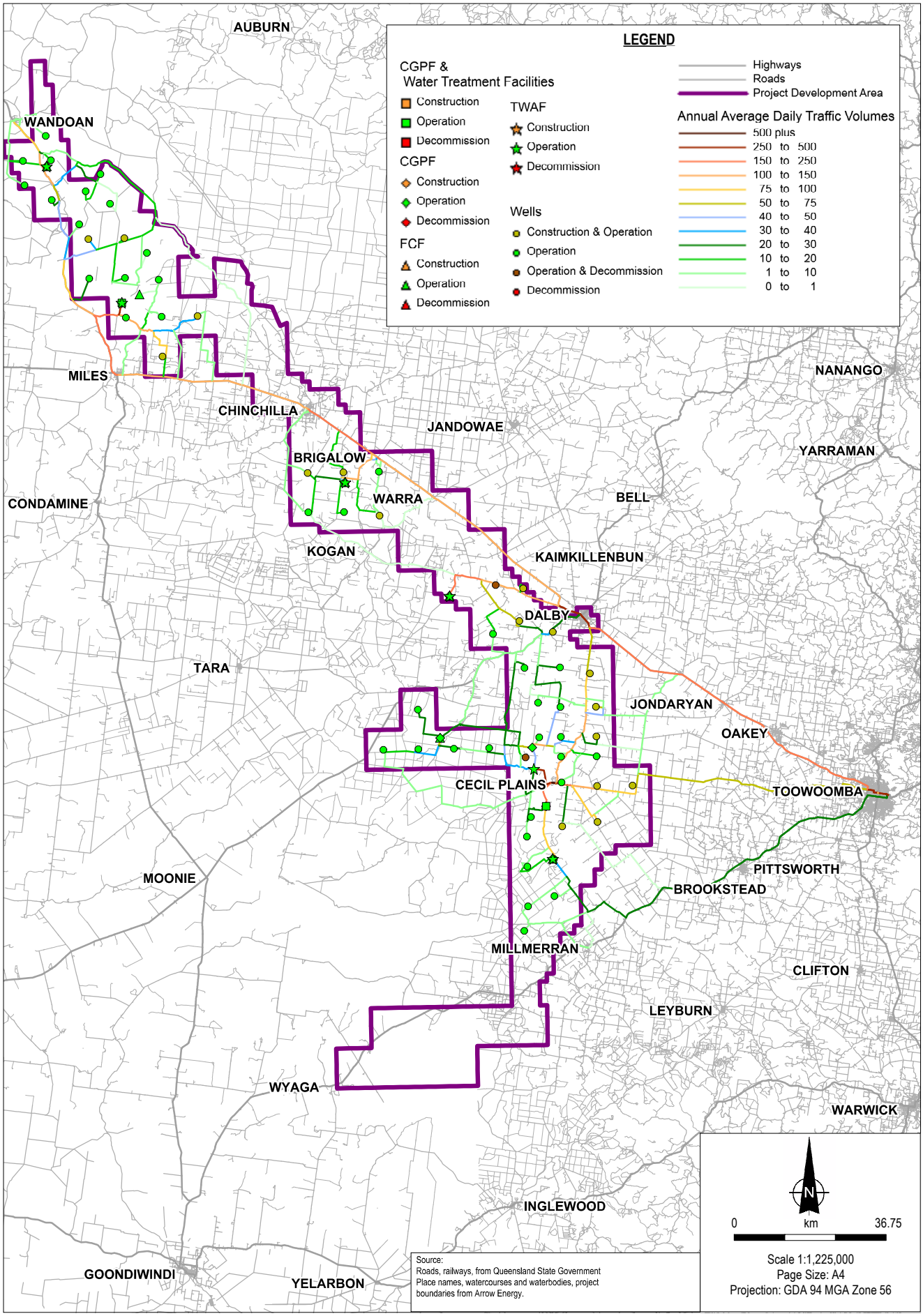

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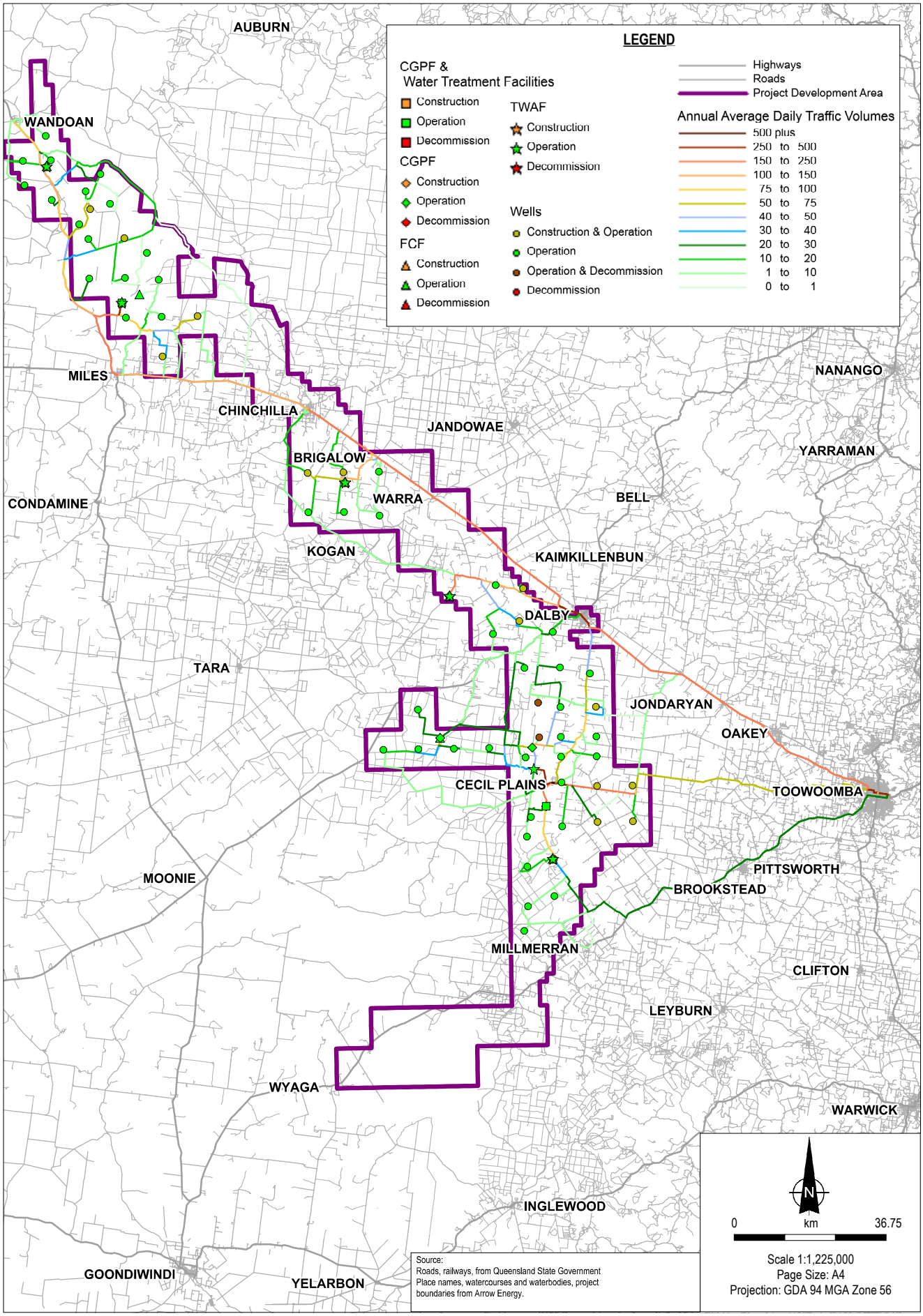

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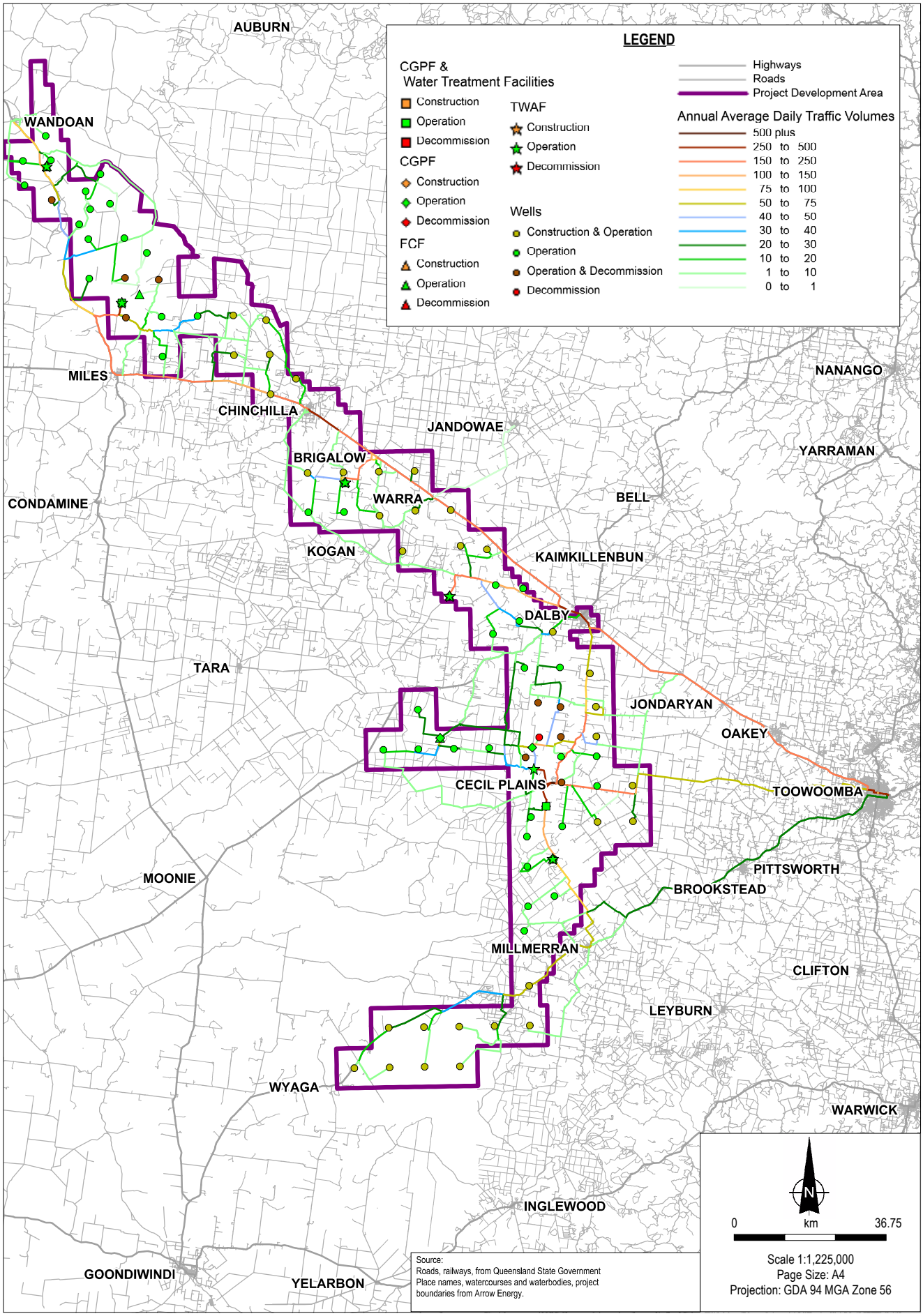

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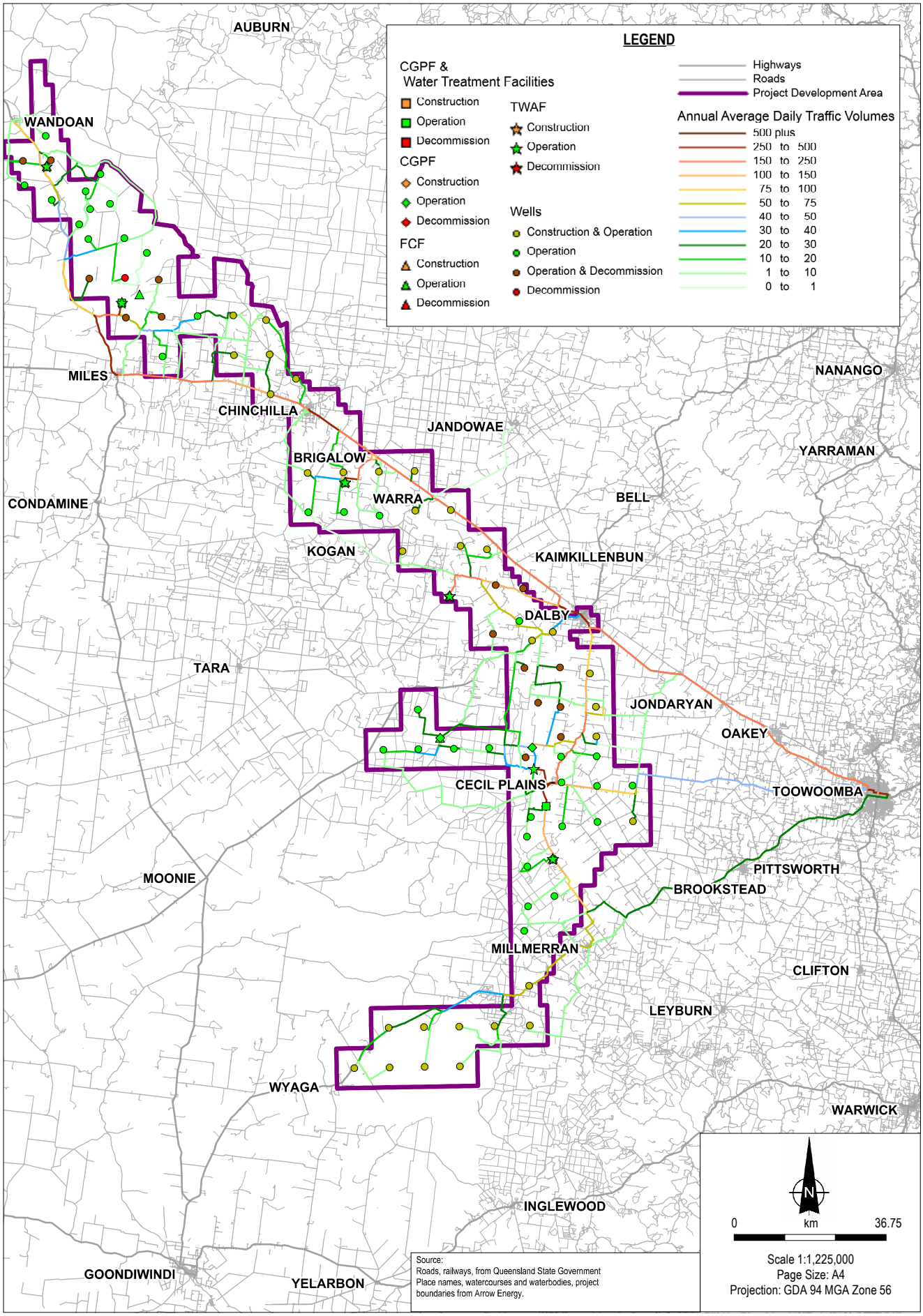

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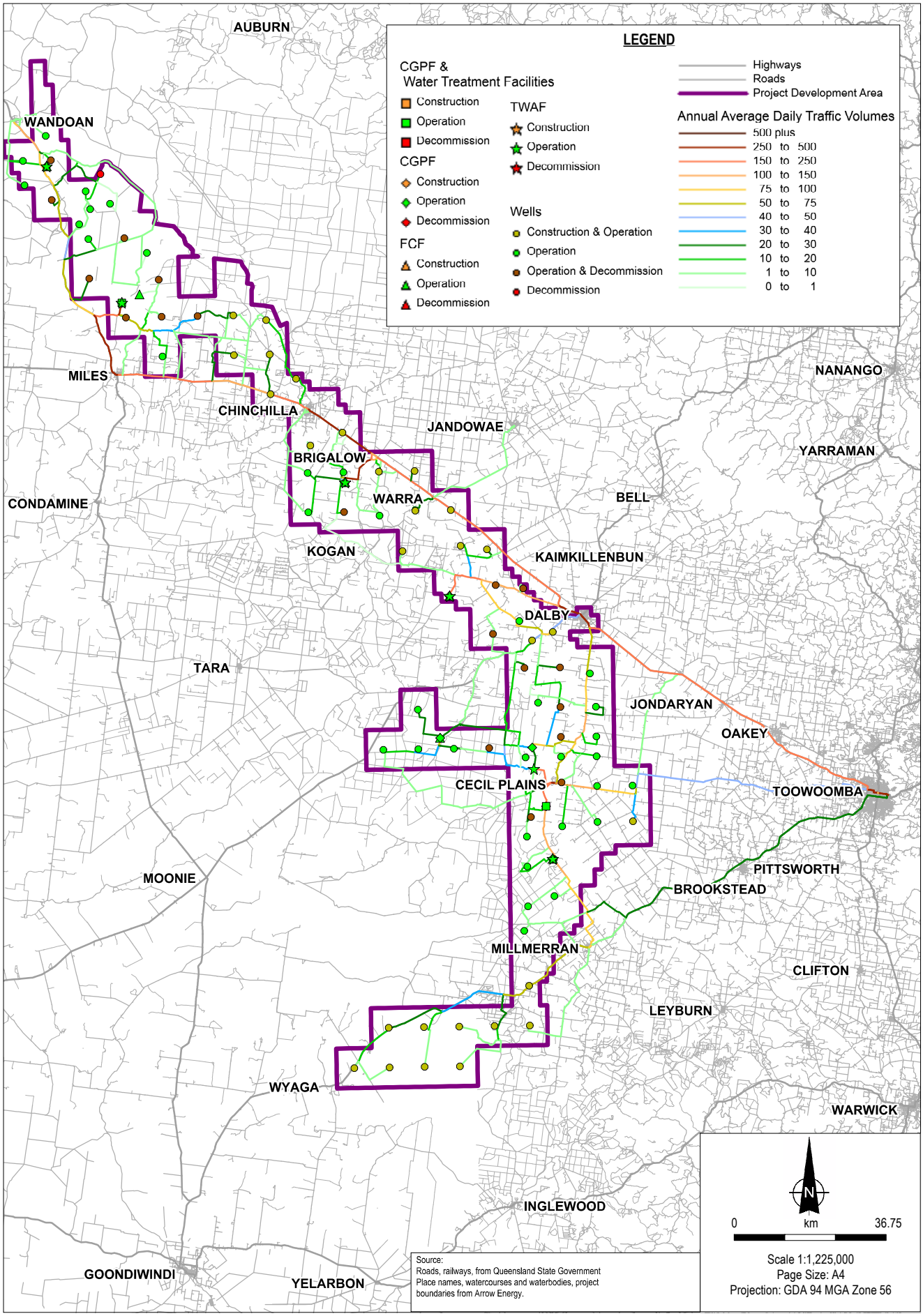

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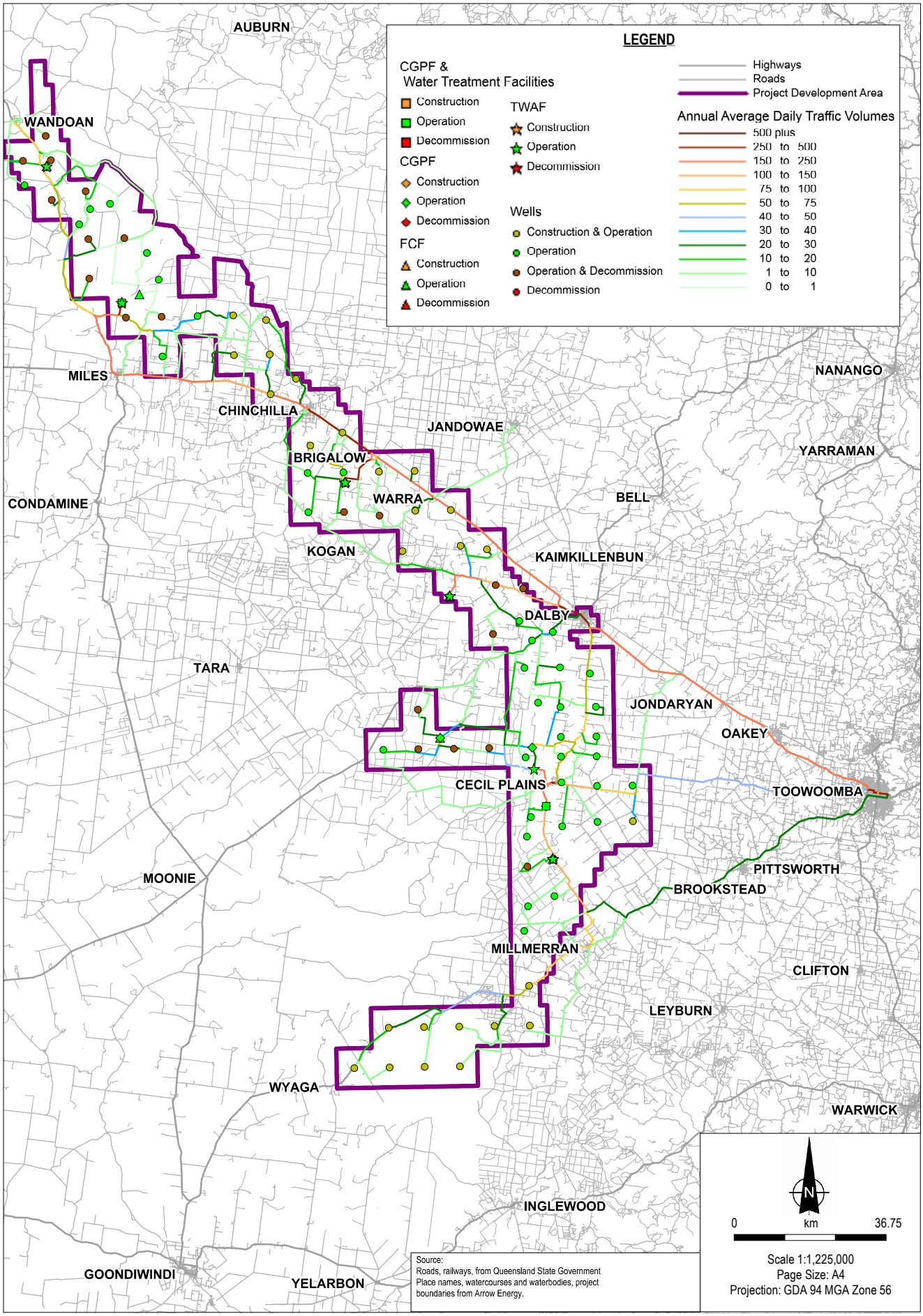

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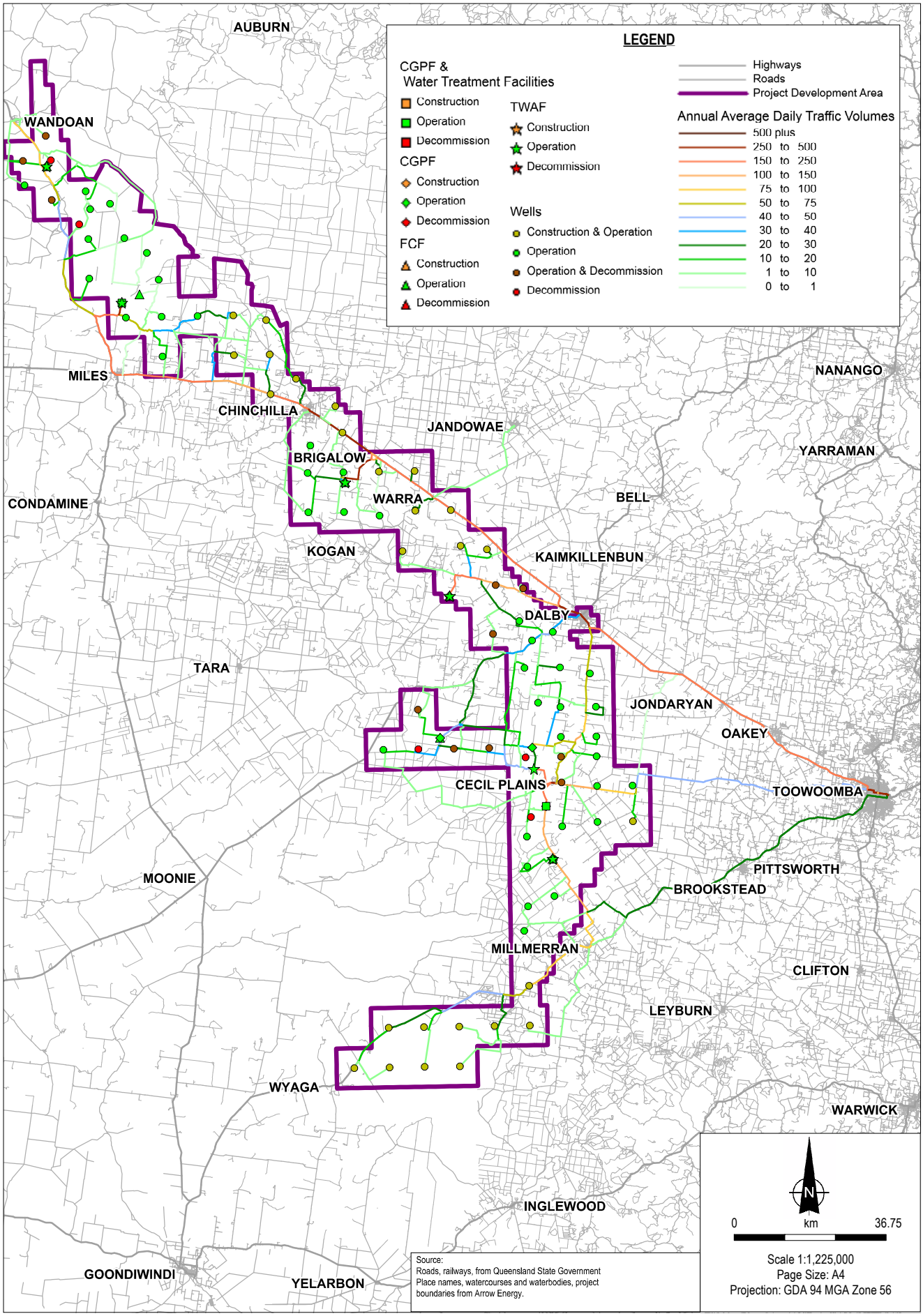
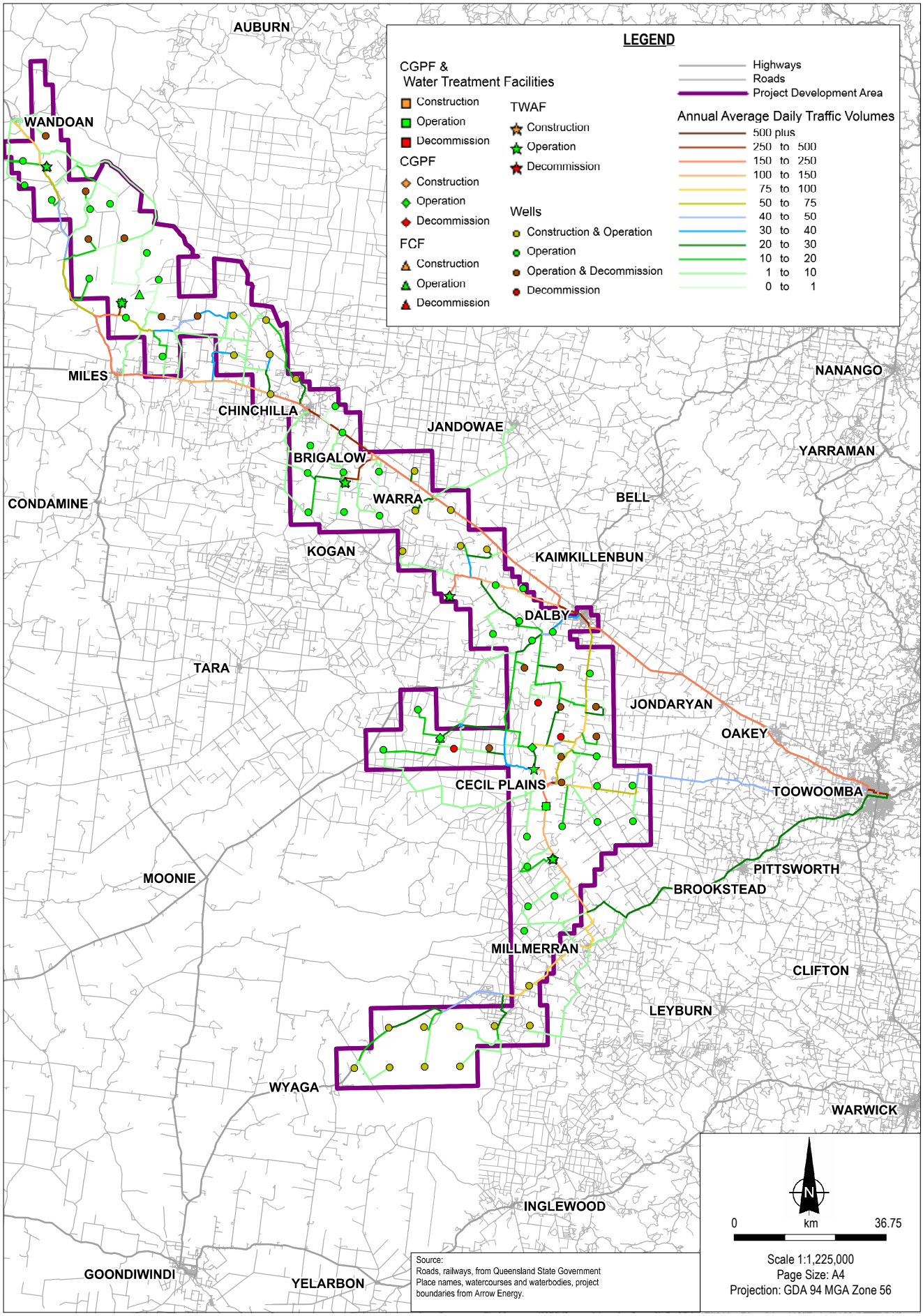
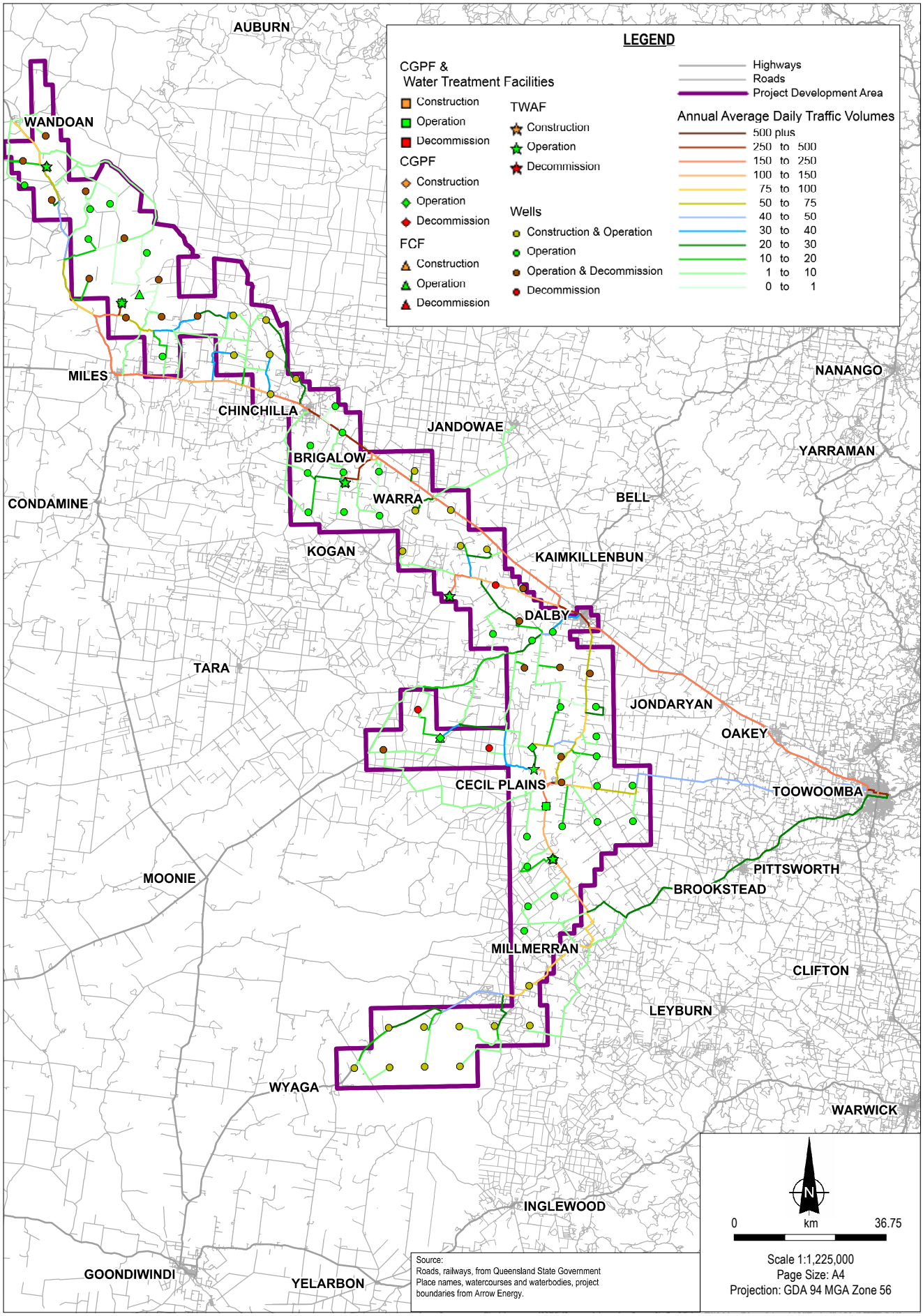


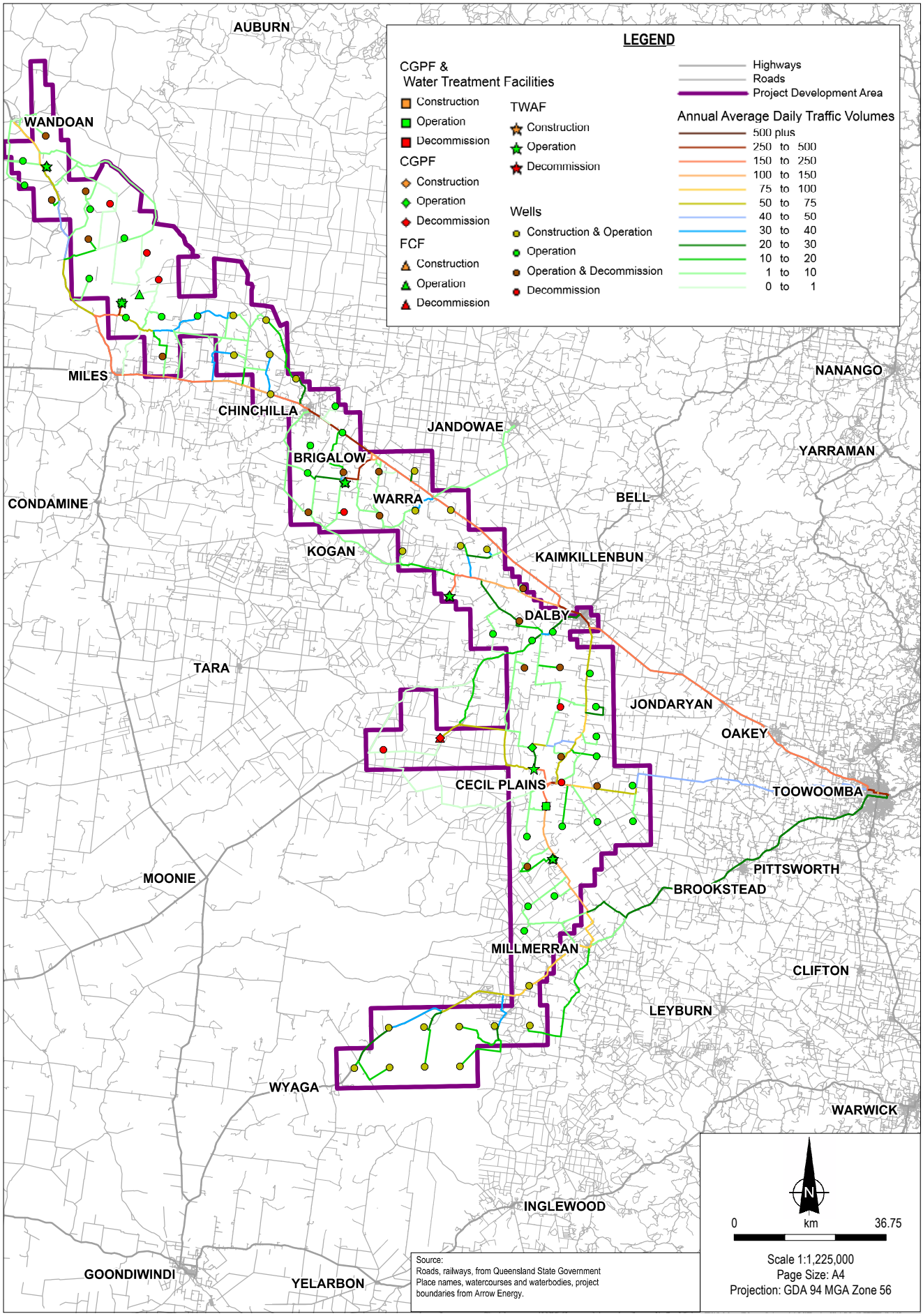
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.21 File Name: 6413_Figure C.21.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2034	Figure No: C.21



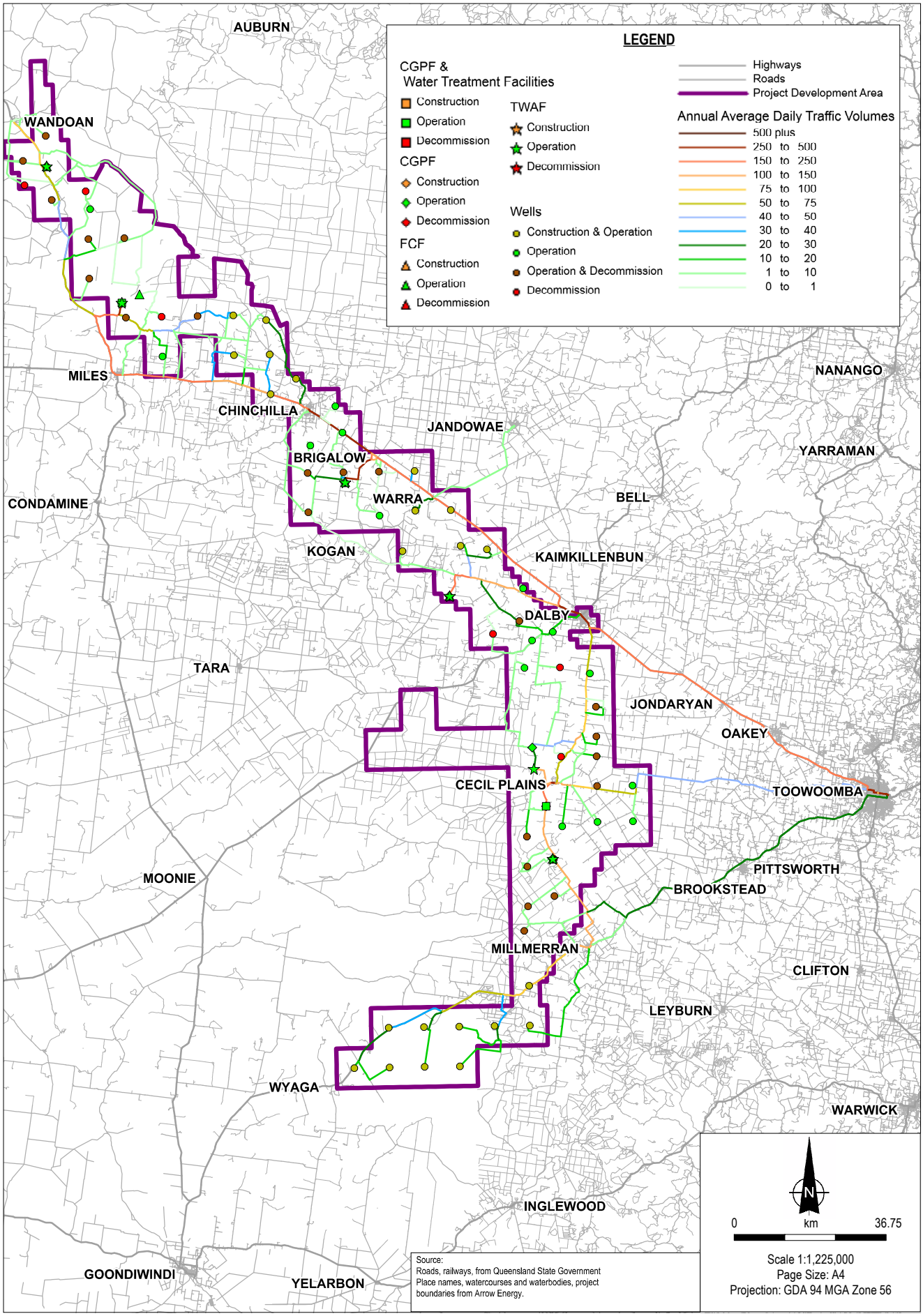
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.22 File Name: 6413_Figure C.22.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2035	Figure No: C.22



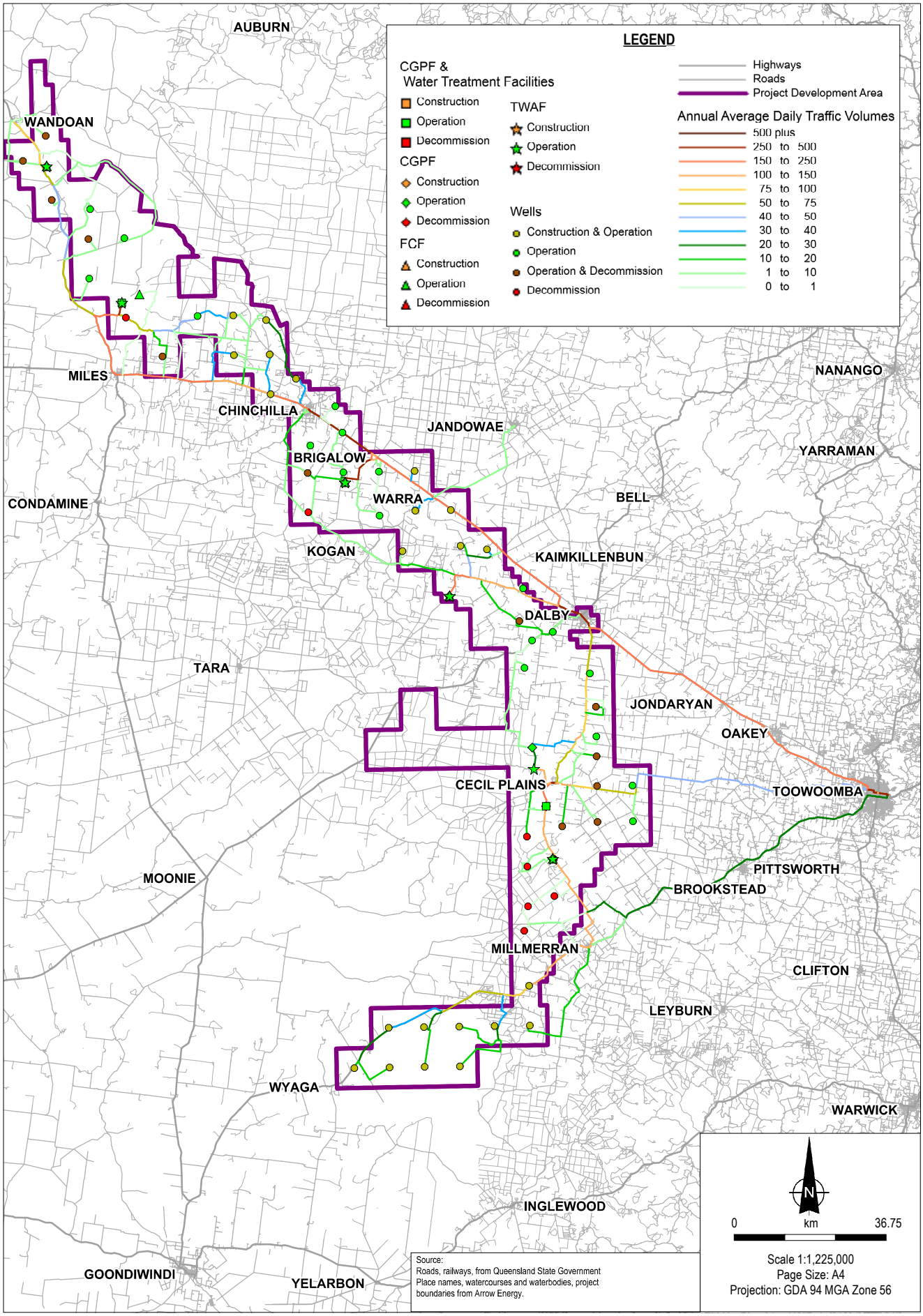
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.23 File Name: 6413_Figure C.23.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2036	Figure No: C.23



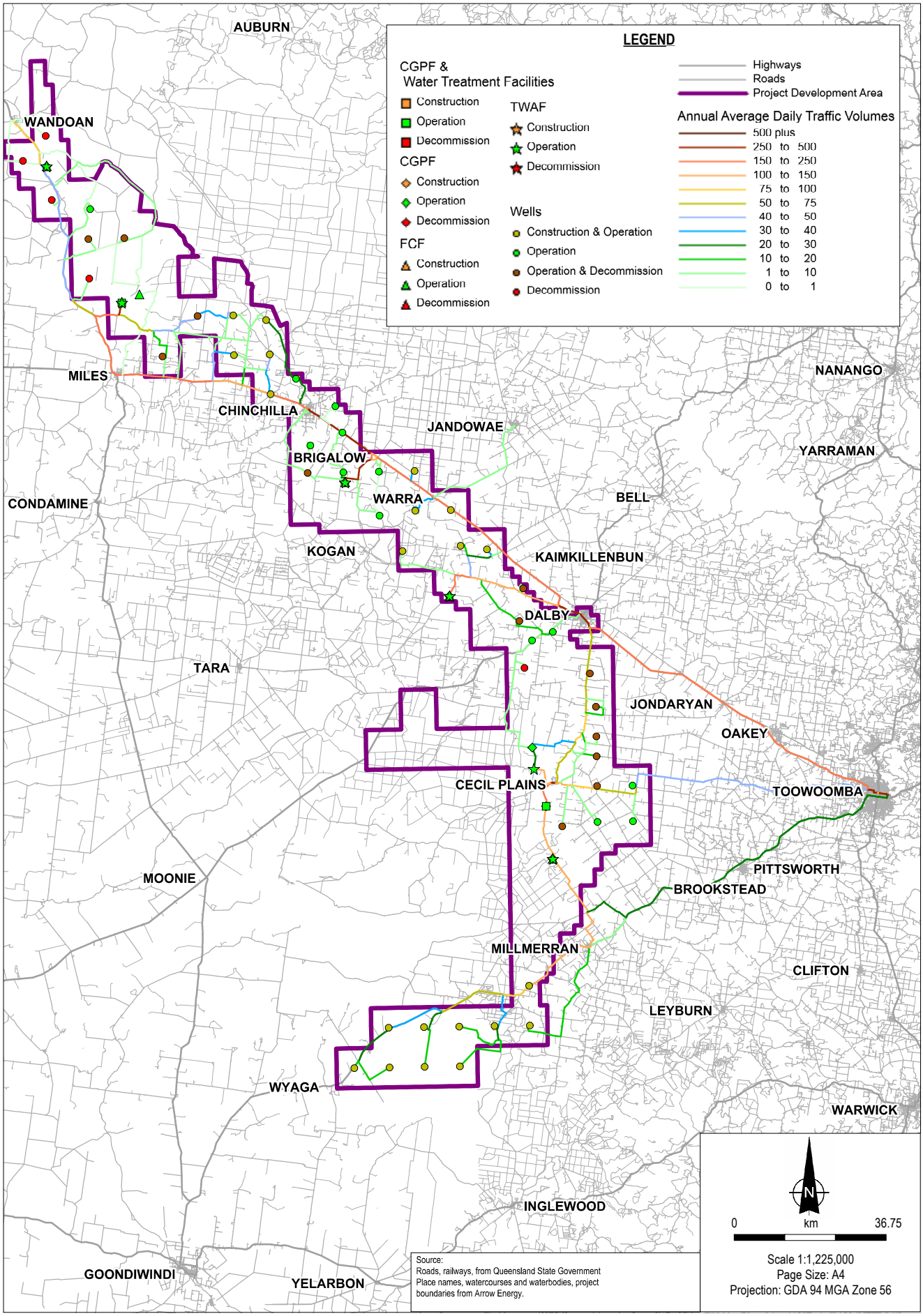
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.24 File Name: 6413_Figure C.24.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2037	Figure No: C.24



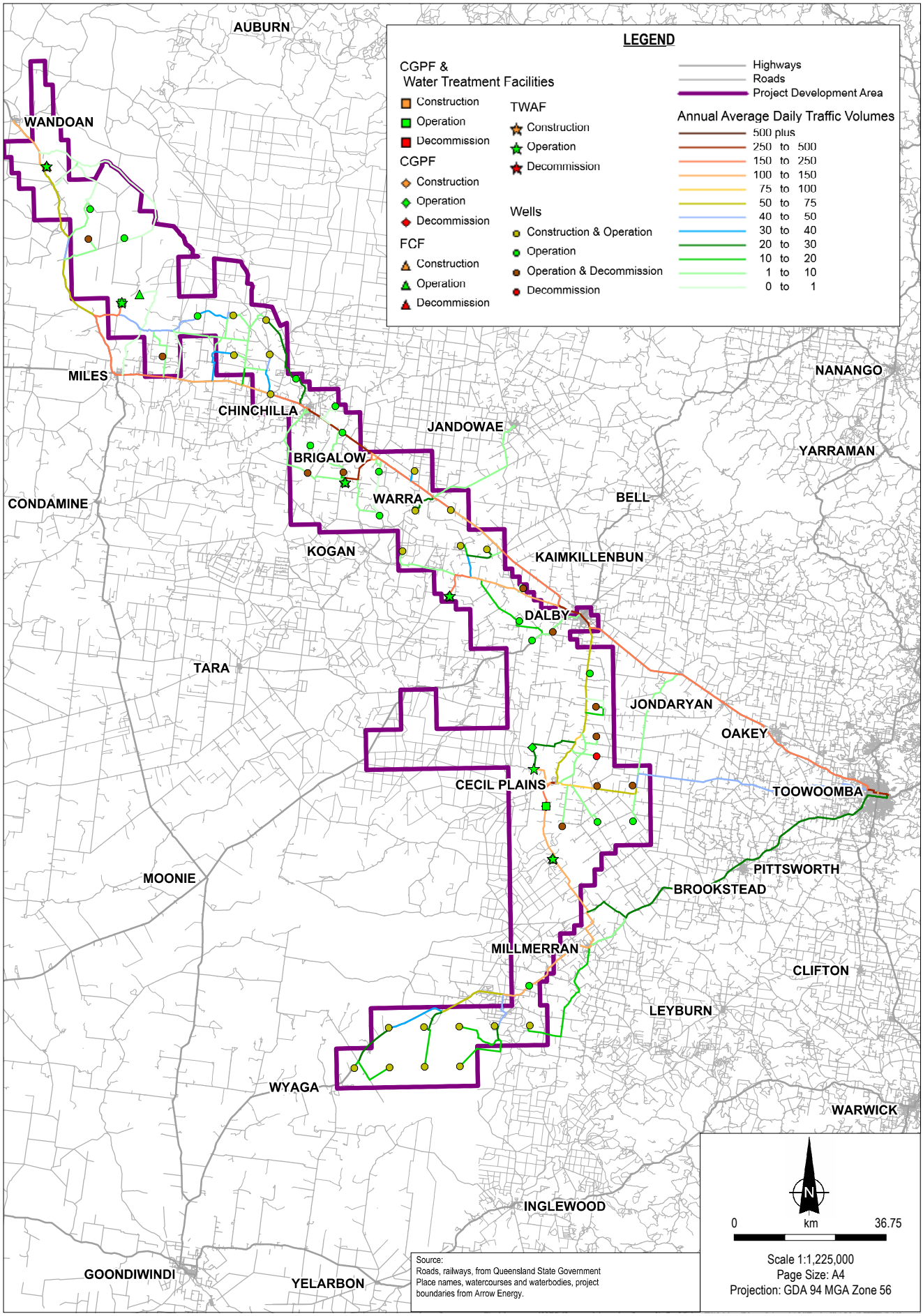
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.25 File Name: 6413_Figure C.25.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2038	Figure No: C.25



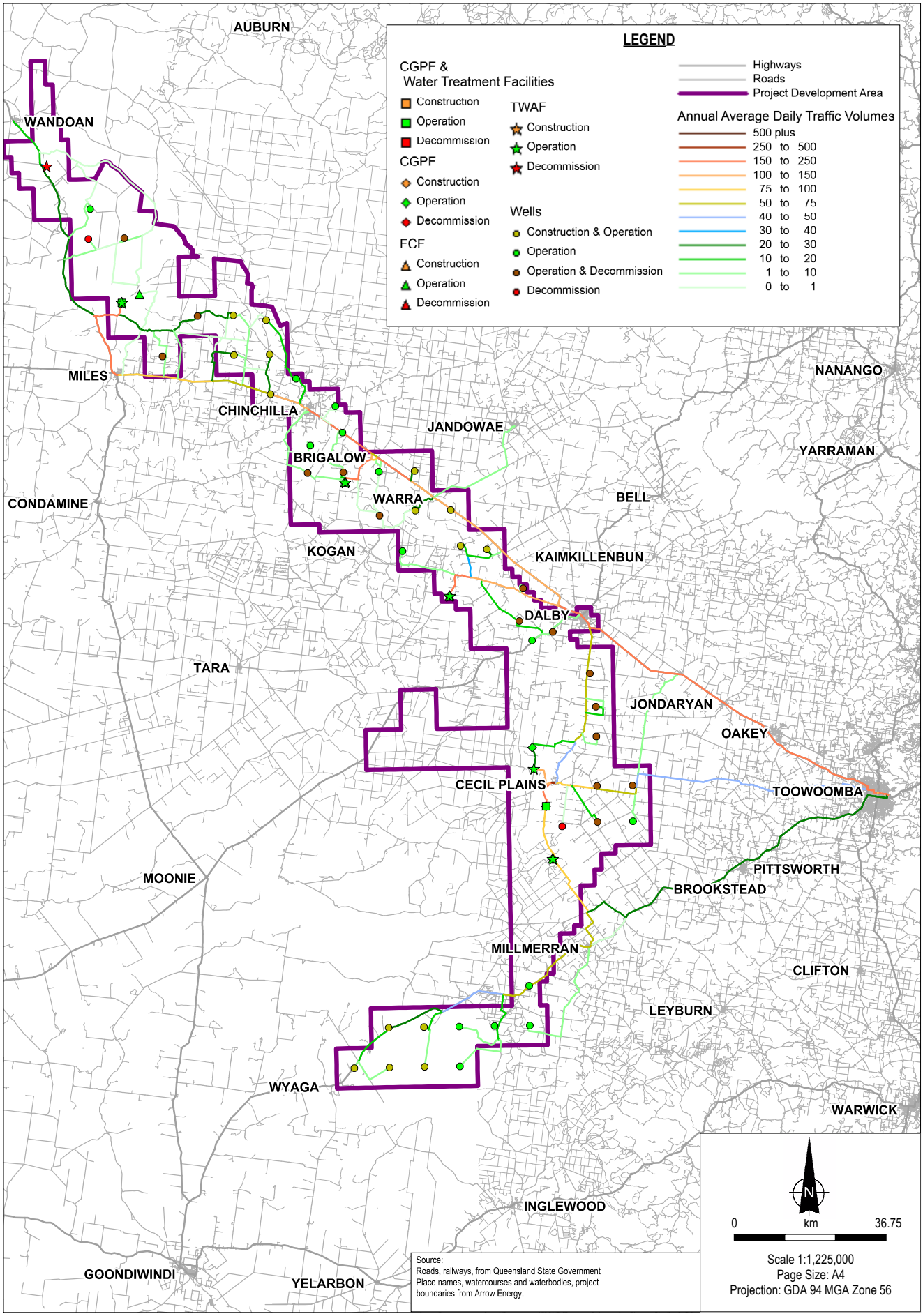
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.26 File Name: 6413_Figure C.26.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2039	Figure No: C.26



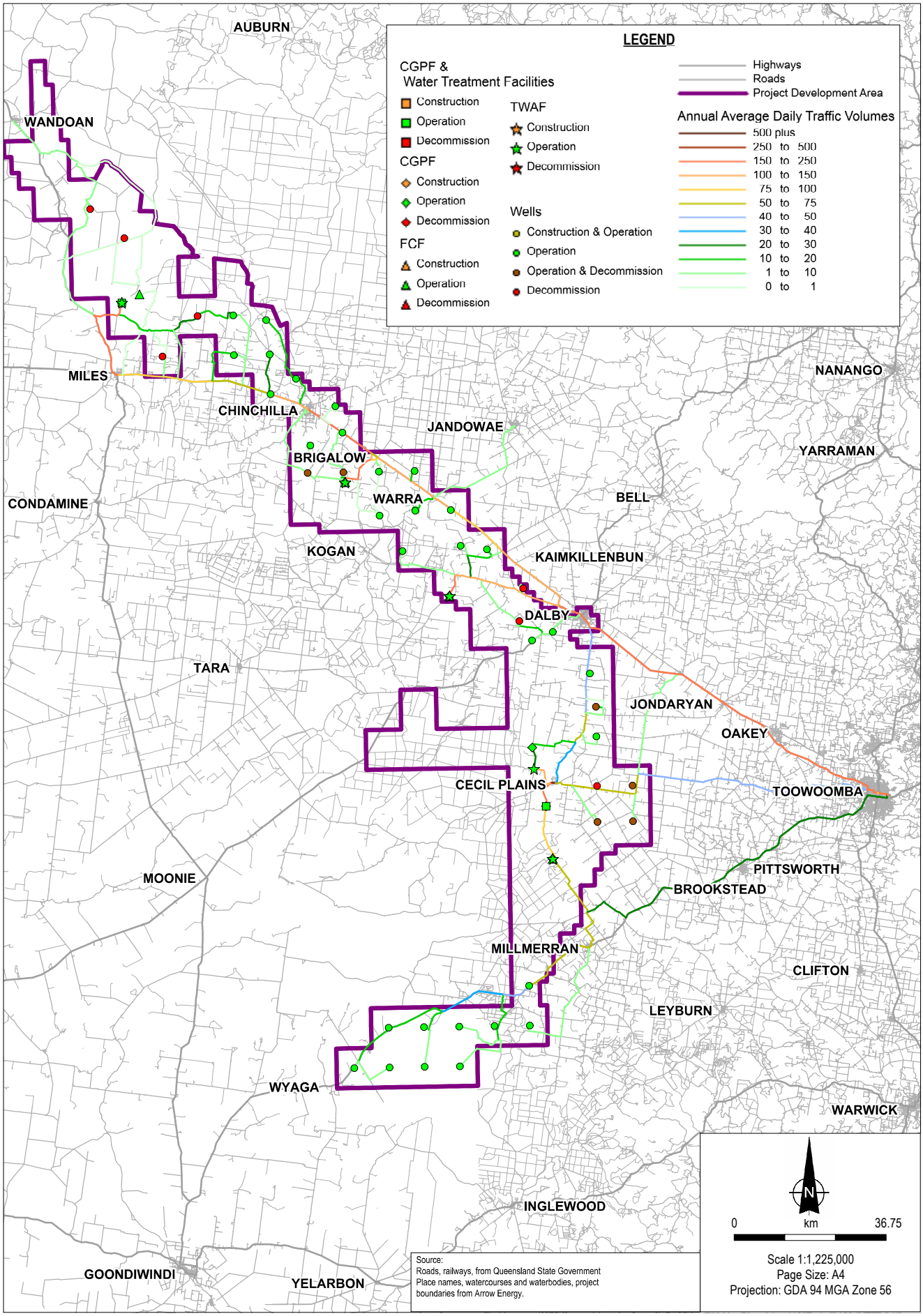
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.27 File Name: 6413_Figure C.27.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2040	Figure No: C.27



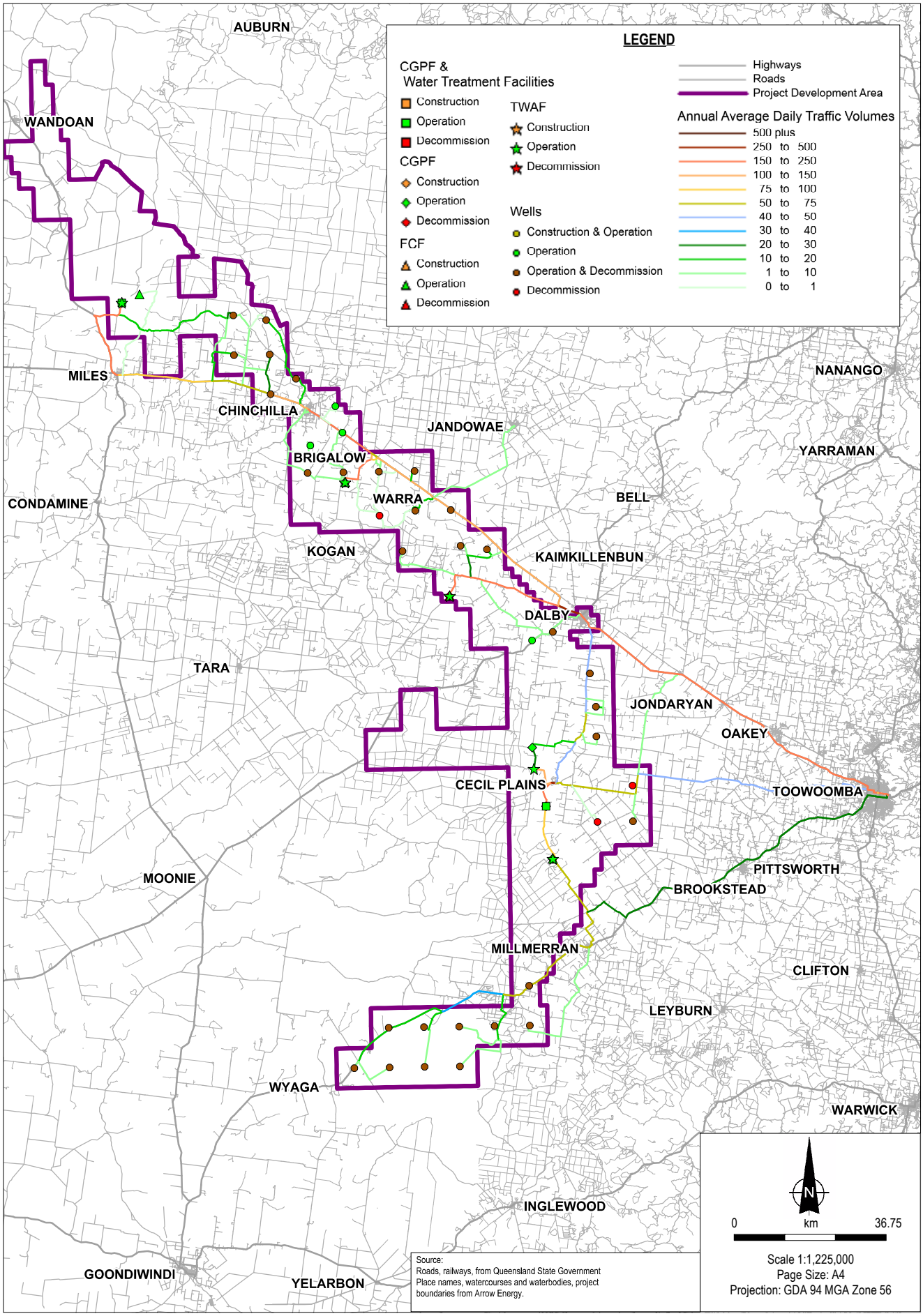
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.28 File Name: 6413_Figure C.28.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2041	Figure No: C.28



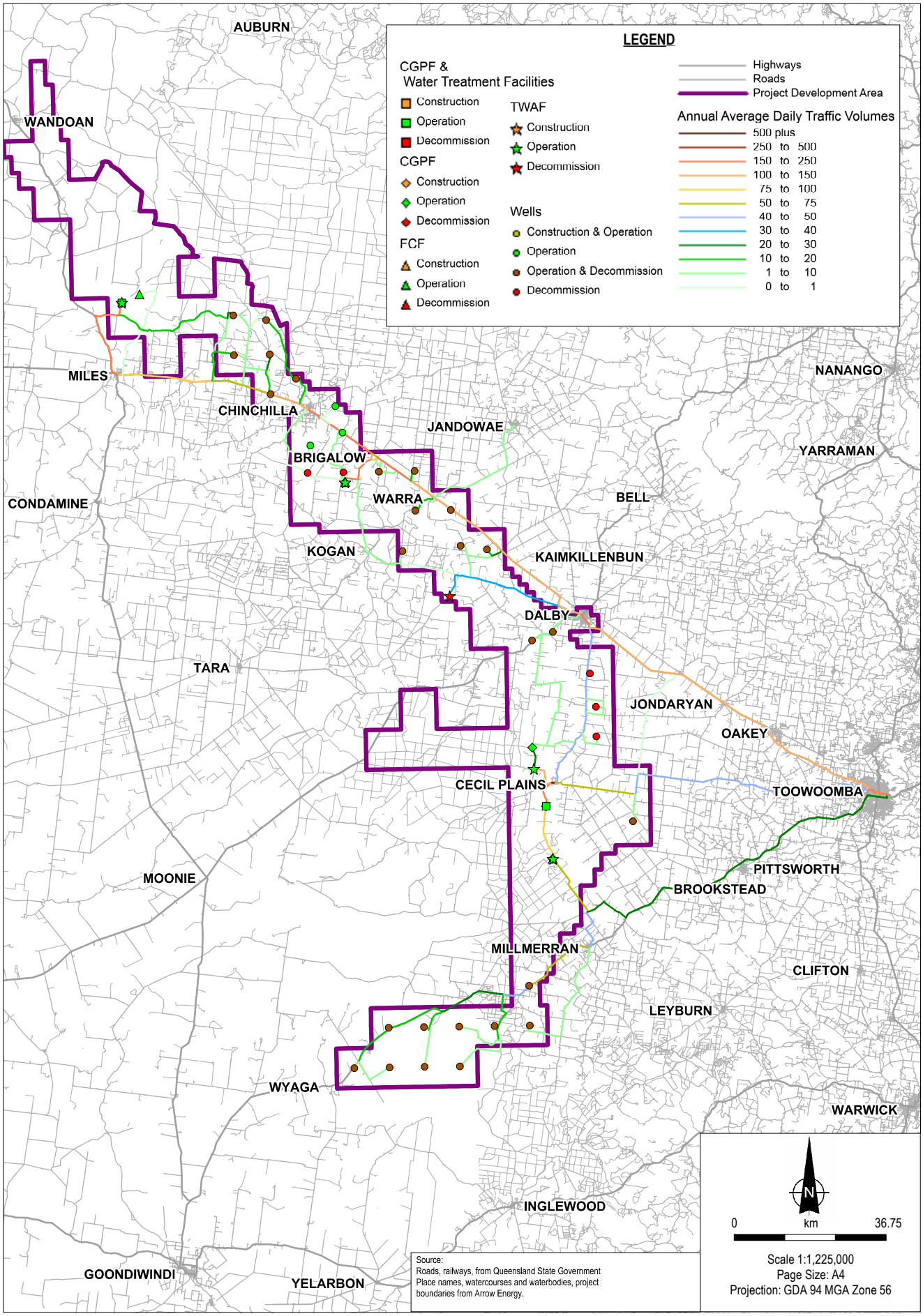
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.29 File Name: 6413_Figure C.29.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2042	Figure No: C.29



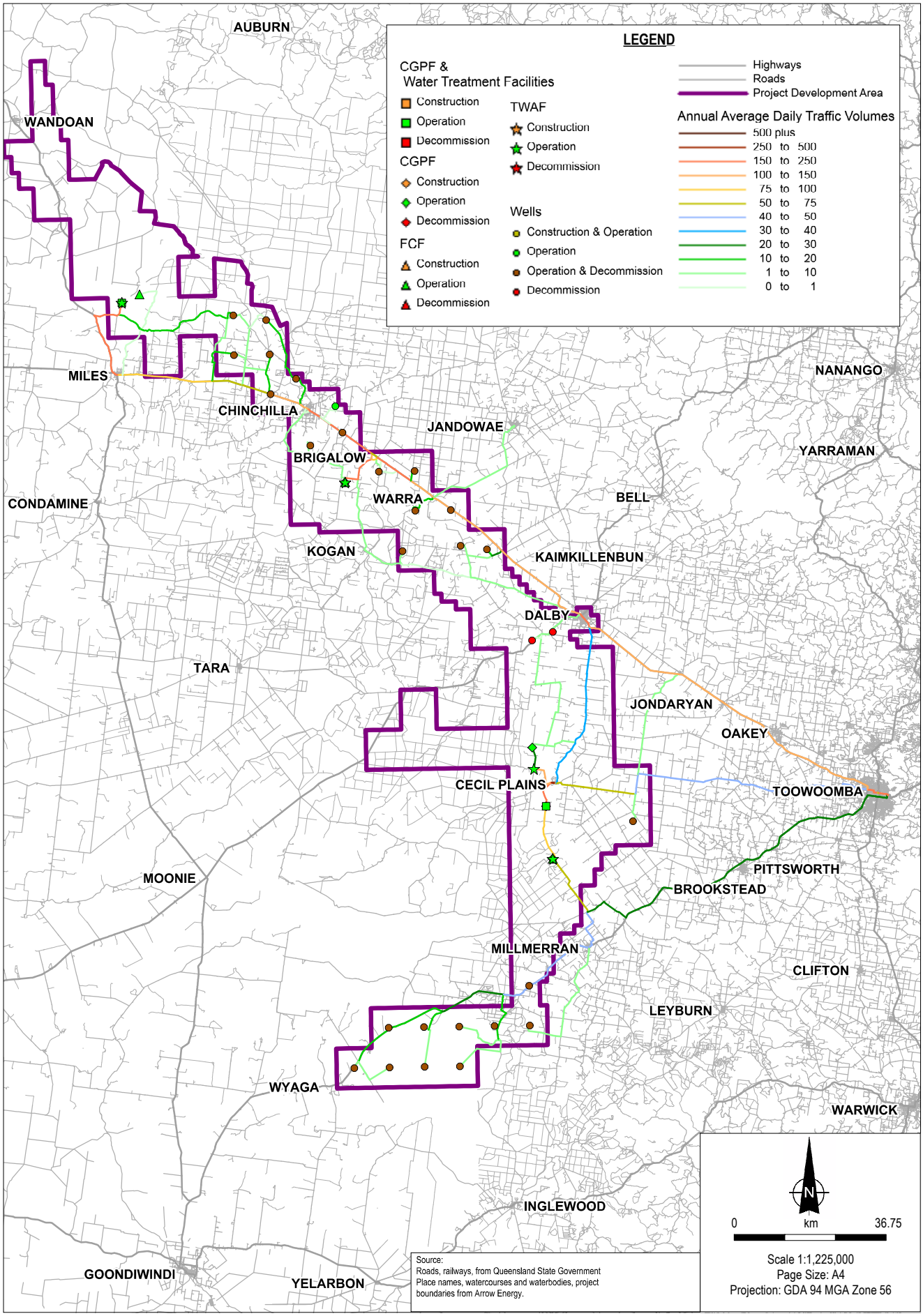
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.30 File Name: 6413_Figure C.30.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2043	Figure No: C.30



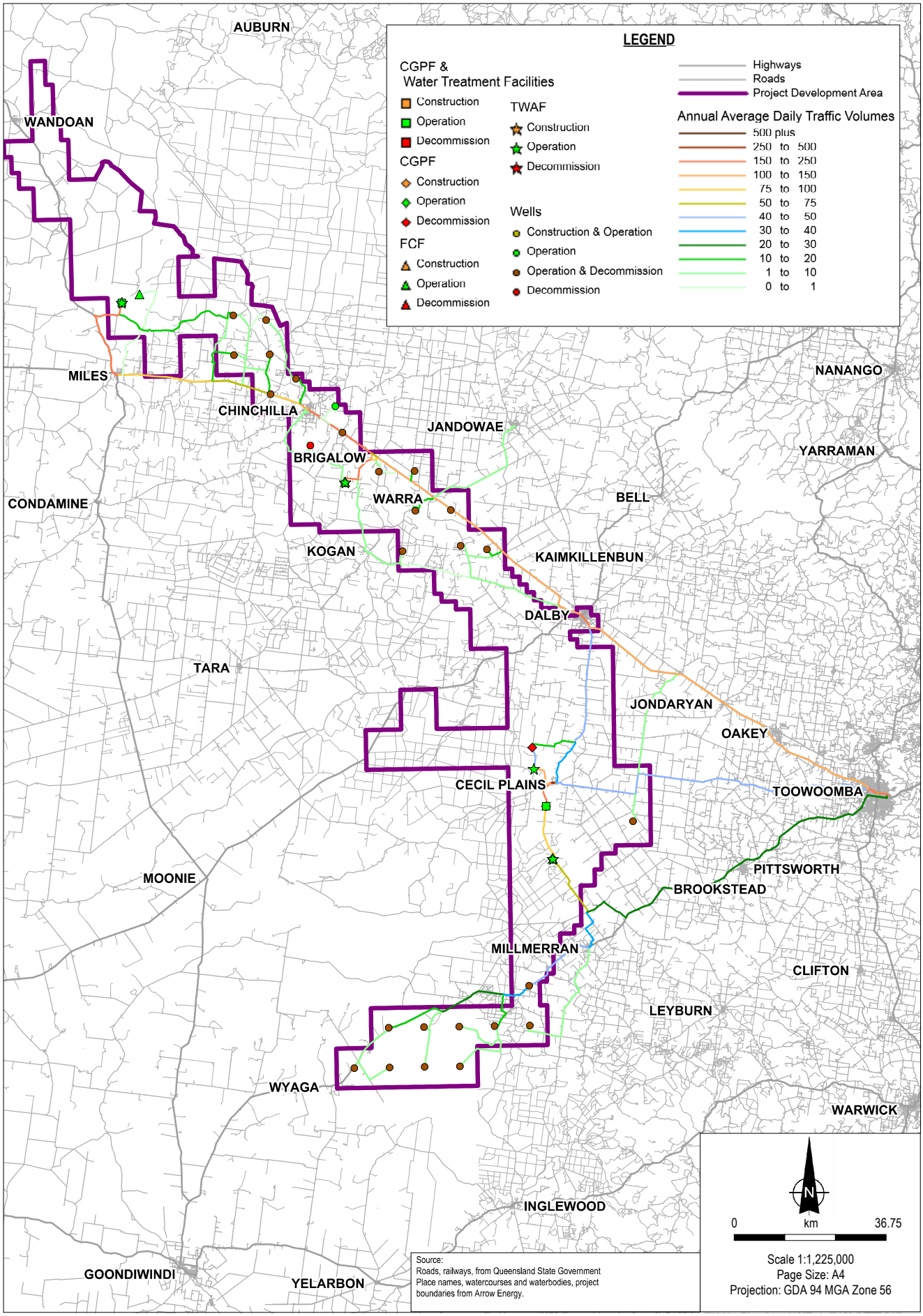
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.31 File Name: 6413_Figure C.31.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2044	Figure No: C.31



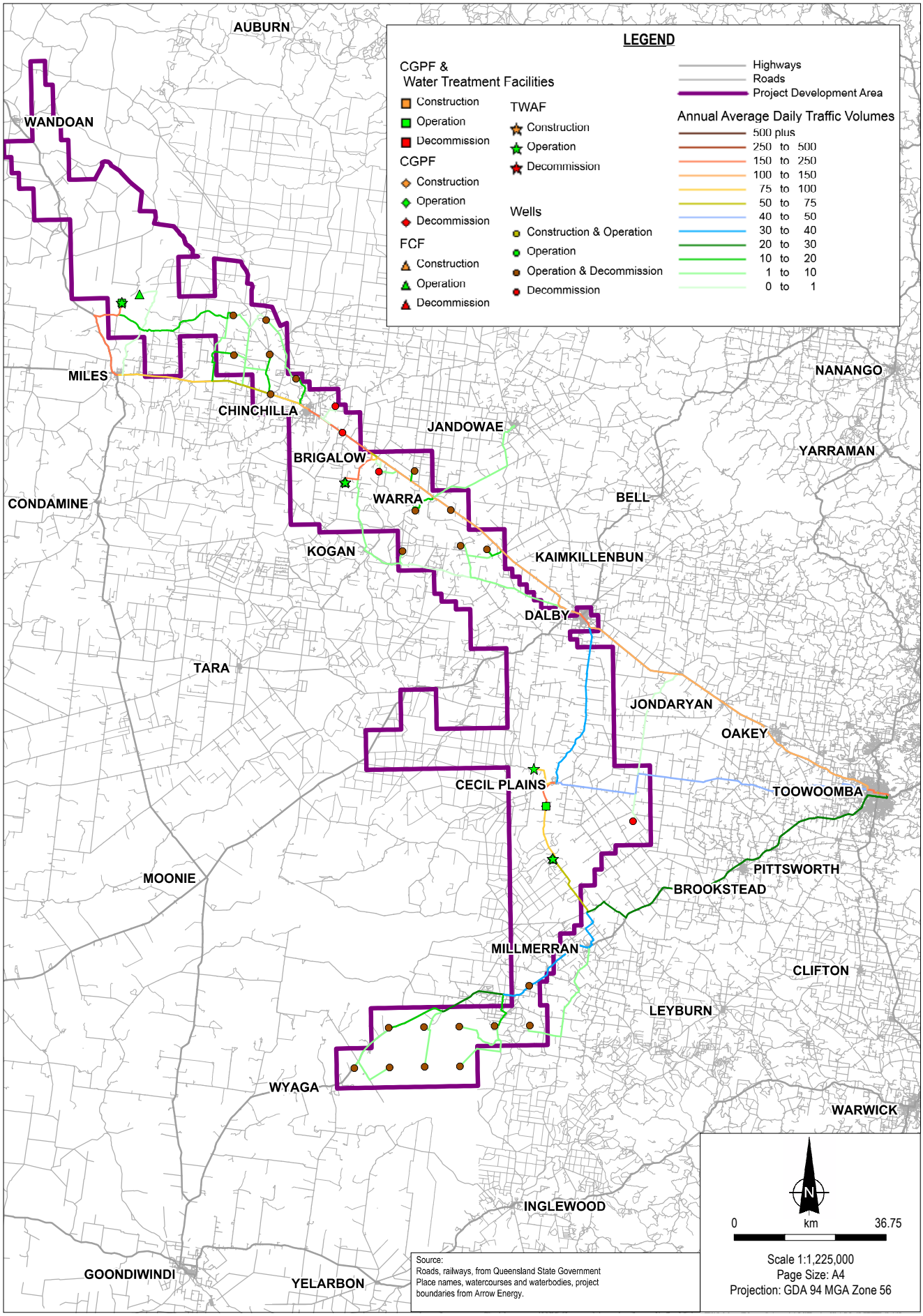
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.32 File Name: 6413_Figure C.32.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2045	Figure No: C.32



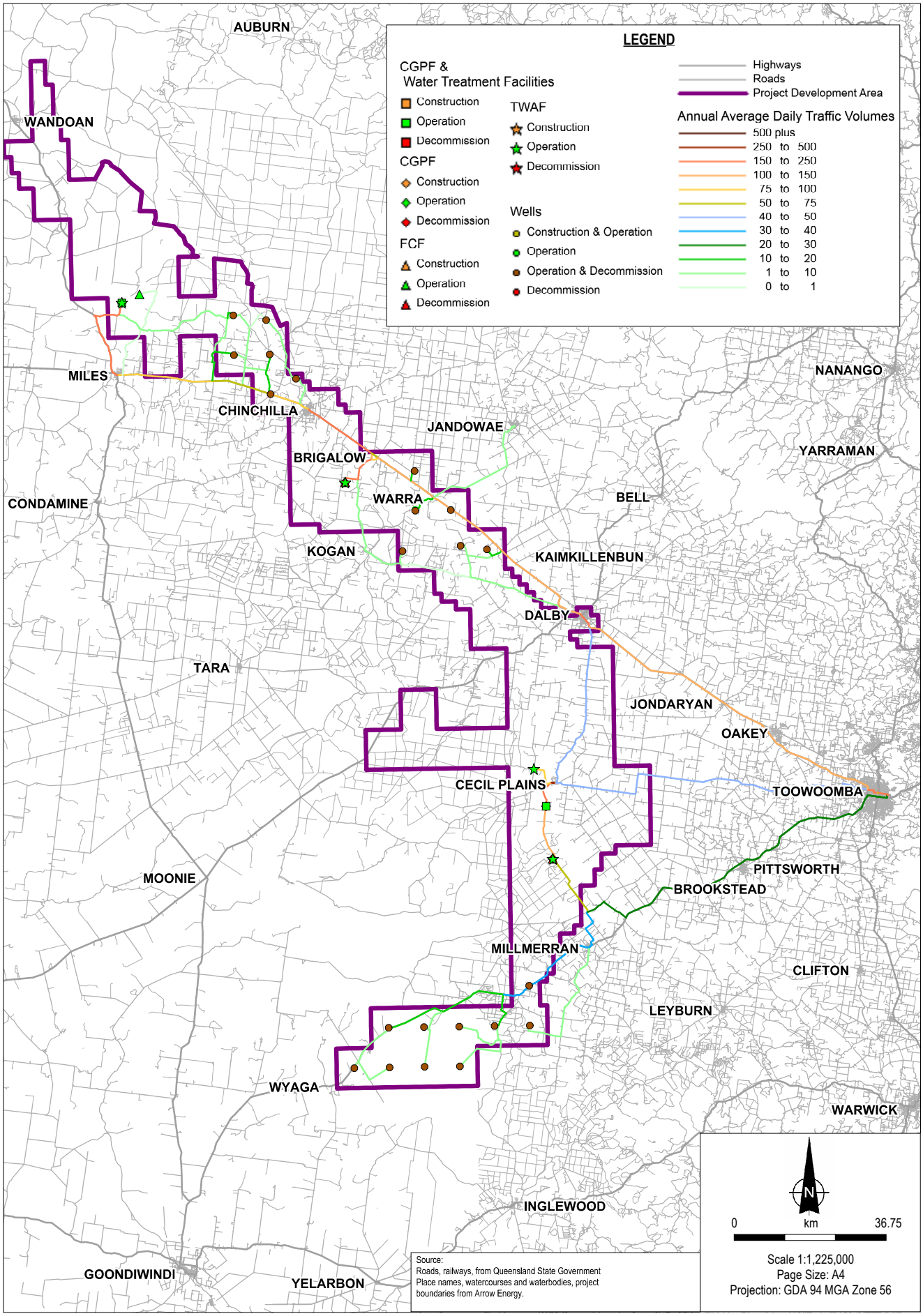
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.33 File Name: 6413_Figure C.33.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2046	Figure No: C.33



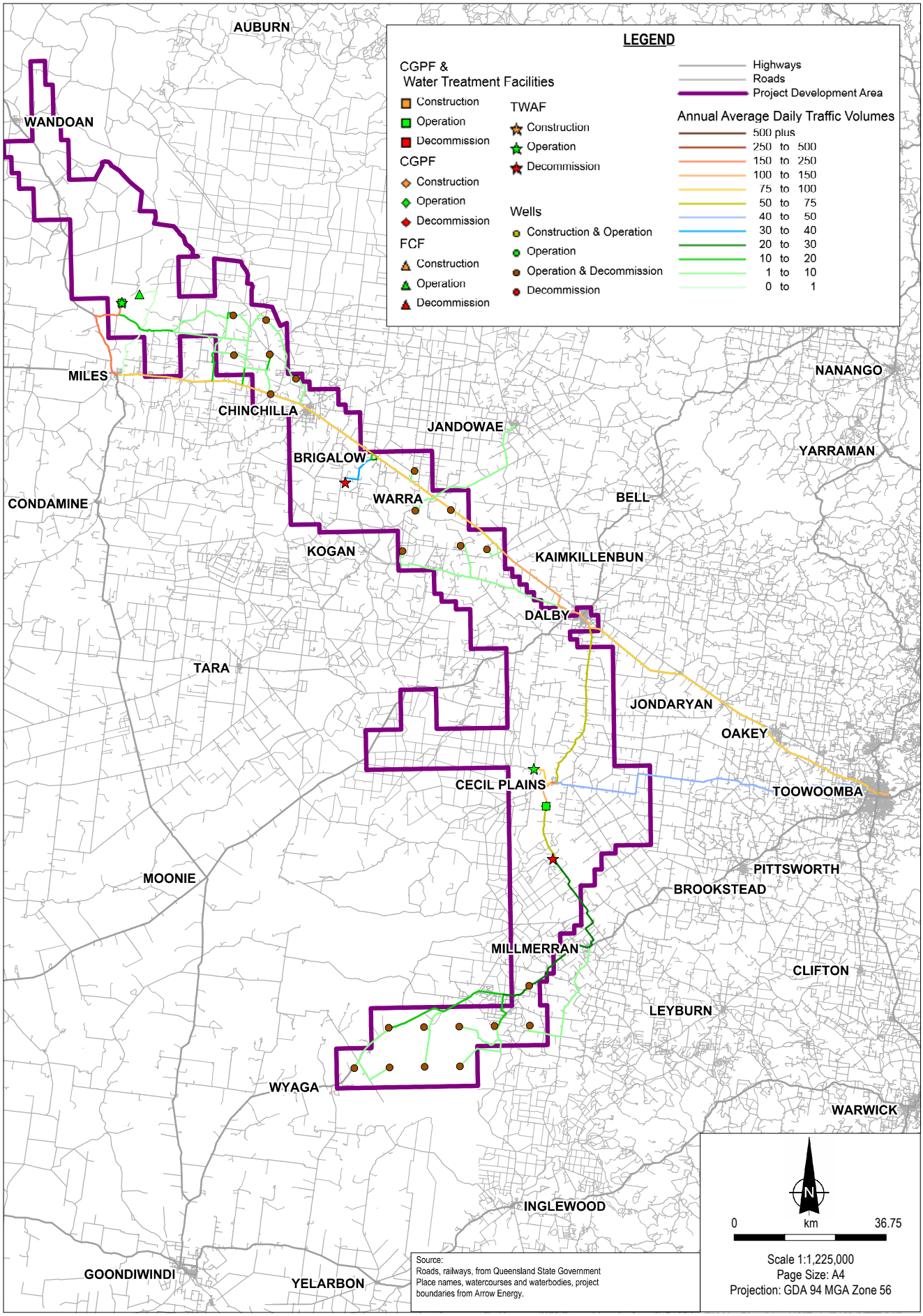
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.34 File Name: 6413_Figure C.34.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2047	Figure No: C.34



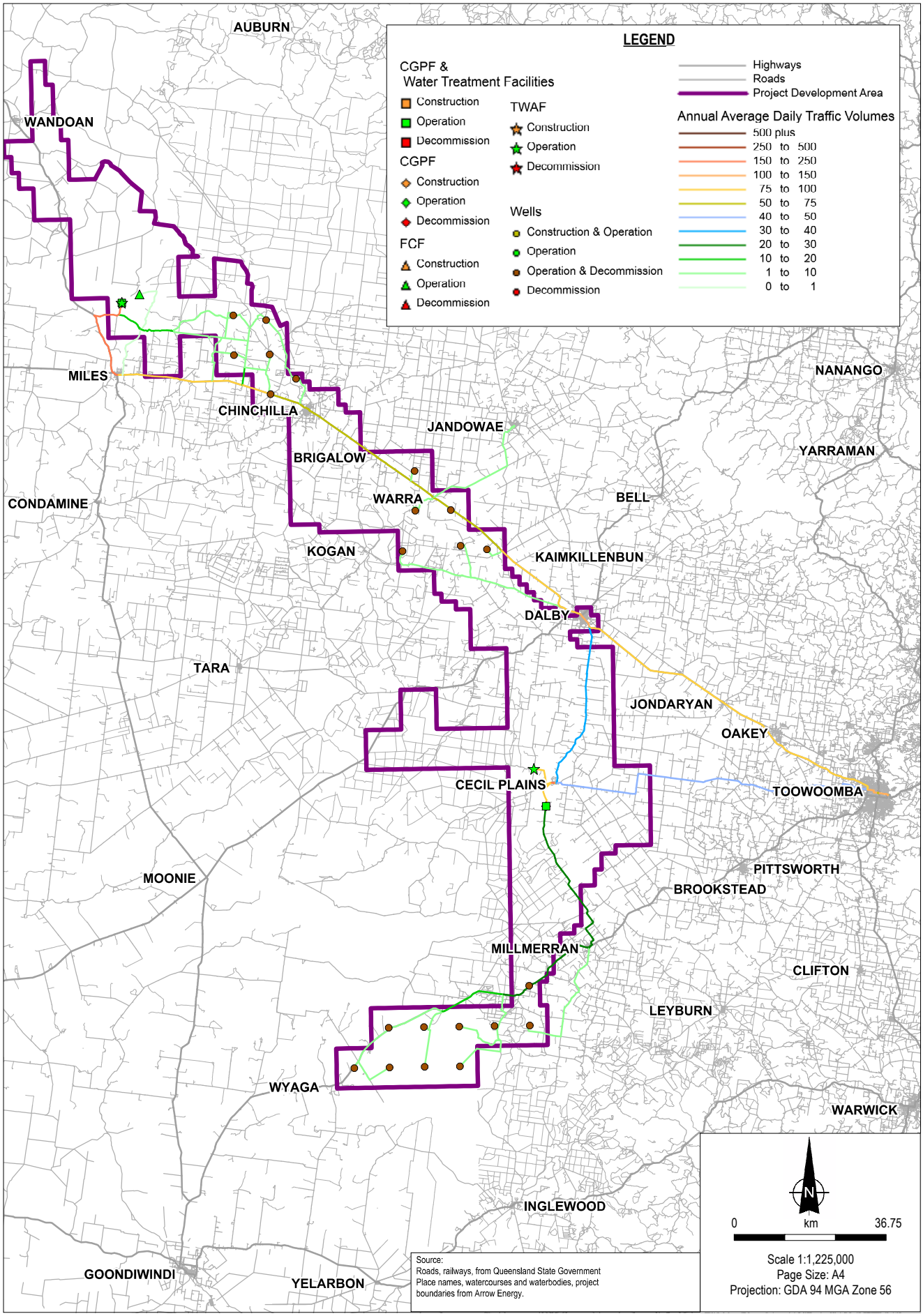
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.35 File Name: 6413_Figure C.35.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2048	Figure No: C.35



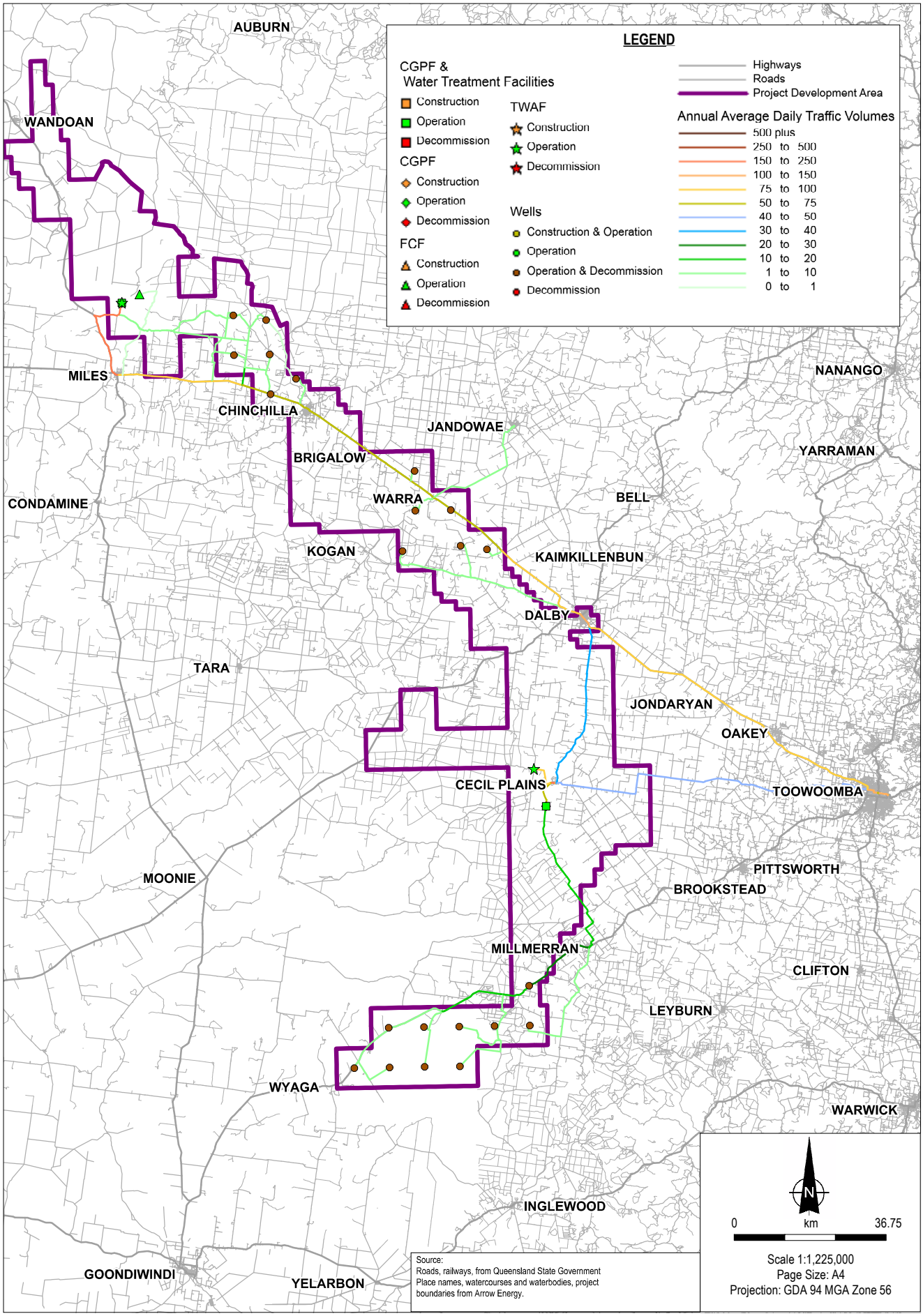
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.36 File Name: 6413_Figure C.36.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2049	Figure No: C.36



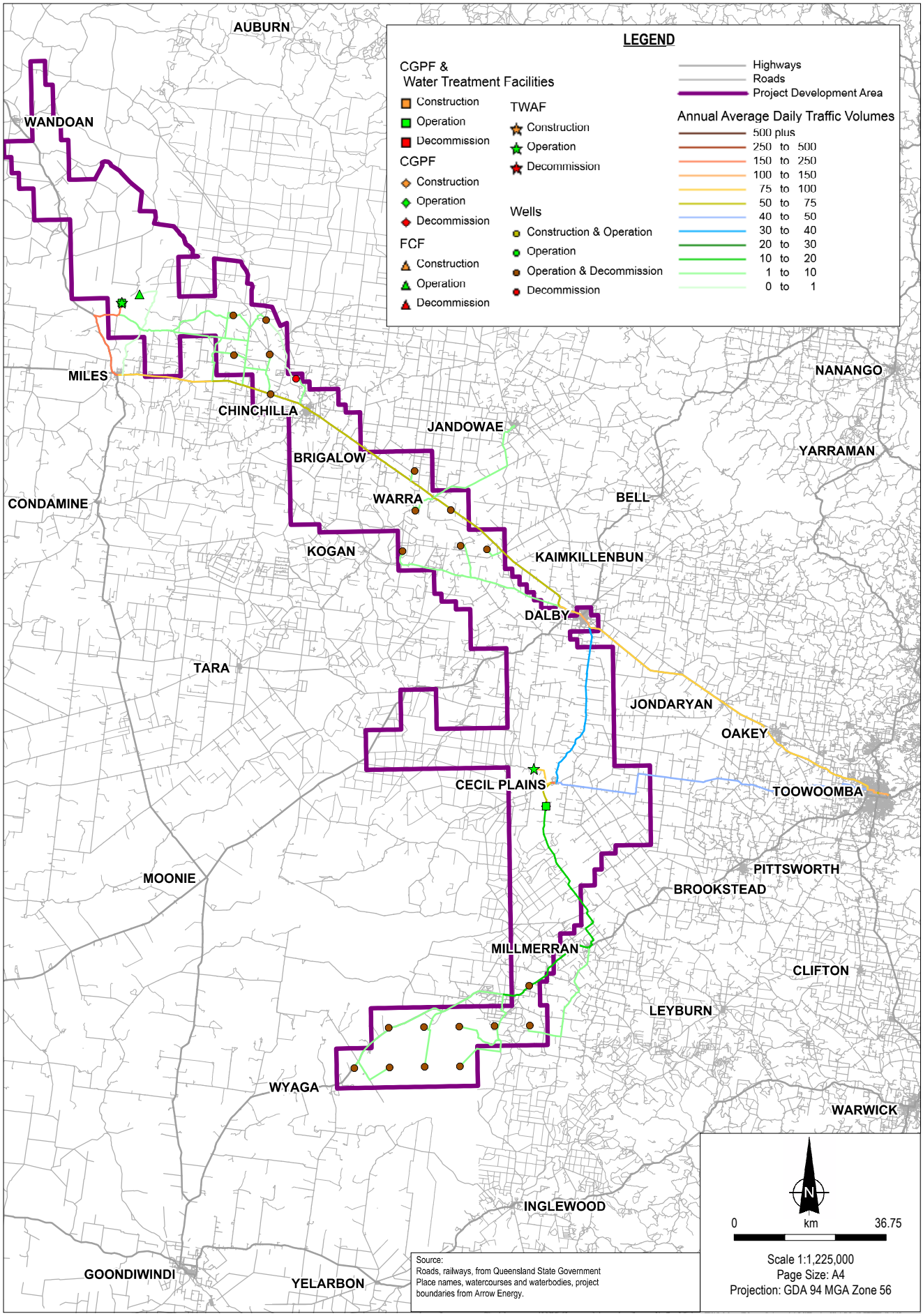
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.37 File Name: 6413_Figure C.37.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2050	Figure No: C.37



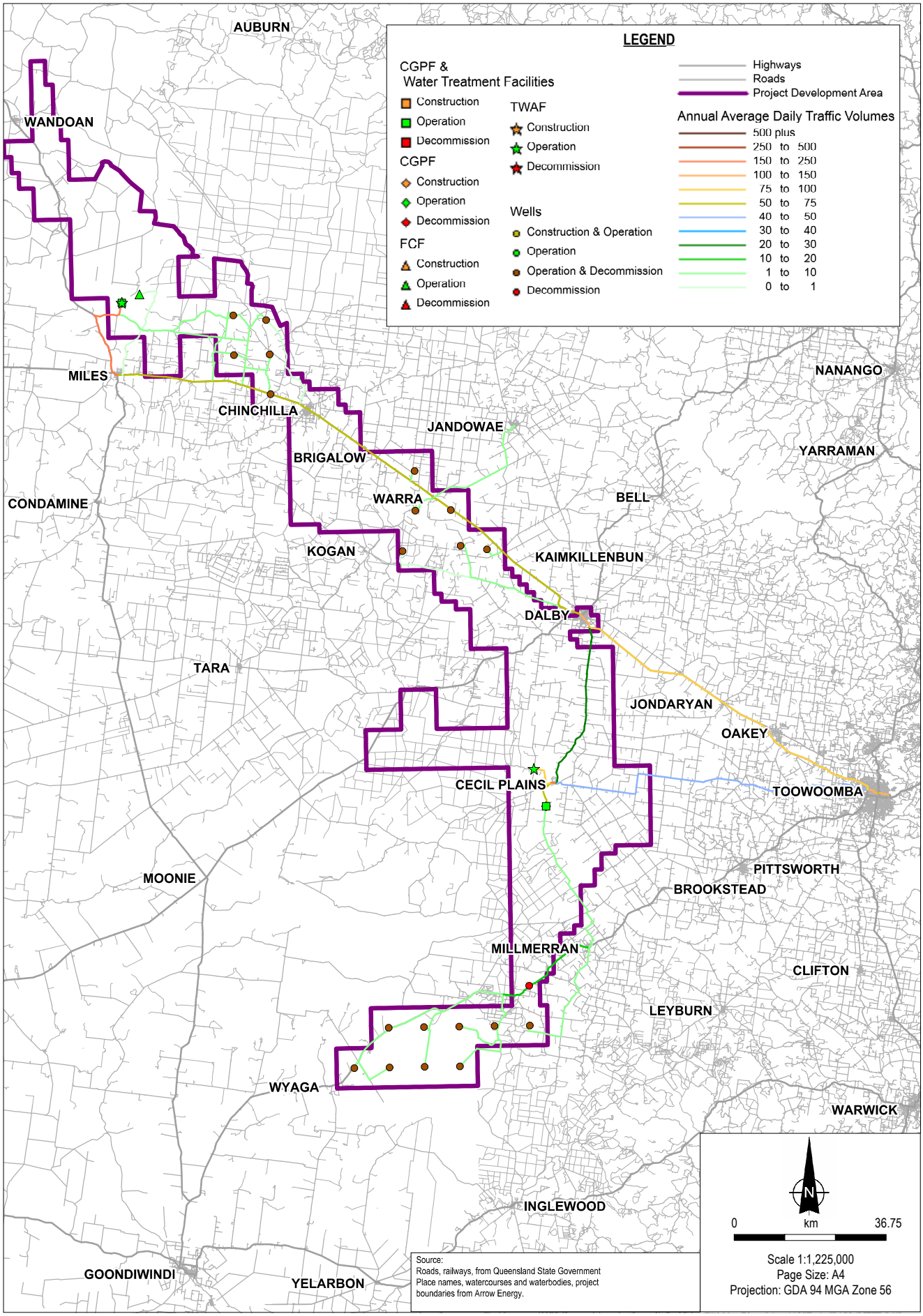
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.38 File Name: 6413_Figure C.38.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2051	Figure No: C.38



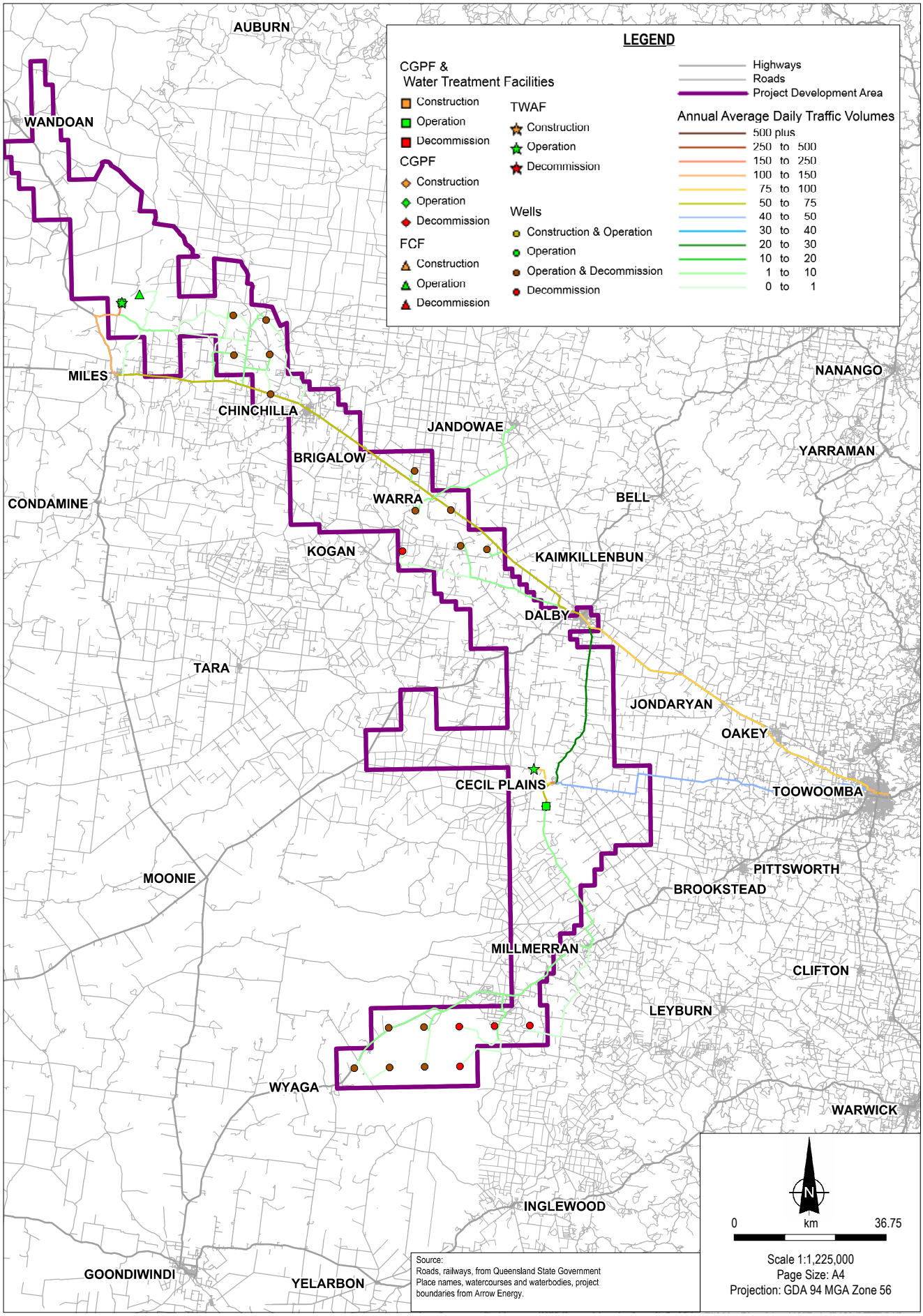
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.39 File Name: 6413_Figure C.39.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2052	Figure No: C.39



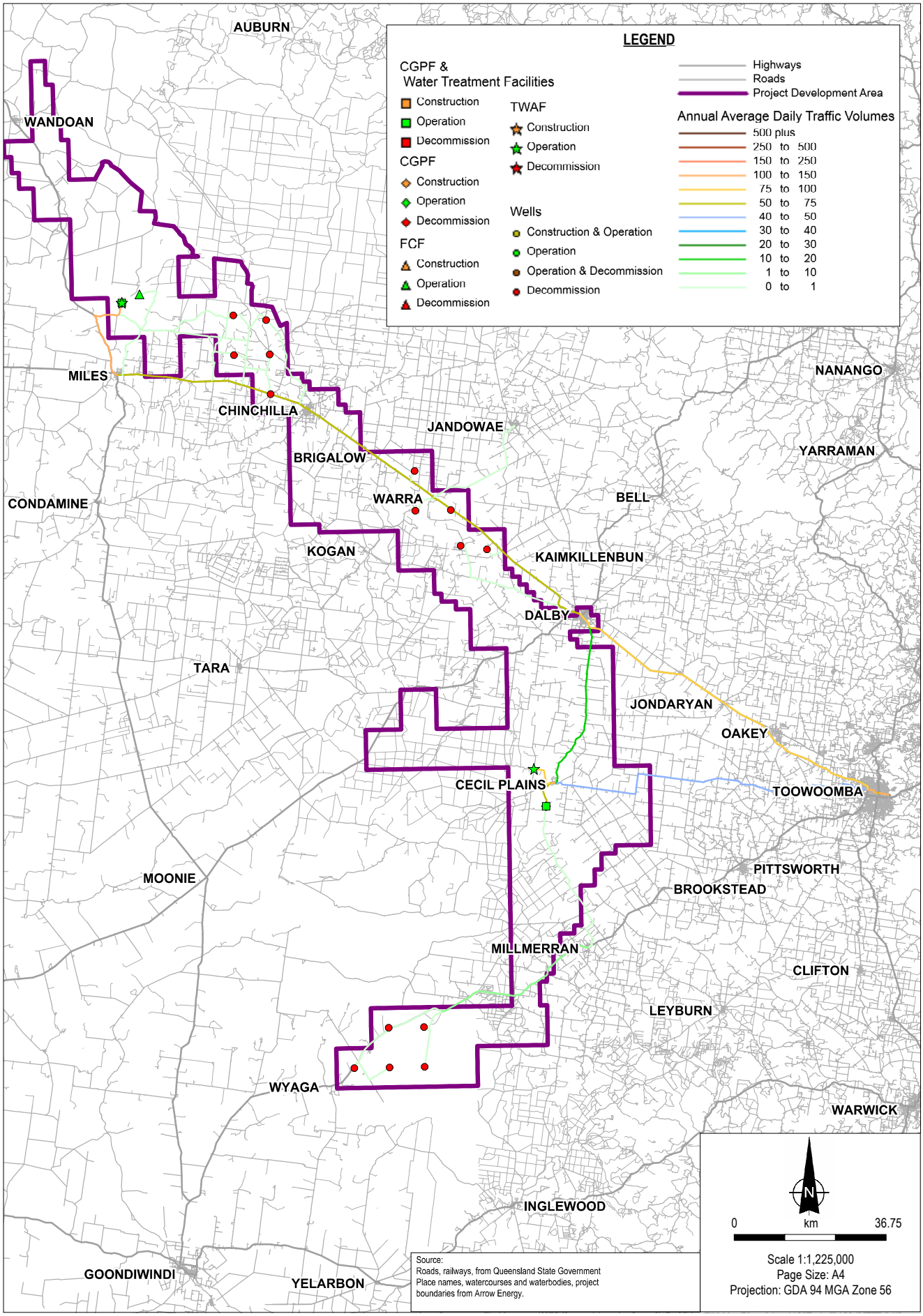
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.40 File Name: 6413_Figure C.40.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2053	Figure No: C.40



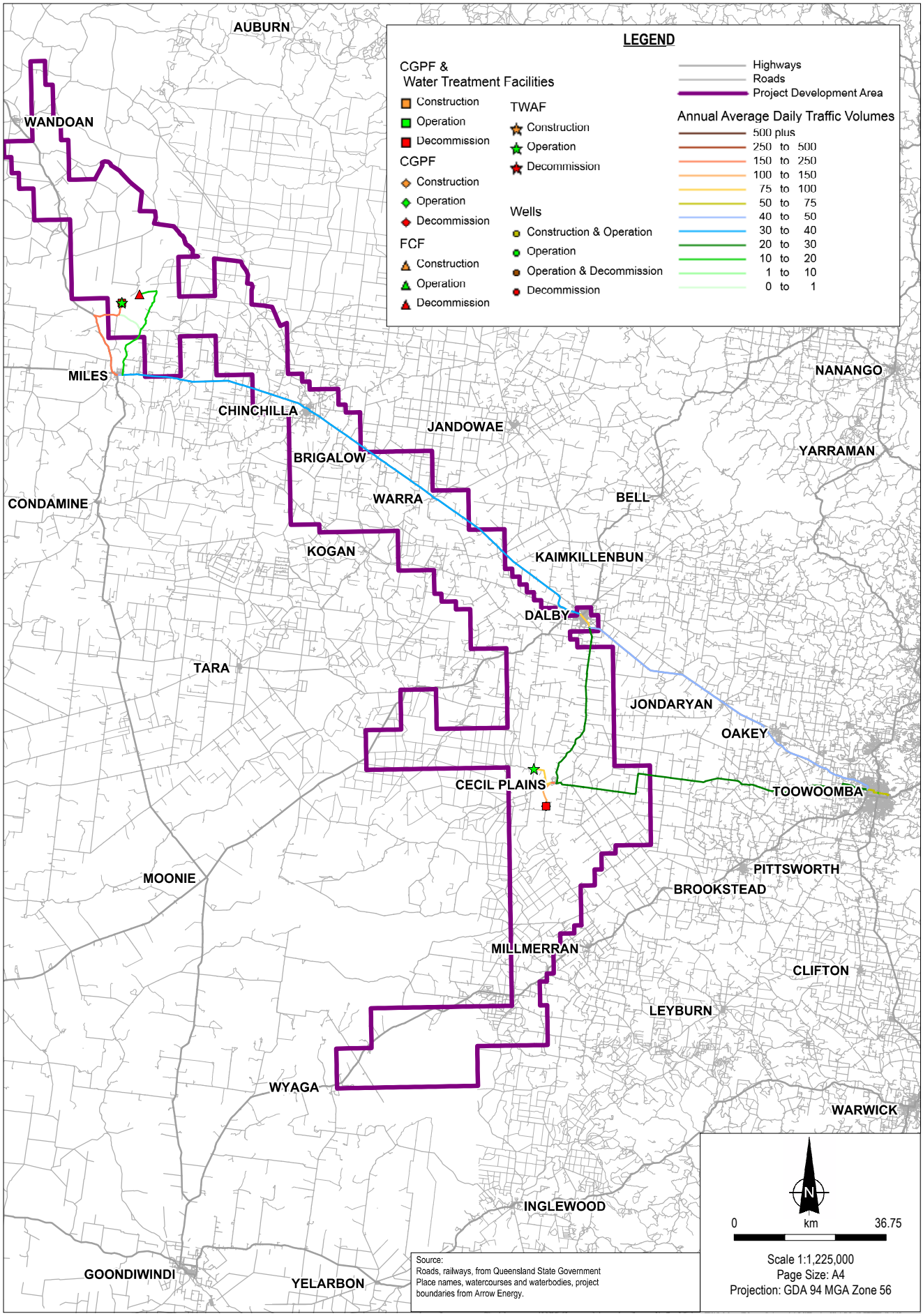
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.41 File Name: 6413_Figure C.41.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2054	Figure No: C.41



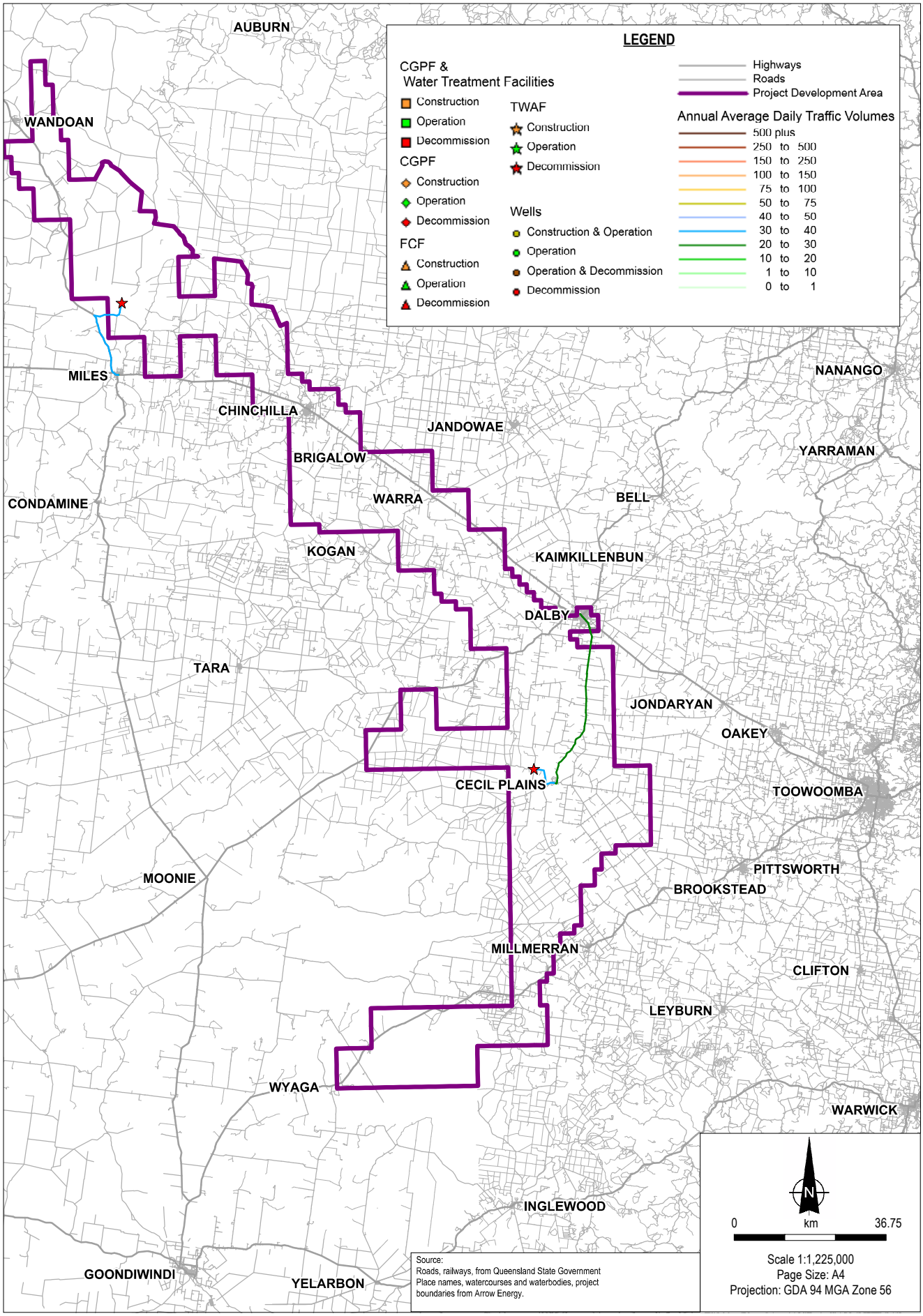
Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.42 File Name: 6413_Figure C.42.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2055	Figure No: C.42



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.43 File Name: 6413_Figure C.43.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2056	Figure No: C.43



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.44 File Name: 6413_Figure C.44.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2057	Figure No: C.44



Cardno Shaping the Future	Date: 31.5.2013 WOR: Figure C.45 File Name: 6413_Figure C.45.wor	Arrow Energy Surat Gas Project	arrow energy go further	Project Traffic Volumes for 2058	Figure No: C.45

Surat Gas Project SREIS

APPENDIX D

Case Studies: Fitness For Use Assessment

Cardno
Shaping the Future

LOCALITY PLAN

KEY ROADS

Road ID	Road Name	Jurisdiction
A	Racecource Road	Western Downs Regional Council
B	Pehlam Road	Western Downs Regional Council
C	Myall Park Road	Western Downs Regional Council
D	Retreat Road	Western Downs Regional Council
E	Leichhardt Creek Taroom Road	Western Downs Regional Council
F	Myall Park Road	Western Downs Regional Council
-	-	-
-	-	-
-	-	-

Fig No. **D1 - A**	**Fit For Use Road Inspection - Miles (CGPF - DA2) - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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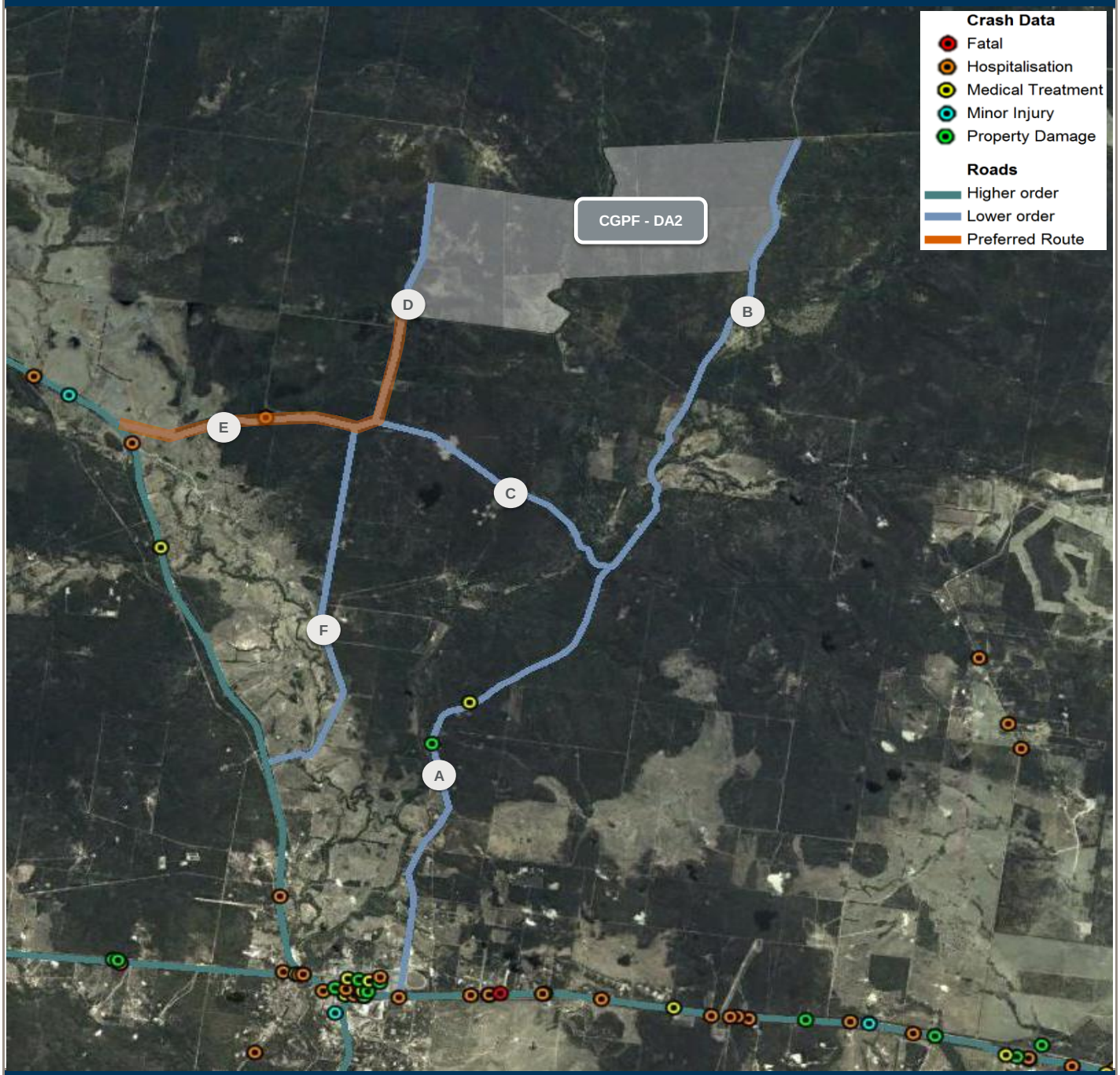
CRASH HISTORY

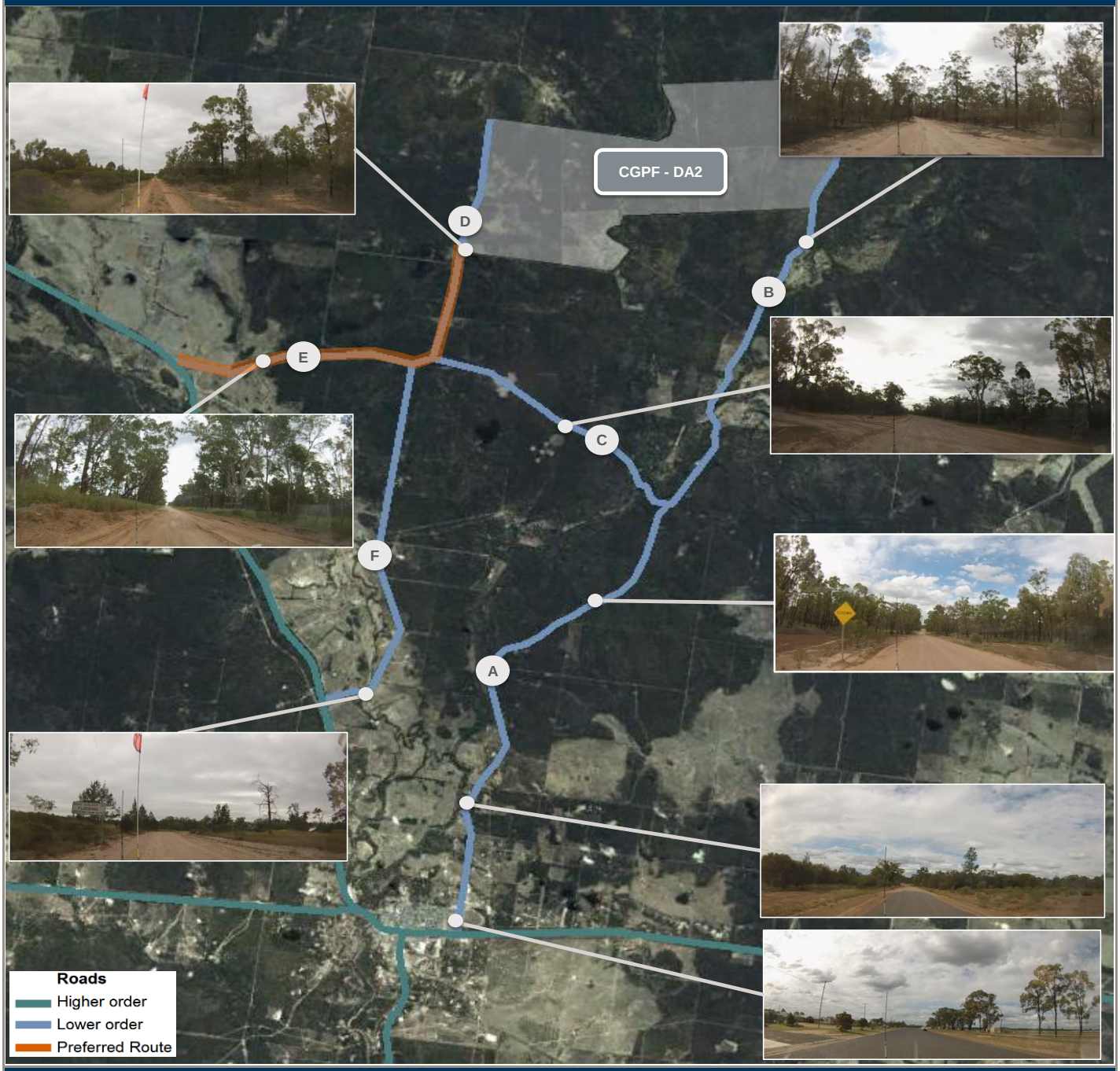


CRASH STATISTICS

Crash Severity	Road ID									TOTAL
	A	B	C	D	E	F	-	-	-	
Fatal	0	0	0	0	0	0	-	-	-	0
Hospitalisation	0	0	0	0	1	0	-	-	-	1
Medical Treatment	1	0	0	0	0	0	-	-	-	1
Minor Injury	0	0	0	0	0	0	-	-	-	0
Property Damage	1	0	0	0	0	0	-	-	-	1
TOTAL	**2**	**0**	**0**	**0**	**1**	**0**	**-**	**-**	**-**	**3**

Fig No. **D1 - B**	**Fit For Use Road Inspection - Miles (CGPF - DA2) - Crash History**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TYPICAL CROSS SECTIONS - PHOTOS



TYPICAL CROSS SECTIONS - CHARACTERISTICS

Parameter	Road ID								
	A	B	C	D	E	F	-	-	-
Speed Limit (km/h)	100	100	100	100	100	100			
Carriageway Surface Condition	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed			
Shoulder Surface Condition	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed			
Carriageway Width (m)	7	8	9	6	10	7			
Shoulder Width (m)	3	2	4	3	-	3			
Total Width (m)	13	12	17	12	10	13			

Fig No. **D1 - C**	**Fit For Use Road Inspection - Miles (CGPF - DA2) - Typical Cross Sections**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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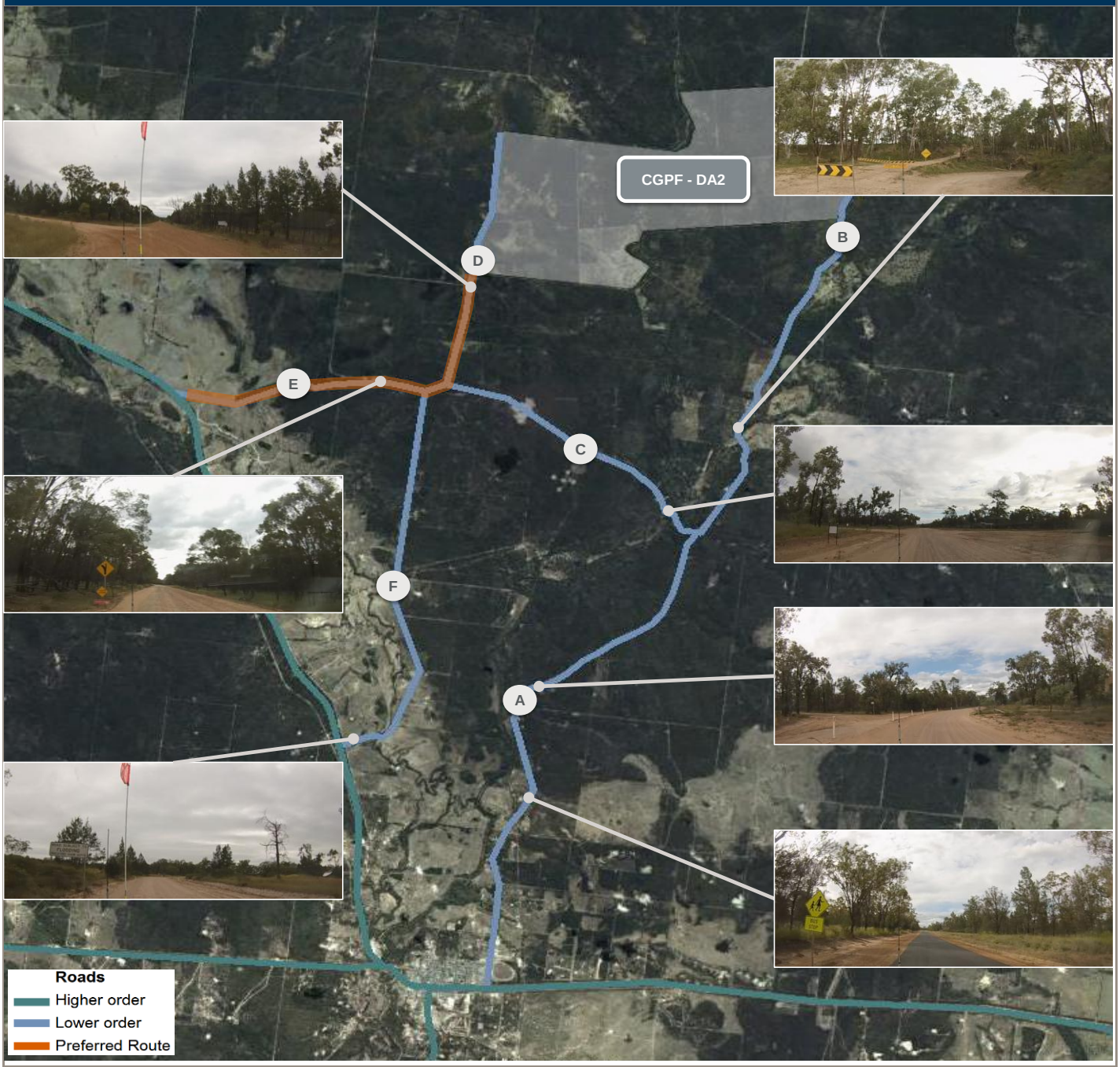
SITE OBSERVATIONS - PHOTOS



SITE OBSERVATIONS - KEY FEATURES

Road ID	Comments
A	Floodways, pipeline construction, corrugations, long route.
B	Rutted, wash outs, narrow in sections, flood prone crossing, floodways, corrugations.
C	Good quality unsealed road. Pipe crossing, floodways.
D	Good quality unsealed raod. Becames a very narrow track north of subject site.
E	Good quality unsealed road.Currently utilised by camp traffic. Quickest route from subject site to external road network.
F	Floodways, long route, semi-trailers observed utilising this route.
-	-
-	-
-	-

Fig No. **D1 - D**	**Fit For Use Road Inspection - Miles (CGPF - DA2) - Site Observations**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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LOCALITY PLAN

KEY ROADS

Road ID	Road Name	Jurisdiction
A	Daandine Nandi Road	Western Downs Regional Council
B	Theten Road	Western Downs Regional Council
C	Kumbarilla Lane	Western Downs Regional Council
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

Fig No. **D2 - A**	**Fit For Use Road Inspection - Kogan (CGPF - DA7) - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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CRASH HISTORY

CRASH STATISTICS

Crash Severity	Road ID									TOTAL
	A	B	C	-	-	-	-	-	-	
Fatal	0	0	0	-	-	-	-	-	-	0
Hospitalisation	2	0	0	-	-	-	-	-	-	2
Medical Treatment	0	0	1	-	-	-	-	-	-	1
Minor Injury	0	0	0	-	-	-	-	-	-	0
Property Damage	0	1	0	-	-	-	-	-	-	1
TOTAL	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**4**

Fig No. **D2 - B**	**Fit For Use Road Inspection - Kogan (CGPF - DA7) - Crash History**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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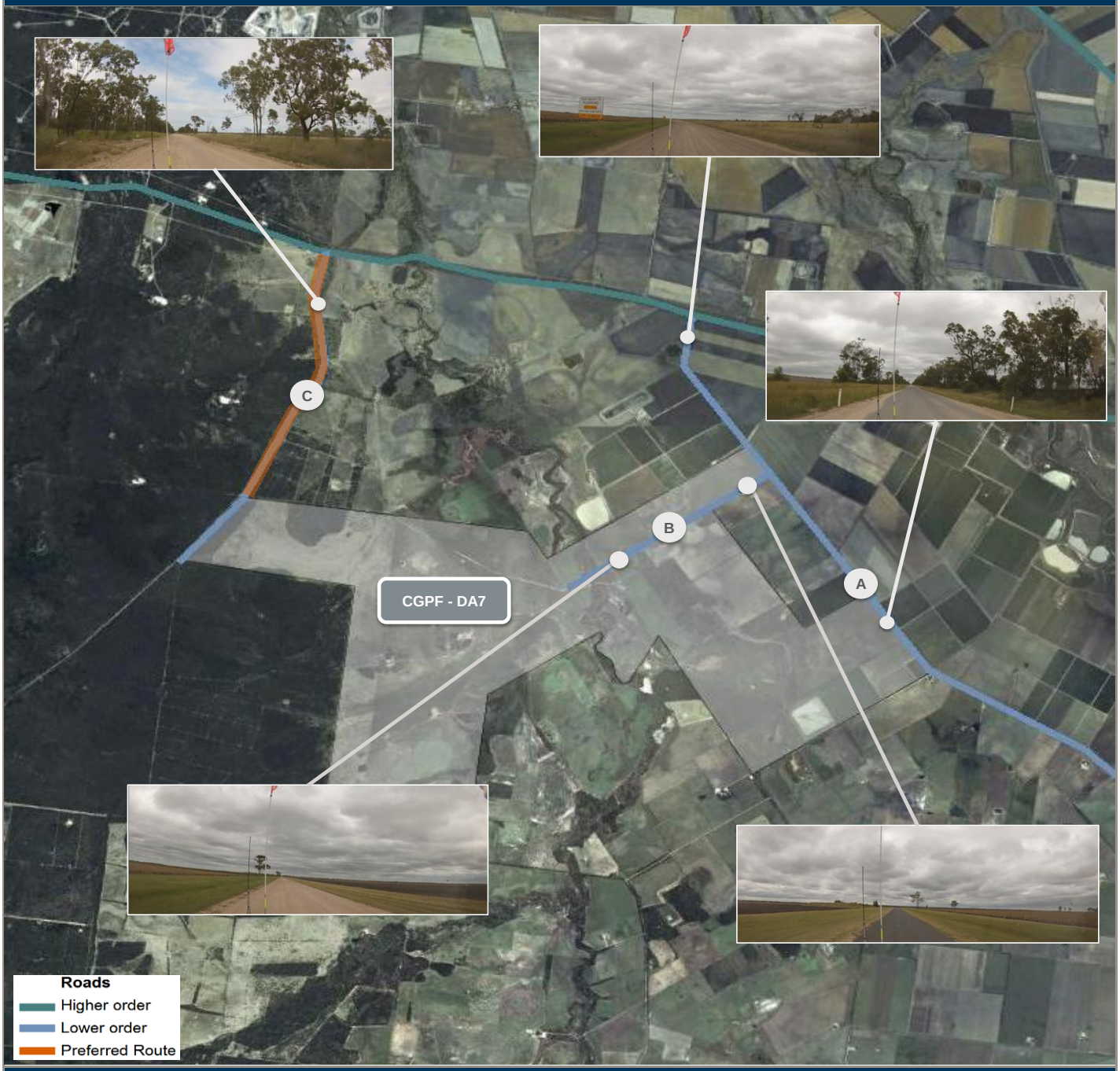
TYPICAL CROSS SECTIONS - PHOTOS



TYPICAL CROSS SECTIONS - CHARACTERISTICS

Parameter	Road ID								
	A	B	C	-	-	-	-	-	-
Speed Limit (km/h)	100	100	100						
Carriageway Surface Condition	Unsealed	Unsealed	Sealed						
Shoulder Surface Condition	-	-	Sealed						
Carriageway Width (m)	11.5	8	8.5						
Shoulder Width (m)	-	-	2.0						
Total Width (m)	11.5	8	12.5						

Fig No. **D2 - C**	**Fit For Use Road Inspection - Kogan (CGPF - DA7) - Typical Cross Sections**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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SITE OBSERVATIONS - PHOTOS

SITE OBSERVATIONS - KEY FEATURES

Road ID	Comments
A	Good standard unsealed road. Prone to flooding in areas, sealed in sections.
B	Narrow in sections, sealed and unsealed sections, wide road shoulders.
C	Currently heavily utilised by energy industry vehicles. Route is sealed in sections.
-	-
-	-
-	-
-	-
-	-
-	-

Fig No. **D2 - D**	**Fit For Use Road Inspection - Kogan (CGPF - DA7) - Site Observations**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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LOCALITY PLAN

KEY ROADS

Road ID	Road Name	Jurisdiction
A	Springvale Road	Western Downs Regional Council
B	Wanka Road	Toowoomba Regional Council
C	Grassdale Road	Western Downs Regional Council/Toowoomba Regional Council
D	Percy Jurgs Road	Toowoomba Regional Council
E	Wilkins Road	Toowoomba Regional Council
F	Duntroon Road (East-West)	Toowoomba Regional Council
G	Duntroon Road (North-South)	Toowoomba Regional Council
H	Cecil Plains-Moonie Road	Toowoomba Regional Council
I	Millmerran-Cecil Plains Road	Toowoomba Regional Council

Fig No. **D3 - A**	**Fit For Use Road Inspection - Cecil Plains (CGPF - DA8, TWAF - DA9, CGPF - DA9) - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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CRASH HISTORY

CRASH STATISTICS

Crash Severity	Road ID									TOTAL
	A	B	C	D	E	F	G	H	I	
Fatal	0	0	0	0	0	0	0	0	1	1
Hospitalisation	1	0	0	0	0	0	0	0	0	1
Medical Treatment	0	0	0	0	0	0	0	0	0	0
Minor Injury	0	0	0	0	0	0	0	0	0	0
Property Damage	1	0	0	0	0	0	0	1	0	2
TOTAL	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**4**

Fig No. **D3 - B**	**Fit For Use Road Inspection - Cecil Plains (CGPF - DA8, TWAF - DA9, CGPF - DA9) - Crash History**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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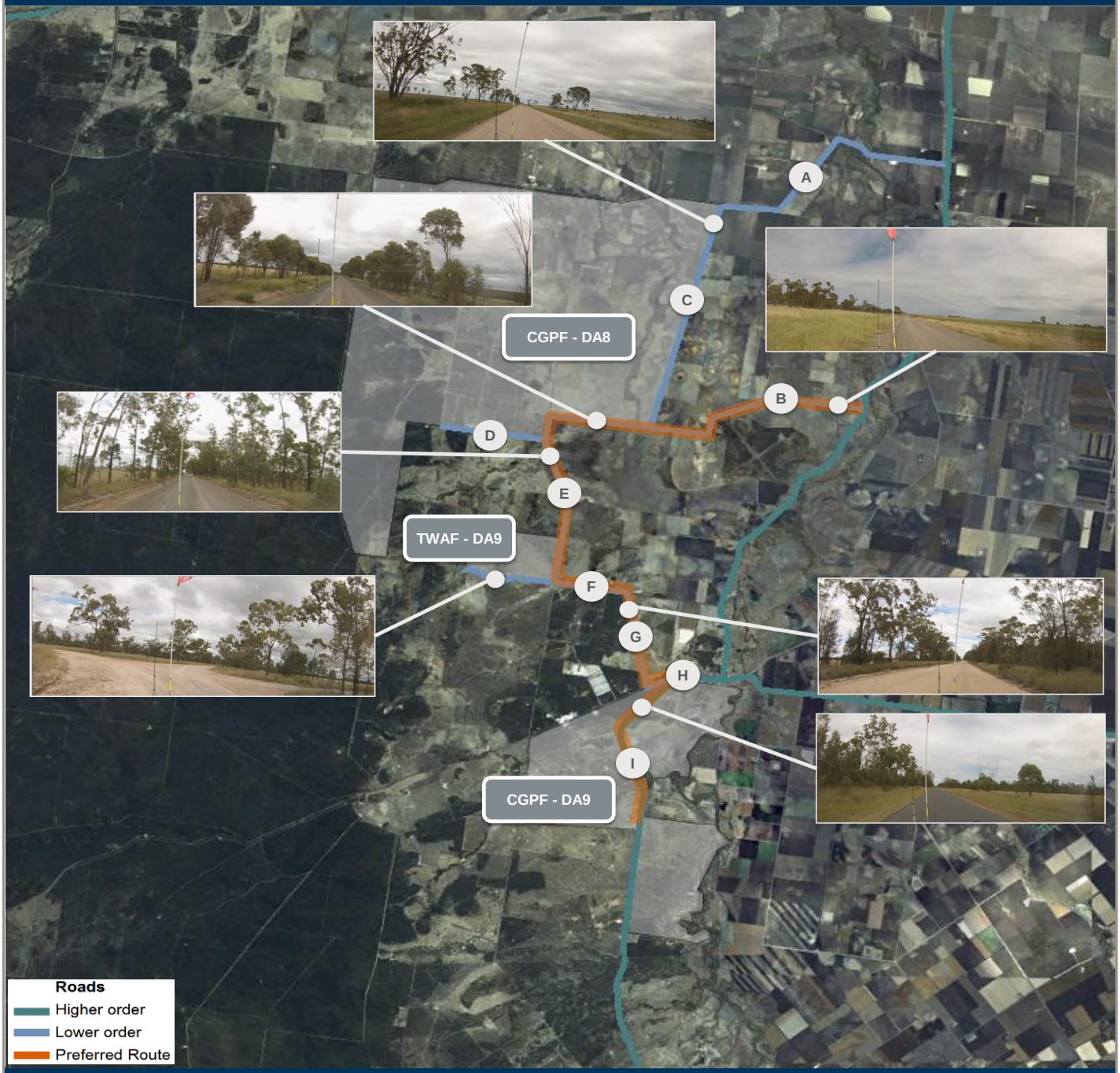
TYPICAL CROSS SECTIONS - PHOTOS

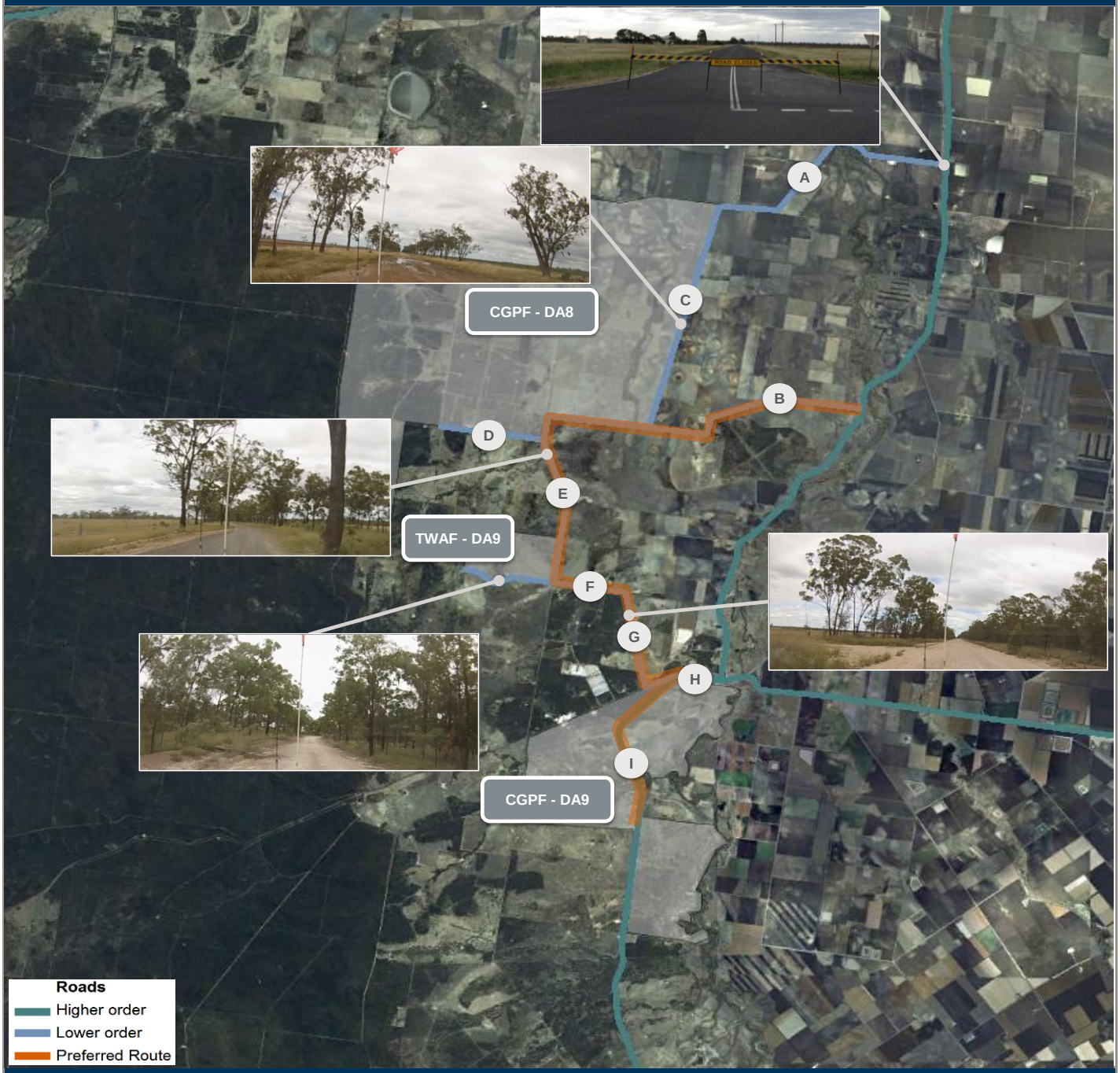


TYPICAL CROSS SECTIONS - CHARACTERISTICS

Parameter	Road ID								
	A	B	C	D	E	F	G	H	I
Speed Limit (km/h)	100	100	100	-	100	100	100	100	100
Carriageway Surface Condition	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed	Unsealed	Sealed	Sealed
Shoulder Surface Condition	-	-	-	-	-	-	-	Unsealed	Unsealed
Carriageway Width (m)	7.0	6.5	7.0	5.5	7.5	7.5	8.0	6.5	6.0
Shoulder Width (m)	-	-	-	-	-	-	-	1.0	1.5
Total Width (m)	7.0	6.5	7.0	5.5	7.5	7.5	8.0	8.5	9.0

Fig No. **D3 - C**	**Fit For Use Road Inspection - Cecil Plains (CGPF - DA8, TWAF - DA9, CGPF - DA9) - Typical Cross Sections**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

SITE OBSERVATIONS - PHOTOS



SITE OBSERVATIONS - KEY FEATURES

Road ID	Comments
A	Road temporarily closed by Council. Therefore did not use.
B	Unsealed road, washouts along route. Semi-trailers observed utilising this route.
C	Wide, unsealed road. Washouts along route. Boggy Sections. Semi-trailers observed utilising this route.
D	Currently used by Arrow. Signs stated that Arrow Inductions need tob e completed prior to entry. Therefore did not use.
E	Good unsealed standard, narrow in sections (i.e. < 7m width), trees located close to carriageway.
F	Good unsealed standard.
G	Loose gravel surface.
H	High standard sealed rural road.
I	Sealed road, narrow in areas, wide unsealed shoulder

Fig No. **D3 - D**	**Fit For Use Road Inspection - Cecil Plains (CGPF - DA8, TWAF - DA9, CGPF - DA9) - Site Observations**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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Surat Gas Project SREIS

APPENDIX E

Case Studies: Intersection Assessment

Cardno
Shaping the Future

LOCALITY PLAN

AERIAL PHOTO

Fig No. **E1 - A**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION PHOTOS

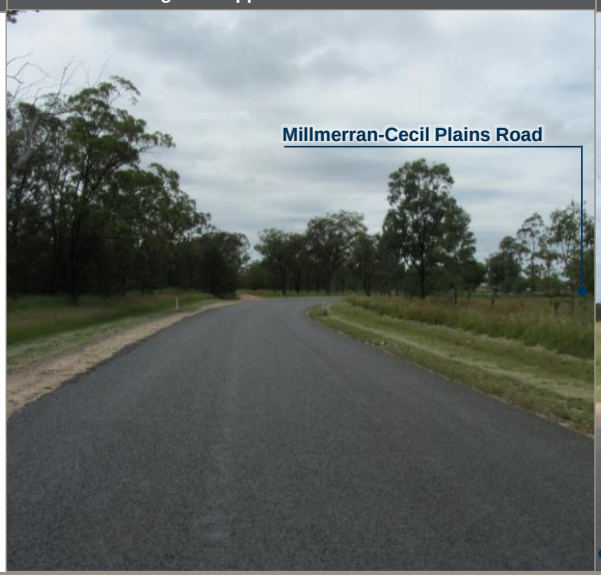
Approach	Looking West Approx. 200m from Intersection	Looking East from Intersection
Eastern Approach - Cecil Plains-Moonie Road		
Approach	**Looking North Approx. 200m from Intersection**	**Looking South from Intersection**
Southern Approach - Millmerran-Cecil Plains Road		
Approach	**Looking East Approx. 200m from Intersection**	**Looking West from Intersection**
Western Approach - Cecil Plains-Moonie Road		

Fig No. **E1 - B**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Photos**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION DETAILS

Approach	Road Name	Jurisdiction
Eastern	Cecil Plains-Moonie Road	Toowoomba Regional Council
Southern	Millmerran-Cecil Plains Road	Toowoomba Regional Council
Western	Cecil Plains-Moonie Road	Toowoomba Regional Council

SPEED LIMITS

Approach	Speed Limit	Comment
Eastern	80 km/h	Deafult Rural Speed Limit
Southern	80 km/h	Speed Sign Located South of Intersection
Western	100 km/h	Speed Sign Located West of Intersection

TURN TREATMENTS

Approach	Left Turn	Right Turn
Eastern	Nil	Nil
Southern	Nil	Nil
Western	Nil	Nil

SIGHT DISTANCES

Approach	Safe Intersection Sight Distance	Approach Stopping Distance
Eastern	300m +	200m +
Southern	300m +	200m +
Western	130m	130m

PAVEMENT CONDITIONS

Approach	Condition	Comments
Eastern	Sealed	-
Southern	Sealed	-
Western	Sealed	-

Fig No. **E1 - C**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Physical Properties**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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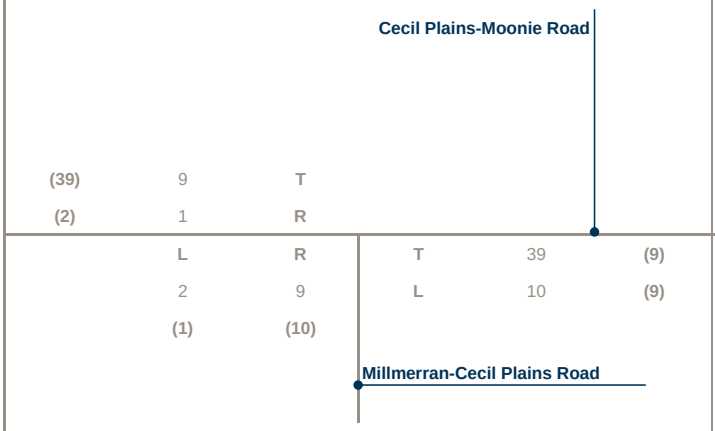
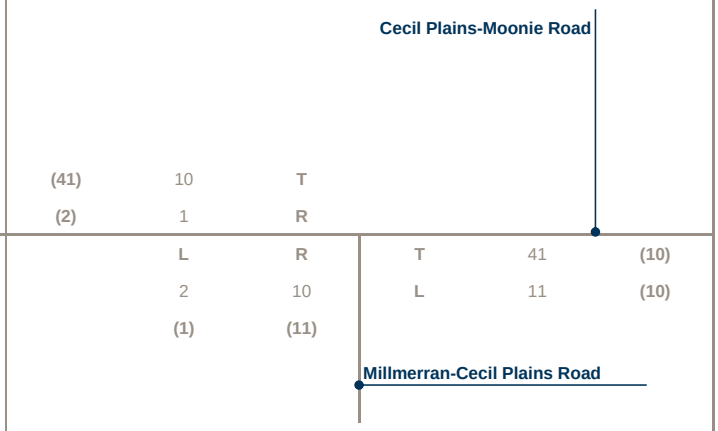
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - TWAF_DA9)

Surveyed Traffic Volumes (2013)

AM Peak	Dervived from PM Count
PM Peak	4:30pm to 5:30pm



Background Traffic Volumes - Year of Construction (2015)



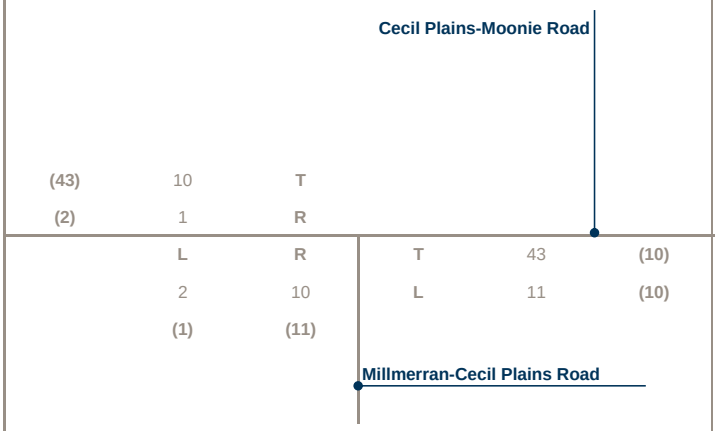
LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2015	3.00%	1.06

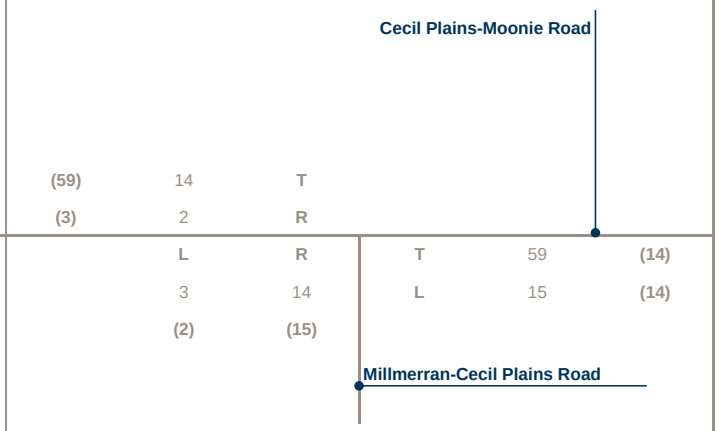
Background Traffic Volumes - Opening Year of Operations (2016)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2016	3.00%	1.09

Background Traffic Volumes - 10 Year Design Horizon (2026)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2026	3.00%	1.39

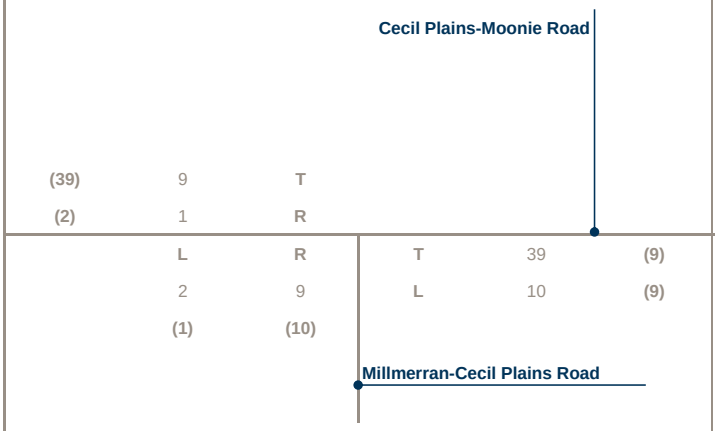
Fig No. **E1 - D**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Background Traffic - TWAF_DA9)**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

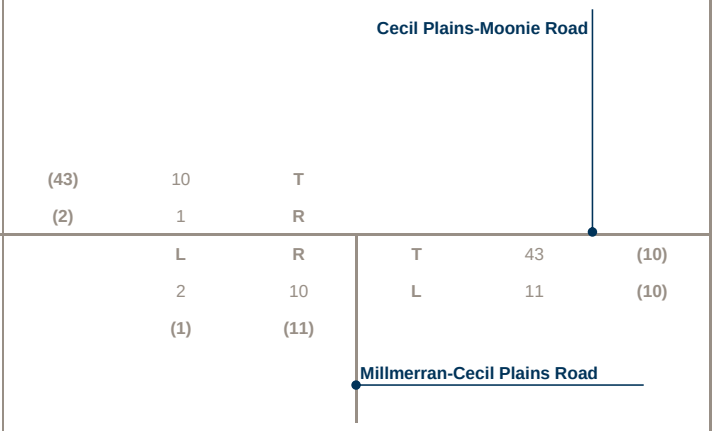
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - CGPF_DA9)

Surveyed Traffic Volumes (2013)

AM Peak	Dervived from PM Count
PM Peak	4:30pm to 5:30pm



Background Traffic Volumes - Year of Construction (2016)



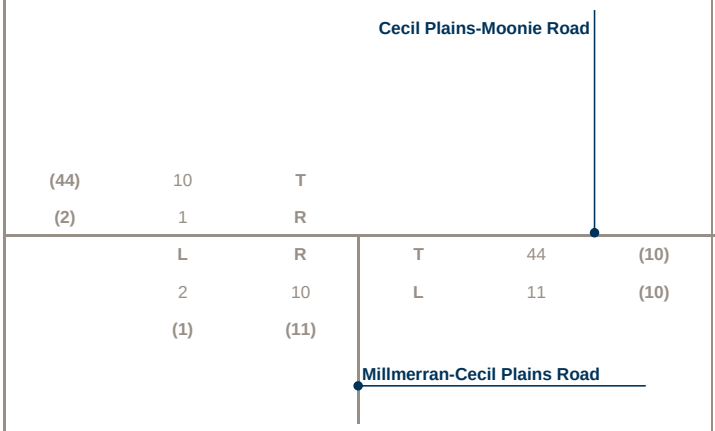
LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2016	3.00%	1.09

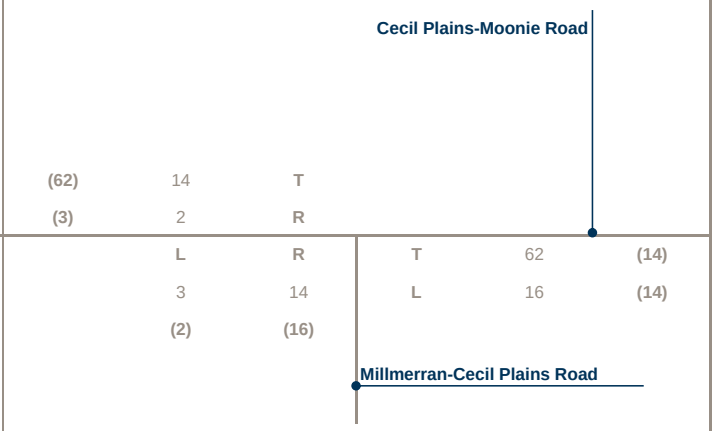
Background Traffic Volumes - Opening Year of Operations (2017)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2017	3.00%	1.12

Background Traffic Volumes - 10 Year Design Horizon (2027)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2027	3.00%	1.42

Fig No. **E1 - E**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Background Traffic - CGPF_DA9)**	Cardno Shaping the Future

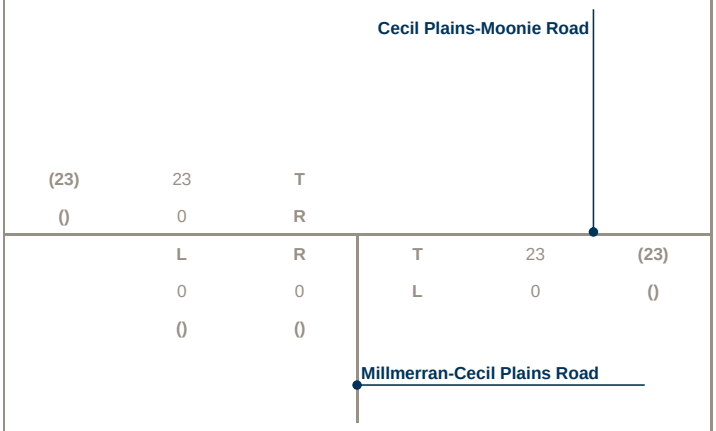
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - TWAF_DA9)

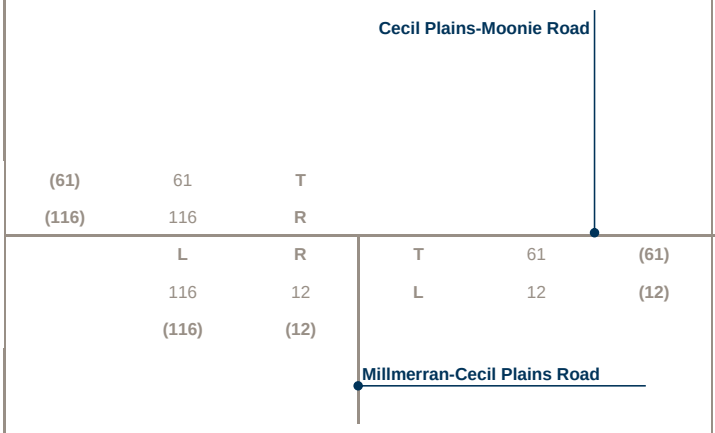
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

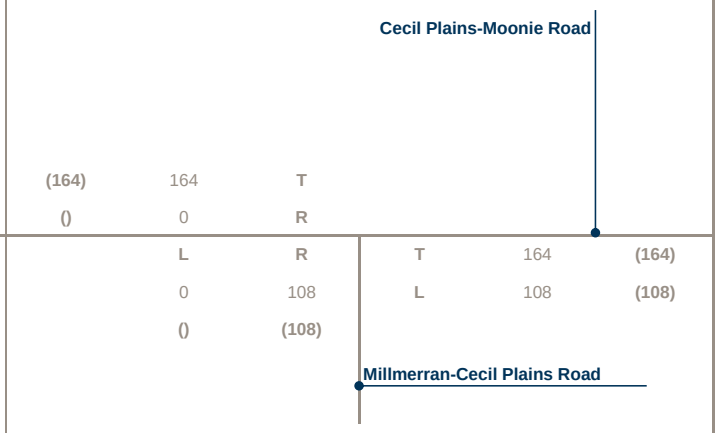
Project Traffic Volumes - Year of Construction (2015)



Project Traffic Volumes - Opening Year of Operations (2016)



Project Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E1 - F**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Project Traffic - TWAF_DA9)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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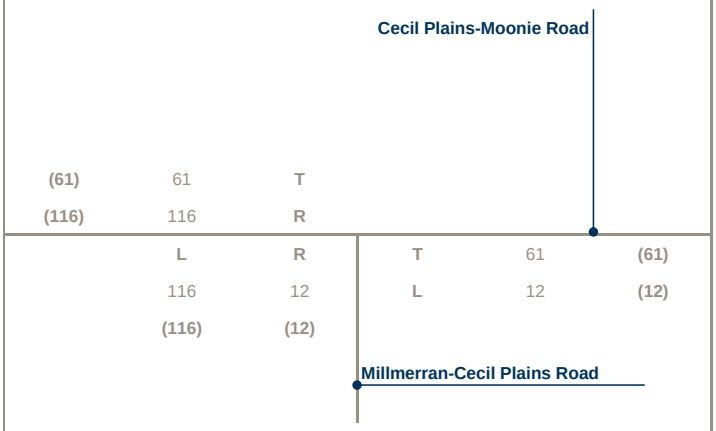
PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - CGPF_DA9)

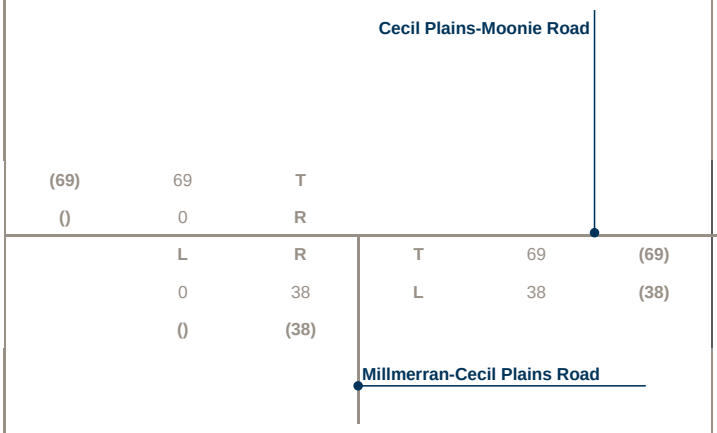
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

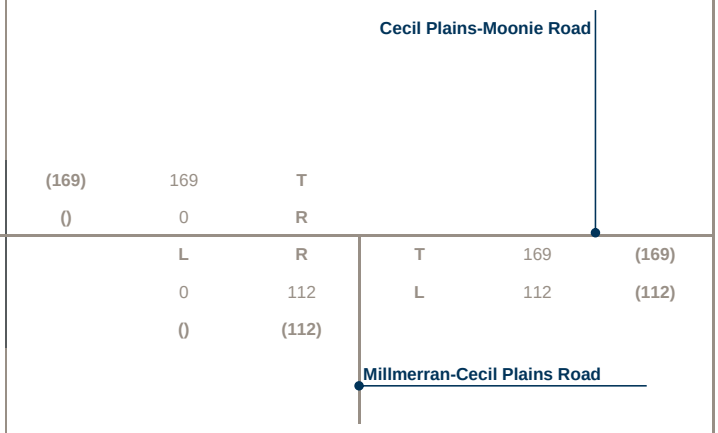
Project Traffic Volumes - Year of Construction (2016)



Project Traffic Volumes - Opening Year of Operations (2017)



Project Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E1 - G**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Project Traffic - CGPF_DA9)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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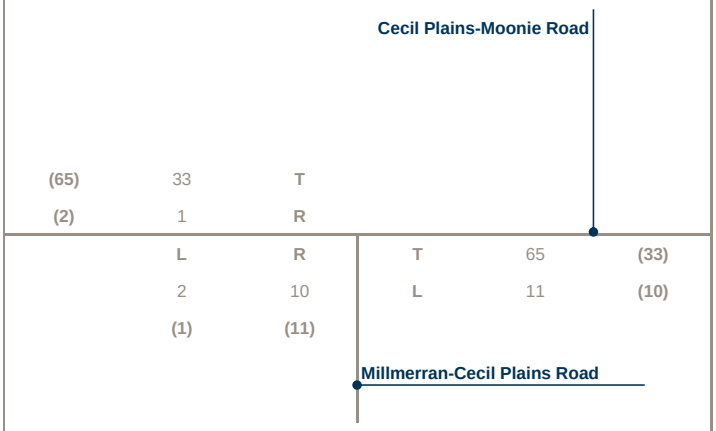
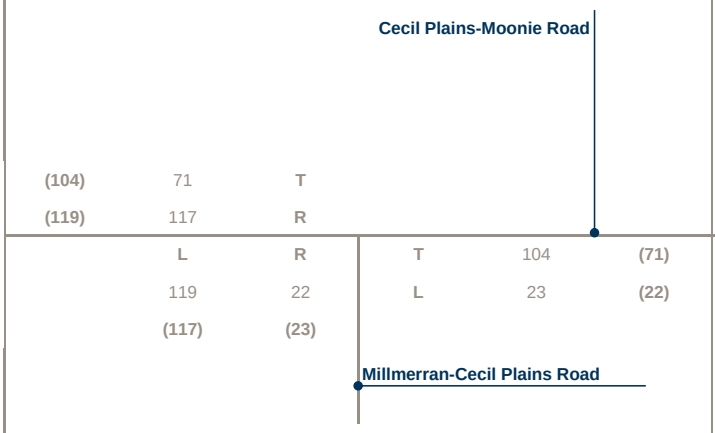
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - TWAF_DA9)

-

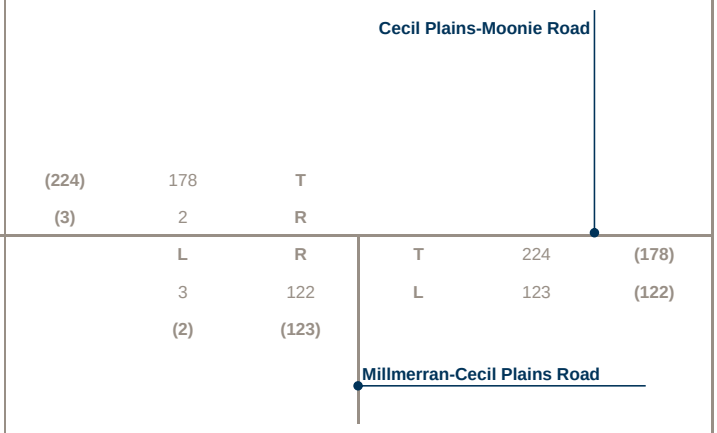
Design Traffic Volumes - Year of Construction (2015)



Design Traffic Volumes - Opening Year of Operations (2016)



Design Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E1 - H**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Design Traffic - TWAF_DA9)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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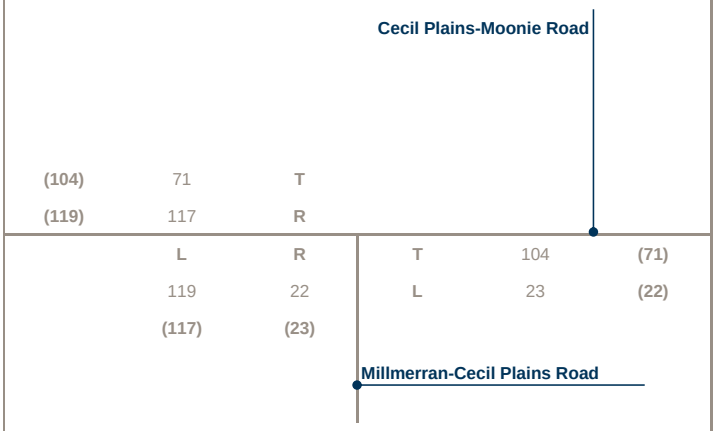
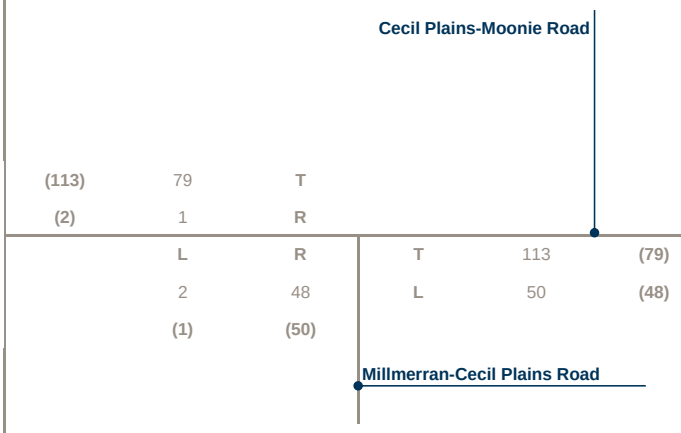
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - CGPF_DA9)

-

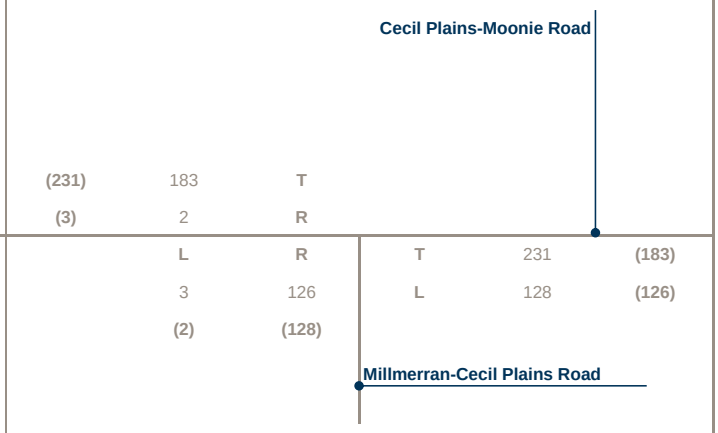
Design Traffic Volumes - Year of Construction (2016)



Design Traffic Volumes - Opening Year of Operations (2017)



Design Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E1 - I**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Intersection Volumes (Design Traffic - CGPF_DA9)**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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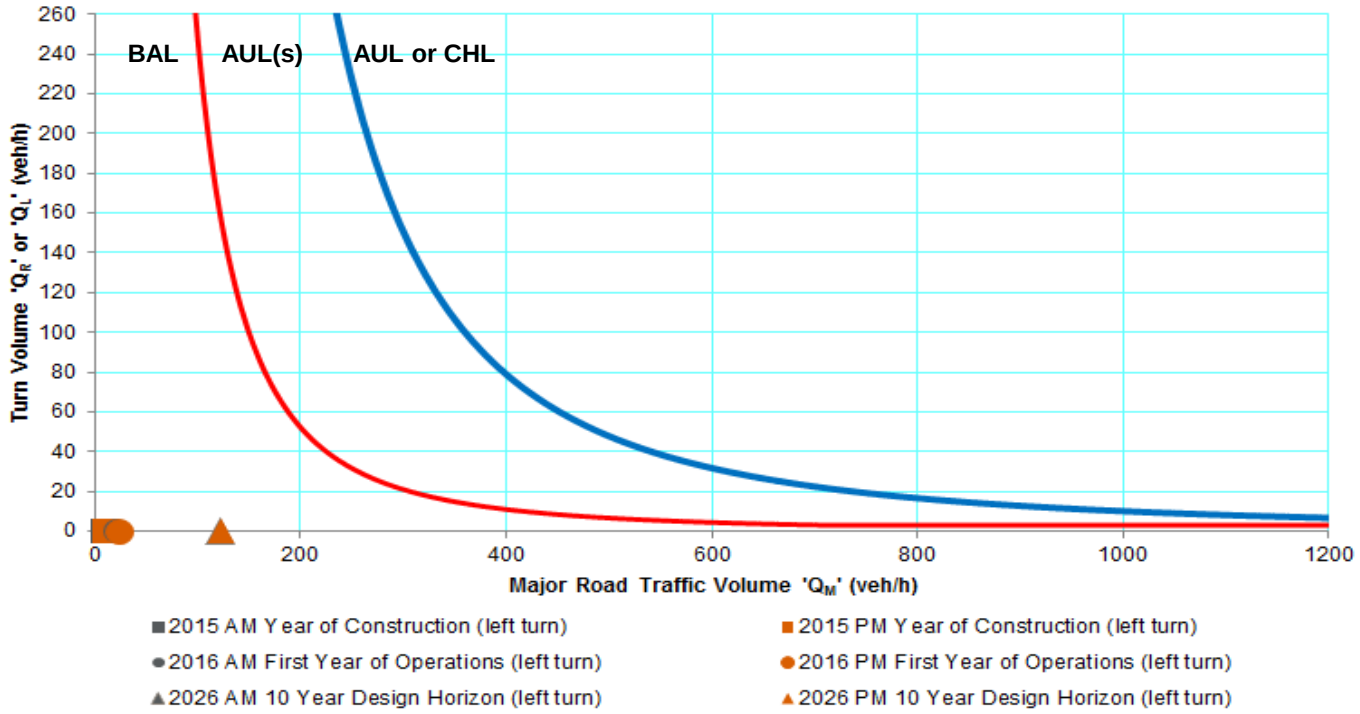
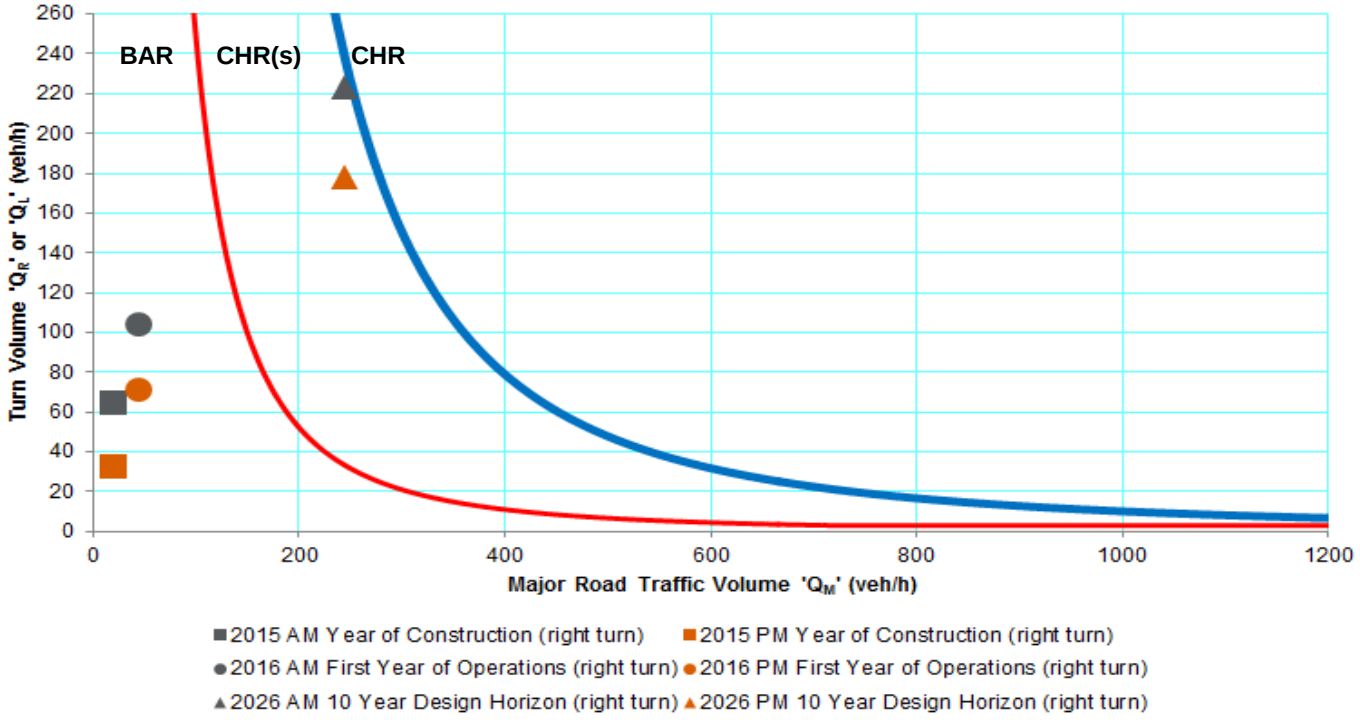
TURN WARRANT ASSESSMENT - LEFT TURN [A] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

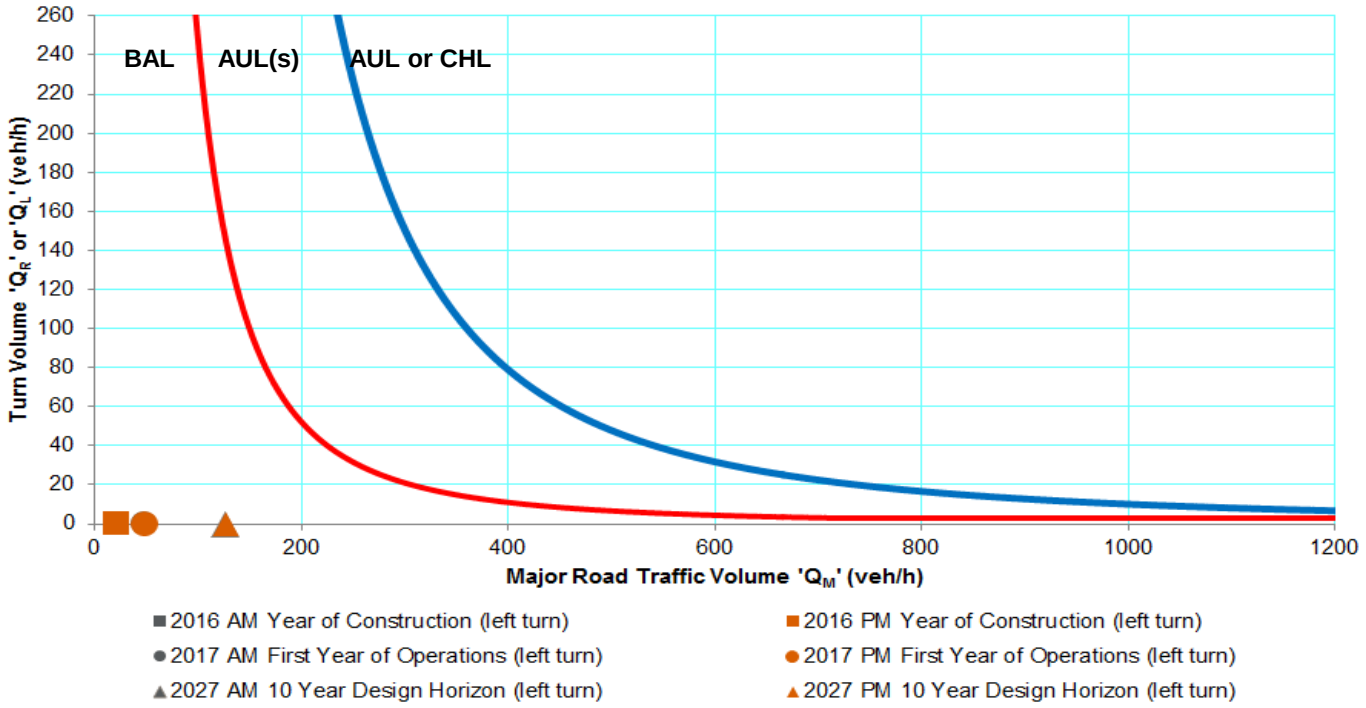
TURN WARRANT ASSESSMENT - RIGHT TURN [A] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

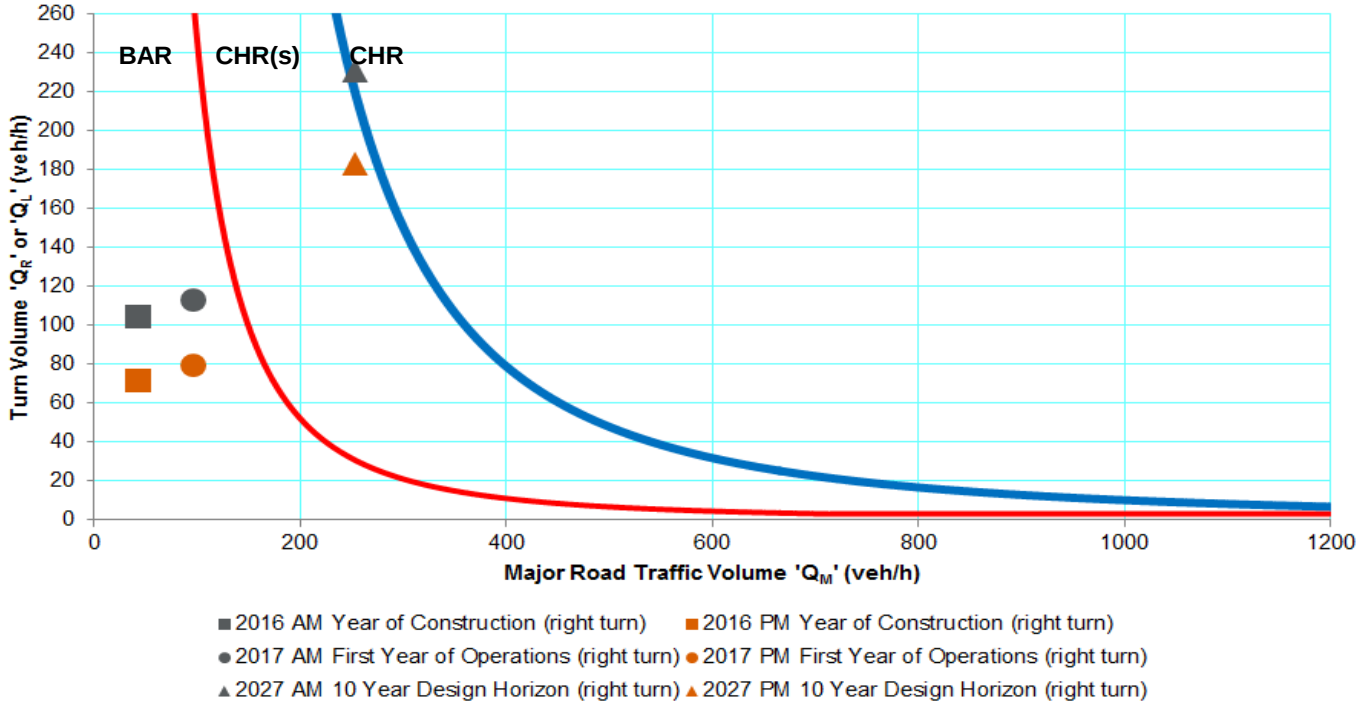
Fig No. E1 - J	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [A] - (TWAF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN [A] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

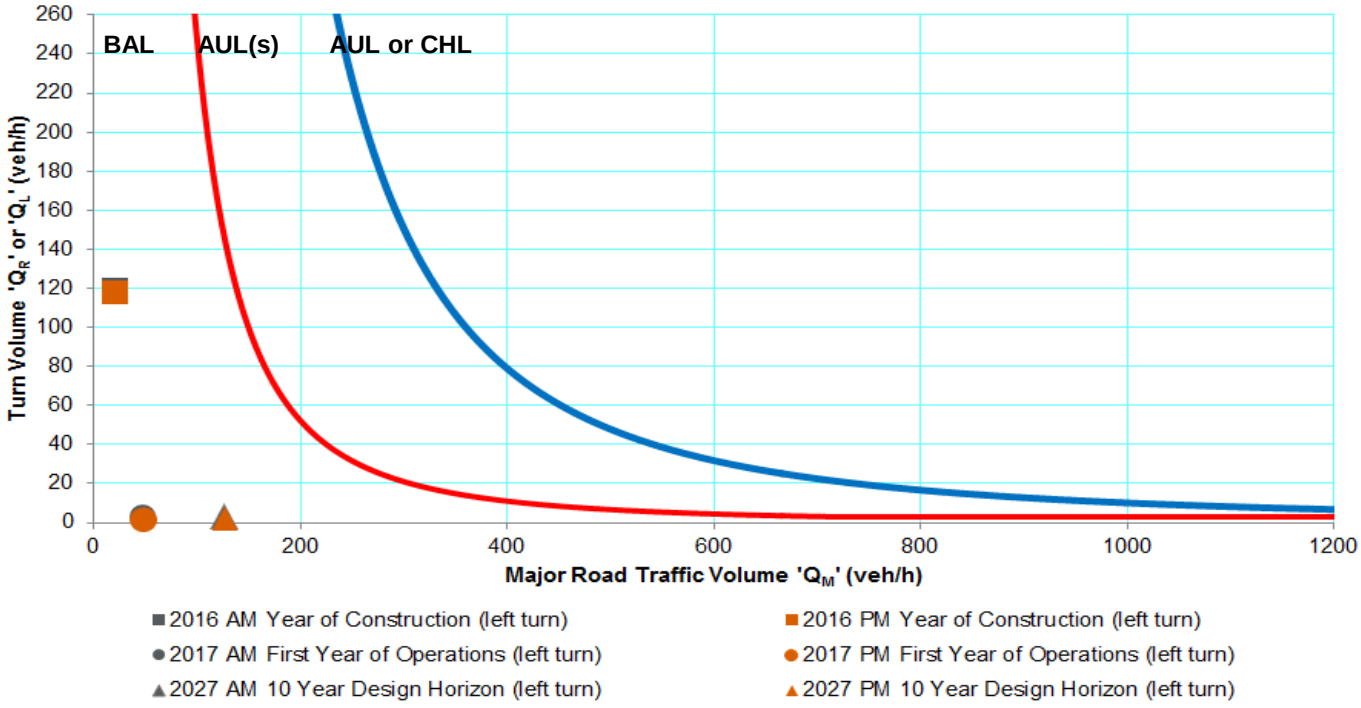
TURN WARRANT ASSESSMENT - RIGHT TURN [A] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

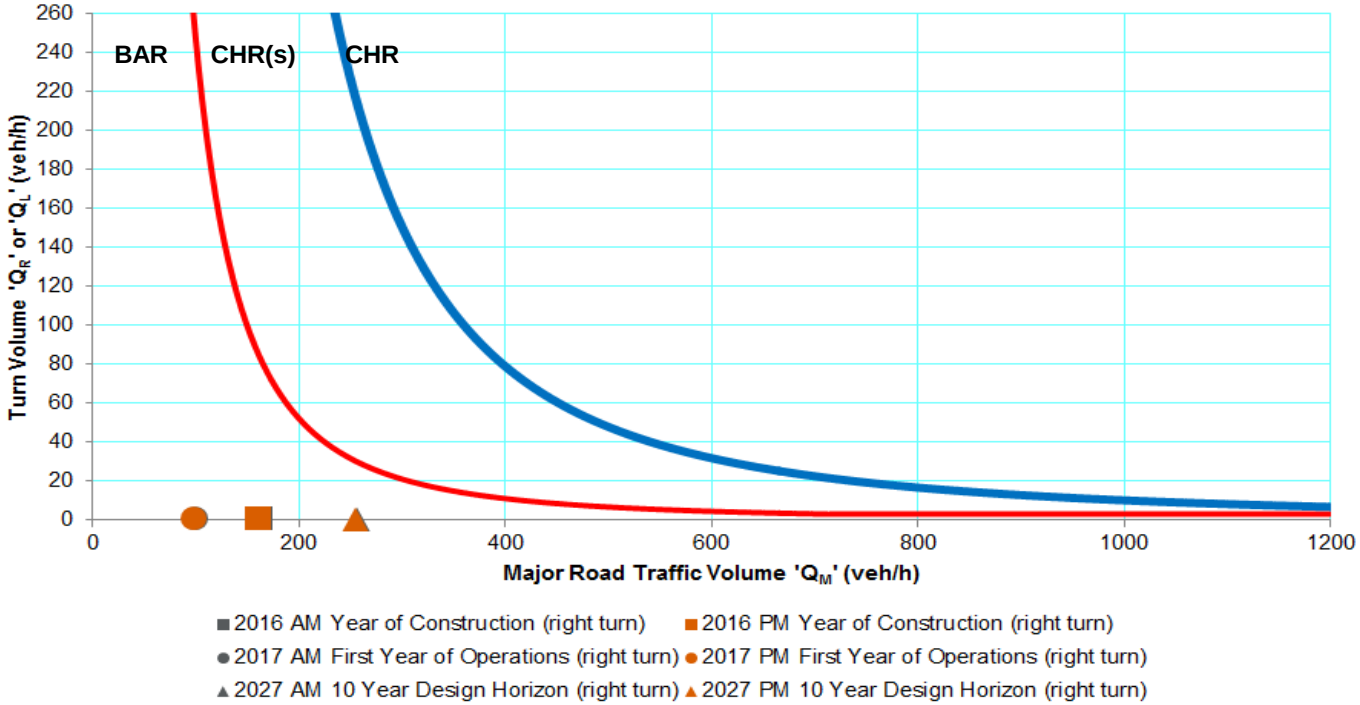
Fig No. E1 - K	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [A] - (CGPF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN [B] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

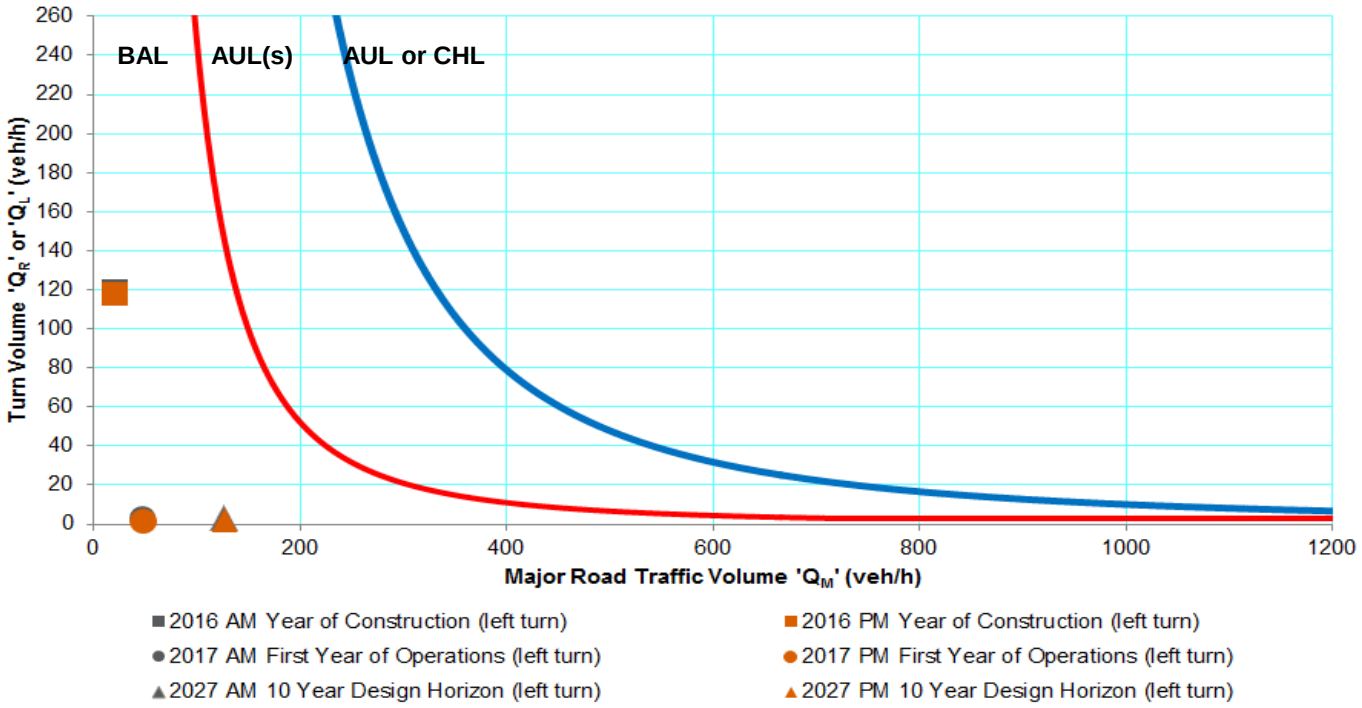
TURN WARRANT ASSESSMENT - RIGHT TURN [B] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

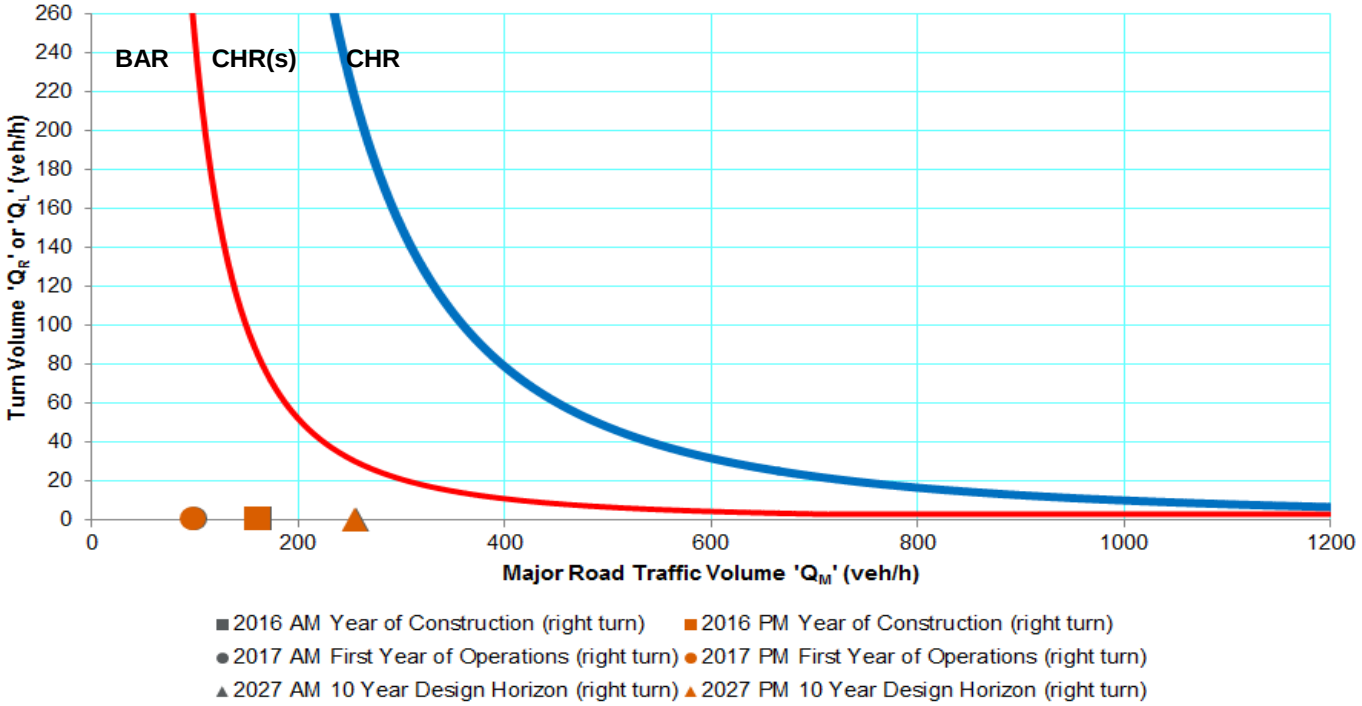
Fig No. E1 - L	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [B] - (TWAF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN [B] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

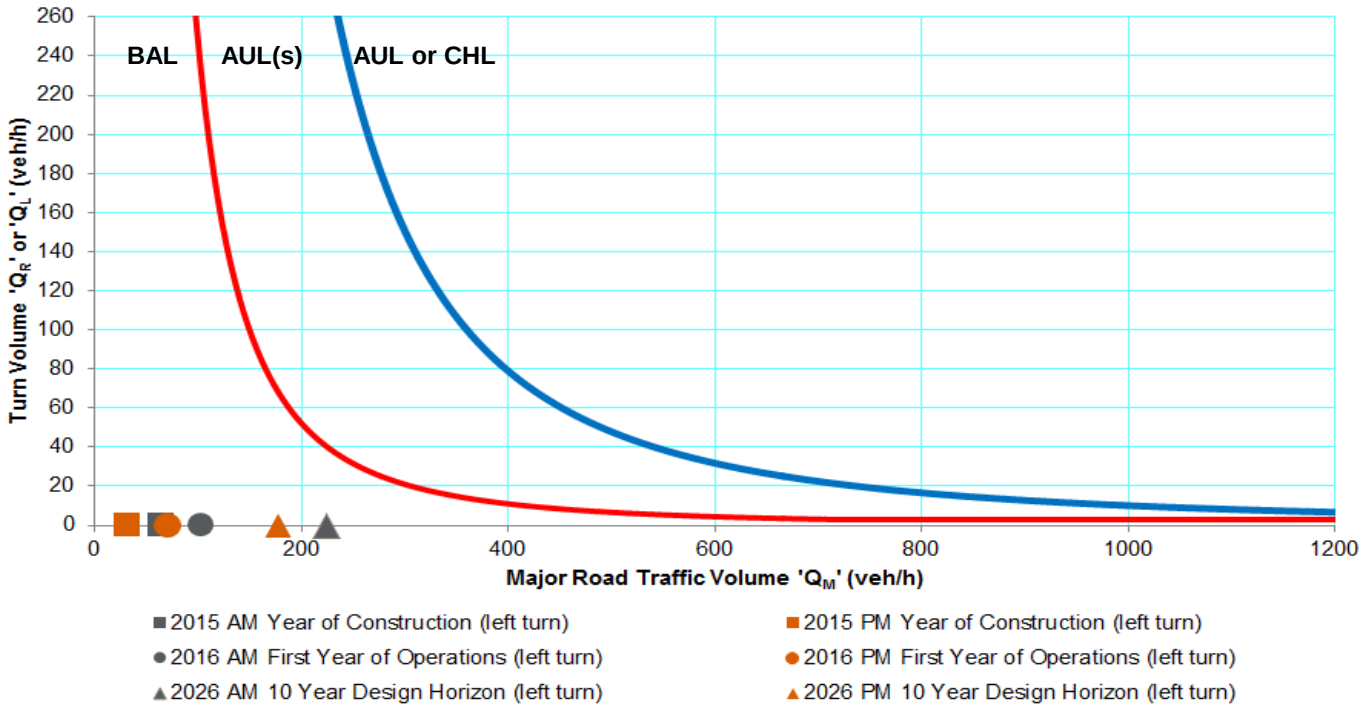
TURN WARRANT ASSESSMENT - RIGHT TURN [B] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

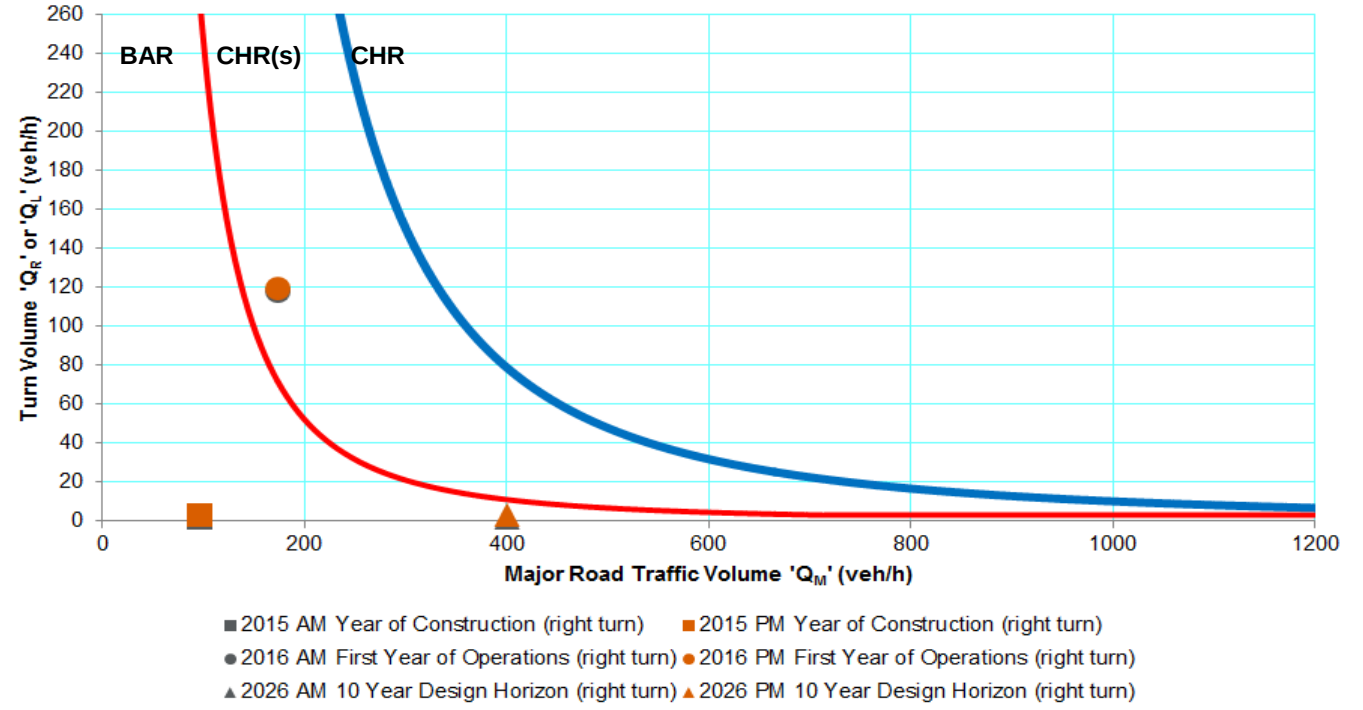
Fig No. E1 - M	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [B] - (CGPF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN [C] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

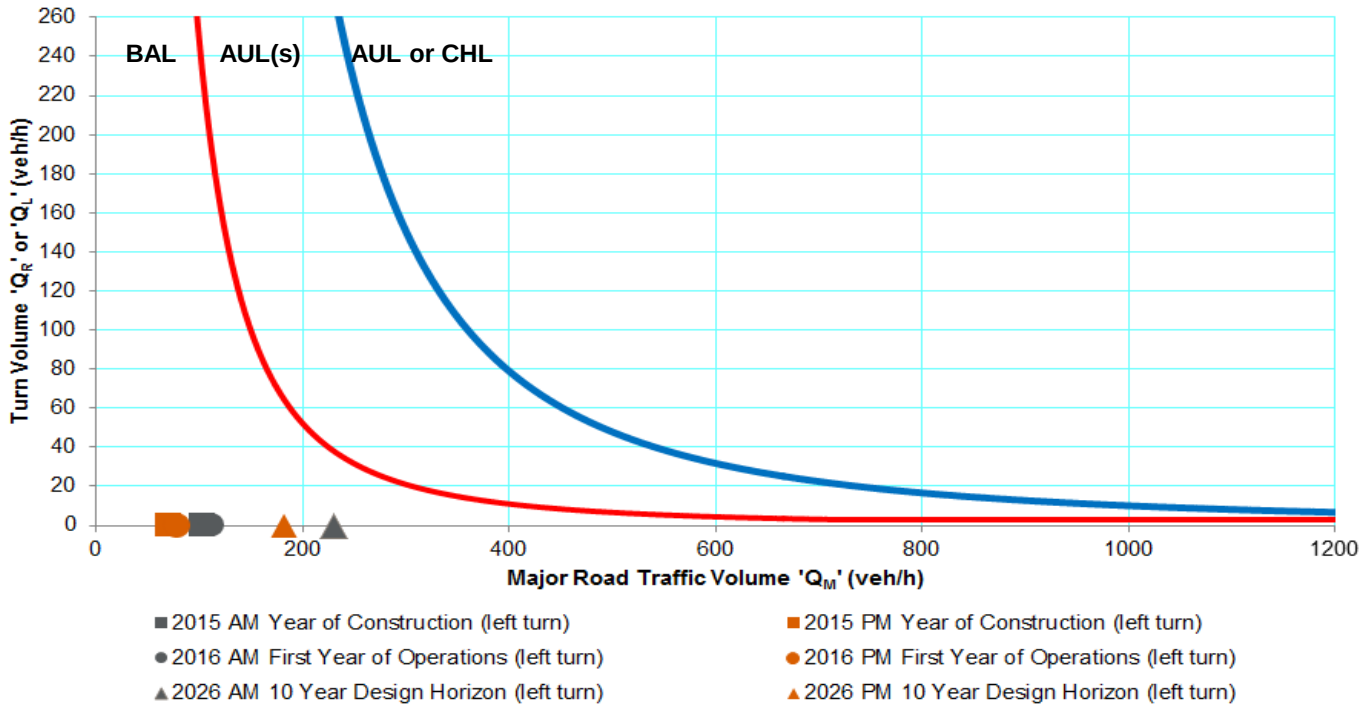
TURN WARRANT ASSESSMENT - RIGHT TURN [C] - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

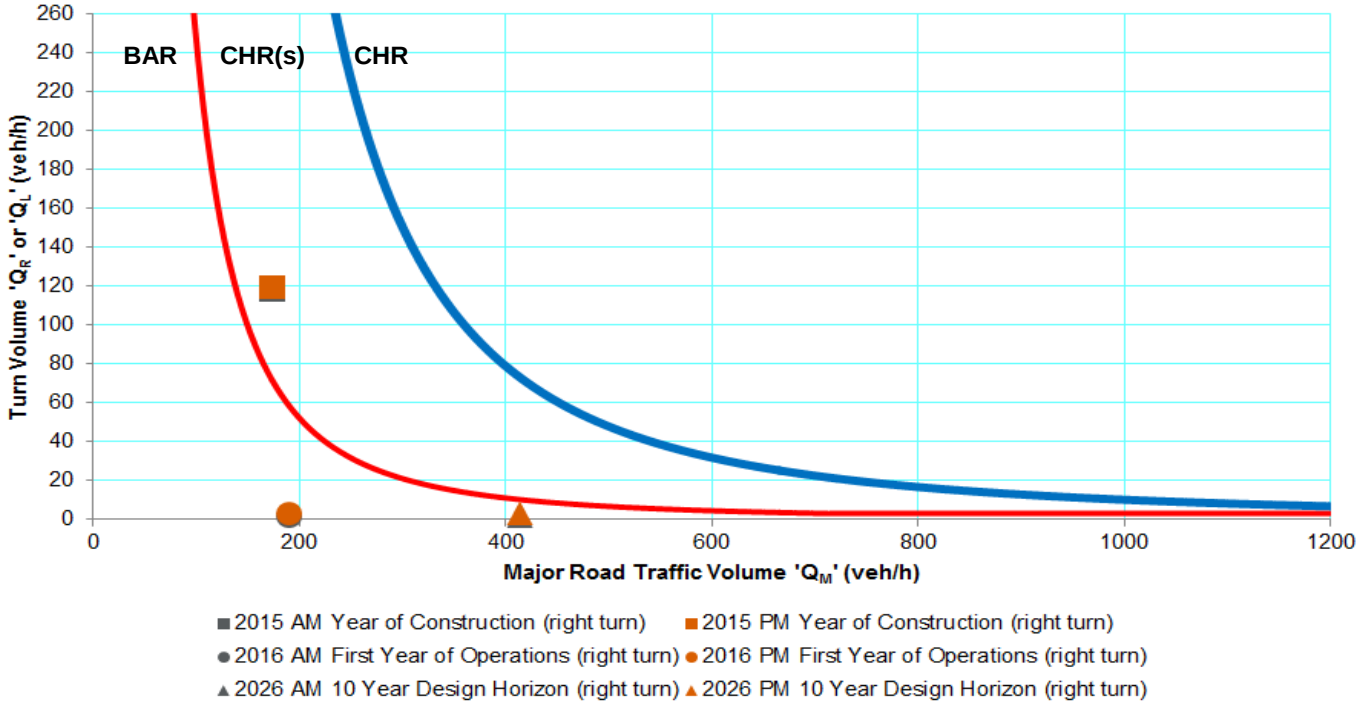
Fig No. E1 - N	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [C] - (TWAF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN [C] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

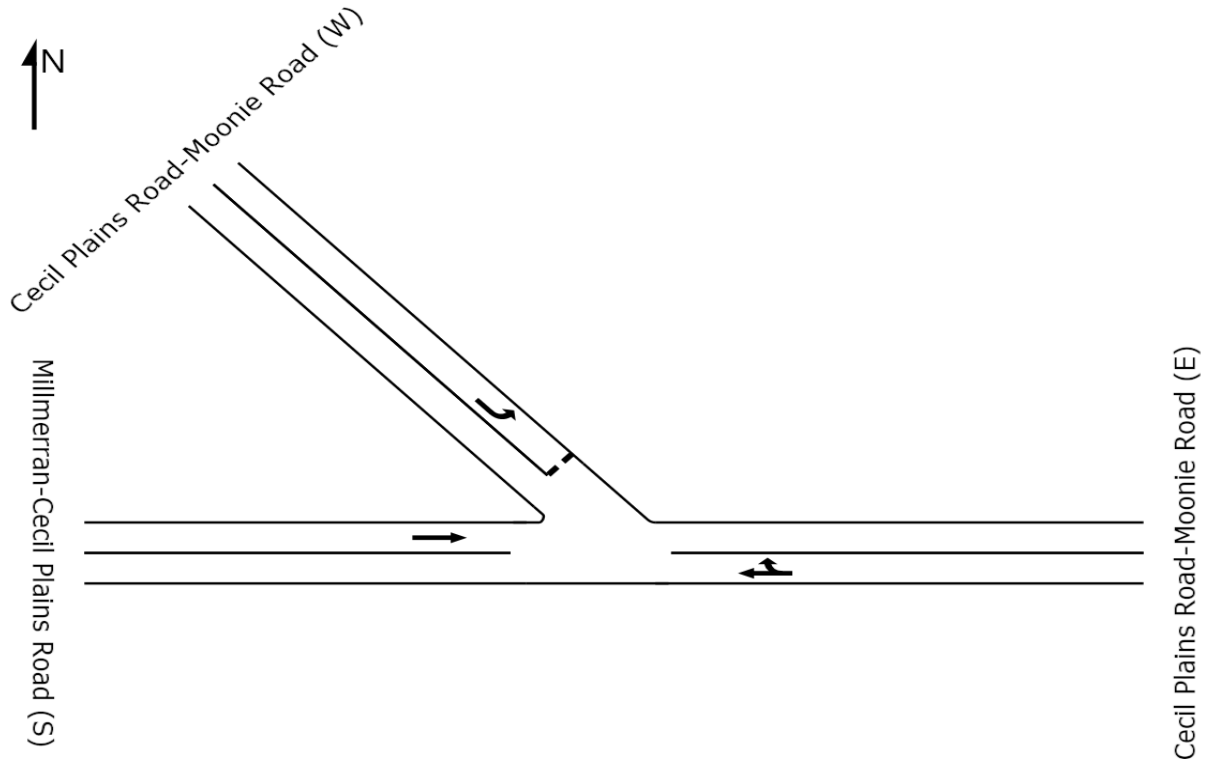
TURN WARRANT ASSESSMENT - RIGHT TURN [C] - CGPF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

Fig No. E1 - O	Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Turn Warrant Assessment [C] - (CGPF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION [A]

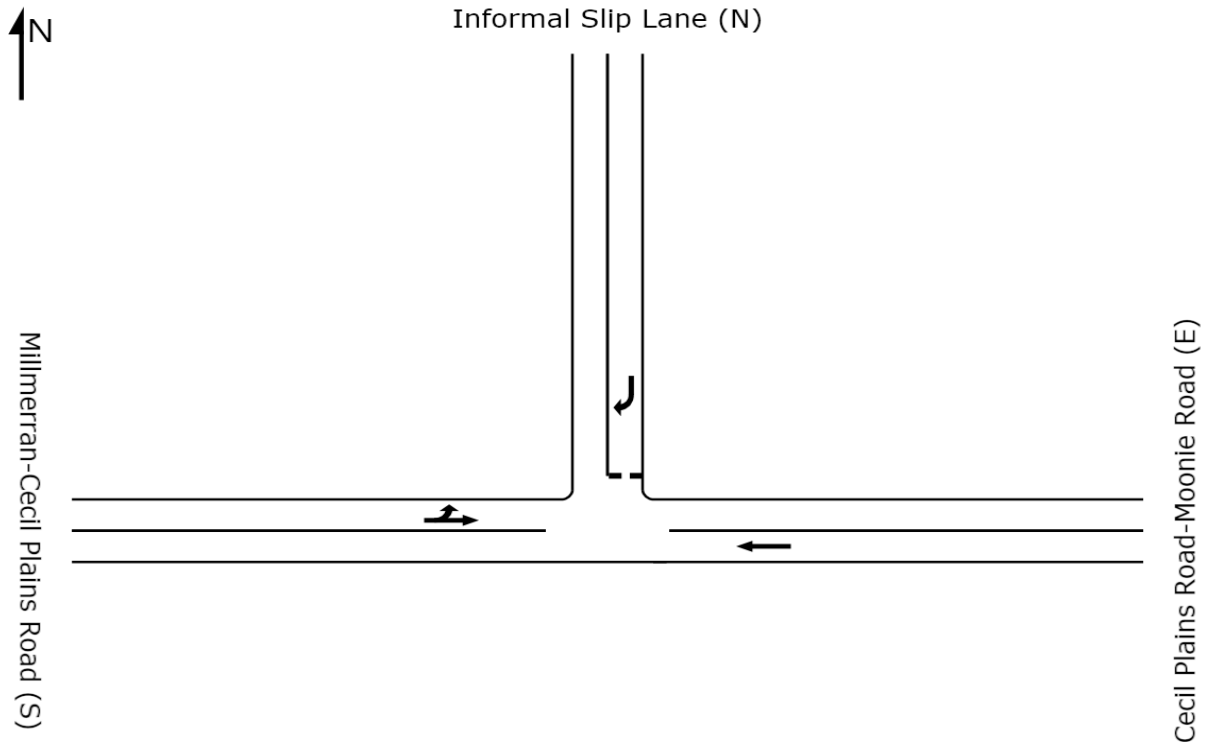


OPERATIONAL ANALYSIS - SUMMARY OF RESULTS [A]

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	71 vehs	0.03	12 secs	1 m	71 vehs	0.03	12 secs	1 m	✓
2015 Year of Construction (TWAF_DA9)	125 vehs	0.05	12 secs	2 m	117 vehs	0.06	12 secs	2 m	✓
2016 Year of Construction (CGPF_DA9)	232 vehs	0.09	12 secs	4 m	232 vehs	0.09	12 secs	3 m	✓
2016 1st Year of Operations (TWAF_DA9)	232 vehs	0.09	12 secs	4 m	232 vehs	0.09	12 secs	3 m	✓
2017 1st Year of Operations (CGPF_DA9)	305 vehs	0.11	12 secs	5 m	305 vehs	0.10	12 secs	4 m	✓
2026 10 Year Design Horizon (TWAF_DA9)	721 vehs	0.27	13 secs	13 m	721 vehs	0.23	13 secs	11 m	✓
2027 10 Year Design Horizon (CGPF_DA9)	703 vehs	0.26	13 secs	13 m	703 vehs	0.23	13 secs	11 m	✓

Fig No. **E1 - P**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Operational Assessment [A]**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION [B]

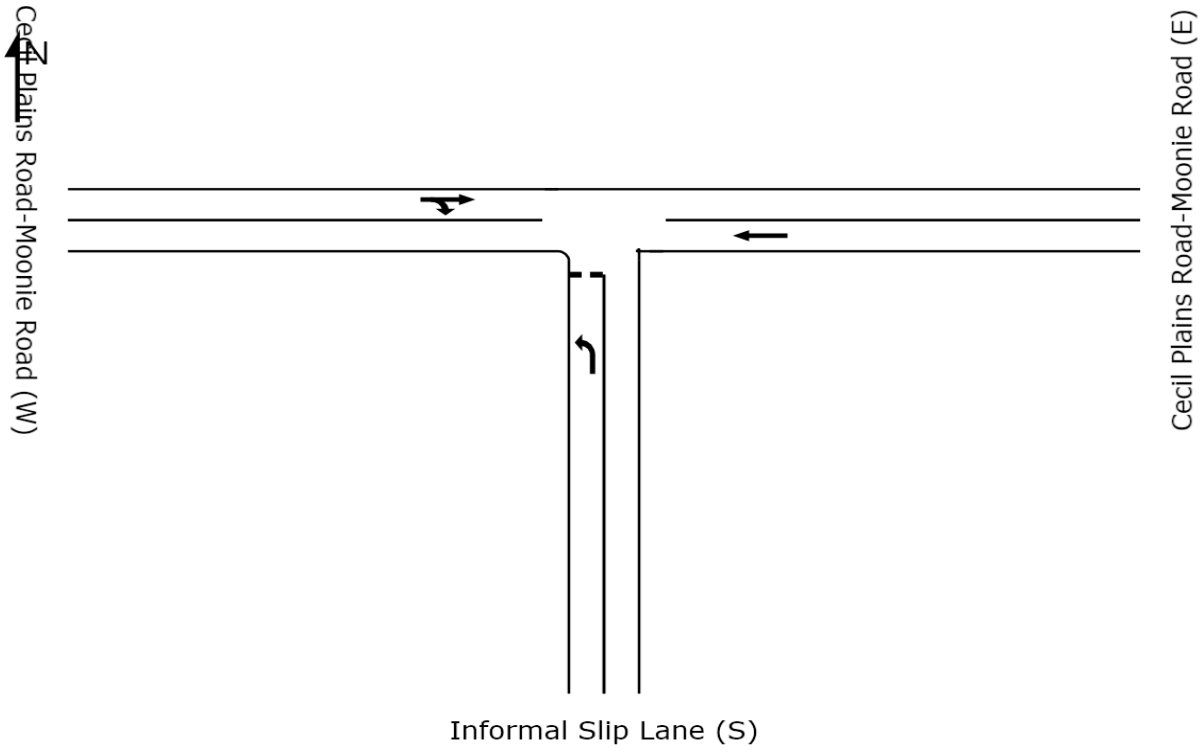


OPERATIONAL ANALYSIS - SUMMARY OF RESULTS [B]

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	23 vehs	0.01	12 secs	0 m	23 vehs	0.01	12 secs	0 m	✓
2015 Year of Construction (TWAF_DA9)	25 vehs	0.01	12 secs	0 m	25 vehs	0.01	12 secs	0 m	✓
2016 Year of Construction (CGPF_DA9)	296 vehs	0.16	13 secs	5 m	296 vehs	0.16	13 secs	5 m	✓
2016 1st Year of Operations (TWAF_DA9)	296 vehs	0.16	13 secs	5 m	296 vehs	0.16	13 secs	5 m	✓
2017 1st Year of Operations (CGPF_DA9)	106 vehs	0.03	13 secs	0 m	106 vehs	0.03	13 secs	0 m	✓
2026 10 Year Design Horizon (TWAF_DA9)	285 vehs	0.08	15 secs	0 m	285 vehs	0.08	15 secs	0 m	✓
2027 10 Year Design Horizon (CGPF_DA9)	273 vehs	0.08	14 secs	0 m	273 vehs	0.08	14 secs	0 m	✓

Fig No. **E1 - Q**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Operational Assessment [B]**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION [C]



OPERATIONAL ANALYSIS - SUMMARY OF RESULTS [C]

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	54 vehs	0.02	12 secs	0 m	54 vehs	0.03	12 secs	1 m	✓
2015 Year of Construction (TWAF_DA9)	106 vehs	0.04	12 secs	1m	106 vehs	0.04	12 secs	2 m	✓
2016 Year of Construction (CGPF_DA9)	433 vehs	0.13	13 secs	6 m	433 vehs	0.15	12 secs	7 m	✓
2016 1st Year of Operations (TWAF_DA9)	433 vehs	0.13	13 secs	6 m	433 vehs	0.15	12 secs	7 m	✓
2017 1st Year of Operations (CGPF_DA9)	205 vehs	0.07	13 secs	2 m	205 vehs	0.07	12 secs	3 m	✓
2026 10 Year Design Horizon (TWAF_DA9)	446 vehs	0.14	13 secs	7 m	446 vehs	0.14	13 secs	8 m	✓
2027 10 Year Design Horizon (CGPF_DA9)	441 vehs	0.14	13 secs	7 m	441 vehs	0.14	13 secs	8 m	✓

Fig No. **E1 - R**	**Intersection of Cecil Plains-Moonie Road/Millmerran-Cecil Plains Road - Operational Assessment [C]**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

LOCALITY PLAN

AERIAL PHOTO

Fig No. **E2 - A**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION PHOTOS

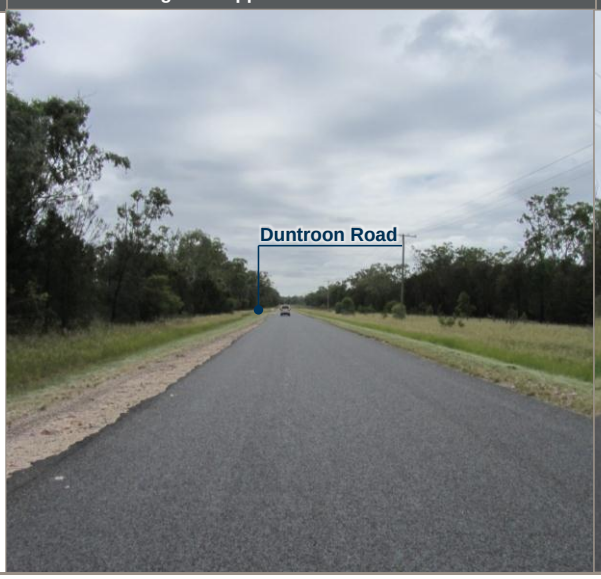
Approach	Looking South Approx. 200m from Intersection	Looking North from Intersection
Northern Approach - Duntroon Road		
Approach	**Looking West Approx. 200m from Intersection**	**Looking East from Intersection**
Eastern Approach - Cecil Plains-Moonie Road		
Approach	**Looking East Approx. 200m from Intersection**	**Looking West from Intersection**
Western Approach - Cecil Plains-Moonie Road		

Fig No. **E2 - B**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Photos**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION DETAILS

Approach	Road Name	Jurisdiction
Northern	Duntroon Road	Toowoomba Regional Council
Eastern	Cecil Plains-Moonie Road	Toowoomba Regional Council
Western	Cecil Plains-Moonie Road	Toowoomba Regional Council

SPEED LIMITS

Approach	Speed Limit	Comment
Northern	100 km/h	Deafult Rural Speed Limit
Eastern	100 km/h	Speed Sign Located East of Intersection
Western	100 km/h	Deafult Rural Speed Limit

TURN TREATMENTS

Approach	Left Turn	Right Turn
Northern	Nil	Nil
Eastern	Nil	Nil
Western	Nil	Nil

SIGHT DISTANCES

Approach	Safe Intersection Sight Distance	Approach Stopping Distance
Northern	300m +	200m +
Eastern	300m +	200m +
Western	300m +	200m +

PAVEMENT CONDITIONS

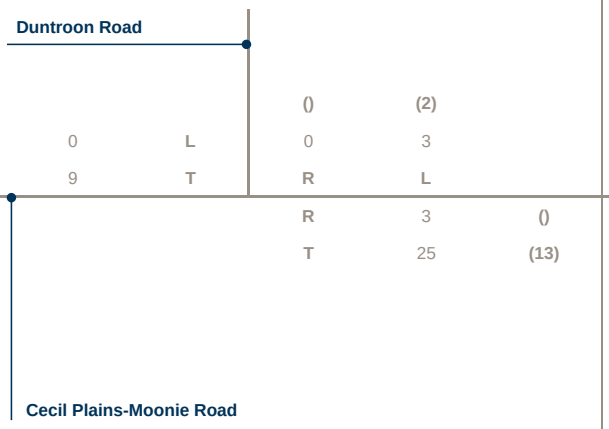
Approach	Condition	Comments
Northern	Loose Gravel	-
Eastern	Sealed	-
Western	Sealed	-

Fig No. **E2 - C**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Physical Properties**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

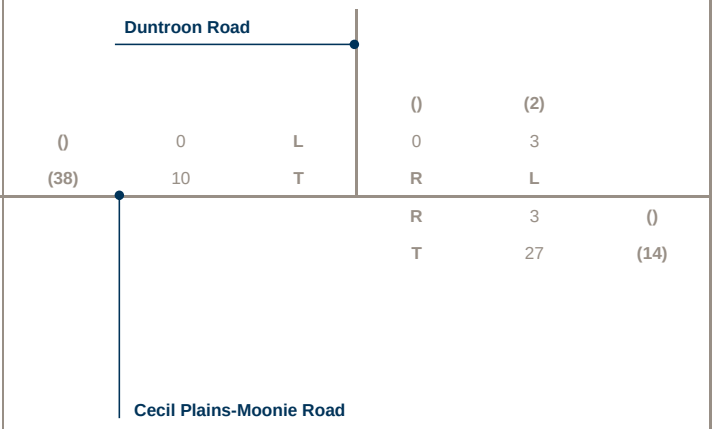
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - TWAF_DA9)

Surveyed Traffic Volumes (2013)

AM Peak	6:30am to 7:30am
PM Peak	4:30pm to 5:30pm



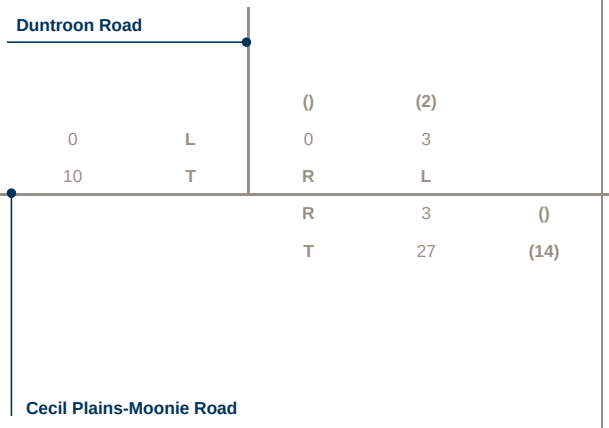
Background Traffic Volumes - Year of Construction (2015)



LEGEND					
L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

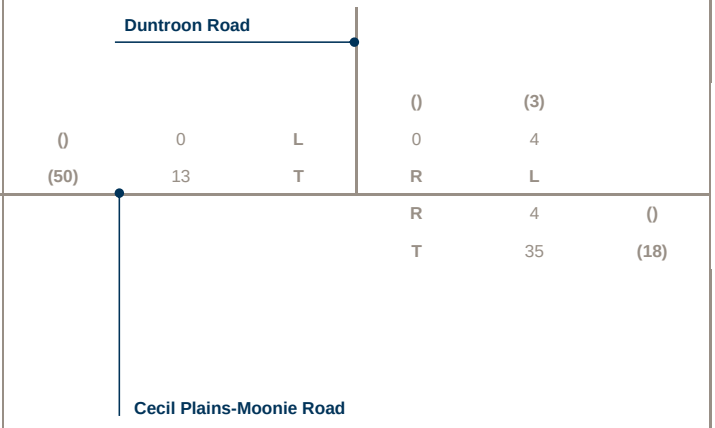
GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2015	3.00%	1.06

Background Traffic Volumes - Opening Year of Operations (2016)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2016	3.00%	1.09

Background Traffic Volumes - 10 Year Design Horizon (2026)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2026	3.00%	1.39

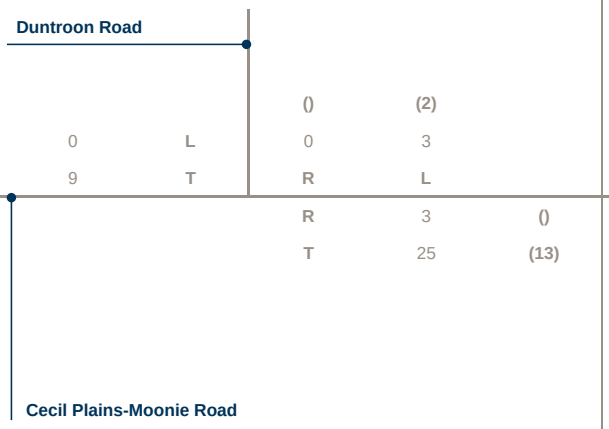
Fig No. **E2 - D**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Background Traffic - TWAF_DA9)**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

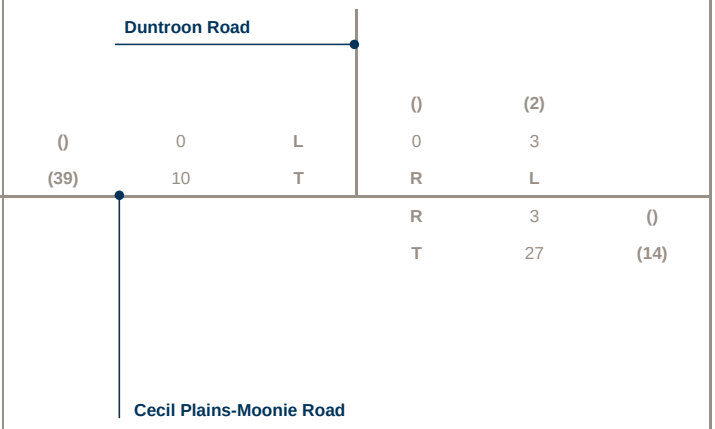
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - CGPF_DA8)

Surveyed Traffic Volumes (2013)

AM Peak	6:30am to 7:30am
PM Peak	4:30pm to 5:30pm



Background Traffic Volumes - Year of Construction (2016)



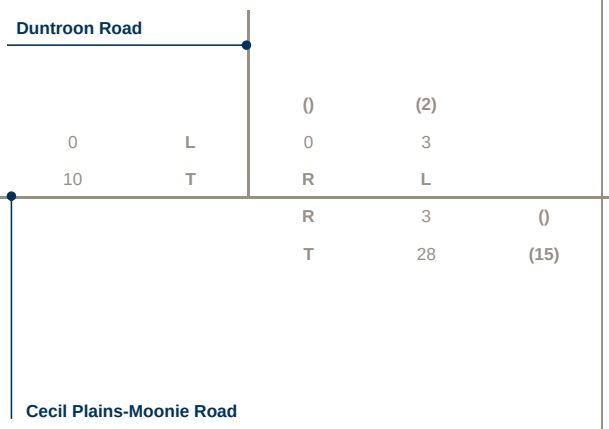
LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2016	3.00%	1.09

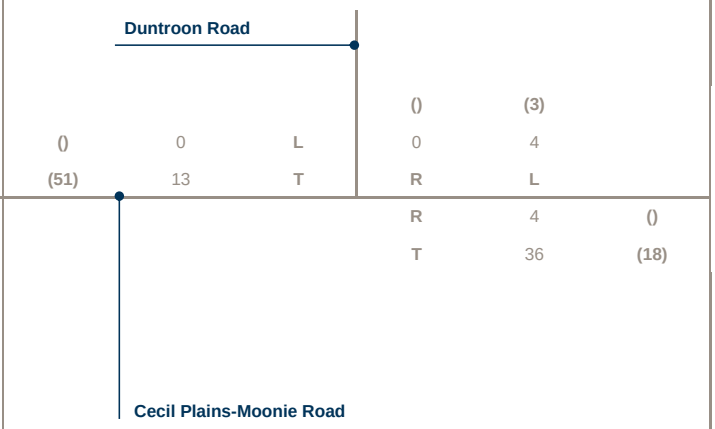
Background Traffic Volumes - Opening Year of Operations (2017)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2017	3.00%	1.12

Background Traffic Volumes - 10 Year Design Horizon (2027)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2027	3.00%	1.42

Fig No. **E2 - E**

Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Background Traffic - CGPF_DA8)

Cardno Shaping the Future

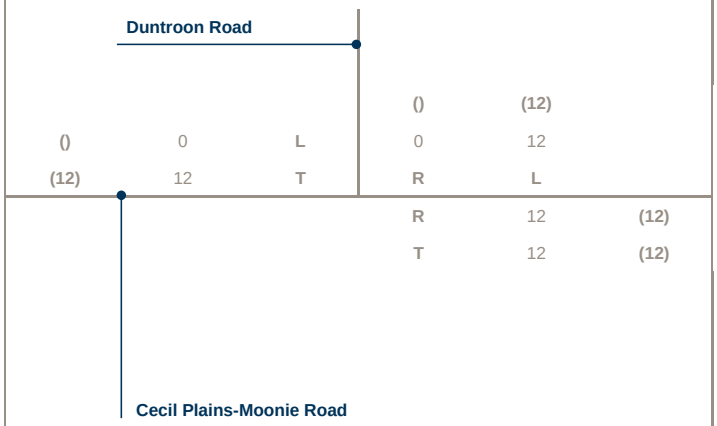
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - TWAF_DA9)

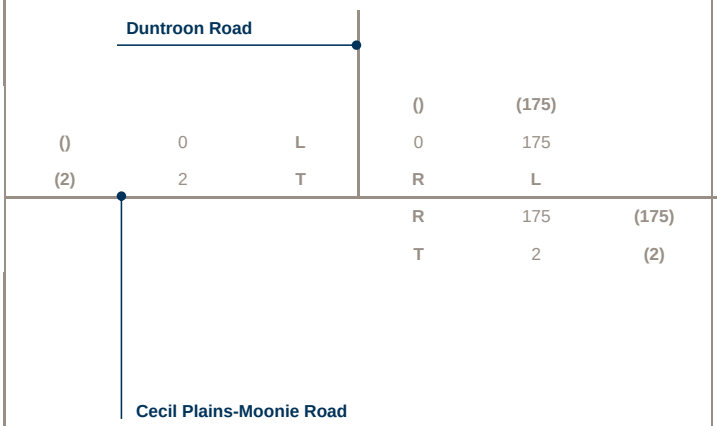
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

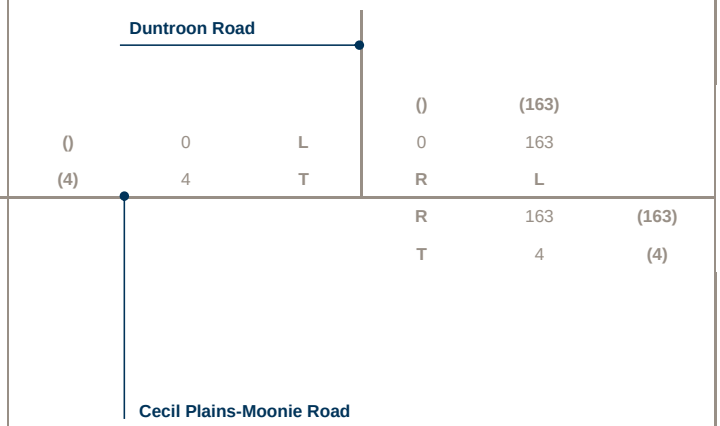
Project Traffic Volumes - Year of Construction (2015)



Project Traffic Volumes - Opening Year of Operations (2016)



Project Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E2 - F**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Project Traffic - TWAF_DA9)**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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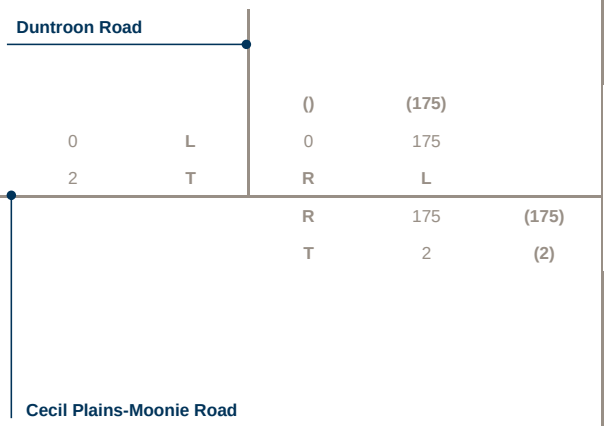
PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - CGPF_DA8)

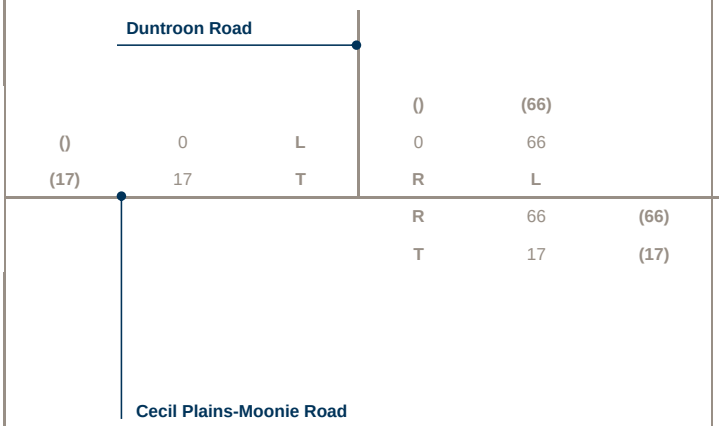
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

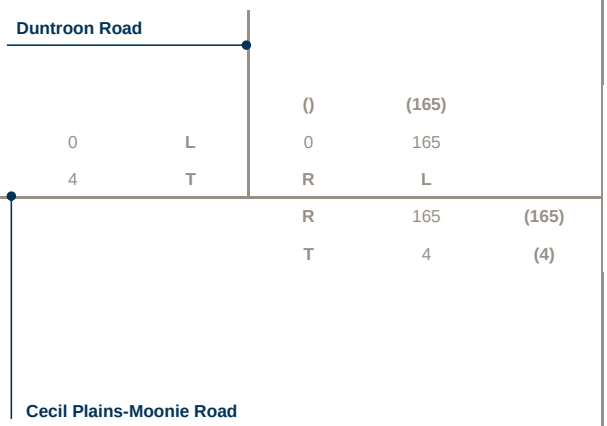
Project Traffic Volumes - Year of Construction (2016)



Project Traffic Volumes - Opening Year of Operations (2017)



Project Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

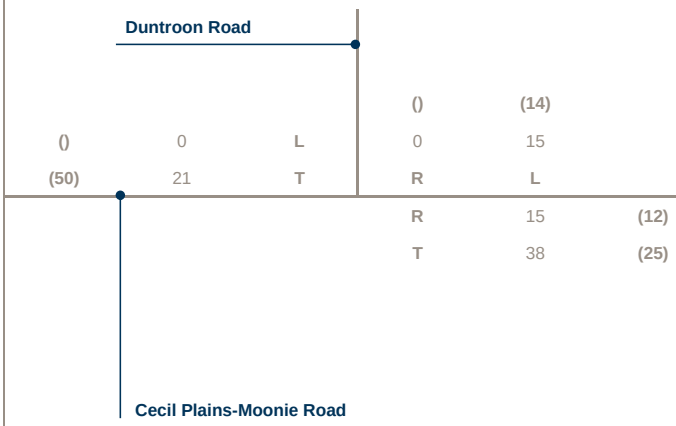
L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E2 - G**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Project Traffic - CGPF_DA8)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

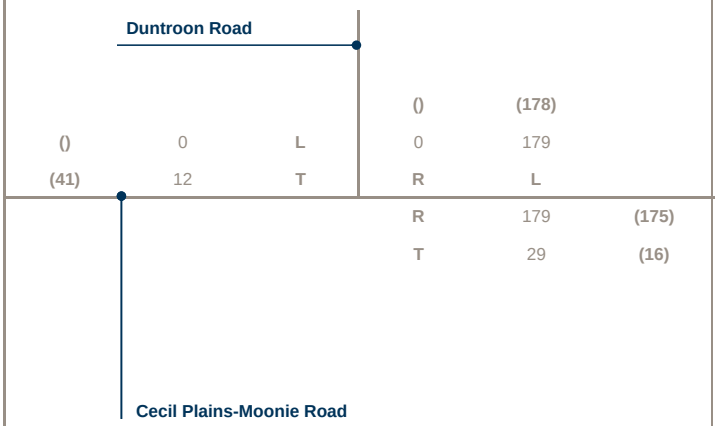
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - TWAF_DA9)

-

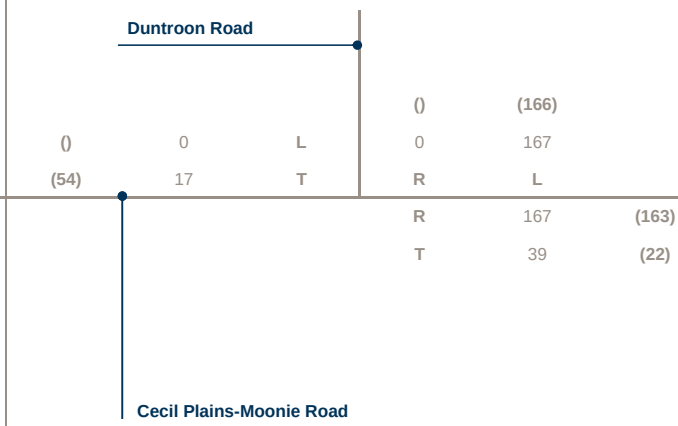
Design Traffic Volumes - Year of Construction (2015)



Design Traffic Volumes - Opening Year of Operations (2016)



Design Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E2 - H**

Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Design Traffic - TWAF_DA9)

Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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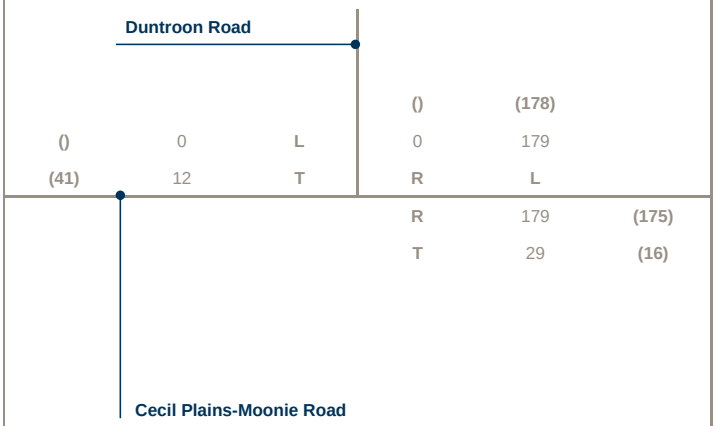
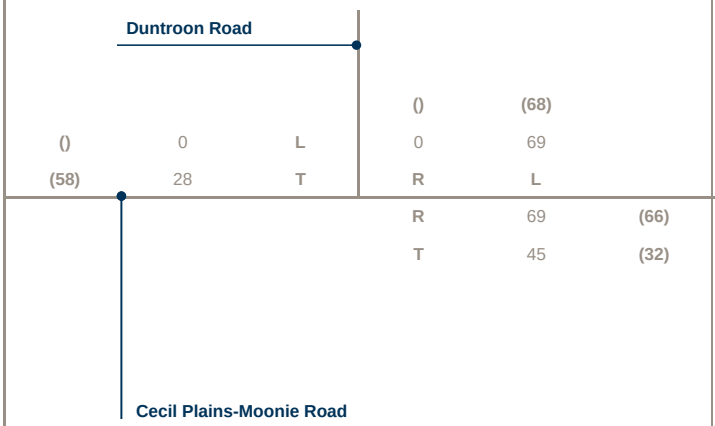
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - GCPF_DA8)

-

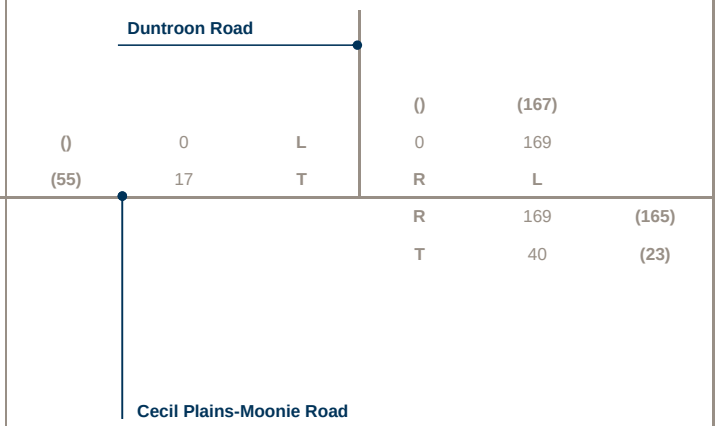
Design Traffic Volumes - Year of Construction (2016)



Design Traffic Volumes - Opening Year of Operations (2017)



Design Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E2 - I**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Intersection Volumes (Design Traffic - CGPF_DA8)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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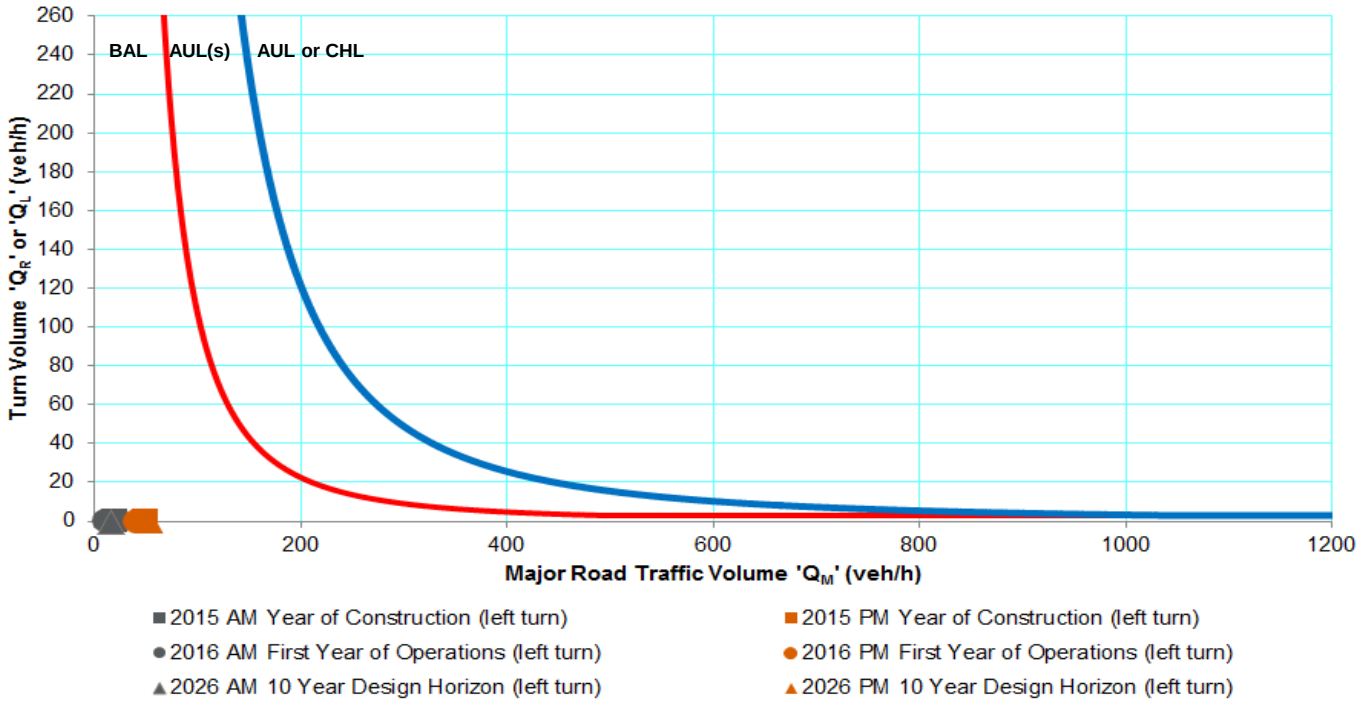
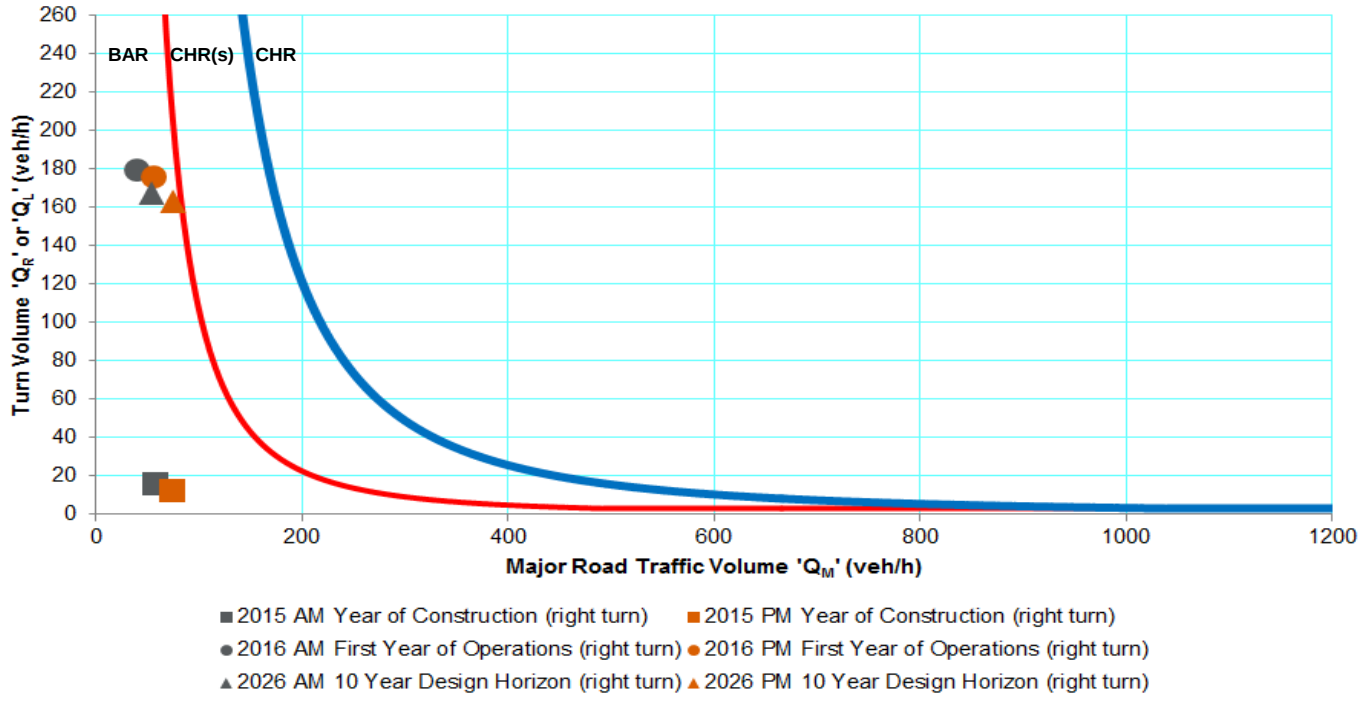
TURN WARRANT ASSESSMENT - LEFT TURN - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

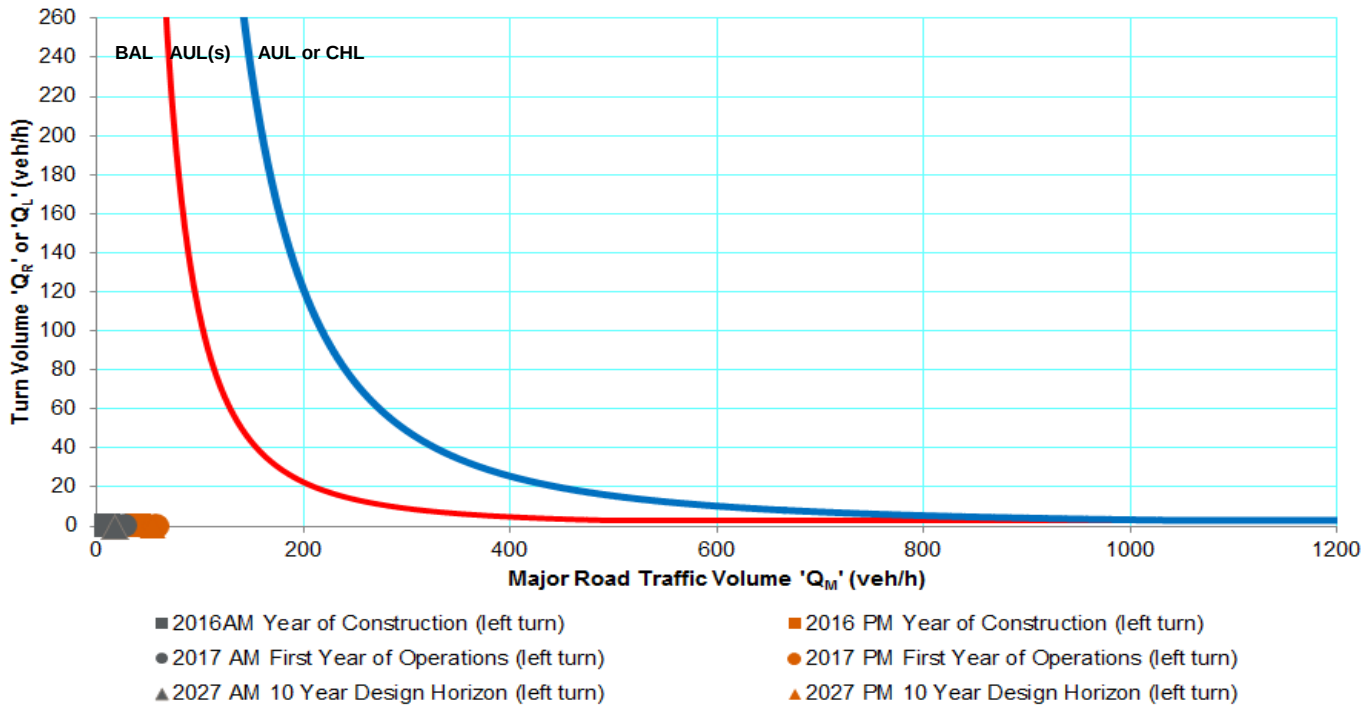
TURN WARRANT ASSESSMENT - RIGHT TURN - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

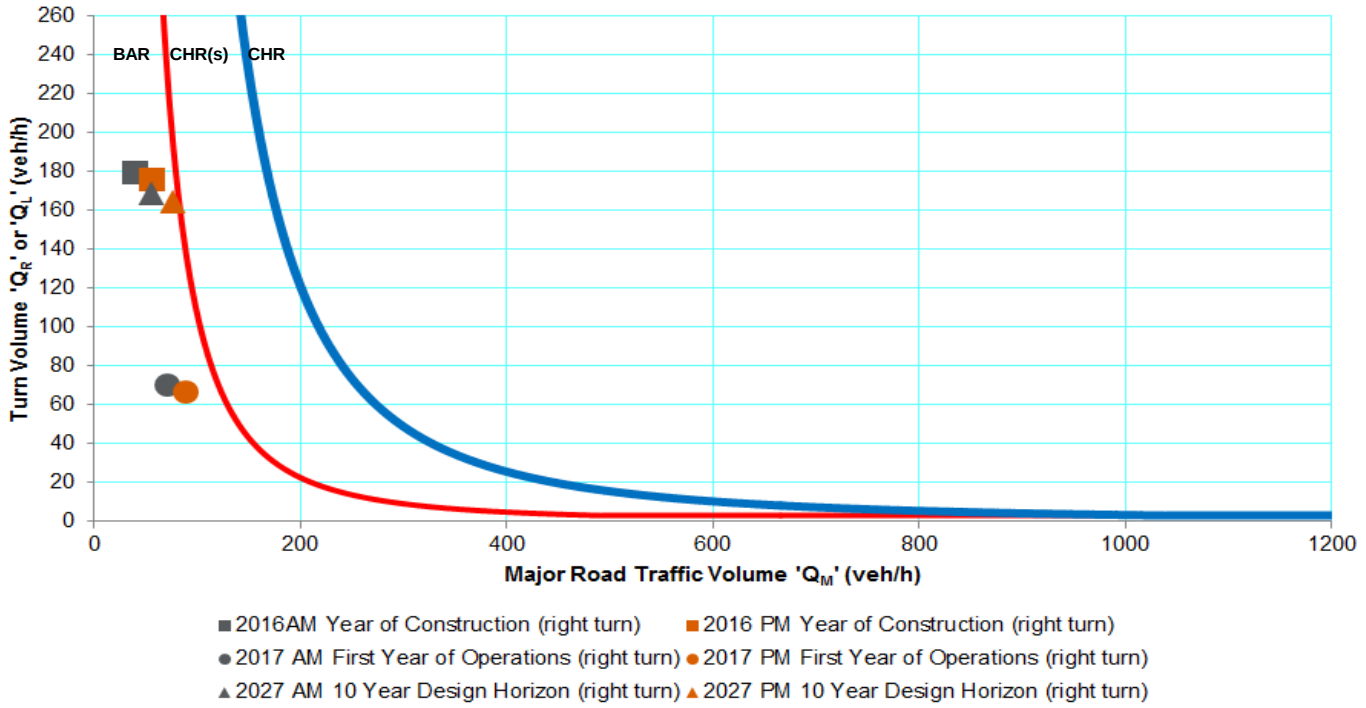
Fig No. E2 - J	Intersection of Cecil Plains-Moonie Road/Duntroon Road - Turn Warrant Assessment - (TWAF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN - CGPF_DA8



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

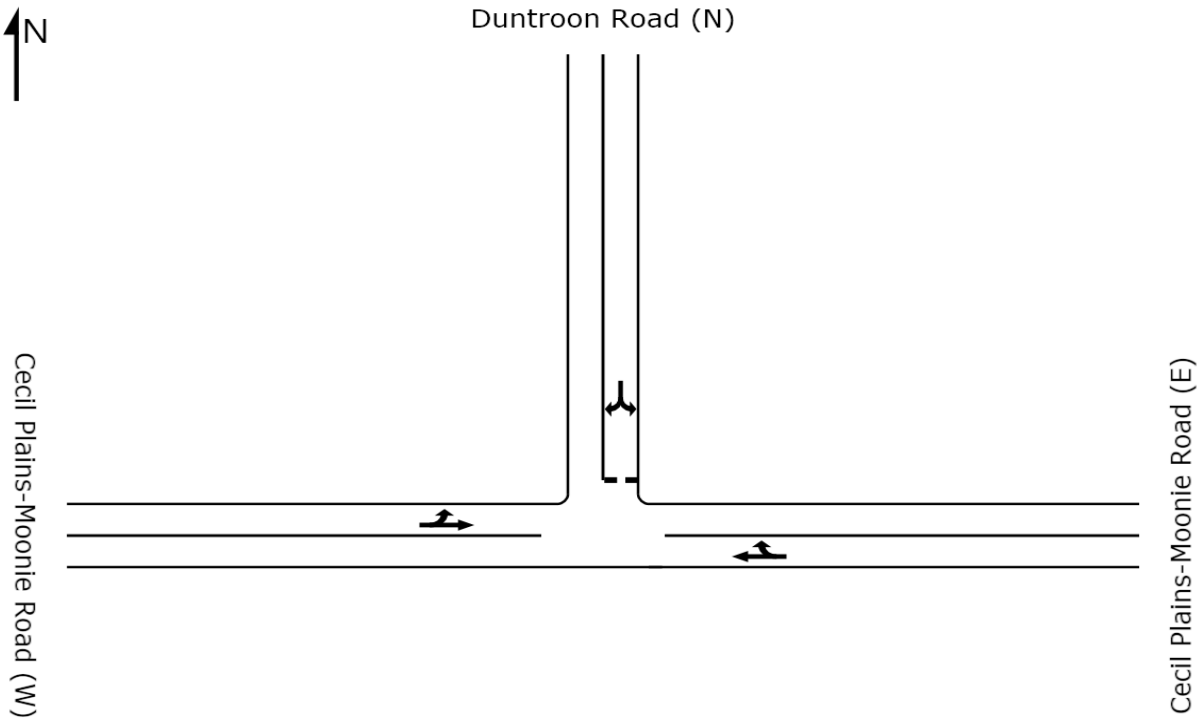
TURN WARRANT ASSESSMENT - RIGHT TURN - CGPF_DA8



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

Fig No. E2 - K	Intersection of Cecil Plains-Moonie Road/Duntroon Road - Turn Warrant Assessment - (CGPF_DA8)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION



OPERATIONAL ANALYSIS - SUMMARY OF RESULTS

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	44 vehs	0.02	14 secs	1 m	57 vehs	0.02	14 secs	1 m	✓
2015 Year of Construction (TWAF_DA9)	96 vehs	0.03	14 secs	1 m	108 vehs	0.03	14 secs	1 m	✓
2016 Year of Construction (CGPF_DA8)	422 vehs	0.16	14 secs	6 m	434 vehs	0.16	14 secs	6 m	✓
2016 1st Year of Operations (TWAF_DA9)	422 vehs	0.16	14 secs	6 m	434 vehs	0.16	14 secs	6 m	✓
2017 1st Year of Operations (CGPF_DA8)	224 vehs	0.08	14 secs	3 m	238 vehs	0.07	14 secs	3 m	✓
2026 10 Year Design Horizon (TWAF_DA9)	413 vehs	0.15	14 secs	6 m	428 vehs	0.15	14 secs	6 m	✓
2027 10 Year Design Horizon (CGPF_DA8)	418 vehs	0.15	14 secs	6 m	434 vehs	0.15	14 secs	6 m	✓

Fig No. **E2 - L**	**Intersection of Cecil Plains-Moonie Road/Duntroon Road - Operational Assessment**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

LOCALITY PLAN

AERIAL PHOTO

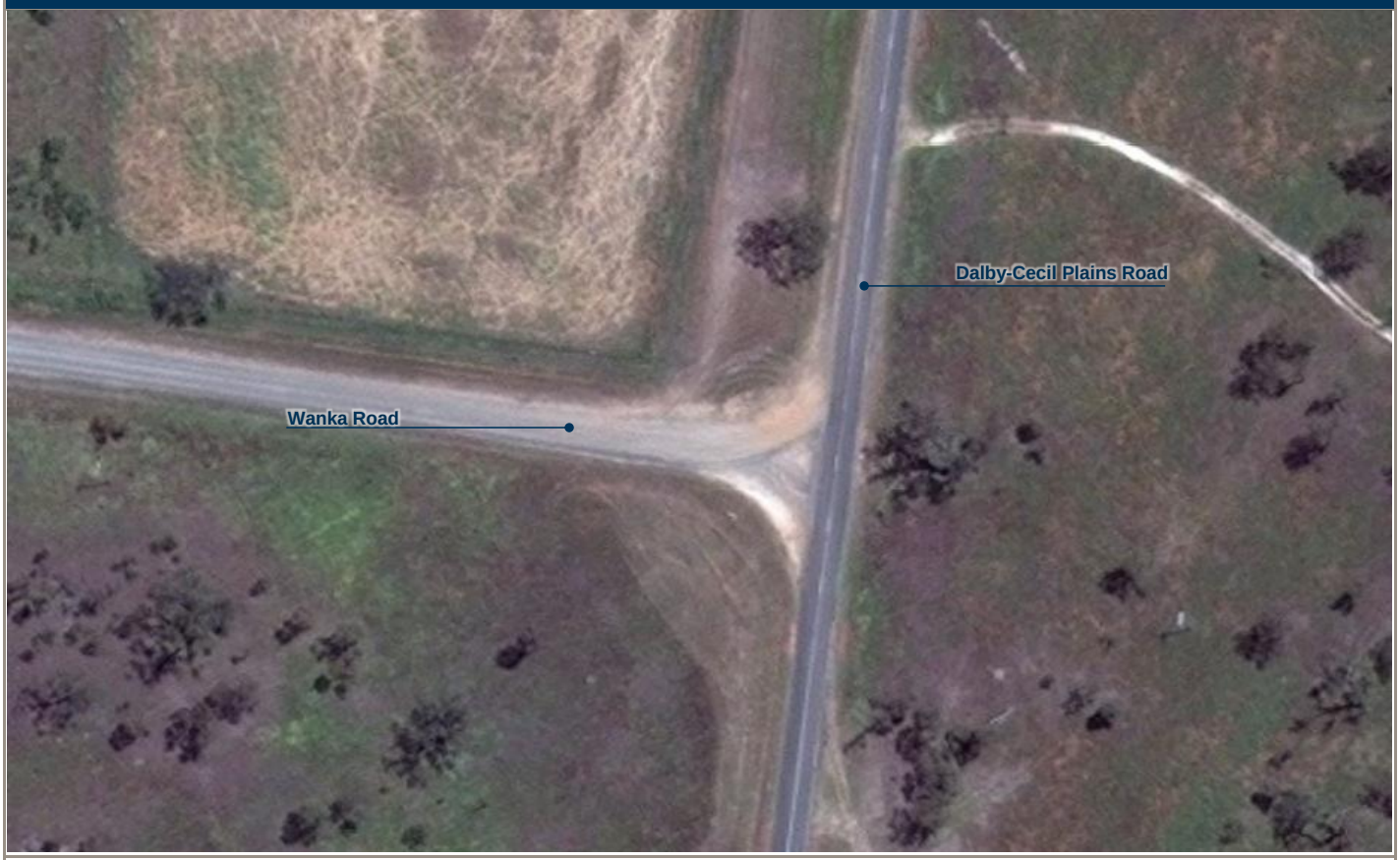


Fig No. **E3 - A**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION PHOTOS

Approach	Looking South Approx. 200m from Intersection	Looking North from Intersection
Northern Approach - Dalby-Cecil Plains Road		
Approach	**Looking North Approx. 200m from Intersection**	**Looking South from Intersection**
Southern Approach - Dalby-Cecil Plains Road		
Approach	**Looking East Approx. 200m from Intersection**	**Looking West from Intersection**
Western Approach - Wanka Road		

Fig No. **E3 - B**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Photos**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION DETAILS

Approach	Road Name	Jurisdiction
Northern	Dallby-Cecil Plains Road	Toowoomba Regional Council
Southern	Dallby-Cecil Plains Road	Toowoomba Regional Council
Western	Wanka Road	Toowoomba Regional Council

SPEED LIMITS

Approach	Speed Limit	Comment
Northern	100 km/h	Deafult Rural Speed Limit
Southern	100 km/h	Deafult Rural Speed Limit
Western	100 km/h	Deafult Rural Speed Limit

TURN TREATMENTS

Approach	Left Turn	Right Turn
Northern	Nil	Nil
Southern	Nil	Nil
Western	Nil	Nil

SIGHT DISTANCES

Approach	Safe Intersection Sight Distance	Approach Stopping Distance
Northern	300m +	200m +
Southern	265m	190m
Western	300m +	200m +

PAVEMENT CONDITIONS

Approach	Condition	Comments
Northern	Sealed	-
Southern	Sealed	-
Western	Loose Gravel	-

Fig No. **E3 - C**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Physical Properties**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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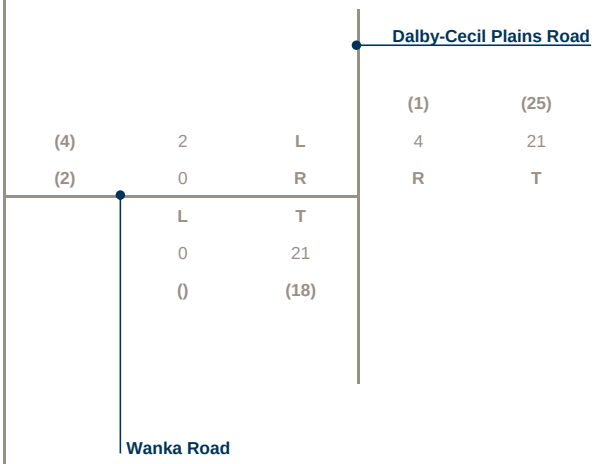
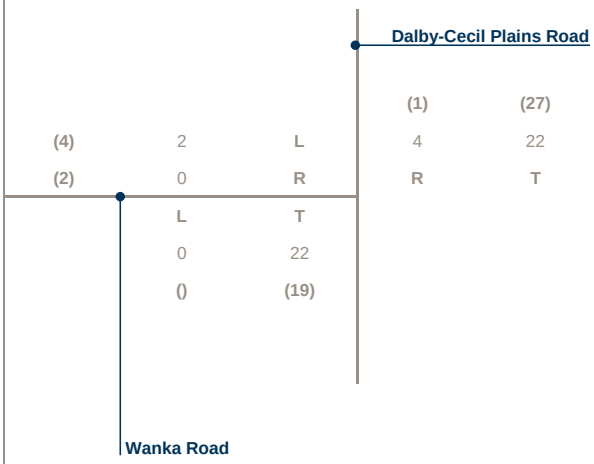
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - TWAF_DA9)

Surveyed Traffic Volumes (2013)

AM Peak	8:00am to 9:00am
PM Peak	4:45pm to 5:45pm



Background Traffic Volumes - Year of Construction (2015)



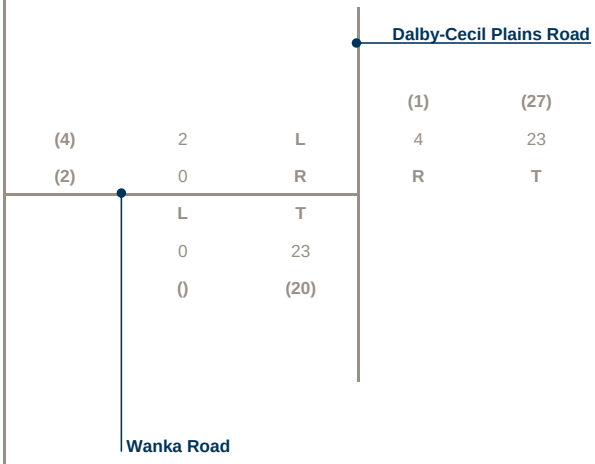
LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2015	3.00%	1.06

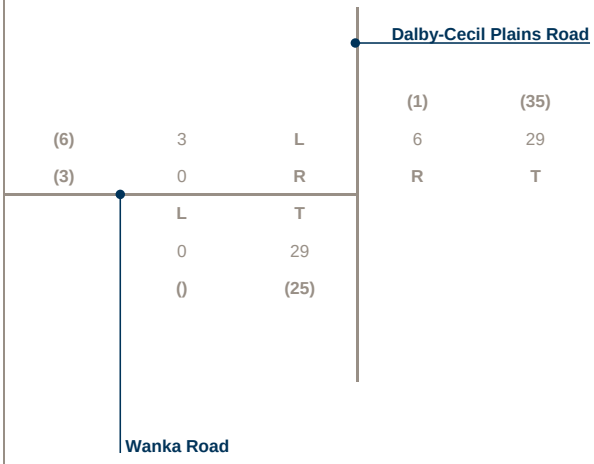
Background Traffic Volumes - Opening Year of Operations (2016)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2016	3.00%	1.09

Background Traffic Volumes - 10 Year Design Horizon (2026)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2026	3.00%	1.39

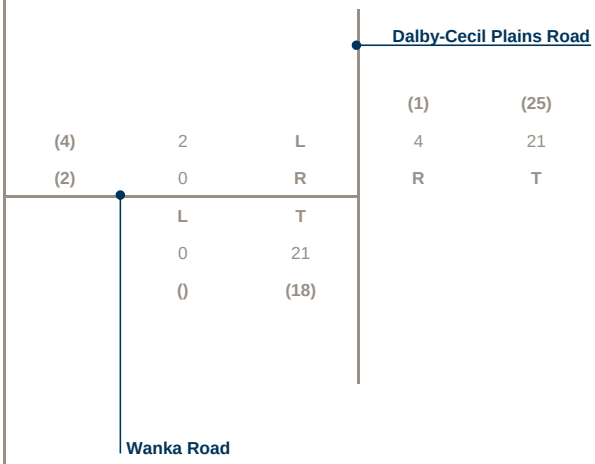
Fig No. **E3 - D**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Background Traffic - TWAF_DA9)**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

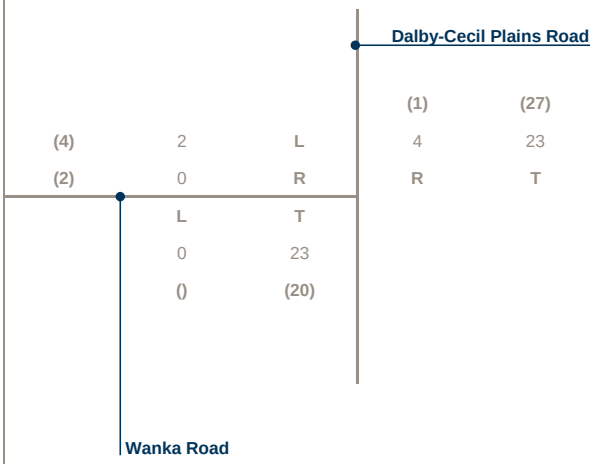
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - CGPF_DA8)

Surveyed Traffic Volumes (2013)

AM Peak	8:00am to 9:00am
PM Peak	4:45pm to 5:45pm



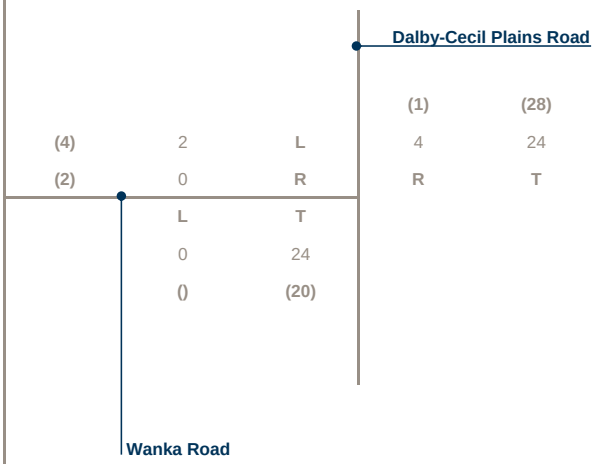
Background Traffic Volumes - Year of Construction (2016)



LEGEND					
L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

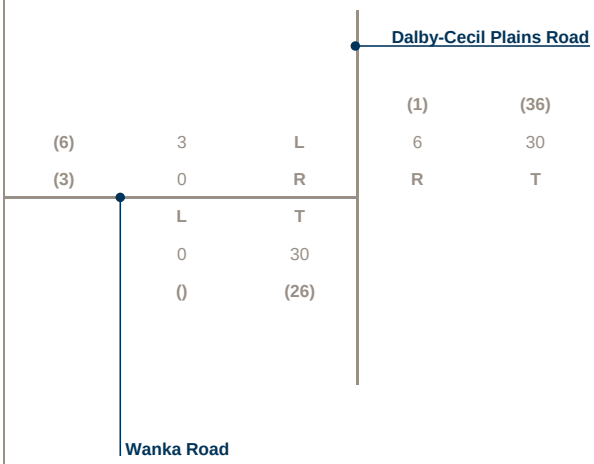
GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2016	3.00%	1.09

Background Traffic Volumes - Opening Year of Operations (2017)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2017	3.00%	1.12

Background Traffic Volumes - 10 Year Design Horizon (2027)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2027	3.00%	1.42

Fig No. **E3 - E**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Background Traffic - CGPF_DA8)**	Cardno Shaping the Future

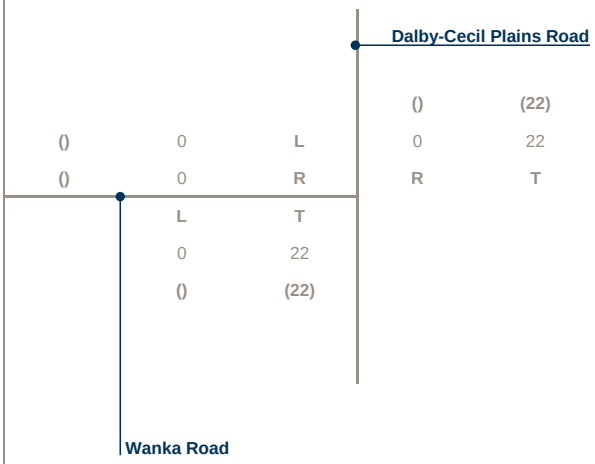
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - TWAF_DA9)

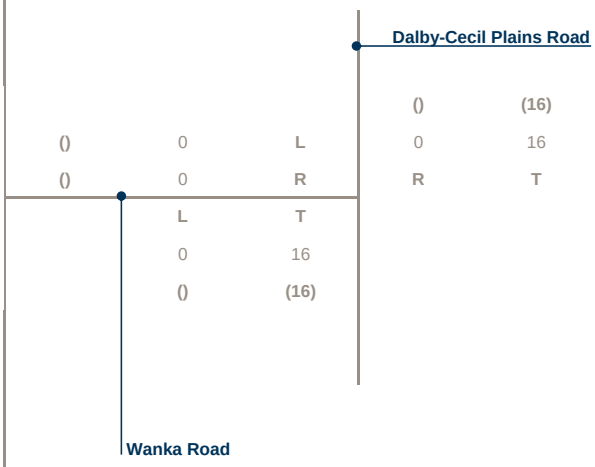
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

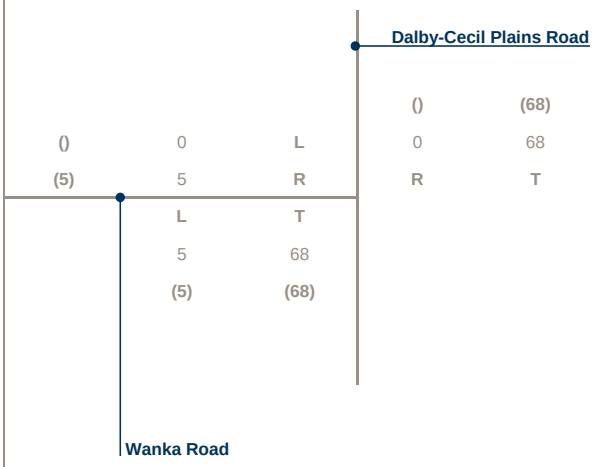
Project Traffic Volumes - Year of Construction (2015)



Project Traffic Volumes - Opening Year of Operations (2016)



Project Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E3 - F**

Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Development Traffic - TWAF_DA9)

Cardno Shaping the Future

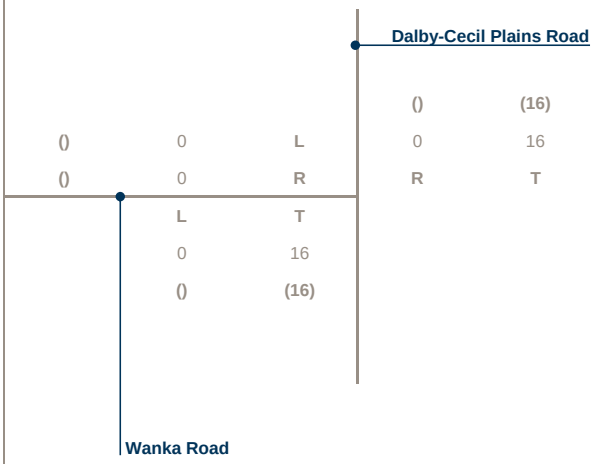
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - CGPF_DA8)

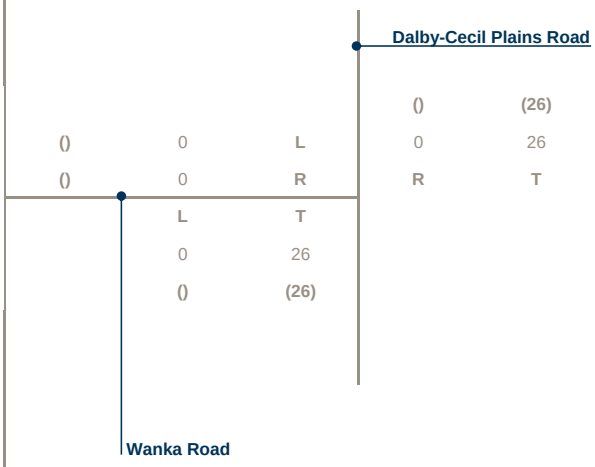
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

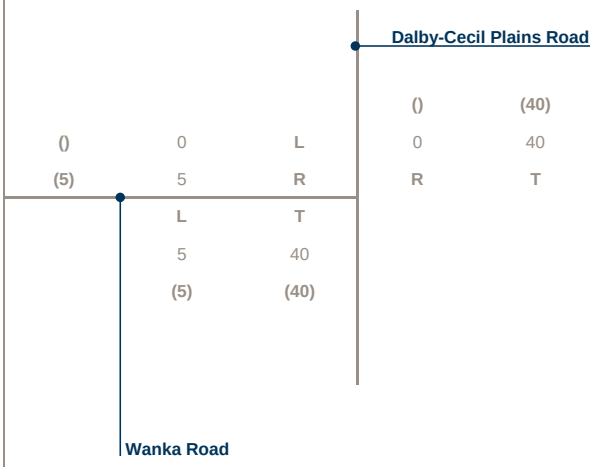
Project Traffic Volumes - Year of Construction (2016)



Project Traffic Volumes - Opening Year of Operations (2017)



Project Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E3 - G**

Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Development Traffic - CGPF_DA8)

Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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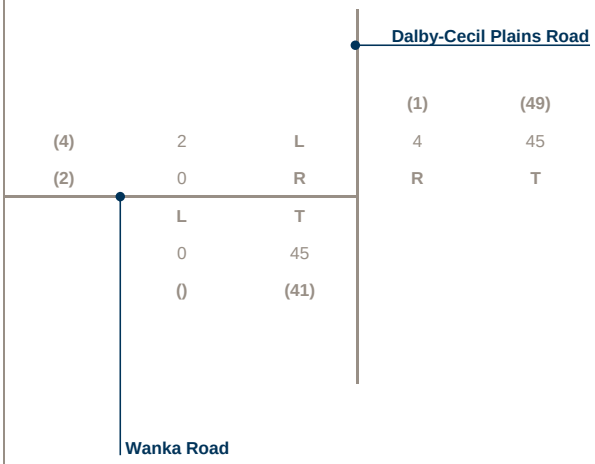
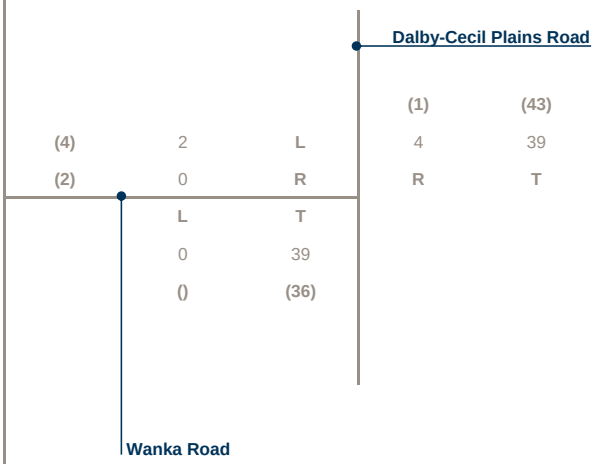
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - TWAF_DA9)

-

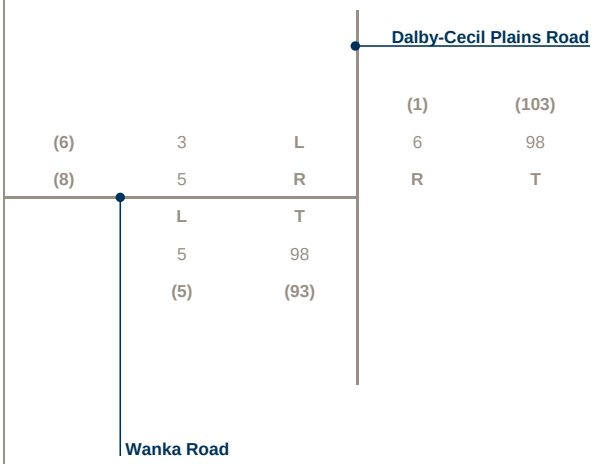
Design Traffic Volumes - Year of Construction (2015)



Design Traffic Volumes - Opening Year of Operations (2016)



Design Traffic Volumes - 10 Year Design Horizon (2026)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E3 - H**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Design Traffic - TWAF_DA9)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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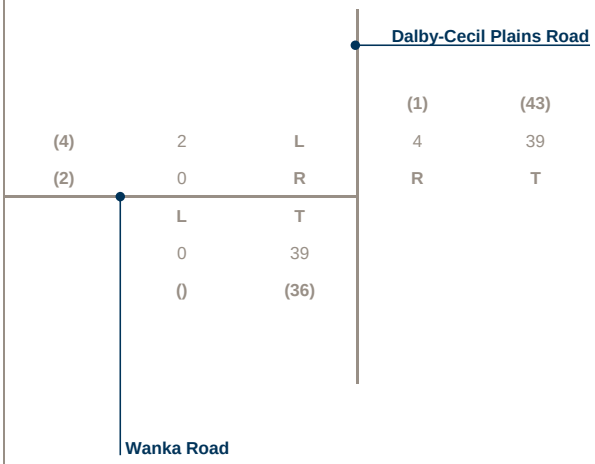
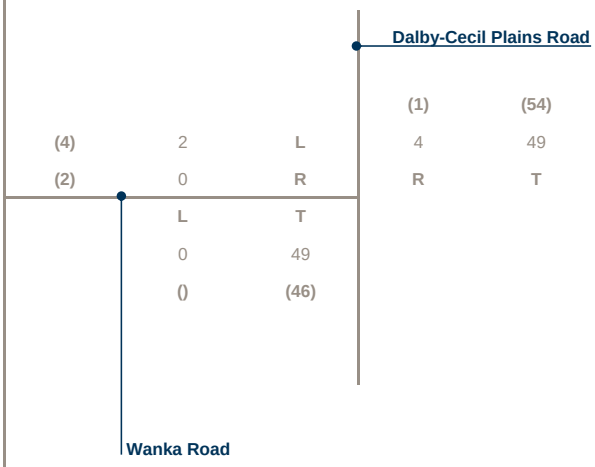
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - CGPF_DA8)

-

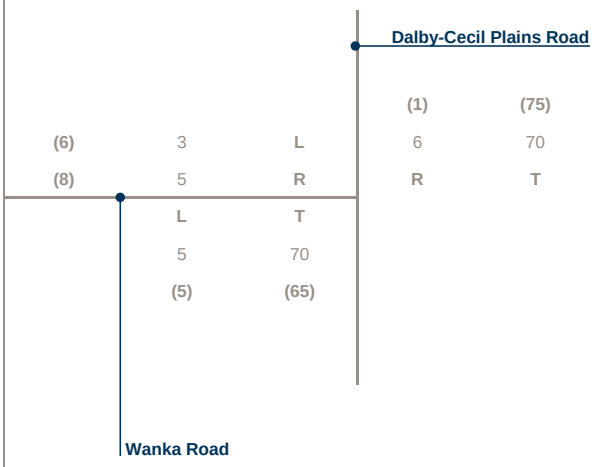
Design Traffic Volumes - Year of Construction (2016)



Design Traffic Volumes - Opening Year of Operations (2017)



Design Traffic Volumes - 10 Year Design Horizon (2027)



LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

Fig No. **E3 - I**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Intersection Volumes (Design Traffic - CGPF_DA8)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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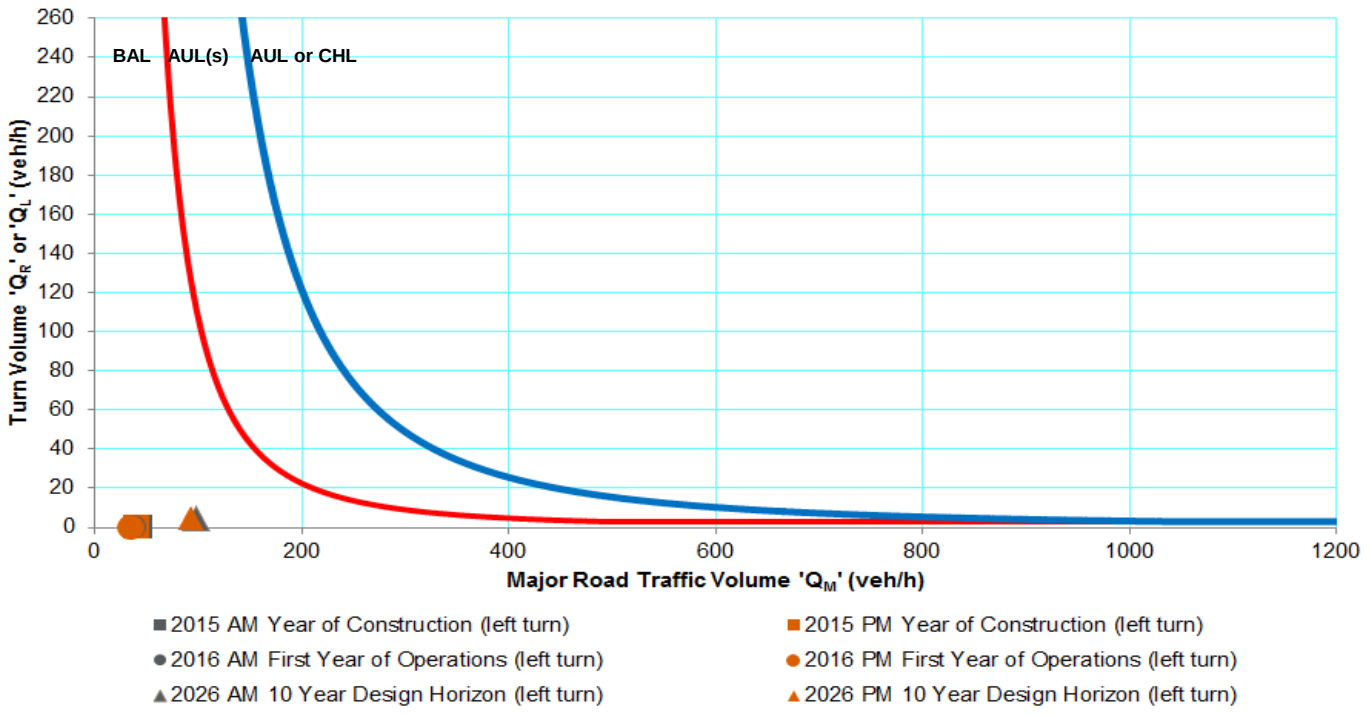
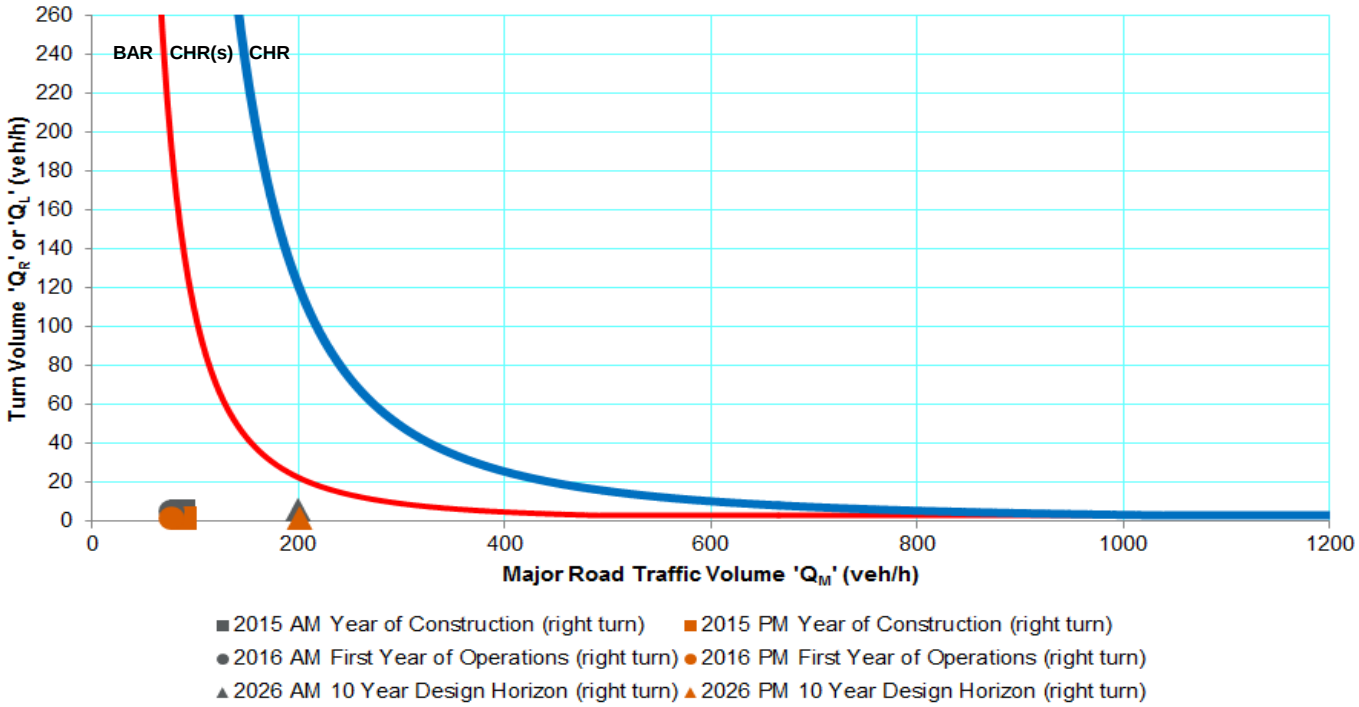
TURN WARRANT ASSESSMENT - LEFT TURN - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

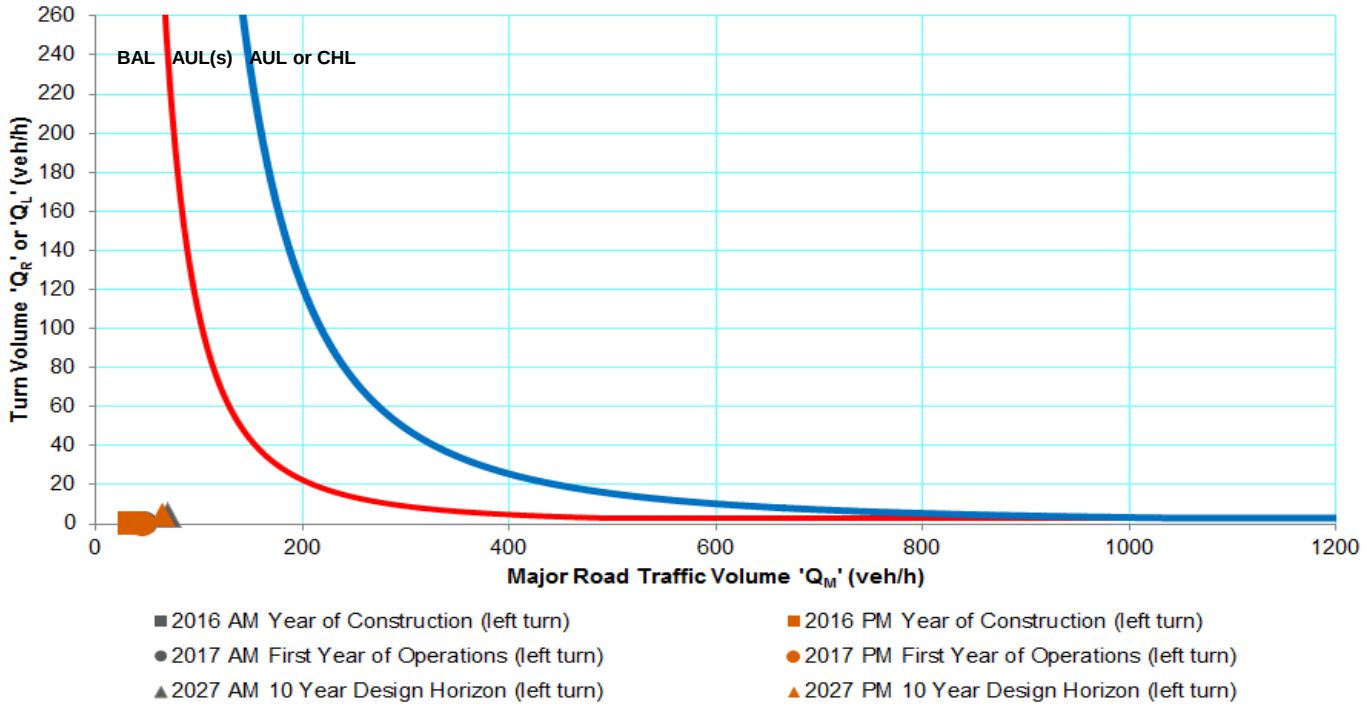
TURN WARRANT ASSESSMENT - RIGHT TURN - TWAF_DA9



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

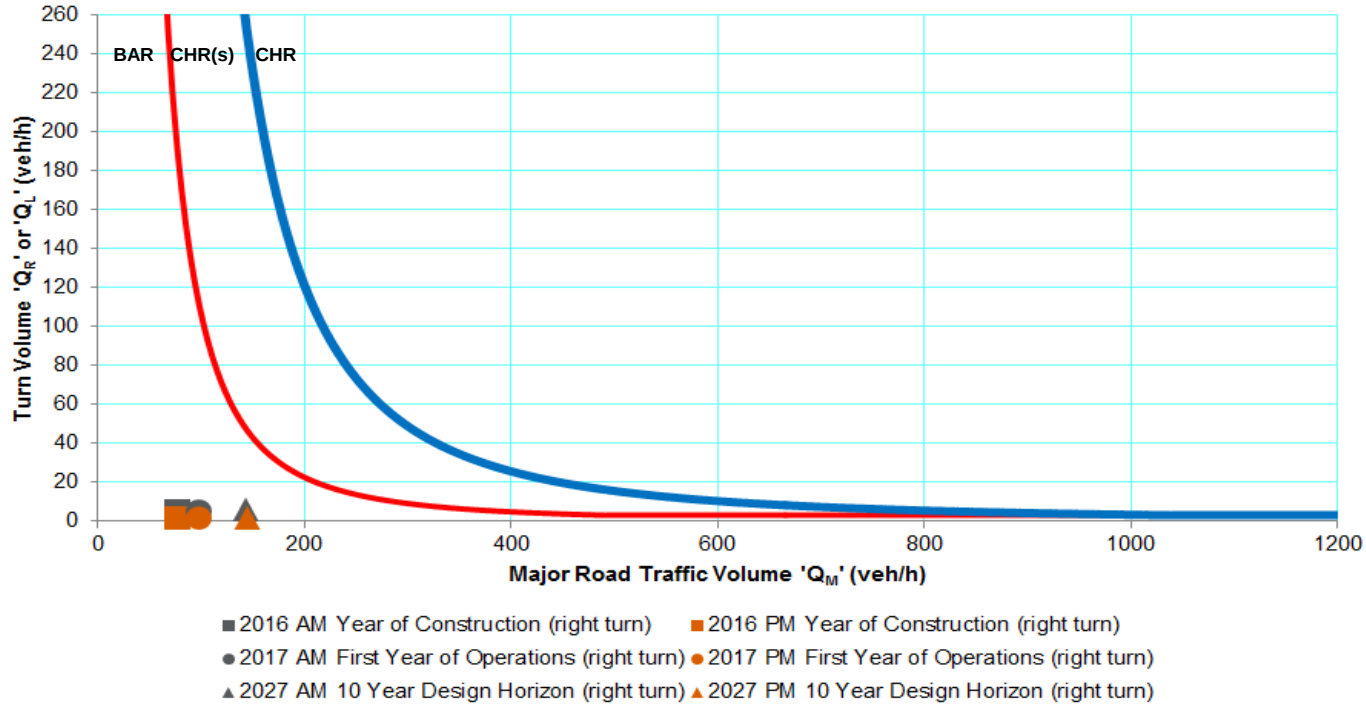
Fig No. E3 - J	Intersection of Dalby-Cecil Plains Road/Wanka Road - Turn Warrant Assessment - (TWAF_DA9)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

TURN WARRANT ASSESSMENT - LEFT TURN - CGPF_DA8



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

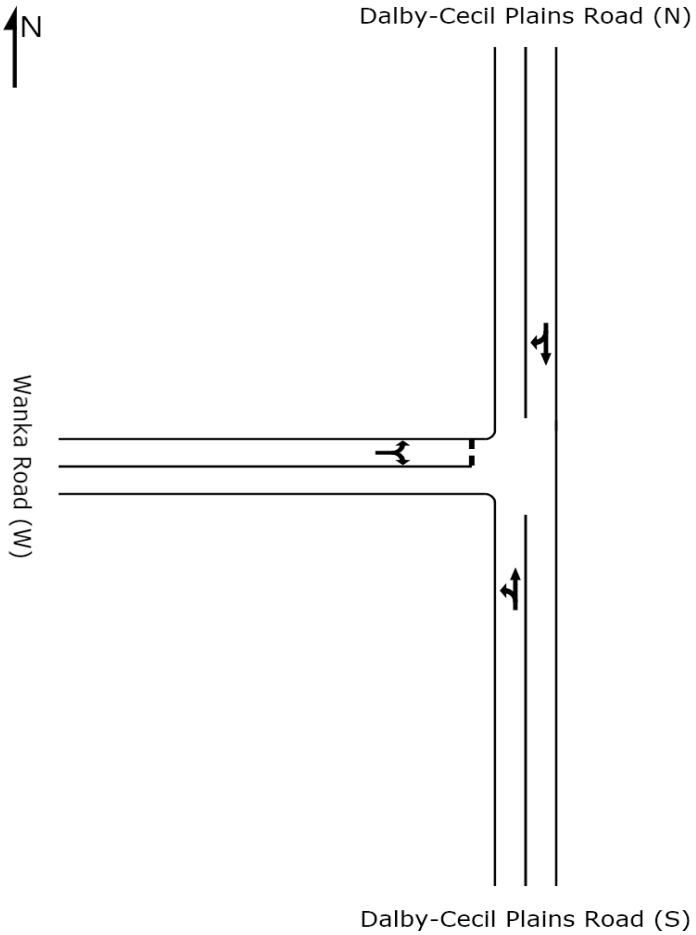
TURN WARRANT ASSESSMENT - RIGHT TURN - CGPF_DA8



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

Fig No. E3 - K	Intersection of Dalby-Cecil Plains Road/Wanka Road - Turn Warrant Assessment - (CGPF_DA8)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION

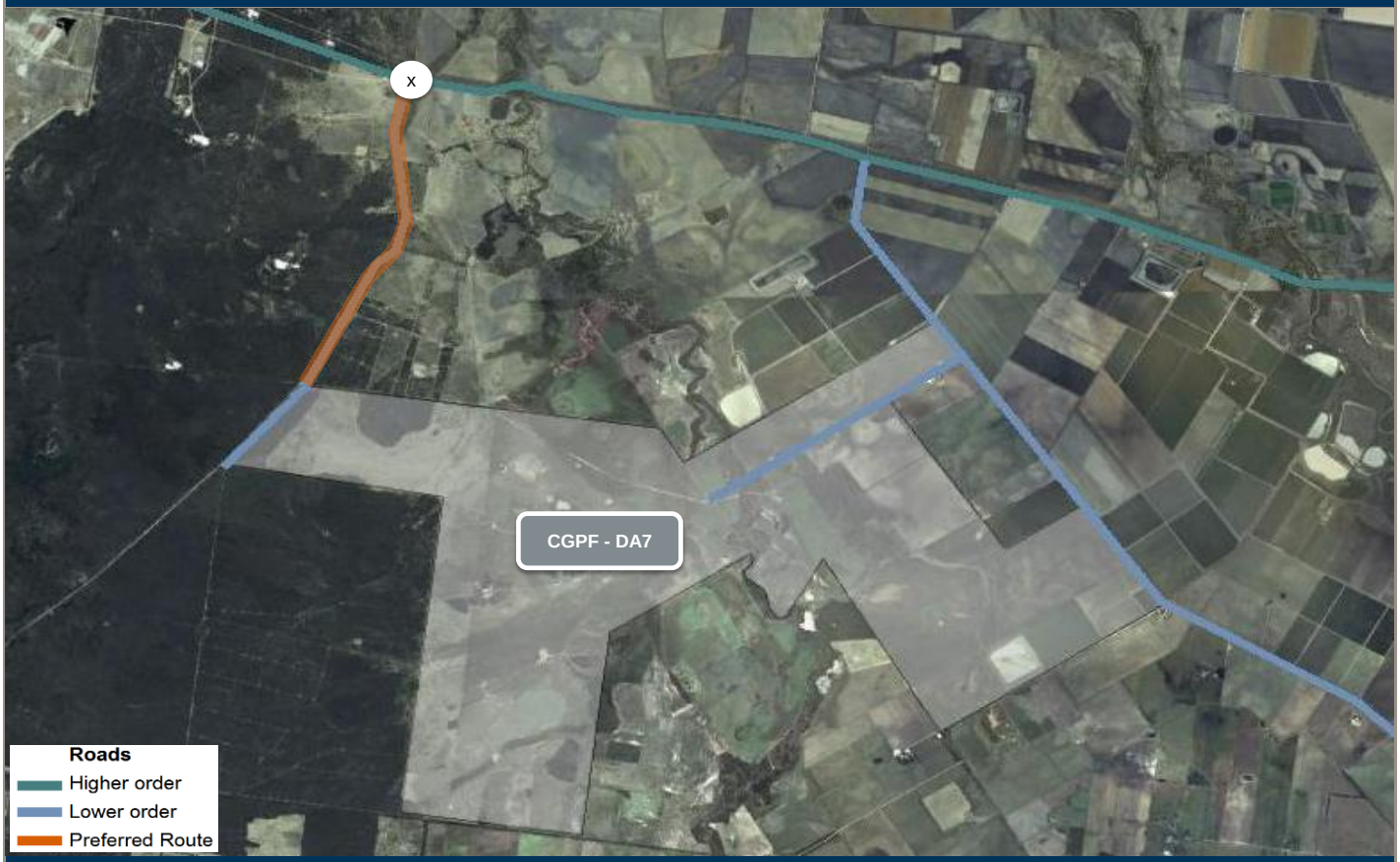


OPERATIONAL ANALYSIS - SUMMARY OF RESULTS

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	53 vehs	0.02	14 secs	1 m	54 vehs	0.02	14 secs	1 m	✓
2015 Year of Construction (TWAF_DA9)	103 vehs	0.03	14 secs	1 m	103 vehs	0.03	14 secs	1 m	✓
2016 Year of Construction (CGPF_DA8)	91 vehs	0.03	14 secs	1 m	92 vehs	0.03	14 secs	1 m	✓
2016 1st Year of Operations (TWAF_DA9)	91 vehs	0.03	14 secs	1 m	92 vehs	0.03	14 secs	1 m	✓
2017 1st Year of Operations (CGPF_DA8)	112 vehs	0.03	14 secs	1 m	114 vehs	0.03	14 secs	2 m	✓
2026 10 Year Design Horizon (TWAF_DA9)	226 vehs	0.06	14 secs	3 m	227 vehs	0.06	14 secs	3 m	✓
2027 10 Year Design Horizon (CGPF_DA8)	167 vehs	0.05	14 secs	2 m	168 vehs	0.05	14 secs	2 m	✓

Fig No. **E3 - L**	**Intersection of Dalby-Cecil Plains Road/Wanka Road - Operational Assessment**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

LOCALITY PLAN



AERIAL PHOTO

Fig No. **E4 - A**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION PHOTOS

Approach	Looking West Approx. 200m from Intersection	Looking East from Intersection
Eastern Approach - Dalby-Kogan Road		
Approach	**Looking North Approx. 200m from Intersection**	**Looking South from Intersection**
Southern Approach - Kumbarilla Lane		
Approach	**Looking East Approx. 200m from Intersection**	**Looking West from Intersection**
Western Approach - Dalby-Kogan Road		

Fig No. **E4 - B**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Intersection Photos**	Cardno Shaping the Future

Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION DETAILS		
Approach	**Road Name**	**Jurisdiction**
Eastern	Dalby-Kogan Road	Western Downs Regional Council
Southern	Kumbarilla Lane	Western Downs Regional Council
Western	Dalby-Kogan Road	Western Downs Regional Council

SPEED LIMITS		
Approach	**Speed Limit**	**Comment**
Eastern	100 km/h	Deafult Rural Speed Limit
Southern	100 km/h	Deafult Rural Speed Limit
Western	100 km/h	Deafult Rural Speed Limit

TURN TREATMENTS		
Approach	**Left Turn**	**Right Turn**
Eastern	Nil	Nil
Southern	Nil	Nil
Western	Nil	Nil

SIGHT DISTANCES		
Approach	**Safe Intersection Sight Distance**	**Approach Stopping Distance**
Eastern	300m +	200m +
Southern	300m +	200m +
Western	300m +	200m +

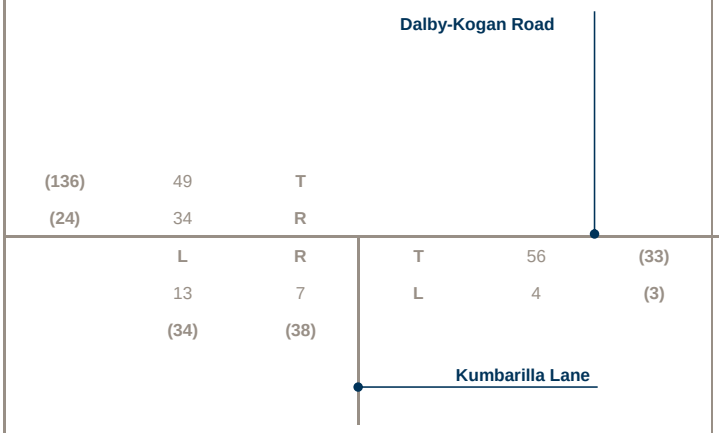
PAVEMENT CONDITIONS		
Approach	**Condition**	**Comments**
Eastern	Sealed	-
Southern	Loose Gravel/Sealed	First 600m unsealed (approx).
Western	Sealed	-

Fig No. **E4 - C**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Physical Properties**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

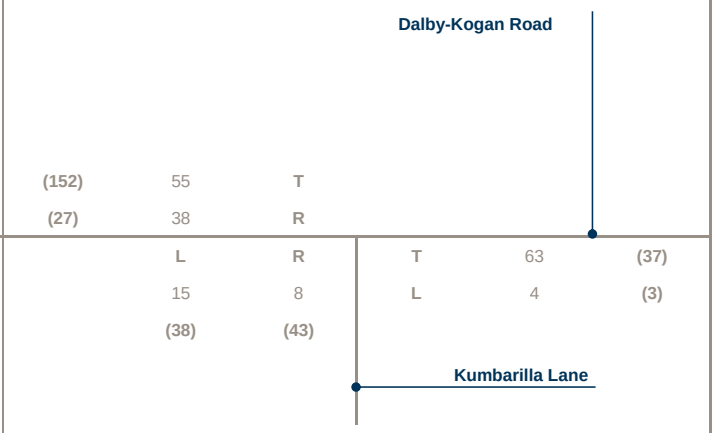
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - CGPF_DA7)

Surveyed Traffic Volumes (2013)

AM Peak	7:15am to 8:15am
PM Peak	4:30pm to 5:30pm



Background Traffic Volumes - Year of Construction (2017)



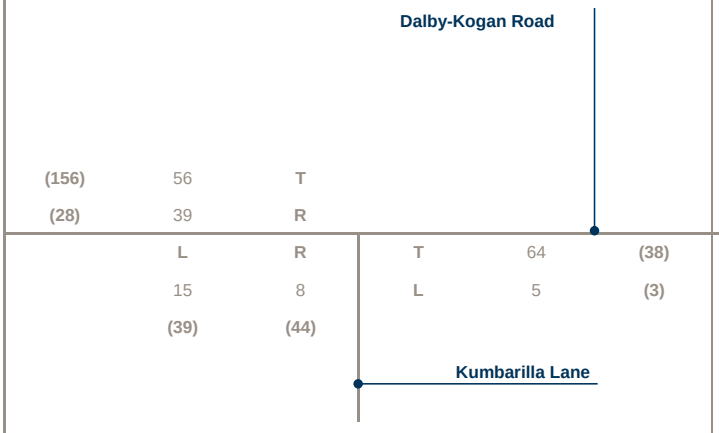
LEGEND

L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2017	3.00%	1.12

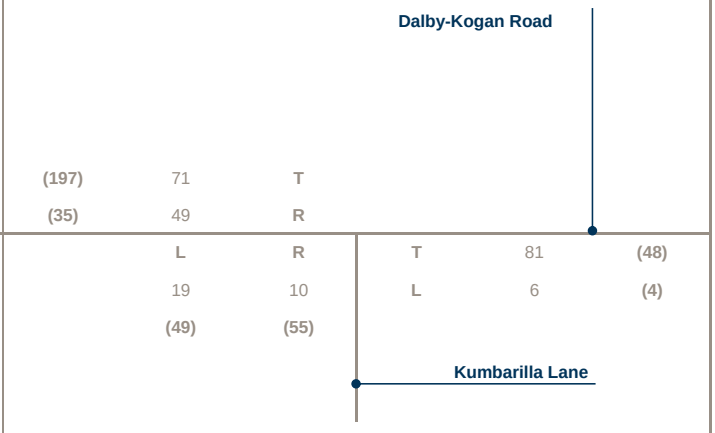
Background Traffic Volumes - Opening Year of Operations (2018)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2018	3.00%	1.15

Background Traffic Volumes - 10 Year Design Horizon (2028)



GROWTH FACTOR

Base Year	Future Year	Growth Rate	Factor
2013	2028	3.00%	1.45

Fig No. **E4 - D**

Intersection of Dalby-Kogan Road/Kumbarilla Lane - Intersection Volumes (Background Traffic - CGPF_DA7)

Cardno Shaping the Future

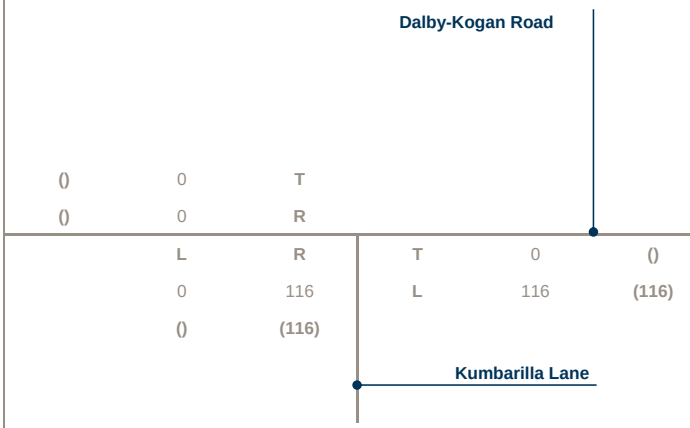
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - CGPF_DA7)

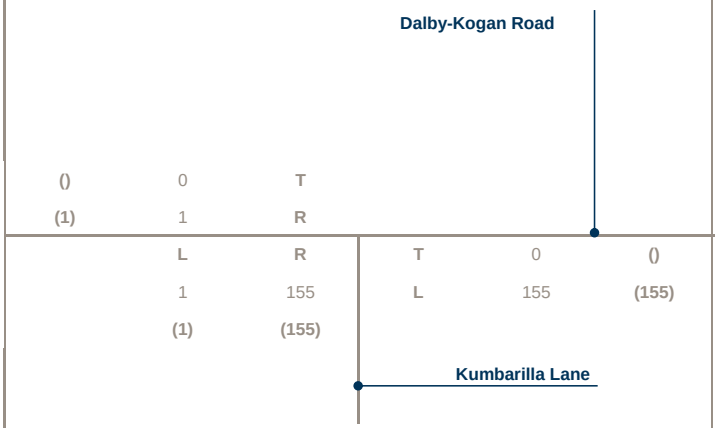
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

Project Traffic Volumes - Year of Construction (2017)



Project Traffic Volumes - Opening Year of Operations (2018)



Project Traffic Volumes - 10 Year Design Horizon (2028)

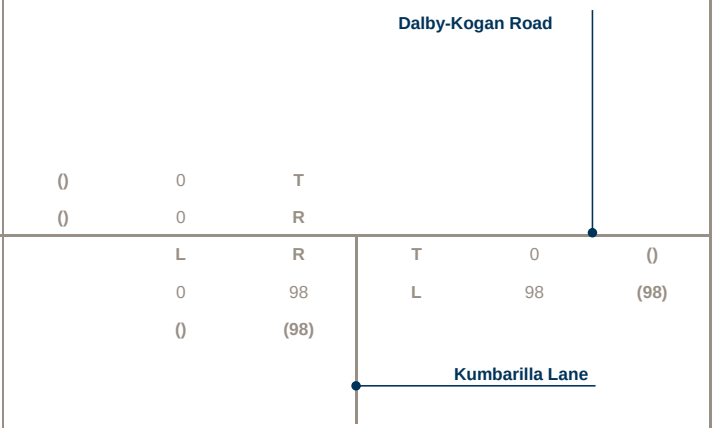


Fig No. **E4 - E**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Intersection Volumes (Development Traffic - CGPF_DA7)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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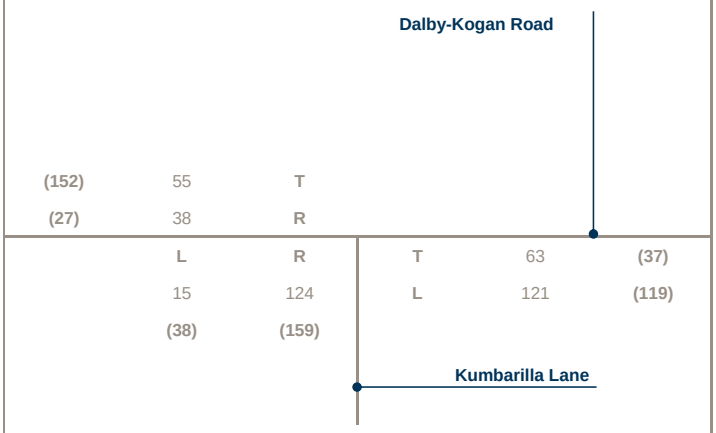
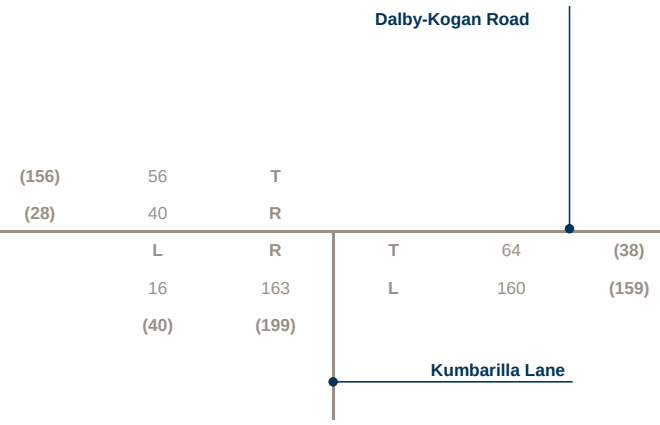
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - CGPF_DA7)

-

Design Traffic Volumes - Year of Construction (2017)



Design Traffic Volumes - Opening Year of Operations (2018)



Design Traffic Volumes - 10 Year Design Horizon (2028)

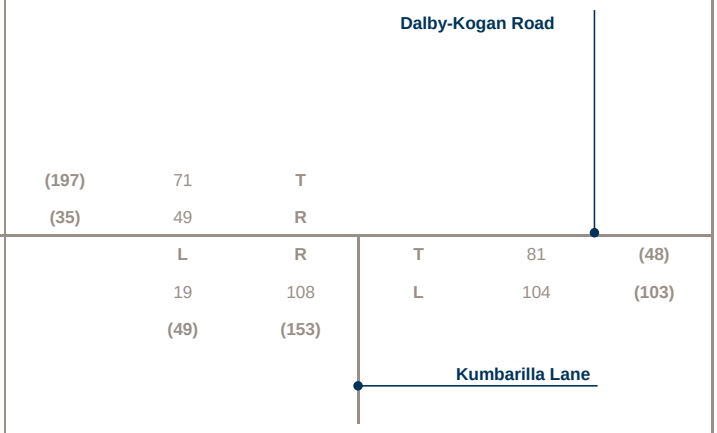


Fig No. **E4 - F**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Intersection Volumes (Design Traffic - CPGF_DA7)**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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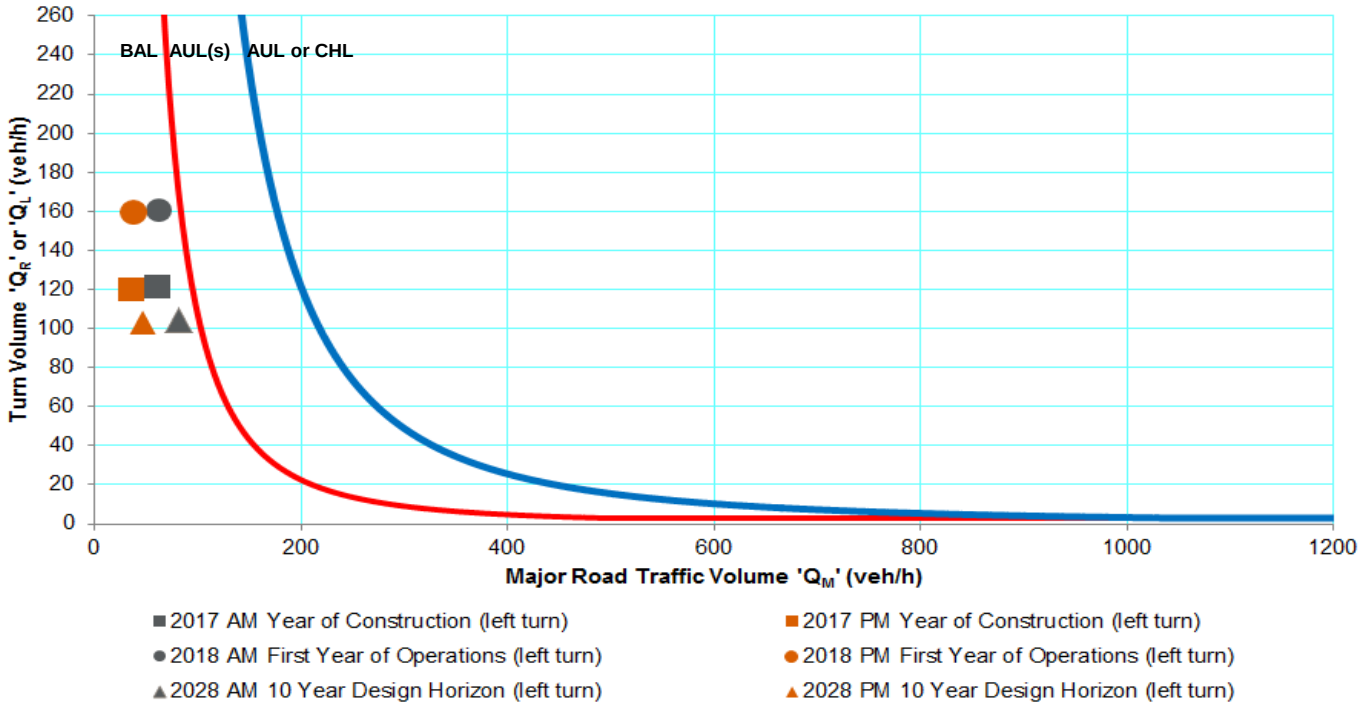
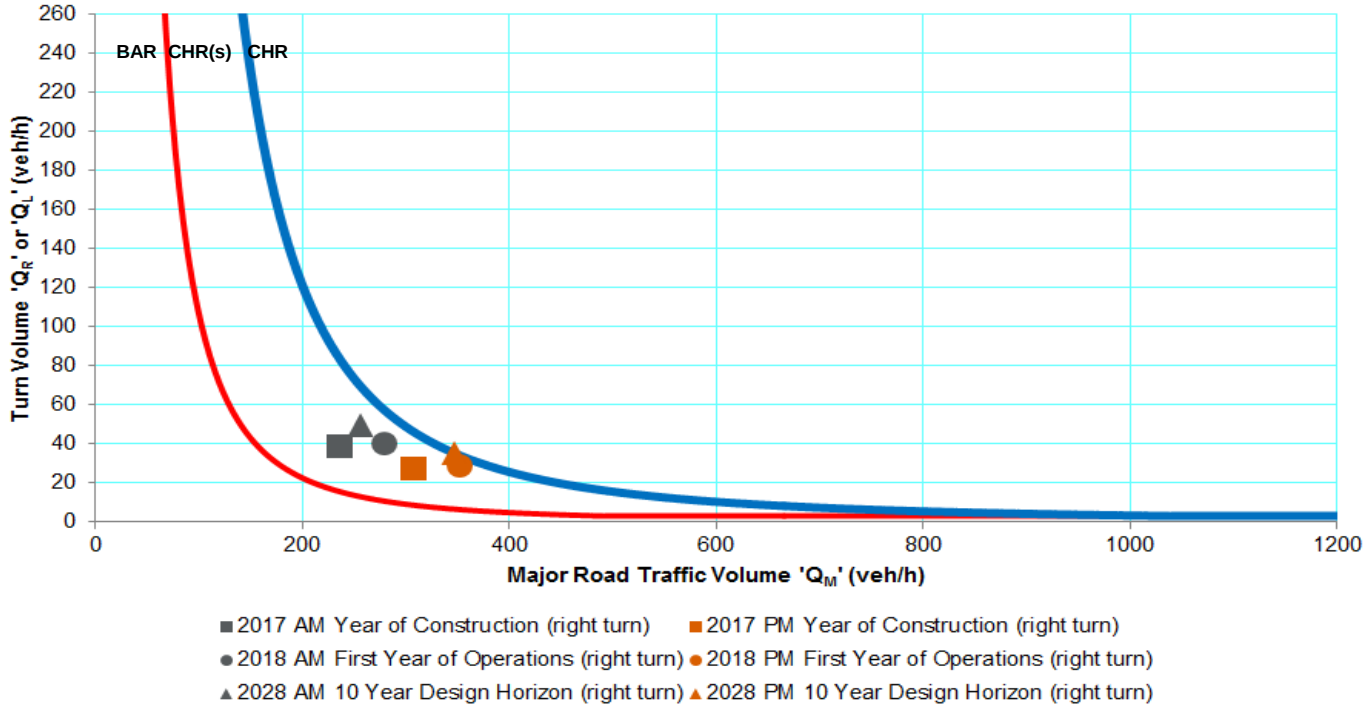
TURN WARRANT ASSESSMENT - LEFT TURN - CGPF_DA7



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

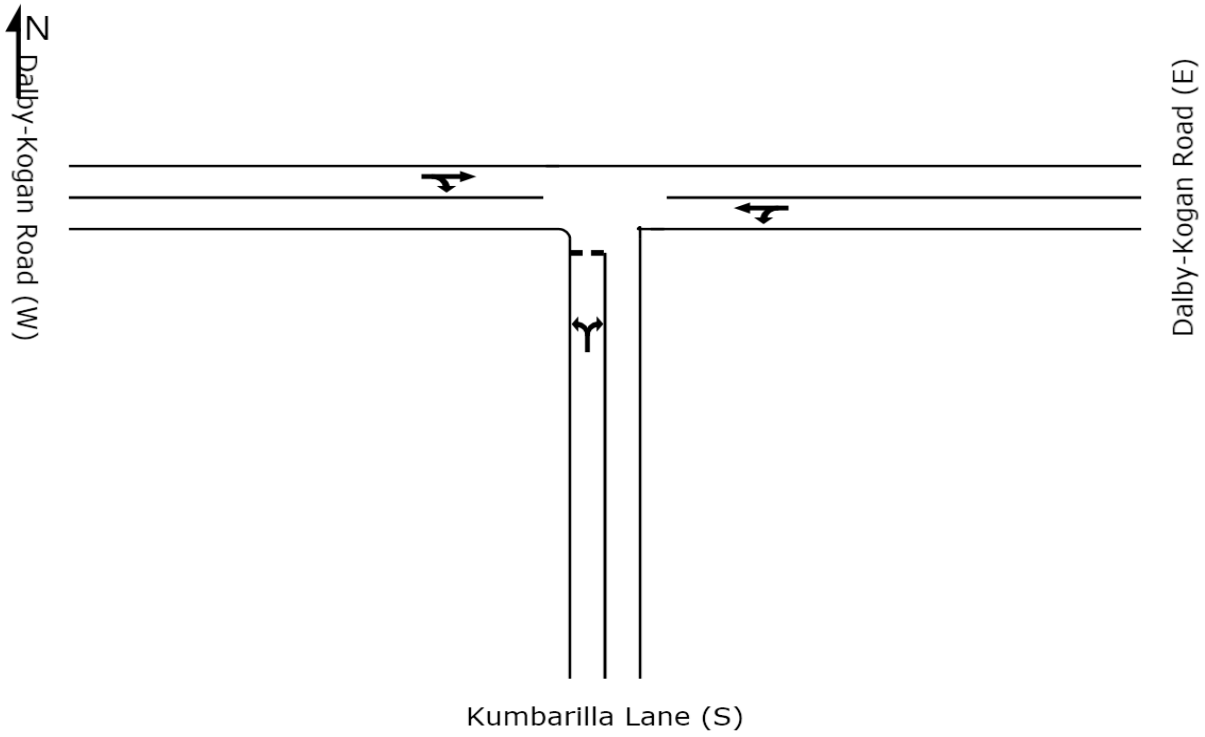
TURN WARRANT ASSESSMENT - RIGHT TURN - CGPF_DA7



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

Fig No. E4 - G	Intersection of Dalby-Kogan Road/Kumbarilla Lane - Turn Warrant Assessment - (CGPF_DA7)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION



OPERATIONAL ANALYSIS - SUMMARY OF RESULTS

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	172 vehs	0.05	14 secs	2 m	282 vehs	0.10	14 secs	5 m	✓
2017 Year of Construction (CGPF_DA7)	438 vehs	0.22	15 secs	7 m	560 vehs	0.33	15 secs	12 m	✓
2018 1st Year of Operations (CGPF_DA7)	525 vehs	0.30	15 secs	10 m	653 vehs	0.42	15 secs	19 m	✓
2028 10 Year Design Horizon (CGPF_DA7)	455 vehs	0.21	15 secs	7 m	616 vehs	0.36	15 secs	14 m	✓

Fig No. **E4 - H**	**Intersection of Dalby-Kogan Road/Kumbarilla Lane - Operational Assessment**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 21/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

LOCALITY PLAN

AERIAL PHOTO

Fig No. **E5 - A**	**Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Locality Plan**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 20/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION PHOTOS

Approach	Looking South Approx. 200m from Intersection	Looking North from Intersection
Northern Approach - Leichhardt Highway		
Approach	**Looking West Approx. 200m from Intersection**	**Looking East from Intersection**
Eastern Approach - Leichhardt Creek Taroom Road		
Approach	**Looking North Approx. 200m from Intersection**	**Looking South from Intersection**
Southern Approach - Leichhardt Highway		

Fig No. **E5 - B**	**Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Intersection Photos**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

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INTERSECTION DETAILS

Approach	Road Name	Jurisdiction
Northern	Leichhardt Highway	Western Downs Regional Council
Eastern	Leichhardt Creek Taroom Road	Western Downs Regional Council
Southern	Leichhardt Highway	Western Downs Regional Council

SPEED LIMITS

Approach	Speed Limit	Comment
Northern	100 km/h	Default Rural Speed Limit
Eastern	100 km/h	Default Rural Speed Limit
Southern	100 km/h	Default Rural Speed Limit

TURN TREATMENTS

Approach	Left Turn	Right Turn
Northern	Nil	Nil
Eastern	Nil	Nil
Southern	Nil	Nil

SIGHT DISTANCES

Approach	Safe Intersection Sight Distance	Approach Stopping Distance
Northern	300m +	200m +
Eastern	300m +	200m +
Southern	300m +	200m +

PAVEMENT CONDITIONS

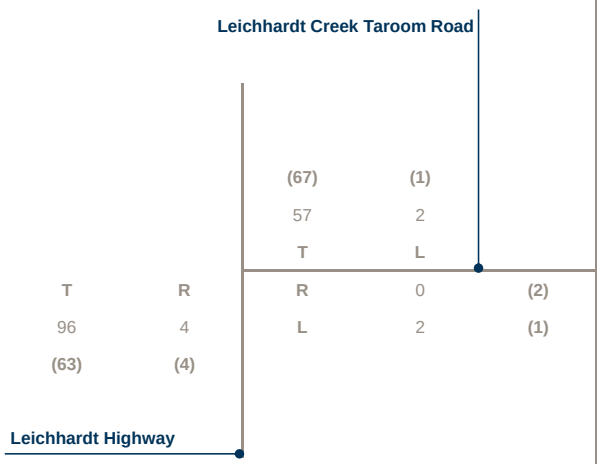
Approach	Condition	Comments
Northern	Sealed	-
Eastern	Loose Gravel	-
Southern	Sealed	-

Fig No. **E5 - C**	**Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Physical Properties**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

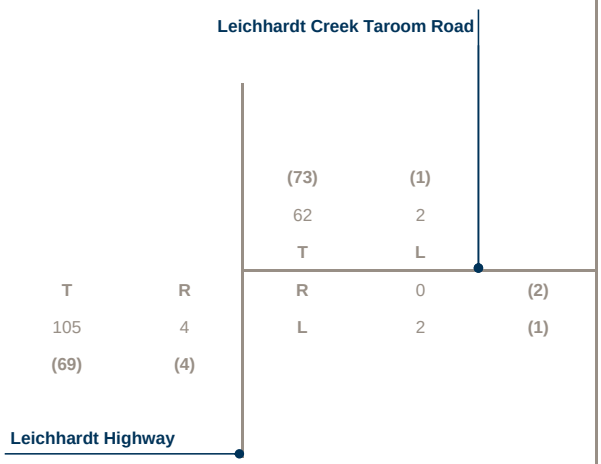
PEAK HOUR INTERSECTION VOLUMES (BACKGROUND TRAFFIC - CGPF_DA2)

Surveyed Traffic Volumes (2013)

AM Peak	7:30am to 8:30am
PM Peak	4:45pm to 5:45pm



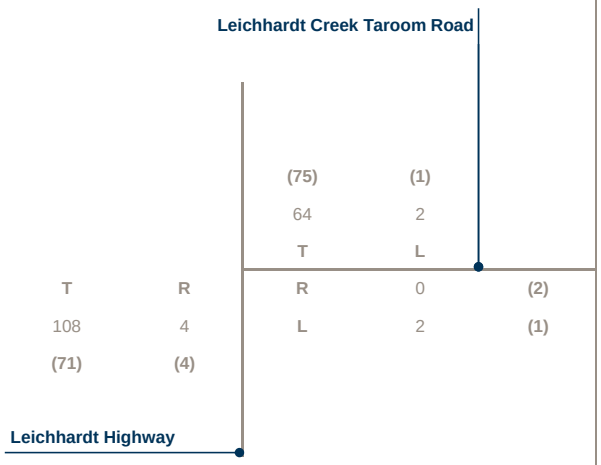
Background Traffic Volumes - Year of Construction (2016)



LEGEND					
L	Left Turn	**T**	Through	**R**	Right Turn
#	AM Peak	**(#)**	PM Peak		

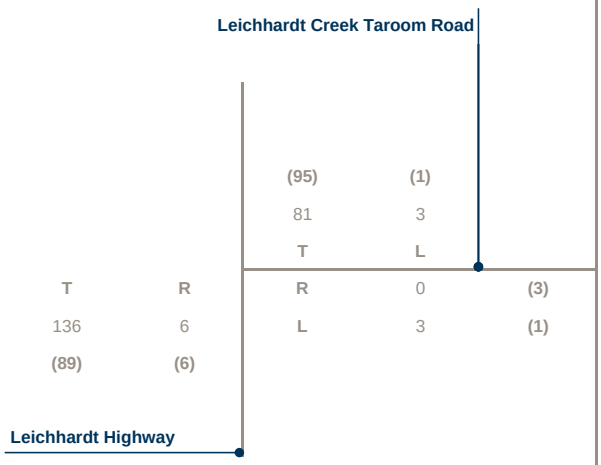
GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2016	3.00%	1.09

Background Traffic Volumes - Opening Year of Operations (2017)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2017	3.00%	1.12

Background Traffic Volumes - 10 Year Design Horizon (2027)



GROWTH FACTOR			
Base Year	**Future Year**	**Growth Rate**	**Factor**
2013	2027	3.00%	1.42

Fig No. **E5 - D**	**Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Intersection Volumes (Background Traffic - CGPF_DA2)**	Cardno Shaping the Future

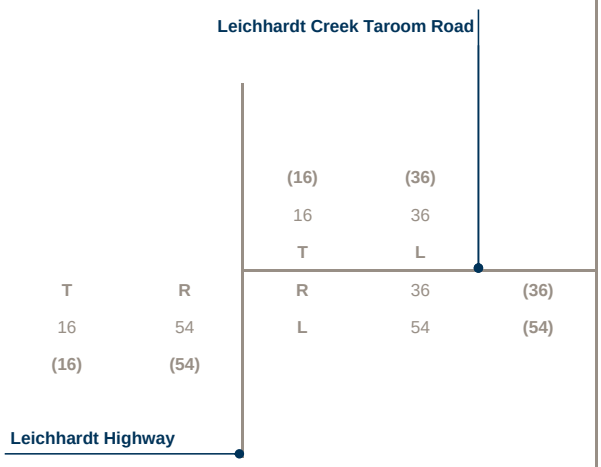
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

PEAK HOUR INTERSECTION VOLUMES (PROJECT TRAFFIC - CGPF_DA2)

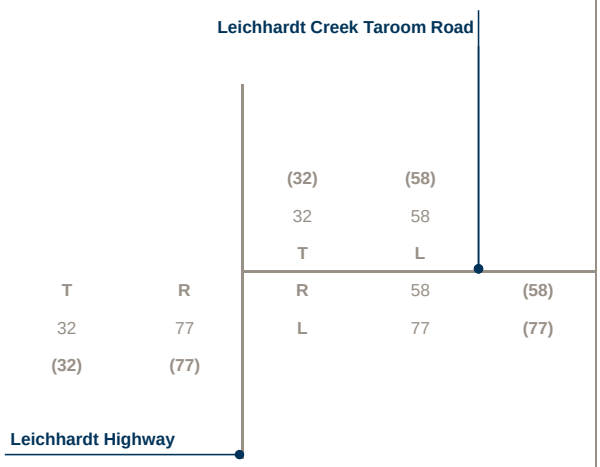
-

Note: It has conservatively been assumed that 100% of the estimated daily project traffic demands that travel through this intersection will do so during both the AM & PM peak hour periods. That is, the project traffic demands presented herein represent 24 hour demands than 1 hour demands.

Project Traffic Volumes - Year of Construction (2016)



Project Traffic Volumes - Opening Year of Operations (2017)



Project Traffic Volumes - 10 Year Design Horizon (2027)

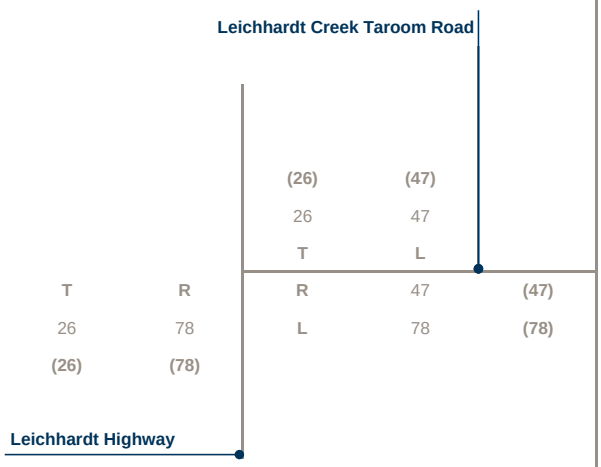
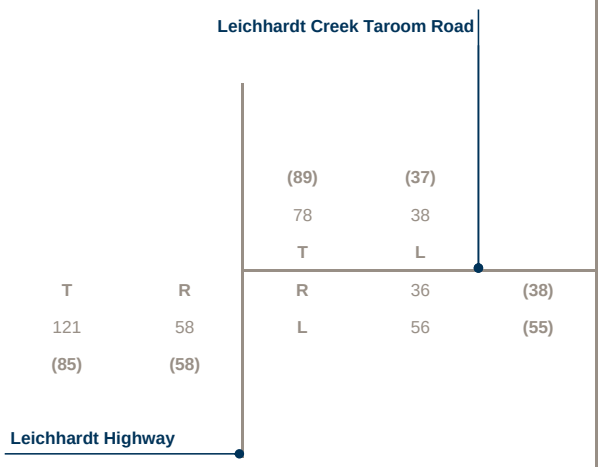


Fig No. **E5 - E**	Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Intersection Volumes (Development Traffic - CGPF_DA2)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

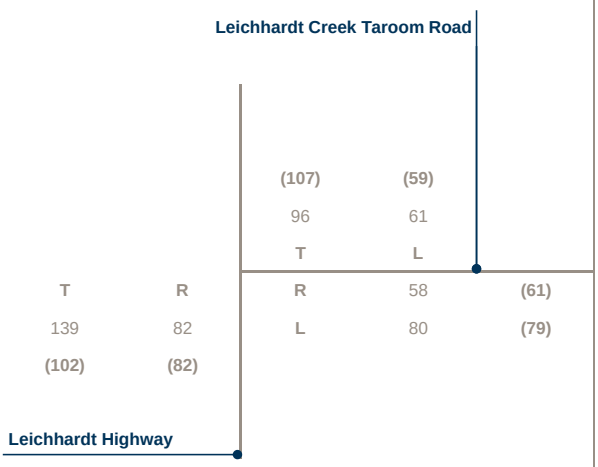
PEAK HOUR INTERSECTION VOLUMES (DESIGN TRAFFIC VOLUMES - CGPF_DA2)

-

Design Traffic Volumes - Year of Construction (2016)



Design Traffic Volumes - Opening Year of Operations (2017)



Design Traffic Volumes - 10 Year Design Horizon (2027)

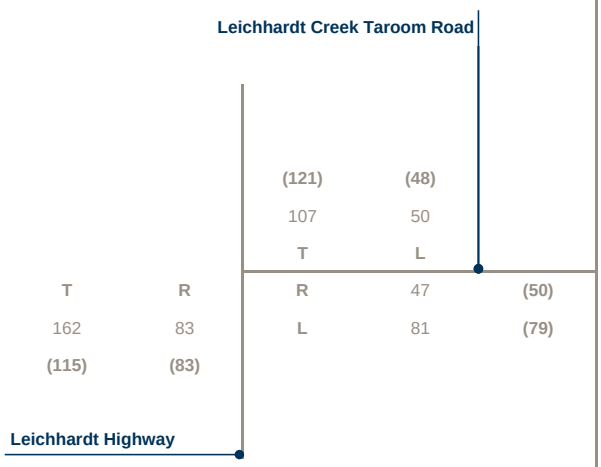
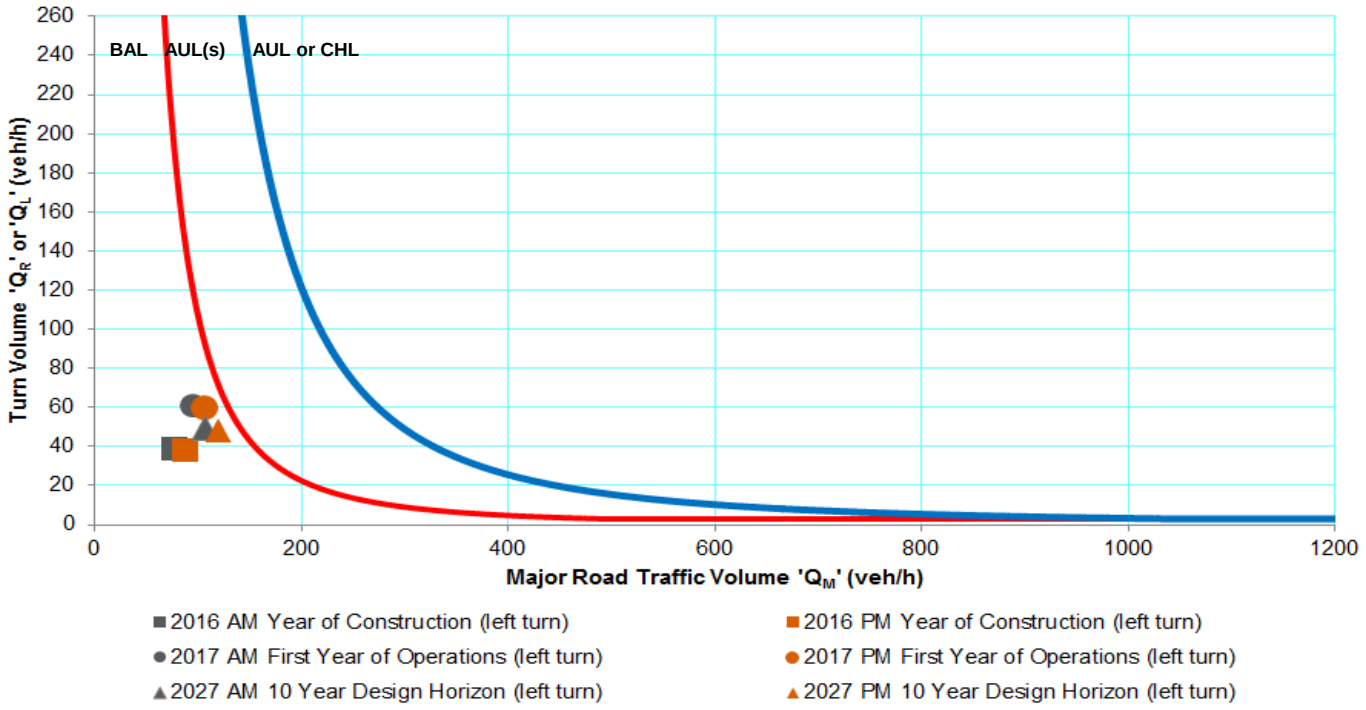


Fig No. **E5 - F**	Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Intersection Volumes (Design Traffic - CGPF_DA2)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

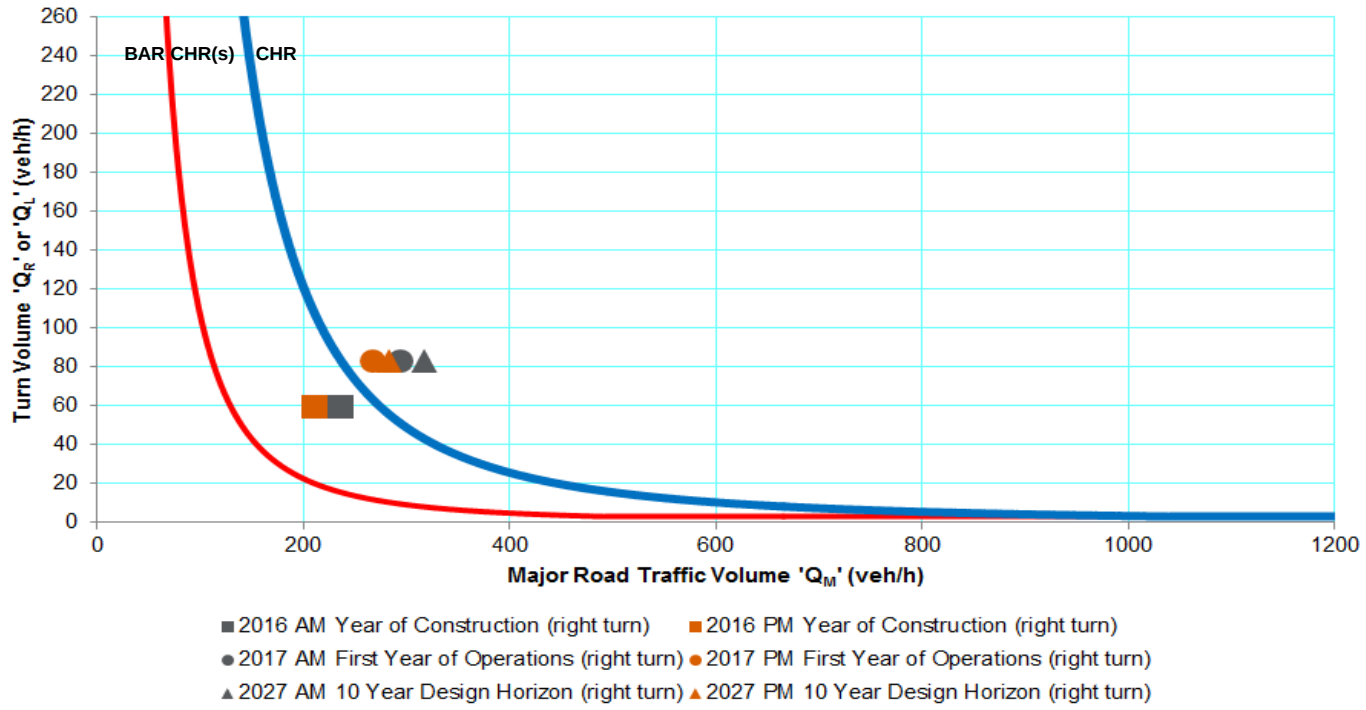
G:\CEB06413 - Surat Gas Project SREIS\6413 Analysis\Intersection Case Study\[6413 SGP Case Study - Intersection Assessment.xlsx]B4-D

TURN WARRANT ASSESSMENT - LEFT TURN - CGPF_DA2



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

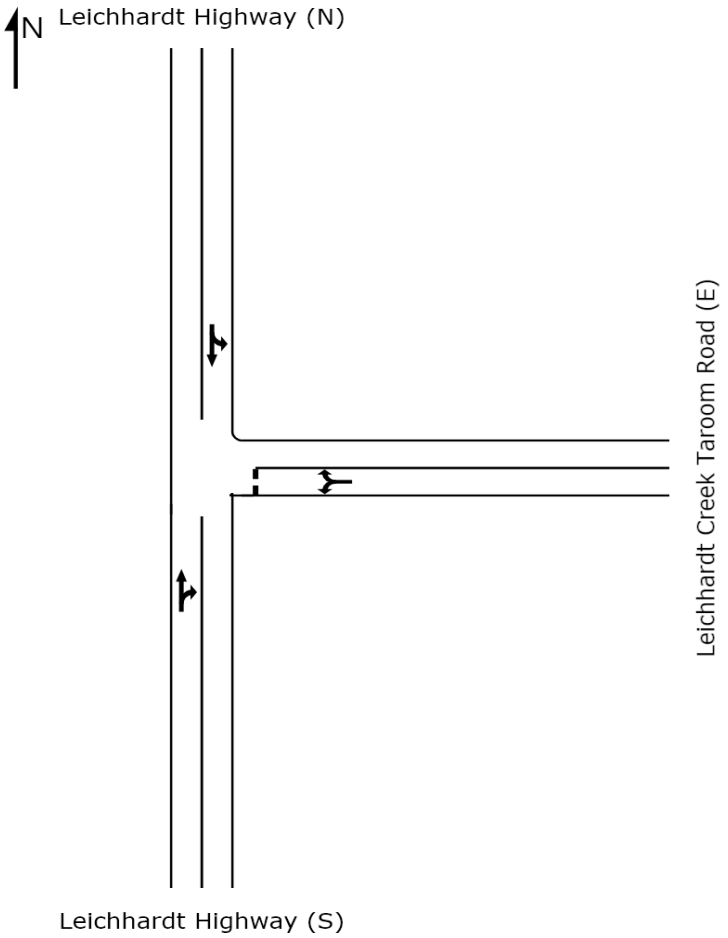
TURN WARRANT ASSESSMENT - RIGHT TURN - CGPF_DA2



BAR Basic Right Turn	CHR Channelised Right Turn	AUL(S) Auxillary Left Turn (Short)
CHR(s) Channelised Right Turn (short)	BAL Basic Left Turn	AUL Auxillary Left Turn

Fig No. E5 - G	Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Turn Warrant Assessment - (CGPF_DA2)	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

OPERATIONAL ANALYSIS - INTERSECTION CONFIGURATION



OPERATIONAL ANALYSIS - SUMMARY OF RESULTS

Scenario	Morning Peak				Afternoon Peak				Acceptable
	Demand	DOS	Critical Delay	95th%ile Queue	Demand	DOS	Critical Delay	95th%ile Queue	
2013 Surveyed Traffic Volumes	171 vehs	0.06	14 secs	3 m	145 vehs	0.04	14 secs	2 m	✓
2016 Year of Construction (CGPF_DA2)	407 vehs	0.12	15 secs	6 m	381 vehs	0.12	15 secs	4 m	✓
2017 1st Year of Operations (CGPF_DA2)	543 vehs	0.20	15 secs	7 m	516 vehs	0.20	15 secs	7 m	✓
2027 10 Year Design Horizon (CGPF_DA2)	558 vehs	0.19	15 secs	8 m	522 vehs	0.19	15 secs	7 m	✓

Fig No. **E5 - H**	**Intersection of Leichhardt Highway/Leichhardt Creek Taroom Road - Operational Assessment**	Cardno Shaping the Future
Project: SGP SREIS RIA	Prepared by: Damien Scutt	Date of Inspection: 19/03/2013
Project No: CEB06413	Prepared by: Jeffrey Baczynski	Document Date: 5/06/2013

Surat Gas Project SREIS

APPENDIX F

Case Studies: Pavement Assessment

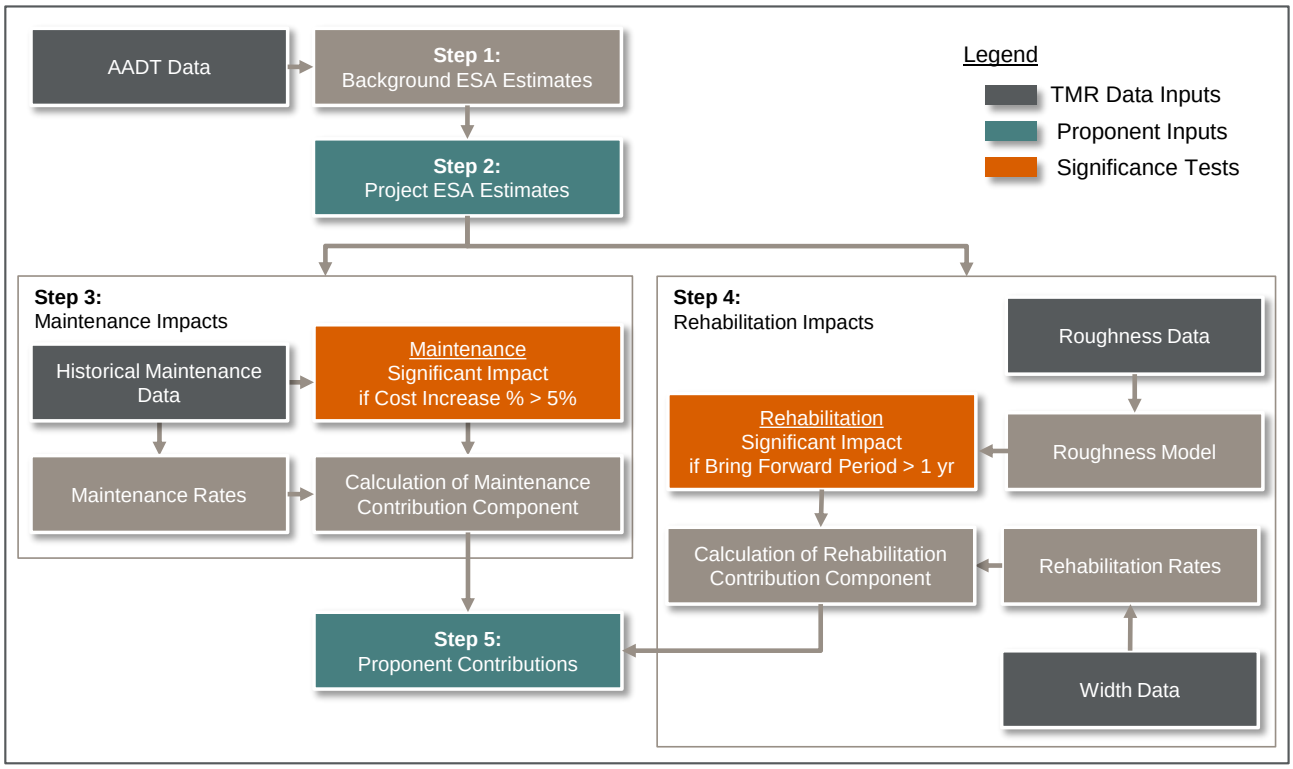
Cardno
Shaping the Future

Pavement Impact Assessment Methodology

As part of the case studies component of the SREIS, a pavement impact assessment was undertaken to the demonstrate the level of further assessment that would still be required to be completed through subsequent RIAs and RMPs as the SGP progresses.

The pavement impact assessment methodology adopted by Cardno is representatively shown in Figure F1. This methodology is consistent with the assessment approach detailed in TMR's *Guidelines for Road Impacts of Development.*

Figure F1 Pavement Impact Assessment Methodology



Scope of Case Study Pavement Impact Assessment

The following road sections were considered to provide an example of the detailed pavement impact assessment methodology:

- Warrego Highway (Chinchilla to Miles) (TMR Ref: 18C: 80.175km to 126.754km)
- Millmerran-Cecil Plains Road (TMR Ref: 3251: 0.000km to 35.610km)
- Moonie Highway (Dalby to Nandi) (TMR Ref: 35A: 0.000km to 11.000km)

The sections were chosen as they have the potential to experience significant impacts on pavement as a result of traffic movements associated with project.

PIA Assumptions

The identified roads were divided into directional sections consistent with those used for traffic modelling such that the existing background ESA loadings (Step 1), anticipated project ESA loadings (Step 2), seal width and roughness are generally homogenous for each assessed section.

The following values have been assumed for assessment parameters:

- 3 counts annual background roughness increase
- discount rate of 6.0%p.a.
- inflation rate of 4.4%p.a
- roughness intervention level of 120 counts (with the exception of those roads where TMR has adopted a higher intervention threshold by way of the existing roughness exceeding 120 counts)

Characteristics for each modelled road section are shown in Table F2 including traffic volumes, roughness and width.

Step 1: Estimation of Baseline ESAs

For the roads considered in the case study, Figure F-1 identifies the baseline equivalent standard axle (ESA) loadings based on 2011 AADT volumes, heavy vehicle (HV) traffic composition data for each section supplied by TMR and average ESA/HV values for each vehicle types from Austroads 2011 as shown in Table F1. This method means that a representative ESA/HV factor is calculated for each road section rather than a generic regional ESA/HV factor being applied to all sections.

The baseline traffic volumes are also summarised in Table F2

Step 2: Estimation of Project ESAs

The ESA generation of the heavy vehicle movements associated with the project was forecast using the traffic model detailed previously. ESA loadings were calculated yearly based on the annual project traffic which is spatially shown in Appendix C.

The ESA estimate includes consideration of the vehicle type likely to be associated with each delivery type (e.g. it is anticipated that concrete deliveries will occur via Austroads Class 4). A generic ESA/HV factor was not adopted for project traffic, but rather loaded and unloaded ESA values were used to reflect the directionality of heavy vehicle movements to and from the project site. This approach is appropriate as it results in the most representative forecasts of the project's ESA generation.

Table F3 identifies the project's estimate ESA loadings by year.

Step 3: Calculation of Maintenance Impacts

The proponent's obligation towards routine maintenance of pavement sections has been calculated based on the percentage increase on each road segment as a result of the project impacts on the chosen roads. Table F5 summarises the potential increase in pavement maintenance cost based on the increase in project ESA loadings beyond the baseline loadings. Typically the proponent contributes to the additional maintenance costs associated with increases in heavy vehicles in consultation with road authorities. For the SGP, monetary contributions have not yet been identified.

Step 4: Calculation of Rehabilitation Impacts

Table F4 and Figure F-2 summarises the reduction in estimated service life of the assessed pavement as a result of the project. In accordance with TMR's *Guidelines to Road Impacts of Development*, the project is defined as having a significant impact on the timing of pavement rehabilitation only where the acceleration time exceeds one year.

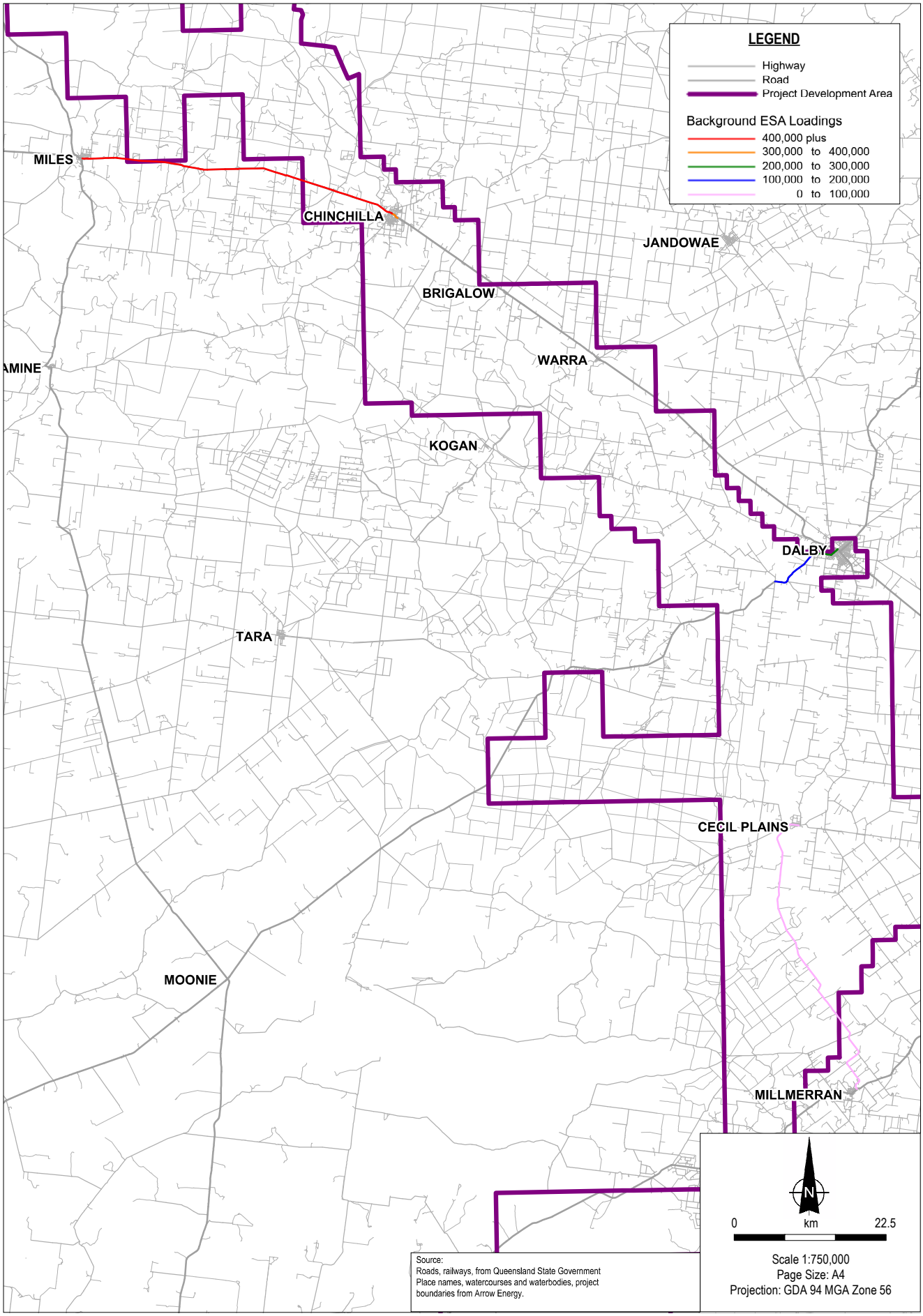
The estimation of the impacts on pavement rehabilitation relies upon roughness as the sole measure of pavement distress and includes consideration of:

- existing pavement roughness
- constant annual roughness deterioration rate
- pavement roughness intervention threshold

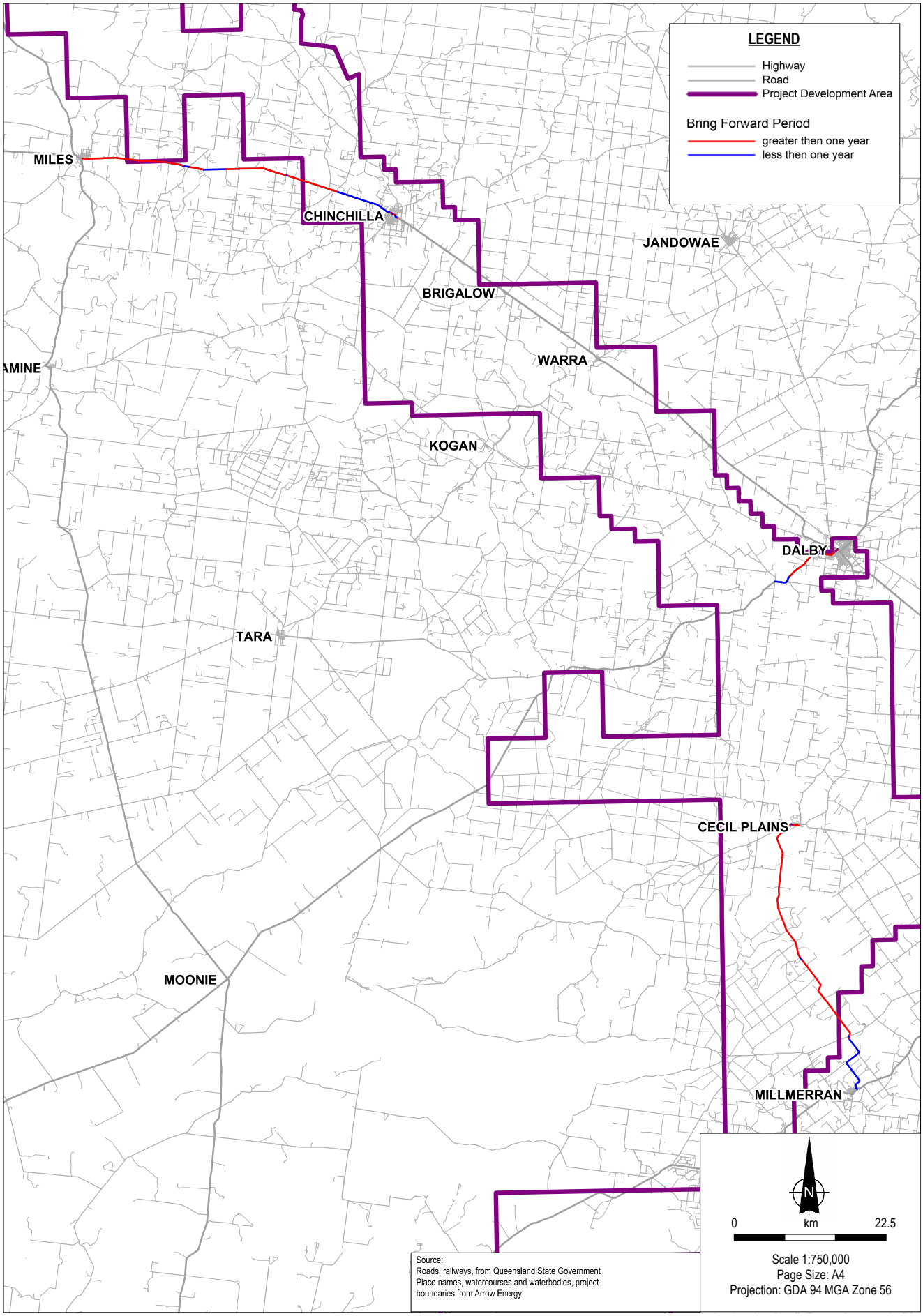
This assessment has identified those sections where a significant impact is anticipated on the timing of rehabilitation based on the project case modelled. Typically the proponent contributes to the cost difference required in bringing the pavement rehabilitation forward from that planned in consultation with road authorities. For the SGP, monetary contributions have not yet been identified.

Step 5: Proponent Contributions

The estimated proponent contributions from Steps 4 and 5 (which have not yet been identified) would be paid to the relevant road authority. Rehabilitation contributions are typically required to be paid upfront as the methodology is based on the premise that TMR invests additional funds at present to cover the cost in bringing the works forward at a later date. The payment of maintenance contributions is typically staged and paid on a regular basis to cover ongoing maintenance costs.



Cardno Shaping the Future	Date: 17.05.2013 WOR: Figure F.1 File Name: 6413_Figure F.1.wor	Arrow Energy Surat Gas Project	arrow energy go further	Background ESA Loading	Figure No: F.1



Cardno Shaping the Future	Date: 17.05.2013 WOR: Figure F.2 File Name: 6413_Figure F.2.wor	Arrow Energy Surat Gas Project	arrow energy go further	Bring Forward Period	Figure No: F.2

ASSESSMENT INPUTS			Source/Notes
Roughness Increase	3	counts/year	*TMR Fitzroy Notes for Contribution Calculations (V28)*
Terminal Roughness	120	counts	*TMR Fitzroy Notes for Contribution Calculations (V28)*
Inflation Rate	4.39%	p.a. (compound)	*ABS6427.0 Road and Bridge Construction Queensland*
Discount Rate	6.00%	p.a. (compound)	*GARID Appendix G Bring Forward Methodology*
Heavy Vehicle Growth Rate	3.00%	p.a. (linear)	*TMR Fitzroy Notes for Contribution Calculations (V28)*
Assessment/Cost Base Year	2013		

AVERAGE ESAs			
2C: 2-Axle Trucks and Buses	0.8	ESAs	*Establishment of a New Pavement Maintenance Database - Stage 1 and 2 Analysis (AP-R394-11)*
2C: 3-Axle Trucks and Buses	1.5	ESAs	
2E: 4-Axle Trucks	1.9	ESAs	
2F: 3-Axle Articulated Trucks	1.8	ESAs	
2G: 4-Axle Articulated Trucks	1.8	ESAs	
2H: 5-Axle Articulated Trucks	2.3	ESAs	
2I: 6-Axle Articulated Trucks	2.7	ESAs	
2J: B-Double	3.0	ESAs	
2K: Double Road Trains	3.4	ESAs	
2L: Triple Road Trains	3.8	ESAs	

ROAD DETAILS					TRAFFIC VOLUMES								ROUGHNESS		WIDTH	
TMR ROAD	Chainage Start	Chainage End	Direction	Length	AADT Survey Year	AADT	HV %	HV AADT	ESA/HV	Survey Year ESAs	HV Growth	Base Year ESAs	Roughness Survey Year	Average Roughness	Total Pavement Width	Section Width
3251	0.000	0.120	G	0.120 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	197.50	8.00 m	4.00 m
3251	0.000	0.120	A	0.120 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	197.50	8.00 m	4.00 m
3251	0.120	0.210	G	0.090 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	187.00	6.22 m	3.11 m
3251	0.120	0.210	A	0.090 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	187.00	6.22 m	3.11 m
3251	0.210	0.250	G	0.040 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	243.00	6.00 m	3.00 m
3251	0.210	0.250	A	0.040 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	243.00	6.00 m	3.00 m
3251	0.250	0.280	G	0.030 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	243.00	6.00 m	3.00 m
3251	0.250	0.280	A	0.030 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	243.00	6.00 m	3.00 m
3251	0.280	0.630	G	0.350 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	158.51	6.00 m	3.00 m
3251	0.280	0.630	A	0.350 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	158.51	6.00 m	3.00 m
3251	0.630	2.090	G	1.460 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	97.28	6.40 m	3.20 m
3251	0.630	2.090	A	1.460 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	97.28	6.40 m	3.20 m
3251	2.090	3.210	G	1.120 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	86.40	6.30 m	3.15 m
3251	2.090	3.210	A	1.120 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	86.40	6.30 m	3.15 m
3251	3.210	3.940	G	0.730 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	72.47	6.38 m	3.19 m
3251	3.210	3.940	A	0.730 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	72.47	6.38 m	3.19 m
3251	3.940	4.430	G	0.490 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	75.69	6.21 m	3.10 m
3251	3.940	4.430	A	0.490 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	75.69	6.21 m	3.10 m
3251	4.430	4.790	G	0.360 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	99.81	6.58 m	3.29 m
3251	4.430	4.790	A	0.360 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	99.81	6.58 m	3.29 m
3251	4.790	6.440	G	1.650 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	75.96	6.27 m	3.13 m
3251	4.790	6.440	A	1.650 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	75.96	6.27 m	3.13 m
3251	6.440	6.690	G	0.250 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	70.80	6.76 m	3.38 m
3251	6.440	6.690	A	0.250 km	2012	162	20.42%	33	1.5	23,871	3%	24,587	2013	70.80	6.76 m	3.38 m
3251	6.690	7.370	G	0.680 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	89.91	7.25 m	3.62 m
3251	6.690	7.370	A	0.680 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	89.91	7.25 m	3.62 m
3251	7.370	9.340	G	1.970 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	77.53	6.80 m	3.40 m
3251	7.370	9.340	A	1.970 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	77.53	6.80 m	3.40 m
3251	9.340	9.630	G	0.290 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	65.31	7.50 m	3.75 m
3251	9.340	9.630	A	0.290 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	65.31	7.50 m	3.75 m
3251	9.630	9.800	G	0.170 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	100.59	6.60 m	3.30 m
3251	9.630	9.800	A	0.170 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	100.59	6.60 m	3.30 m
3251	9.800	9.850	G	0.050 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	141.00	6.60 m	3.30 m
3251	9.800	9.850	A	0.050 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	141.00	6.60 m	3.30 m
3251	9.850	13.580	G	3.730 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	73.63	6.95 m	3.47 m
3251	9.850	13.580	A	3.730 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	73.63	6.95 m	3.47 m
3251	13.580	13.750	G	0.170 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	84.24	7.00 m	3.50 m
3251	13.580	13.750	A	0.170 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	84.24	7.00 m	3.50 m
3251	13.750	14.920	G	1.170 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	86.19	7.00 m	3.50 m
3251	13.750	14.920	A	1.170 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	86.19	7.00 m	3.50 m
3251	14.920	16.410	G	1.490 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	95.35	7.00 m	3.50 m
3251	14.920	16.410	A	1.490 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	95.35	7.00 m	3.50 m
3251	16.410	16.680	G	0.270 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	76.78	6.79 m	3.40 m
3251	16.410	16.680	A	0.270 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	76.78	6.79 m	3.40 m
3251	16.680	19.900	G	3.220 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	81.48	6.27 m	3.14 m
3251	16.680	19.900	A	3.220 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	81.48	6.27 m	3.14 m
3251	19.900	21.460	G	1.560 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	77.85	6.03 m	3.01 m
3251	19.900	21.460	A	1.560 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	77.85	6.03 m	3.01 m
3251	21.460	21.970	G	0.510 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	77.10	6.00 m	3.00 m
3251	21.460	21.970	A	0.510 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	77.10	6.00 m	3.00 m
3251	21.970	23.140	G	1.170 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	78.36	6.00 m	3.00 m
3251	21.970	23.140	A	1.170 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	78.36	6.00 m	3.00 m
3251	23.140	23.590	G	0.450 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	103.22	6.00 m	3.00 m
3251	23.140	23.590	A	0.450 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	103.22	6.00 m	3.00 m
3251	23.590	25.060	G	1.470 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	68.50	6.00 m	3.00 m
3251	23.590	25.060	A	1.470 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	68.50	6.00 m	3.00 m
3251	25.060	25.730	G	0.670 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	72.72	6.00 m	3.00 m
3251	25.060	25.730	A	0.670 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	72.72	6.00 m	3.00 m
3251	25.730	27.900	G	2.170 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	79.86	6.04 m	3.02 m
3251	25.730	27.900	A	2.170 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	79.86	6.04 m	3.02 m

Table **F2** **Section Properties**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD DETAILS					TRAFFIC VOLUMES								ROUGHNESS		WIDTH	
TMR ROAD	Chainage Start	Chainage End	Direction	Length	AADT Survey Year	AADT	HV %	HV AADT	ESA/HV	Survey Year ESAs	HV Growth	Base Year ESAs	Roughness Survey Year	Average Roughness	Total Pavement Width	Section Width
3251	27.900	28.020	G	0.120 km	2012	166	15.47%	26	1.7	19,710	3%	20,301	2013	75.17	6.00 m	3.00 m
3251	27.900	28.020	A	0.120 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	75.17	6.00 m	3.00 m
3251	28.020	29.940	G	1.920 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	78.78	6.00 m	3.00 m
3251	28.020	29.940	A	1.920 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	78.78	6.00 m	3.00 m
3251	29.940	31.190	G	1.250 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	74.66	6.00 m	3.00 m
3251	29.940	31.190	A	1.250 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	74.66	6.00 m	3.00 m
3251	31.190	37.830	G	6.640 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	66.02	6.01 m	3.01 m
3251	31.190	37.830	A	6.640 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	66.02	6.01 m	3.01 m
3251	37.830	38.895	G	1.065 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	81.96	6.00 m	3.00 m
3251	37.830	38.895	A	1.065 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	81.96	6.00 m	3.00 m
3251	38.950	44.210	G	5.260 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	74.97	5.82 m	2.91 m
3251	38.950	44.210	A	5.260 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	74.97	5.82 m	2.91 m
3251	44.210	44.300	G	0.090 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	66.00	6.00 m	3.00 m
3251	44.210	44.300	A	0.090 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	66.00	6.00 m	3.00 m
3251	44.300	44.360	G	0.060 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	93.00	6.00 m	3.00 m
3251	44.300	44.360	A	0.060 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	93.00	6.00 m	3.00 m
3251	44.360	44.520	G	0.160 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	115.38	7.13 m	3.56 m
3251	44.360	44.520	A	0.160 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	115.38	7.13 m	3.56 m
3251	44.520	44.630	G	0.110 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	123.00	12.27 m	6.14 m
3251	44.520	44.630	A	0.110 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	123.00	12.27 m	6.14 m
3251	44.630	44.860	G	0.230 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	100.91	15.02 m	7.51 m
3251	44.630	44.860	A	0.230 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	100.91	15.02 m	7.51 m
3251	44.860	45.090	G	0.230 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	105.39	17.96 m	8.98 m
3251	44.860	45.090	A	0.230 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	105.39	17.96 m	8.98 m
3251	45.090	45.320	G	0.230 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	101.74	19.17 m	9.59 m
3251	45.090	45.320	A	0.230 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	101.74	19.17 m	9.59 m
3251	45.320	45.610	G	0.290 km	2012	166	15.47%	26	1.6	19,710	3%	20,301	2013	92.03	19.34 m	9.67 m
3251	45.320	45.610	A	0.290 km	2012	162	20.42%	33	1.6	23,871	3%	24,587	2013	92.03	19.34 m	9.67 m
18C	80.175	80.365	G	0.190 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	95.74	11.00 m	5.50 m
18C	80.175	80.365	A	0.190 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	95.74	11.00 m	5.50 m
18C	80.365	80.485	G	0.120 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	141.42	11.00 m	5.50 m
18C	80.365	80.485	A	0.120 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	141.42	11.00 m	5.50 m
18C	80.485	80.615	G	0.130 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	158.35	9.00 m	4.50 m
18C	80.485	80.615	A	0.130 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	158.35	9.00 m	4.50 m
18C	80.615	80.645	G	0.030 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	163.00	9.00 m	4.50 m
18C	80.615	80.645	A	0.030 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	163.00	9.00 m	4.50 m
18C	80.645	80.705	G	0.060 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	163.33	9.00 m	4.50 m
18C	80.645	80.705	A	0.060 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	163.33	9.00 m	4.50 m
18C	80.705	80.875	G	0.170 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	134.79	12.00 m	6.00 m
18C	80.705	80.875	A	0.170 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	134.79	12.00 m	6.00 m
18C	80.875	81.045	G	0.170 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	75.62	17.21 m	8.60 m
18C	80.875	81.045	A	0.170 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	75.62	17.21 m	8.60 m
18C	81.045	81.255	G	0.210 km	2012	3,579	14.65%	524	0.0	350,656	3%	361,175	2013	75.45	14.07 m	7.04 m
18C	81.045	81.255	A	0.210 km	2012	3,430	16.09%	552	0.0	417,122	3%	429,636	2013	75.45	14.07 m	7.04 m
18C	81.255	81.505	G	0.250 km	2012	2,704	21.63%	585	0.0	449,060	3%	462,531	2013	105.60	12.20 m	6.10 m
18C	81.255	81.505	A	0.250 km	2012	2,657	22.57%	600	0.0	424,933	3%	437,681	2013	105.60	12.20 m	6.10 m
18C	81.505	81.755	G	0.250 km	2012	2,704	21.63%	585	0.0	449,060	3%	462,531	2013	64.96	12.60 m	6.30 m
18C	81.505	81.755	A	0.250 km	2012	2,657	22.57%	600	0.0	424,933	3%	437,681	2013	64.96	12.60 m	6.30 m
18C	81.755	82.425	G	0.670 km	2012	2,704	21.63%	585	0.0	449,060	3%	462,531	2013	115.65	9.21 m	4.60 m
18C	81.755	82.425	A	0.670 km	2012	2,657	22.57%	600	0.0	424,933	3%	437,681	2013	115.65	9.21 m	4.60 m
18C	82.425	82.775	G	0.350 km	2012	2,704	21.63%	585	0.0	449,060	3%	462,531	2013	102.71	9.00 m	4.50 m
18C	82.425	82.775	A	0.350 km	2012	2,657	22.57%	600	0.0	424,933	3%	437,681	2013	102.71	9.00 m	4.50 m
18C	82.775	83.155	G	0.380 km	2012	2,704	21.63%	585	0.0	449,060	3%	462,531	2013	106.92	10.11 m	5.05 m
18C	82.775	83.155	A	0.380 km	2012	2,657	22.57%	600	0.0	424,933	3%	437,681	2013	106.92	10.11 m	5.05 m
18C	83.155	87.525	G	4.370 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	91.09	9.05 m	4.52 m
18C	83.155	87.525	A	4.370 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	91.09	9.05 m	4.52 m
18C	87.525	89.805	G	2.280 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	89.92	9.00 m	4.50 m
18C	87.525	89.805	A	2.280 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	89.92	9.00 m	4.50 m
18C	89.805	90.315	G	0.510 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	84.12	9.00 m	4.50 m
18C	89.805	90.315	A	0.510 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	84.12	9.00 m	4.50 m

Table **F2** **Section Properties**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD DETAILS					TRAFFIC VOLUMES								ROUGHNESS		WIDTH	
TMR ROAD	Chainage Start	Chainage End	Direction	Length	AADT Survey Year	AADT	HV %	HV AADT	ESA/HV	Survey Year ESAs	HV Growth	Base Year ESAs	Roughness Survey Year	Average Roughness	Total Pavement Width	Section Width
18C	90.315	90.335	G	0.020 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	88.00	9.00 m	4.50 m
18C	90.315	90.335	A	0.020 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	88.00	9.00 m	4.50 m
18C	90.335	90.955	G	0.620 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	83.68	9.00 m	4.50 m
18C	90.335	90.955	A	0.620 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	83.68	9.00 m	4.50 m
18C	90.955	91.665	G	0.710 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	79.66	9.25 m	4.63 m
18C	90.955	91.665	A	0.710 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	79.66	9.25 m	4.63 m
18C	91.665	95.015	G	3.350 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	66.59	10.75 m	5.38 m
18C	91.665	95.015	A	3.350 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	66.59	10.75 m	5.38 m
18C	95.015	96.275	G	1.260 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	66.30	11.10 m	5.55 m
18C	95.015	96.275	A	1.260 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	66.30	11.10 m	5.55 m
18C	96.275	97.355	G	1.080 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	60.66	10.88 m	5.44 m
18C	96.275	97.355	A	1.080 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	60.66	10.88 m	5.44 m
18C	97.355	97.425	G	0.070 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	98.43	12.00 m	6.00 m
18C	97.355	97.425	A	0.070 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	98.43	12.00 m	6.00 m
18C	97.425	97.575	G	0.150 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	115.50	10.00 m	5.00 m
18C	97.425	97.575	A	0.150 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	115.50	10.00 m	5.00 m
18C	97.575	98.965	G	1.390 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	66.55	11.31 m	5.66 m
18C	97.575	98.965	A	1.390 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	66.55	11.31 m	5.66 m
18C	98.965	104.235	G	5.270 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	73.06	10.84 m	5.42 m
18C	98.965	104.235	A	5.270 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	73.06	10.84 m	5.42 m
18C	104.235	104.435	G	0.200 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	61.37	12.80 m	6.40 m
18C	104.235	104.435	A	0.200 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	61.37	12.80 m	6.40 m
18C	104.435	106.355	G	1.920 km	2012	1,834	29.49%	541	0.0	422,743	3%	435,425	2013	67.05	10.27 m	5.13 m
18C	104.435	106.355	A	1.920 km	2012	1,774	32.14%	570	0.0	418,071	3%	430,613	2013	67.05	10.27 m	5.13 m
18C	106.355	108.855	G	2.500 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	95.02	9.00 m	4.50 m
18C	106.355	108.855	A	2.500 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	95.02	9.00 m	4.50 m
18C	108.855	109.405	G	0.550 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	99.01	9.00 m	4.50 m
18C	108.855	109.405	A	0.550 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	99.01	9.00 m	4.50 m
18C	109.405	109.445	G	0.040 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	105.00	9.00 m	4.50 m
18C	109.405	109.445	A	0.040 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	105.00	9.00 m	4.50 m
18C	109.445	109.815	G	0.370 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	72.55	9.00 m	4.50 m
18C	109.445	109.815	A	0.370 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	72.55	9.00 m	4.50 m
18C	109.815	110.045	G	0.230 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	57.85	9.00 m	4.50 m
18C	109.815	110.045	A	0.230 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	57.85	9.00 m	4.50 m
18C	110.045	110.105	G	0.060 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	58.08	9.00 m	4.50 m
18C	110.045	110.105	A	0.060 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	58.08	9.00 m	4.50 m
18C	110.105	111.465	G	1.360 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	79.85	9.00 m	4.50 m
18C	110.105	111.465	A	1.360 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	79.85	9.00 m	4.50 m
18C	111.465	112.375	G	0.910 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2012	86.15	9.00 m	4.50 m
18C	111.465	112.375	A	0.910 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2012	86.15	9.00 m	4.50 m
18C	112.375	112.735	G	0.360 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2012	66.46	9.00 m	4.50 m
18C	112.375	112.735	A	0.360 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2012	66.46	9.00 m	4.50 m
18C	112.735	113.585	G	0.850 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2012	51.64	9.00 m	4.50 m
18C	112.735	113.585	A	0.850 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2012	51.64	9.00 m	4.50 m
18C	113.585	115.465	G	1.880 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	54.83	9.00 m	4.50 m
18C	113.585	115.465	A	1.880 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	54.83	9.00 m	4.50 m
18C	115.465	116.065	G	0.600 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	64.01	9.00 m	4.50 m
18C	115.465	116.065	A	0.600 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	64.01	9.00 m	4.50 m
18C	116.065	118.625	G	2.560 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	48.88	9.00 m	4.50 m
18C	116.065	118.625	A	2.560 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	48.88	9.00 m	4.50 m
18C	118.625	120.505	G	1.880 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	51.15	9.00 m	4.50 m
18C	118.625	120.505	A	1.880 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	51.15	9.00 m	4.50 m
18C	120.505	121.765	G	1.260 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	56.36	9.00 m	4.50 m
18C	120.505	121.765	A	1.260 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	56.36	9.00 m	4.50 m
18C	121.765	122.285	G	0.520 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	69.04	9.00 m	4.50 m
18C	121.765	122.285	A	0.520 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	69.04	9.00 m	4.50 m
18C	122.285	125.535	G	3.250 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	61.05	9.00 m	4.50 m
18C	122.285	125.535	A	3.250 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	61.05	9.00 m	4.50 m
18C	125.535	125.795	G	0.260 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	81.79	9.00 m	4.50 m
18C	125.535	125.795	A	0.260 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	81.79	9.00 m	4.50 m

Table **F2** **Section Properties**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD DETAILS					TRAFFIC VOLUMES								ROUGHNESS		WIDTH	
TMR ROAD	Chainage Start	Chainage End	Direction	Length	AADT Survey Year	AADT	HV %	HV AADT	ESA/HV	Survey Year ESAs	HV Growth	Base Year ESAs	Roughness Survey Year	Average Roughness	Total Pavement Width	Section Width
18C	125.795	125.895	G	0.100 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	65.30	9.00 m	4.50 m
18C	125.795	125.895	A	0.100 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	65.30	9.00 m	4.50 m
18C	125.895	125.945	G	0.050 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	43.30	9.00 m	4.50 m
18C	125.895	125.945	A	0.050 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	43.30	9.00 m	4.50 m
18C	125.945	126.005	G	0.060 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	41.08	9.00 m	4.50 m
18C	125.945	126.005	A	0.060 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	41.08	9.00 m	4.50 m
18C	126.005	126.235	G	0.230 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	44.37	9.00 m	4.50 m
18C	126.005	126.235	A	0.230 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	44.37	9.00 m	4.50 m
18C	126.235	126.475	G	0.240 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	49.21	9.00 m	4.50 m
18C	126.235	126.475	A	0.240 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	49.21	9.00 m	4.50 m
18C	126.475	126.745	G	0.270 km	2012	1,714	31.36%	538	0.0	430,372	3%	443,283	2013	72.04	11.21 m	5.60 m
18C	126.475	126.745	A	0.270 km	2012	1,728	30.87%	533	0.0	422,232	3%	434,899	2013	72.04	11.21 m	5.60 m
35A	0.000	0.130	G	0.130 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	124.69	19.77 m	9.88 m
35A	0.000	0.130	A	0.130 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	124.69	19.77 m	9.88 m
35A	0.130	0.240	G	0.110 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	77.73	20.00 m	10.00 m
35A	0.130	0.240	A	0.110 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	77.73	20.00 m	10.00 m
35A	0.240	0.350	G	0.110 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	83.09	20.00 m	10.00 m
35A	0.240	0.350	A	0.110 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	83.09	20.00 m	10.00 m
35A	0.350	0.470	G	0.120 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	92.67	20.00 m	10.00 m
35A	0.350	0.470	A	0.120 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	92.67	20.00 m	10.00 m
35A	0.470	0.740	G	0.270 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	71.11	20.00 m	10.00 m
35A	0.470	0.740	A	0.270 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	71.11	20.00 m	10.00 m
35A	0.740	0.800	G	0.060 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	113.00	20.00 m	10.00 m
35A	0.740	0.800	A	0.060 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	113.00	20.00 m	10.00 m
35A	0.800	1.020	G	0.220 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	58.64	20.00 m	10.00 m
35A	0.800	1.020	A	0.220 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	58.64	20.00 m	10.00 m
35A	1.020	1.220	G	0.200 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	71.10	20.00 m	10.00 m
35A	1.020	1.220	A	0.200 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	71.10	20.00 m	10.00 m
35A	1.220	1.270	G	0.050 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	86.00	20.00 m	10.00 m
35A	1.220	1.270	A	0.050 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	86.00	20.00 m	10.00 m
35A	1.270	1.720	G	0.450 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	57.96	21.50 m	10.75 m
35A	1.270	1.720	A	0.450 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	57.96	21.50 m	10.75 m
35A	1.720	1.930	G	0.210 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	75.38	21.14 m	10.57 m
35A	1.720	1.930	A	0.210 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	75.38	21.14 m	10.57 m
35A	1.930	2.500	G	0.570 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	63.63	14.00 m	7.00 m
35A	1.930	2.500	A	0.570 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	63.63	14.00 m	7.00 m
35A	2.500	2.550	G	0.050 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	82.00	14.00 m	7.00 m
35A	2.500	2.550	A	0.050 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	82.00	14.00 m	7.00 m
35A	2.550	2.900	G	0.350 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	111.14	9.71 m	4.86 m
35A	2.550	2.900	A	0.350 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	111.14	9.71 m	4.86 m
35A	2.900	3.130	G	0.230 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	95.09	9.00 m	4.50 m
35A	2.900	3.130	A	0.230 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	95.09	9.00 m	4.50 m
35A	3.130	3.700	G	0.570 km	2012	3,186	10.40%	331	0.0	192,757	3%	198,539	2013	100.93	10.30 m	5.15 m
35A	3.130	3.700	A	0.570 km	2012	3,199	11.92%	381	0.0	221,774	3%	228,427	2013	100.93	10.30 m	5.15 m
35A	3.700	5.820	G	2.120 km	2012	1,235	26.48%	327	0.0	207,284	3%	213,502	2013	63.42	9.41 m	4.71 m
35A	3.700	5.820	A	2.120 km	2012	1,133	20.63%	234	0.0	156,439	3%	161,132	2013	63.42	9.41 m	4.71 m
35A	5.820	8.590	G	2.770 km	2012	1,235	26.48%	327	0.0	207,284	3%	213,502	2013	85.77	8.76 m	4.38 m
35A	5.820	8.590	A	2.770 km	2012	1,133	20.63%	234	0.0	156,439	3%	161,132	2013	85.77	8.76 m	4.38 m
35A	8.590	9.190	G	0.600 km	2012	1,235	26.48%	327	0.0	207,284	3%	213,502	2013	105.13	8.97 m	4.49 m
35A	8.590	9.190	A	0.600 km	2012	1,133	20.63%	234	0.0	156,439	3%	161,132	2013	105.13	8.97 m	4.49 m
35A	9.190	9.430	G	0.240 km	2012	1,235	26.48%	327	0.0	207,284	3%	213,502	2013	94.58	10.47 m	5.24 m
35A	9.190	9.430	A	0.240 km	2012	1,133	20.63%	234	0.0	156,439	3%	161,132	2013	94.58	10.47 m	5.24 m
35A	9.430	11.000	G	1.570 km	2012	1,235	26.48%	327	0.0	207,284	3%	213,502	2013	115.97	7.02 m	3.51 m
35A	9.430	11.000	A	1.570 km	2012	1,133	20.63%	234	0.0	156,439	3%	161,132	2013	115.97	7.02 m	3.51 m

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
3251	0	0.12	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0	0.12	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	0.12	0.21	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0.12	0.21	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	0.21	0.25	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0.21	0.25	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	0.25	0.28	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0.25	0.28	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	0.28	0.63	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0.28	0.63	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	0.63	2.09	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	0.63	2.09	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	2.09	3.21	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	2.09	3.21	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	3.21	3.94	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	3.21	3.94	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	3.94	4.43	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	3.94	4.43	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	4.43	4.79	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	4.43	4.79	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	4.79	6.44	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	4.79	6.44	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	6.44	6.69	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	6.44	6.69	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	6.69	7.37	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	6.69	7.37	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	7.37	9.34	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	7.37	9.34	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	9.34	9.63	G	0	0	0	304	0	0	152	0	0	0	0	184	207	250	207	207	207	67,856	72,572	77,246	81,985	86,673	91,412	96,101	100,817	106,057
3251	9.34	9.63	A	0	0	0	78	0	0	39	0	0	0	0	184	207	218	207	207	207	77,175	81,864	86,580	91,291	96,007	100,704	105,393	110,109	115,349
3251	9.63	9.8	G	0	0	0	304	0	0	152	0	0	0	0	9,182	9,838	1,502	1,459	1,459	1,459	69,121	73,809	78,525	83,237	87,953	92,641	97,353	102,069	107,339
3251	9.63	9.8	A	0	0	0	78	0	0	39	0	0	0	0	10,426	11,082	1,470	1,459	1,459	1,459	78,427	83,143	87,832	92,556	97,245	101,933	106,672	111,361	116,150
3251	9.8	9.85	G	0	0	0	304	0	0	152	0	0	0	0	9,182	9,838	1,502	1,459	1,459	1,459	69,121	73,809	78,525	83,237	87,953	92,641	97,353	102,069	107,339
3251	9.8	9.85	A	0	0	0	78	0	0	39	0	0	0	0	10,426	11,082	1,470	1,459	1,459	1,459	78,427	83,143	87,832	92,556	97,245	101,933	106,672	111,361	116,150
3251	9.85	13.58	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	36,330	35,544	25,805	25,514	25,514	25,514	93,176	97,865	102,580	107,292	112,008	116,720	121,408	126,124	131,394
3251	9.85	13.58	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	35,185	35,513	25,582	25,514	25,514	25,514	102,483	107,199	111,887	116,612	121,300	126,012	130,728	135,416	140,205
3251	13.58	13.75	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	36,330	35,544	25,805	25,514	25,514	25,514	93,176	97,865	102,580	107,292	112,008	116,720	121,408	126,124	131,394
3251	13.58	13.75	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	35,185	35,513	25,582	25,514	25,514	25,514	102,483	107,199	111,887	116,612	121,300	126,012	130,728	135,416	140,205
3251	13.75	14.92	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	36,330	35,544	25,805	25,514	25,514	25,514	93,176	97,865	102,580	107,292	112,008	116,720	121,408	126,124	131,394
3251	13.75	14.92	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	35,185	35,513	25,582	25,514	25,514	25,514	102,483	107,199	111,887	116,612	121,300	126,012	130,728	135,416	140,205
3251	14.92	16.41	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	36,330	35,544	25,805	25,514	25,514	25,514	93,176	97,865	102,580	107,292	112,008	116,720	121,408	126,124	131,394
3251	14.92	16.41	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	35,185	35,513	25,582	25,514	25,514	25,514	102,483	107,199	111,887	116,612	121,300	126,012	130,728	135,416	140,205
3251	16.41	16.68	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	36,330	35,544	25,805	25,514	25,514	25,514	93,176	97,865	102,580	107,292	112,008	116,720	121,408	126,124	131,394
3251	16.41	16.68	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	35,185	35,513	25,582	25,514	25,514	25,514	102,483	107,199	111,887	116,612	121,300	126,012	130,728	135,416	140,205
3251	16.68	19.9	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	51,606	38,623	26,877	26,587	26,587	26,587	94,221	98,937	103,626	108,364	113,053	117,765	122,466	127,155	131,977
3251	16.68	19.9	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	52,892	38,948	26,654	26,587	26,587	26,587	103,555	108,244	112,918	117,657	122,345	127,084	131,773	136,489	139,858
3251	19.9	21.46	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	182,415	50,033	36,110	35,820	35,820	35,820	103,496	108,185	112,896	117,598	122,309	127,025	131,714	136,453	141,808
3251	19.9	21.46	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	201,683	50,657	35,887	35,820	35,820	35,820	112,788	117,477	122,216	126,904	131,643	136,332	141,048	145,745	142,146
3251	21.46	21.97	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	182,415	50,033	36,110	35,820	35,820	35,820	103,496	108,185	112,896	117,598	122,309	127,025	131,714	136,453	141,808
3251	21.46	21.97	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	201,683	50,657	35,887	35,820	35,820	35,820	112,788	117,477	122,216	126,904	131,643	136,332	141,048	145,745	142,146
3251	21.97	23.14	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	182,415	50,033	36,110	35,820	35,820	35,820	103,496	108,185	112,896	117,598	122,309	127,025	131,714	136,453	141,808
3251	21.97	23.14	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	201,683	50,657	35,887	35,820	35,820	35,820	112,788	117,477	122,216	126,904	131,643	136,332	141,048	145,745	142,146
3251	23.14	23.59	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	182,415	50,033	36,110	35,820	35,820	35,820	103,496	108,185	112,896	117,598	122,309	127,025	131,714	136,453	141,808
3251	23.14	23.59	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	201,683	50,657	35,887	35,820	35,820	35,820	112,788	117,477	122,216	126,904	131,643	136,332	141,048	145,745	142,146
3251	23.59	25.06	G	0	0	0	304	0	0	30,119	24,055	24,055	24,055	24,952	182,415	50,033	36,110	35,820	35,820	35,820	103,496	108,185	112,896	117,598	122,309	127,025	131,714	136,453	141,808
3251	23.59	25.06	A	0	0	0	78	0	0	25,439	24,055	24,055	24,055	24,259	201,683	50,657	35,887	35,820	35,820	35,820	112,788	117,477	122,216	126,904	131,643	136,332	141,048	145,745	142,146
3251	25.06	25.73	G	0	0	0	304	0	4,060	114,807	93,367	93,367	93,367	132,585	208,489	162,064	108,242	108,009	108,009	108,009	111,799	111,799	111,799	110,518	108,118	108,118	108,118	105,634	110,832
3251	25.06	25.73	A	0	0	0	78	0	20,759	121,373	95,518	95,518	95,518	134,044	232,708	166,918	111,208	110,170	110,170	110,170	123,256	123,256	123,256	120,929	119,590	119,590	119,590	117,091	112,289
3251	25.73	27.9	G	0	0	0	304	0	4,060	66,887	89,907	89,907	89,907	89,907	99,818	91,754	90,486	90,253	90,253	90,253	94,044	94,044	94,044	95,863	93,860	93,860	93,860	93,860	105,948
3251	25.73	27.9	A	0	0	0	78	0	20,759	74,296	92,059	92,059	92,059	92,059	125,844	97,611	93,480	92,415	92,415	92,415	105,501	105,501	105,501	106,274	105,317	105,317	105,317	105,317	107,378
3251	27.9	28.02	G	0	0	0	304	0	4,060	70,209	90,459	90,459	90,459	93,193	107,956	97,907	93,337	93,105	93,105	93,105	96,895	96,895	96,895	103,637	96,136	96,136	96,136	100,212	118,350
3251	27.9	28.02	A	0	0	0	78	0	20,759	84,459	92,611	92,611	92,611	100,909	148,560	111,840	96,331	95,266	95,266	95,266	108,352	108,352	108,352	111,197	107,593	107,593	107,593	109,316	113,673
3251	28.02	29.94	G	0	0	0	304	0	4,060	70,209	90,459	90,459	90,459	93,193	107,956	97,907	93,337	93,105	93,105	93,105	96,895	96,895	96,895	103,637	96,136	96,136	96,136	100,212	118,350
3251	28.02	29.94	A	0	0	0	78	0	20,759	84,459	92,611	92,611	92,611	100,909	148,560	111,840	96,331	95,266	95,266	95,266	108,352	108,352	108,352	111,197	107,593	107,593	107,593	109,316	113,673
3251	29.94	31.19	G	0	0	0	304	0	4,060	70,209	90,459	90,459	90,459	93,193	107,956	97,907	93,337	93,105	93,105	93,105	96,895	96,895	96,895	103,637	96,136	96,136	96,136	100,212	118,350
3251	29.94	31.19	A	0	0	0	78	0	20,759	84,459	92,611	92,611	92,611	100,909	148,560	111,840	96,331	95,266	95,266	95,266	108,352	108,352	108,352	111,197	107,593	107,593	107,593	109,316	113,673
3251	31.19	37.83	G	0	0	0	304	0	4,060	70,209	90,459	90,459	90,459	93,193	107,956	97,907	93,337	93,105	93,105	93,105	96,895	96,895	96,895	103,637	96,136	96,136	96,136	100,212	118,350
3251	31.19	37.83	A	0	0	0	78	0	20,759	84,459	92,611	92,611	92,611	100,909	148,560	111,840	96,331	95,266	95,266	95,266	108,352	108,352	108,352	111,197	107,593	107,593	107,593	109,316	113,673
3251	37.83	38.895	G	0	0	0	232,672	118,777	111,398	161,105	242,222	244,017	241,308	208,391	210,374	224,224	230,755	233,853	248,662	252,632	270,654	267,114	258,134	257,940	245,648	241,325	236,234	235,892	250,805
3251	37.83	38.895	A	0	0	0	221,732	52,604	71,696	124,459	158,118	160,802	164,306	162,554	185,330	184,573	183,568	190,493	202,813	212,456	227,520	227,537	225,841	228,159	220,998	217,546	212,294	209,596	210,899
3251	38.95	44.21	G	0	0	0	232,672	118,777	111,398	161,105	242,222	244,017	241,308	208,391	210,374	224,224	230,755	233,853	248,662	252,632	270,654	267,114	258,134	257,940	245,648	241,325	236,234	235,892	250,805
3251	38.95	44.21	A	0	0	0	221,732	52,604	71,696	124,459	158,118	160,802	164,306	162,554	185,330	184,573	183,568	190,493	202,813	212,456	227,520	227,537	225,841	228,159	220,998	217,546	212,294	209,596	210,899
3251	44.21	44.3	G	0	0	0	15,476	86,240	98,469	137,414	175,483	203,112	193,925	201,913	210,374	224,224	224,273	233,853	248,662	252,632	270,654	267,114	258,134	257,940	245,648	241,325	236,234	235,892	250,805
3251	44.21	44.3	A	0	0	0	14,266	44,248	68,381	118,375	140,979	150,292	152,137	160,899	185,330	184,573	181,913	190,493	202,813	212,456	227,520	227,537	225,841	228,159	220,998	217,546	212,294	209,596	210,899
3251	44.3	44.36	G	0	0	0	15,476	86,240	98,469	137,414	175,483	203,112	193,925	201,913	210,374	224,224	224,273	233,853	248,662	252,632	270,654	267,114	258,134	257,940	245,648	241,325	236,234	235,892	250,805
3251	44.3	44.36	A	0	0	0	14,266	44,248	68,381	118,375	140,979	150,292	152,137	160,899	185,330	184,573	181,913	190,493	202,813	212,456	227,520	227,537	225,841	228,159	220,998	217,546	212,294	209,596	210,899
3251	44.36	44.52	G	0	333	27,521	126,625	210,379	247,803	261,170	405,712	490,437	464,752	444,475	499,199	608,254	584,684	604,130	629,470	584,187	637,762	572,927	469,029	447,245	436,983	401,704	395,693	409,538	368,049
3251	44.36	44.52	A	0	685	48,056	134,084	183,856	235,205	245,831	383,458	446,339	427,172	405,428	477,644	579,298	544,292	562,737	585,589	544,672	595,403	525,814	427,108	419,433	409,620	378,731	372,556	385,210	328,919
3251	44.52	44.63	G	0	333	27,521	126,625	210,379	247,803	261,170	405,712	490,437	464,752	444,475	499,199	608,254	584,684	604,130	629,470	584,187	637,762	572,927	469,029	447,245	436,983	401,704	395,693	409,538	368,049
3251	44.52	44.63	A	0	685	48,056	134,084	183,856	235,205	245,831	383,458	446,339	427,172	405,428	477,644	579,298	544,292	562,737	585,589	544,672	595,403	525,814	427,108	419,433	409,620	378,731	372,556	385,210	328,919
3251	44.63	44.86	G	0	333	27,521	126,625	210,379	247,803	261,170	405,712	490,437	464,752	444,475	499,199	608,254	584,684	604,130	629,470	584,187	637,762	572,927	469,029	447,245	436,983	401,704	395,693	409,538	368,049
3251	44.63	44.86	A	0	685	48,056	134,084	183,856	235,205	245,831	383,458	446,339	427,172	405,428	477,644	579,298	544,292	562,737	585,589	544,672	595,403	525,814	427,108	419,433	409,620	378,731	372,556	385,210	328,919
3251	44.86	45.09	G	0	333	27,521	126,625	210,379	247,803	261,170	405,712	490,437	464,752	444,475	499,199	608,254	584,684	604,130	629,470	584,187	637,762	572,927	469,029	447,245	436,983	401,704	395,693	409,538	368,049
3251	44.86	45.09	A	0	685	48,056	134,084	183,856	235,205	245,831	383,458	446,339	427,172	405,428	477,644	579,298	544,292	562,737	585,589	544,672	595,403	525,814	427,108	419,433	409,620	378,731	372,556	385,210	328,919

Table **F3** — **Project ESA Loadings**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

Cardno Shaping the Future

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
3251	0	0.12	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0	0.12	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	0.12	0.21	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0.12	0.21	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	0.21	0.25	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0.21	0.25	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	0.25	0.28	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0.25	0.28	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	0.28	0.63	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0.28	0.63	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	0.63	2.09	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	0.63	2.09	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	2.09	3.21	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	2.09	3.21	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	3.21	3.94	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	3.21	3.94	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	3.94	4.43	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	3.94	4.43	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	4.43	4.79	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	4.43	4.79	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	4.79	6.44	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	4.79	6.44	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	6.44	6.69	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	6.44	6.69	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	6.69	7.37	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	6.69	7.37	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	7.37	9.34	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	7.37	9.34	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	9.34	9.63	G	110,125	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	9.34	9.63	A	119,444	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	9.63	9.8	G	110,788	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	9.63	9.8	A	119,584	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	9.8	9.85	G	110,788	114,734	119,423	67,751	57,276	57,577	52,866	48,150	43,438	38,722	34,033	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	9.8	9.85	A	119,584	124,041	128,757	69,297	57,276	53,680	48,941	44,253	39,514	34,825	30,109	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	9.85	13.58	G	134,843	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	9.85	13.58	A	143,640	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	13.58	13.75	G	134,843	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	13.58	13.75	A	143,640	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	13.75	14.92	G	134,843	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	13.75	14.92	A	143,640	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	14.92	16.41	G	134,843	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	14.92	16.41	A	143,640	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	16.41	16.68	G	134,843	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	16.41	16.68	A	143,640	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	16.68	19.9	G	134,909	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	16.68	19.9	A	143,570	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	19.9	21.46	G	135,063	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	19.9	21.46	A	143,595	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	21.46	21.97	G	135,063	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	21.46	21.97	A	143,595	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	21.97	23.14	G	135,063	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	21.97	23.14	A	143,595	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	23.14	23.59	G	135,063	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	23.14	23.59	A	143,595	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	23.59	25.06	G	135,063	138,790	143,478	91,806	81,331	81,632	76,921	72,205	67,516	62,777	58,089	29,295	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	23.59	25.06	A	143,595	148,096	152,812	93,352	81,331	77,736	72,997	68,308	63,592	58,881	54,165	25,398	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	25.06	25.73	G	96,356	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	25.06	25.73	A	106,245	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	25.73	27.9	G	95,910	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	25.73	27.9	A	105,799	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	27.9	28.02	G	102,398	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	27.9	28.02	A	108,912	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	28.02	29.94	G	102,398	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	28.02	29.94	A	108,912	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	29.94	31.19	G	102,398	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	29.94	31.19	A	108,912	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	31.19	37.83	G	102,398	93,492	93,492	90,312	89,701	94,167	94,167	94,167	94,167	94,167	142,631	71,333	24,606	19,905	15,193	10,504	5,766	831	0	0	0	0	0
3251	31.19	37.83	A	108,912	104,949	104,949	94,019	91,863	92,432	92,432	92,432	92,432	92,432	127,300	41,108	20,682	16,008	11,296	6,580	1,869	189	0	0	0	0	0
3251	37.83	38.895	G	222,107	207,836	196,701	180,218	166,429	162,476	160,334	158,093	156,176	155,370	203,751	132,989	85,939	81,039	76,072	71,047	67,261	62,002	151,948	0	0	0	0
3251	37.83	38.895	A	193,197	183,883	174,355	157,244	144,206	136,356	134,214	131,973	130,028	129,250	164,033	78,380	57,658	52,757	47,791	42,766	38,953	36,976	138,666	0	0	0	0
3251	38.95	44.21	G	222,107	207,836	196,701	180,218	166,429	162,476	160,334	158,093	156,176	155,370	203,751	132,989	85,939	81,039	76,072	71,047	67,261	62,002	151,948	0	0	0	0
3251	38.95	44.21	A	193,197	183,883	174,355	157,244	144,206	136,356	134,214	131,973	130,028	129,250	164,033	78,380	57,658	52,757	47,791	42,766	38,953	36,976	138,666	0	0	0	0
3251	44.21	44.3	G	222,107	207,836	196,701	180,218	166,429	162,476	160,334	158,093	156,176	155,370	203,751	132,989	85,939	81,039	76,072	71,047	67,261	62,002	150,875	0	0	0	0
3251	44.21	44.3	A	193,197	183,883	174,355	157,244	144,206	136,356	134,214	131,973	130,028	129,250	164,033	78,380	57,658	52,757	47,791	42,766	38,953	36,976	137,592	0	0	0	0
3251	44.3	44.36	G	222,107	207,836	196,701	180,218	166,429	162,476	160,334	158,093	156,176	155,370	203,751	132,989	85,939	81,039	76,072	71,047	67,261	62,002	150,875	0	0	0	0
3251	44.3	44.36	A	193,197	183,883	174,355	157,244	144,206	136,356	134,214	131,973	130,028	129,250	164,033	78,380	57,658	52,757	47,791	42,766	38,953	36,976	137,592	0	0	0	0
3251	44.36	44.52	G	348,530	321,534	310,399	293,919	280,104	276,174	274,009	271,768	291,604	244,486	292,867	222,109	175,059	170,159	165,192	160,144	156,381	151,122	239,991	42,038	0	0	0
3251	44.36	44.52	A	314,958	299,549	290,021	272,910	259,848	252,022	249,857	247,616	267,424	220,334	255,116	169,464	148,742	143,841	138,875	133,827	130,037	128,061	228,676	15,711	0	0	0
3251	44.52	44.63	G	348,530	321,534	310,399	293,919	280,104	276,174	274,009	271,768	291,604	244,486	292,867	222,109	175,059	170,159	165,192	160,144	156,381	151,122	239,991	42,038	0	0	0
3251	44.52	44.63	A	314,958	299,549	290,021	272,910	259,848	252,022	249,857	247,616	267,424	220,334	255,116	169,464	148,742	143,841	138,875	133,827	130,037	128,061	228,676	15,711	0	0	0
3251	44.63	44.86	G	348,530	321,534	310,399	293,919	280,104	276,174	274,009	271,768	291,604	244,486	292,867	222,109	175,059	170,159	165,192	160,144	156,381	151,122	239,991	42,038	0	0	0
3251	44.63	44.86	A	314,958	299,549	290,021	272,910	259,848	252,022	249,857	247,616	267,424	220,334	255,116	169,464	148,742	143,841	138,875	133,827	130,037	128,061	228,676	15,711	0	0	0
3251	44.86	45.09	G	348,530	321,534	310,399	293,919	280,104	276,174	274,009	271,768	291,604	244,486	292,867	222,109	175,059	170,159	165,192	160,144	156,381	151,122	239,991	42,038	0	0	0
3251	44.86	45.09	A	314,958	299,549	290,021	272,910	259,848	252,022	249,857	247,616	267,424	220,334	255,116	169,464	148,742	143,841	138,875	133,827	130,037	128,061	228,676	15,711	0	0	0

Table **F3** — **Project ESA Loadings**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

Cardno Shaping the Future

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
3251	45.09	45.32	G	0	333	27,521	126,625	210,379	247,803	261,170	405,712	490,437	464,752	444,475	499,199	608,254	584,684	604,130	629,470	584,187	637,762	572,927	469,029	447,245	436,983	401,704	395,693	409,538	368,049
3251	45.09	45.32	A	0	685	48,056	134,084	183,856	235,205	245,831	383,458	446,339	427,172	405,428	477,644	579,298	544,292	562,737	585,589	544,672	595,403	525,814	427,108	419,433	409,620	378,731	372,556	385,210	328,919
3251	45.32	45.61	G	0	103	26,809	61,181	86,459	122,595	68,219	157,044	241,332	212,267	192,979	247,680	357,378	335,856	357,922	385,125	341,383	398,476	332,193	229,444	203,360	186,476	176,215	161,719	159,214	171,166
3251	45.32	45.61	A	0	455	47,343	68,640	59,936	109,998	52,880	134,790	197,234	174,687	153,932	226,124	328,422	295,463	316,529	341,244	301,868	356,117	285,079	187,523	175,548	159,113	153,242	138,582	134,886	132,036
18C	80.175	80.365	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	191,154	185,258	167,671	172,710	164,553	169,454	172,422	228,398	236,652	242,770	254,665	253,463	247,580	254,267	273,297	263,629
18C	80.175	80.365	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	209,720	181,474	173,840	174,591	175,591	181,782	183,282	242,729	253,045	258,844	266,316	272,885	260,251	266,742	280,569	274,966
18C	80.365	80.485	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	191,154	185,258	167,671	172,710	164,553	169,454	172,422	228,398	236,652	242,770	254,665	253,463	247,580	254,267	273,297	263,629
18C	80.365	80.485	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	209,720	181,474	173,840	174,591	175,591	181,782	183,282	242,729	253,045	258,844	266,316	272,885	260,251	266,742	280,569	274,966
18C	80.485	80.615	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	191,154	185,258	167,671	172,710	164,553	169,454	172,422	228,398	236,652	242,770	254,665	253,463	247,580	254,267	273,297	263,629
18C	80.485	80.615	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	209,720	181,474	173,840	174,591	175,591	181,782	183,282	242,729	253,045	258,844	266,316	272,885	260,251	266,742	280,569	274,966
18C	80.615	80.645	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	192,051	186,615	170,615	176,114	168,485	173,456	176,975	233,273	241,619	247,829	260,345	259,120	253,260	259,923	281,690	269,768
18C	80.615	80.645	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	210,616	182,831	176,783	177,994	179,523	185,783	187,835	247,604	258,012	263,903	271,996	278,542	265,931	272,399	288,962	281,105
18C	80.645	80.705	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	192,051	186,615	170,615	176,114	168,485	173,456	176,975	233,273	241,619	247,829	260,345	259,120	253,260	259,923	281,690	269,768
18C	80.645	80.705	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	210,616	182,831	176,783	177,994	179,523	185,783	187,835	247,604	258,012	263,903	271,996	278,542	265,931	272,399	288,962	281,105
18C	80.705	80.875	G	0	0	10,075	56,558	86,812	80,178	152,060	156,176	164,306	171,460	192,051	186,615	170,615	176,114	168,485	173,456	176,975	233,273	241,619	247,829	260,345	259,120	253,260	259,923	281,690	269,768
18C	80.705	80.875	A	0	0	1,283	28,776	81,495	82,465	169,643	169,645	170,795	171,807	210,616	182,831	176,783	177,994	179,523	185,783	187,835	247,604	258,012	263,903	271,996	278,542	265,931	272,399	288,962	281,105
18C	80.875	81.045	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	96,714	90,473	72,886	77,925	69,630	74,094	76,578	133,106	141,797	147,709	154,131	162,472	157,623	165,368	177,155	178,547
18C	80.875	81.045	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	115,279	86,689	79,054	79,805	80,667	86,422	87,439	147,438	158,190	163,783	165,782	181,894	170,295	177,844	184,427	189,884
18C	81.045	81.255	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	96,714	90,473	72,886	77,925	69,630	74,094	76,578	133,106	141,797	147,709	154,131	162,472	157,623	165,368	177,155	178,547
18C	81.045	81.255	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	115,279	86,689	79,054	79,805	80,667	86,422	87,439	147,438	158,190	163,783	165,782	181,894	170,295	177,844	184,427	189,884
18C	81.255	81.505	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	134,737	142,289	148,201	157,192	162,472	157,623	165,368	177,155	179,881
18C	81.255	81.505	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	153,083	159,926	165,518	176,255	181,894	170,295	177,844	184,427	190,054
18C	81.505	81.755	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	134,737	142,289	148,201	157,192	162,472	157,623	165,368	177,155	179,881
18C	81.505	81.755	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	153,083	159,926	165,518	176,255	181,894	170,295	177,844	184,427	190,054
18C	81.755	82.425	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	134,737	142,289	148,201	157,192	162,472	157,623	165,368	177,155	179,881
18C	81.755	82.425	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	153,083	159,926	165,518	176,255	181,894	170,295	177,844	184,427	190,054
18C	82.425	82.775	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	134,737	142,289	148,201	157,192	162,472	157,623	165,368	177,155	179,881
18C	82.425	82.775	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	153,083	159,926	165,518	176,255	181,894	170,295	177,844	184,427	190,054
18C	82.775	83.155	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	134,737	142,289	148,201	157,192	162,472	157,623	165,368	177,155	179,881
18C	82.775	83.155	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	153,083	159,926	165,518	176,255	181,894	170,295	177,844	184,427	190,054
18C	83.155	87.525	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	117,246	123,312	127,907	135,425	137,064	132,648	138,933	149,387	150,650
18C	83.155	87.525	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	136,238	141,622	146,130	155,436	157,474	145,935	152,025	157,579	161,770
18C	87.525	89.805	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	117,246	123,312	127,907	135,425	137,064	132,648	138,933	149,387	150,650
18C	87.525	89.805	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	136,238	141,622	146,130	155,436	157,474	145,935	152,025	157,579	161,770
18C	89.805	90.315	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	117,246	123,312	127,907	135,425	137,064	132,648	138,933	149,387	150,650
18C	89.805	90.315	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	136,238	141,622	146,130	155,436	157,474	145,935	152,025	157,579	161,770
18C	90.315	90.335	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	117,246	123,312	127,907	135,425	137,064	132,648	138,933	149,387	150,650
18C	90.315	90.335	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	136,238	141,622	146,130	155,436	157,474	145,935	152,025	157,579	161,770
18C	90.335	90.955	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	96,469	100,720	103,464	109,177	108,974	102,801	107,241	115,865	115,317
18C	90.335	90.955	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	118,971	122,513	125,176	132,699	132,868	119,538	123,814	127,539	129,888
18C	90.955	91.665	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	74,418	74,658	75,381	79,127	79,112	71,084	71,514	78,120	75,578
18C	90.955	91.665	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	97,285	96,846	97,542	103,043	103,387	88,240	88,508	90,216	90,598
18C	91.665	95.015	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	74,418	74,658	75,381	79,127	79,112	71,084	71,514	78,120	75,578
18C	91.665	95.015	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	97,285	96,846	97,542	103,043	103,387	88,240	88,508	90,216	90,598
18C	95.015	96.275	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	74,418	74,658	75,381	79,127	79,112	71,084	71,514	78,120	75,578
18C	95.015	96.275	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	97,285	96,846	97,542	103,043	103,387	88,240	88,508	90,216	90,598
18C	96.275	97.355	G	0	0	10,075	56,558	86,812	79,948	84,960	64,518	72,648	79,802	98,928	92,156	78,517	80,159	72,278	74,382	79,352	74,418	74,658	75,381	79,127	79,112	71,084	71,514	78,120	75,578
18C	96.275	97.355	A	0	0	1,283	28,776	81,495	82,235	102,543	77,987	79,137	80,148	123,900	92,750	99,445	87,640	89,821	87,284	97,077	97,285	96,846	97,542	103,043	103,387	88,240	88,508	90,216	90,598
18C	97.355	97.425	G	0	0	10,075	56,558	86,812	78,844	84,714	64,518	72,297	79,763	98,928	92,104	78,517	79,964	72,278	74,187	79,248	74,507	74,376	74,504	77,726	77,124	68,466	68,523	74,544	71,473
18C	97.355	97.425	A	0	0	1,283	28,776	81,495	81,983	102,487	77,987	79,057	80,140	123,900	92,738	99,445	87,596	89,821	87,239	97,054	102,242	101,703	101,660	106,648	106,237	90,498	90,693	91,678	91,531
18C	97.425	97.575	G	0	0	10,075	56,558	86,812	78,844	84,714	64,518	72,297	79,763	98,928	92,104	78,517	79,964	72,278	74,187	79,248	74,507	74,376	74,504	77,726	77,124	68,466	68,523	74,544	71,473
18C	97.425	97.575	A	0	0	1,283	28,776	81,495	81,983	102,487	77,987	79,057	80,140	123,900	92,738	99,445	87,596	89,821	87,239	97,054	102,242	101,703	101,660	106,648	106,237	90,498	90,693	91,678	91,531
18C	97.575	98.965	G	0	0	10,075	56,558	86,812	78,844	84,714	64,518	72,297	79,763	98,928	92,104	78,517	79,964	72,278	74,187	79,248	74,507	74,376	74,504	77,726	77,124	68,466	68,523	74,544	71,473
18C	97.575	98.965	A	0	0	1,283	28,776	81,495	81,983	102,487	77,987	79,057	80,140	123,900	92,738	99,445	87,596	89,821	87,239	97,054	102,242	101,703	101,660	106,648	106,237	90,498	90,693	91,678	91,531
18C	98.965	104.235	G	0	0	10,075	56,558	86,812	78,844	84,714	64,518	72,297	79,763	98,928	92,104	78,517	79,964	72,278	74,187	79,248	74,507	74,376	74,504	77,726	77,124	68,466	68,523	74,544	71,473
18C	98.965	104.235	A	0	0	1,283	28,776	81,495	81,983	102,487	77,987	79,057	80,140	123,900	92,738	99,445	87,596	89,821	87,239	97,054	102,242	101,703	101,660	106,648	106,237	90,498	90,693	91,678	91,531
18C	104.235	104.435	G	0	0	10,075	56,558	86,812	78,844	84,714	64,518	72,297	79,763	98,928	92,104	78,517	79,964	72,278	74,187	79,248	74,507	74,376	74,504	77,726	77,124	68,466	68,523	74,544	71,473
18C	104.235	104.435	A	0	0	1,283	28,776	81,495	81,983	102,487	77,987	79,057	80,140	123,900	92,738	99,445	87,596	89,821	87,239	97,054	102,242	101,703	101,660	106,648	106,237	90,498	90,693	91,678	91,531
18C	104.435	106.355	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	104.435	106.355	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	106.355	108.855	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	106.355	108.855	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	108.855	109.405	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	108.855	109.405	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	109.405	109.445	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	109.405	109.445	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	109.445	109.815	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	109.445	109.815	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	109.815	110.045	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	109.815	110.045	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	110.045	110.105	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	110.045	110.105	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	110.105	111.465	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	110.105	111.465	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	111.465	112.375	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	111.465	112.375	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	112.375	112.735	G	0	0	10,075	56,558	86,812	78,701	84,714	64,518	72,050	79,607	98,928	91,559	78,517	79,717	72,278	73,486	78,260	100,026	101,566	103,426	106,143	107,138	102,290	104,008	111,773	108,253
18C	112.375	112.735	A	0	0	1,283	28,776	81,495	81,951	102,487	77,987	79,001	80,104	123,900	92,614	99,445	87,539	89,821	87,080	96,829	132,622	133,606	135,309	139,655	140,806	129,184	130,902	133,655	132,840
18C	112.735	113.585	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,204	92,223	79,069	80,755	72,968	75,419	81,102	101,566	103,107	105,632	107,615	108,609	104,864	106,034	113,014	111,979
18C	112.735	113.585	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	124,176	95,207	99,997	89,242	90,511	90,891	102,314	134,162	135,147	137,139	141,127	142,278	131,117	132,521	134,897	135,141
18C	113.585	115.465	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,204	92,223	79,069	80,755	72,968	75,419	81,102	101,566	103,107	105,632	107,615	108,609	104,864	106,034	113,014	111,979
18C	113.585	115.465	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	124,176	95,207	99,997	89,242	90,511	90,891	102,314	134,162	135,147	137,139	141,127	142,278	131,117	132,521	134,897	135,141
18C	115.465	116.065	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,204	92,223	79,069	80,755	72,968	75,419	81,102	101,566	103,107	105,632	107,615	108,609	104,864	106,034	113,014	111,979
18C	115.465	116.065	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	124,176	95,207	99,997	89,242	90,511	90,891	102,314	134,162	135,147	137,139	141,127	142,278	131,117	132,521	134,897	135,141

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
3251	45.09	45.32	G	348,530	321,534	310,399	293,919	280,104	276,174	274,009	271,768	291,604	244,486	292,867	222,109	175,059	170,159	165,192	160,144	156,381	151,122	239,991	42,038	0	0	0
3251	45.09	45.32	A	314,958	299,549	290,021	272,910	259,848	252,022	249,857	247,616	267,424	220,334	255,116	169,464	148,742	143,841	138,875	133,827	130,037	128,061	228,676	15,711	0	0	0
3251	45.32	45.61	G	153,693	130,216	118,782	99,359	81,749	76,255	68,434	62,789	60,274	58,572	73,564	113,090	77,790	72,913	67,924	62,898	59,135	53,853	40,027	30,265	0	0	0
3251	45.32	45.61	A	120,121	108,230	98,404	78,349	61,493	52,103	44,282	38,637	36,095	34,420	35,813	60,445	51,473	46,596	41,606	36,581	32,791	30,792	28,712	3,937	0	0	0
18C	80.175	80.365	G	265,423	268,031	258,615	197,725	183,883	178,220	174,690	169,320	162,022	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.175	80.365	A	277,913	280,507	272,232	216,378	203,466	199,517	194,823	189,311	183,059	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.365	80.485	G	265,423	268,031	258,615	197,725	183,883	178,220	174,690	169,320	162,022	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.365	80.485	A	277,913	280,507	272,232	216,378	203,466	199,517	194,823	189,311	183,059	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.485	80.615	G	265,423	268,031	258,615	197,725	183,883	178,220	174,690	169,320	162,022	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.485	80.615	A	277,913	280,507	272,232	216,378	203,466	199,517	194,823	189,311	183,059	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.615	80.645	G	274,483	272,125	262,478	199,611	187,217	180,335	175,794	170,332	164,460	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.615	80.645	A	286,973	284,600	276,095	218,264	206,801	201,633	195,927	190,323	185,496	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.645	80.705	G	274,483	272,125	262,478	199,611	187,217	180,335	175,794	170,332	164,460	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.645	80.705	A	286,973	284,600	276,095	218,264	206,801	201,633	195,927	190,323	185,496	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.705	80.875	G	274,483	272,125	262,478	199,611	187,217	180,335	175,794	170,332	164,460	162,043	182,222	50,895	37,700	36,171	34,575	33,116	31,741	30,784	26,552	0	0	0	0
18C	80.705	80.875	A	286,973	284,600	276,095	218,264	206,801	201,633	195,927	190,323	185,496	180,374	204,304	72,977	59,782	58,253	56,657	55,198	53,822	52,866	24,305	0	0	0	0
18C	80.875	81.045	G	182,802	186,468	177,511	115,955	102,504	100,405	95,955	90,309	83,288	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	80.875	81.045	A	195,292	198,944	191,128	134,608	122,087	121,702	116,089	110,300	104,324	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	81.045	81.255	G	182,802	186,468	177,511	115,955	102,504	100,405	95,955	90,309	83,288	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	81.045	81.255	A	195,292	198,944	191,128	134,608	122,087	121,702	116,089	110,300	104,324	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	81.255	81.505	G	186,832	189,164	180,643	116,255	105,771	102,338	96,554	90,909	86,882	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	81.255	81.505	A	195,805	199,287	191,527	134,646	122,507	121,948	116,165	110,377	104,778	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	81.505	81.755	G	186,832	189,164	180,643	116,255	105,771	102,338	96,554	90,909	86,882	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	81.505	81.755	A	195,805	199,287	191,527	134,646	122,507	121,948	116,165	110,377	104,778	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	81.755	82.425	G	186,832	189,164	180,643	116,255	105,771	102,338	96,554	90,909	86,882	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	81.755	82.425	A	195,805	199,287	191,527	134,646	122,507	121,948	116,165	110,377	104,778	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	82.425	82.775	G	186,832	189,164	180,643	116,255	105,771	102,338	96,554	90,909	86,882	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	82.425	82.775	A	195,805	199,287	191,527	134,646	122,507	121,948	116,165	110,377	104,778	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	82.775	83.155	G	186,832	189,164	180,643	116,255	105,771	102,338	96,554	90,909	86,882	80,618	70,604	48,596	46,117	43,460	40,899	38,382	35,259	31,589	26,552	0	0	0	0
18C	82.775	83.155	A	195,805	199,287	191,527	134,646	122,507	121,948	116,165	110,377	104,778	98,949	92,686	70,678	68,198	65,542	62,981	60,464	57,341	53,670	24,305	0	0	0	0
18C	83.155	87.525	G	153,946	158,799	153,427	94,750	88,289	85,555	81,207	77,142	74,579	69,844	61,263	47,940	45,480	42,713	39,965	37,508	34,707	31,382	26,552	0	0	0	0
18C	83.155	87.525	A	163,893	169,208	164,475	113,211	105,025	105,023	100,675	96,376	92,213	87,887	83,199	69,876	67,300	64,533	61,786	59,590	56,789	53,463	24,305	0	0	0	0
18C	87.525	89.805	G	153,946	158,799	153,427	94,750	88,289	85,555	81,207	77,142	74,579	69,844	61,263	47,940	45,480	42,713	39,965	37,508	34,707	31,382	26,552	0	0	0	0
18C	87.525	89.805	A	163,893	169,208	164,475	113,211	105,025	105,023	100,675	96,376	92,213	87,887	83,199	69,876	67,300	64,533	61,786	59,590	56,789	53,463	24,305	0	0	0	0
18C	89.805	90.315	G	153,946	158,799	153,427	94,750	88,289	85,555	81,207	77,142	74,579	69,844	61,263	47,940	45,480	42,713	39,965	37,508	34,707	31,382	26,552	0	0	0	0
18C	89.805	90.315	A	163,893	169,208	164,475	113,211	105,025	105,023	100,675	96,376	92,213	87,887	83,199	69,876	67,300	64,533	61,786	59,590	56,789	53,463	24,305	0	0	0	0
18C	90.315	90.335	G	153,946	158,799	153,427	94,750	88,289	85,555	81,207	77,142	74,579	69,844	61,263	47,940	45,480	42,713	39,965	37,508	34,707	31,382	26,552	0	0	0	0
18C	90.315	90.335	A	163,893	169,208	164,475	113,211	105,025	105,023	100,675	96,376	92,213	87,887	83,199	69,876	67,300	64,533	61,786	59,590	56,789	53,463	24,305	0	0	0	0
18C	90.335	90.955	G	116,769	119,829	116,762	69,101	66,422	65,811	63,282	61,059	60,333	57,394	50,650	55,182	51,381	47,328	43,287	39,494	35,506	31,506	26,552	0	0	0	0
18C	90.335	90.955	A	130,170	133,703	130,636	88,283	83,157	83,996	81,467	78,982	76,688	74,130	71,306	75,838	71,921	67,842	63,800	60,269	56,542	53,327	24,305	0	0	0	0
18C	90.955	91.665	G	77,245	76,277	75,598	41,753	43,133	43,128	42,507	42,278	43,546	42,558	37,629	52,699	49,196	45,419	41,723	38,114	34,540	31,322	26,552	0	0	0	0
18C	90.955	91.665	A	91,027	90,597	89,824	61,016	59,869	61,313	60,692	60,201	59,901	59,294	58,285	73,355	69,737	65,933	62,237	58,889	55,576	53,143	24,305	0	0	0	0
18C	91.665	95.015	G	77,245	76,277	75,598	41,753	43,133	43,128	42,507	42,278	43,546	42,558	37,629	52,699	49,196	45,419	41,723	38,114	34,540	31,322	26,552	0	0	0	0
18C	91.665	95.015	A	91,027	90,597	89,824	61,016	59,869	61,313	60,692	60,201	59,901	59,294	58,285	73,355	69,737	65,933	62,237	58,889	55,576	53,143	24,305	0	0	0	0
18C	95.015	96.275	G	77,245	76,277	75,598	41,753	43,133	43,128	42,507	42,278	43,546	42,558	37,629	52,699	49,196	45,419	41,723	38,114	34,540	31,322	26,552	0	0	0	0
18C	95.015	96.275	A	91,027	90,597	89,824	61,016	59,869	61,313	60,692	60,201	59,901	59,294	58,285	73,355	69,737	65,933	62,237	58,889	55,576	53,143	24,305	0	0	0	0
18C	96.275	97.355	G	77,245	76,277	75,598	41,753	43,133	43,128	42,507	42,278	43,546	42,558	37,629	52,699	49,196	45,419	41,723	38,114	34,540	31,322	26,552	0	0	0	0
18C	96.275	97.355	A	91,027	90,597	89,824	61,016	59,869	61,313	60,692	60,201	59,901	59,294	58,285	73,355	69,737	65,933	62,237	58,889	55,576	53,143	24,305	0	0	0	0
18C	97.355	97.425	G	72,553	71,104	69,842	35,461	36,672	37,570	37,706	37,842	39,640	39,204	34,711	59,237	54,401	49,420	44,632	39,937	35,197	31,539	26,552	0	0	0	0
18C	97.355	97.425	A	91,206	90,617	88,169	55,765	53,407	53,521	53,539	53,556	53,785	53,729	53,157	77,541	72,704	67,724	62,936	58,356	54,403	52,837	24,305	0	0	0	0
18C	97.425	97.575	G	72,553	71,104	69,842	35,461	36,672	37,570	37,706	37,842	39,640	39,204	34,711	59,237	54,401	49,420	44,632	39,937	35,197	31,539	26,552	0	0	0	0
18C	97.425	97.575	A	91,206	90,617	88,169	55,765	53,407	53,521	53,539	53,556	53,785	53,729	53,157	77,541	72,704	67,724	62,936	58,356	54,403	52,837	24,305	0	0	0	0
18C	97.575	98.965	G	72,553	71,104	69,842	35,461	36,672	37,570	37,706	37,842	39,640	39,204	34,711	59,237	54,401	49,420	44,632	39,937	35,197	31,539	26,552	0	0	0	0
18C	97.575	98.965	A	91,206	90,617	88,169	55,765	53,407	53,521	53,539	53,556	53,785	53,729	53,157	77,541	72,704	67,724	62,936	58,356	54,403	52,837	24,305	0	0	0	0
18C	98.965	104.235	G	72,553	71,104	69,842	35,461	36,672	37,570	37,706	37,842	39,640	39,204	34,711	59,237	54,401	49,420	44,632	39,937	35,197	31,539	26,552	0	0	0	0
18C	98.965	104.235	A	91,206	90,617	88,169	55,765	53,407	53,521	53,539	53,556	53,785	53,729	53,157	77,541	72,704	67,724	62,936	58,356	54,403	52,837	24,305	0	0	0	0
18C	104.235	104.435	G	72,553	71,104	69,842	35,461	36,672	37,570	37,706	37,842	39,640	39,204	34,711	59,237	54,401	49,420	44,632	39,937	35,197	31,539	26,552	0	0	0	0
18C	104.235	104.435	A	91,206	90,617	88,169	55,765	53,407	53,521	53,539	53,556	53,785	53,729	53,157	77,541	72,704	67,724	62,936	58,356	54,403	52,837	24,305	0	0	0	0
18C	104.435	106.355	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	104.435	106.355	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	106.355	108.855	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	106.355	108.855	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	108.855	109.405	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	108.855	109.405	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	109.405	109.445	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	109.405	109.445	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	109.445	109.815	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	109.445	109.815	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	109.815	110.045	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	109.815	110.045	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	110.045	110.105	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	110.045	110.105	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	110.105	111.465	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	110.105	111.465	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	111.465	112.375	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	111.465	112.375	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	112.375	112.735	G	110,872	113,233	109,077	59,896	56,741	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	112.375	112.735	A	134,081	137,607	131,414	81,051	73,477	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	112.735	113.585	G	111,861	115,348	109,951	63,902	61,733	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	112.735	113.585	A	135,069	139,080	132,288	83,227	75,878	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	113.585	115.465	G	111,861	115,348	109,951	63,902	61,733	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	113.585	115.465	A	135,069	139,080	132,288	83,227	75,878	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	115.465	116.065	G	111,861	115,348	109,951	63,902	61,733	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	115.465	116.065	A	135,069	139,080	132,288	83,227	75,878	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
18C	116.065	118.625	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,536	92,453	79,642	82,882	75,056	78,812	84,289	104,602	106,142	108,690	110,650	111,645	107,923	109,093	118,124	114,784
18C	116.065	118.625	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	126,027	95,437	101,918	98,696	95,206	100,592	107,022	137,198	138,182	140,197	144,162	145,313	134,175	135,579	138,818	137,946
18C	118.625	120.505	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,536	92,453	79,642	82,882	75,056	78,812	84,289	104,602	106,142	108,690	110,650	111,645	107,923	109,093	118,124	114,784
18C	118.625	120.505	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	126,027	95,437	101,918	98,696	95,206	100,592	107,022	137,198	138,182	140,197	144,162	145,313	134,175	135,579	138,818	137,946
18C	120.505	121.765	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,536	92,453	79,642	82,882	75,056	78,812	84,289	104,602	106,142	108,690	110,650	111,645	107,923	109,093	118,124	114,784
18C	120.505	121.765	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	126,027	95,437	101,918	98,696	95,206	100,592	107,022	137,198	138,182	140,197	144,162	145,313	134,175	135,579	138,818	137,946
18C	121.765	122.285	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,536	92,453	79,642	82,882	75,056	78,812	84,289	104,602	106,142	108,690	110,650	111,645	107,923	109,093	118,124	114,784
18C	121.765	122.285	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	126,027	95,437	101,918	98,696	95,206	100,592	107,022	137,198	138,182	140,197	144,162	145,313	134,175	135,579	138,818	137,946
18C	122.285	125.535	G	0	0	10,075	56,558	86,604	78,592	84,328	64,587	71,768	79,526	99,536	92,453	79,642	82,882	75,056	78,812	84,289	104,602	106,142	108,690	110,650	111,645	107,923	109,093	118,124	114,784
18C	122.285	125.535	A	0	0	1,283	28,776	81,448	82,541	102,453	78,056	79,999	80,865	126,027	95,437	101,918	98,696	95,206	100,592	107,022	137,198	138,182	140,197	144,162	145,313	134,175	135,579	138,818	137,946
18C	125.535	125.795	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	125.535	125.795	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	125.795	125.895	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	125.795	125.895	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	125.895	125.945	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	125.895	125.945	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	125.945	126.005	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	125.945	126.005	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	126.005	126.235	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	126.005	126.235	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	126.235	126.475	G	0	0	10,075	56,673	87,693	80,267	86,183	65,852	74,479	82,216	101,614	95,552	81,966	85,206	77,380	81,136	86,590	107,386	113,138	114,468	113,990	112,704	112,574	112,427	118,931	117,801
18C	126.235	126.475	A	0	0	1,283	29,219	85,970	86,990	105,507	79,320	84,822	85,166	129,497	100,147	104,251	101,029	97,540	102,925	109,333	139,730	142,455	143,632	146,320	146,382	136,745	137,383	139,370	139,404
18C	126.475	126.745	G	0	0	20,759	135,551	188,090	181,021	191,491	169,906	174,623	186,443	197,832	196,551	181,174	176,685	173,545	169,413	174,725	198,516	203,274	201,441	200,151	193,564	195,596	200,918	200,667	201,474
18C	126.475	126.745	A	0	0	4,060	100,153	186,641	188,368	211,415	184,017	185,597	190,013	226,174	201,716	204,113	193,126	194,326	191,836	198,069	238,524	254,060	255,329	250,656	233,738	230,430	241,216	241,277	245,077
35A	0	0.13	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0	0.13	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.13	0.24	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.13	0.24	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.24	0.35	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.24	0.35	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.35	0.47	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.35	0.47	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.47	0.74	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.47	0.74	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.74	0.8	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.74	0.8	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	0.8	1.02	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	0.8	1.02	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	1.02	1.22	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	1.02	1.22	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	1.22	1.27	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	1.22	1.27	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	1.27	1.72	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	1.27	1.72	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	1.72	1.93	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	1.72	1.93	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	1.93	2.5	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	1.93	2.5	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	2.5	2.55	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	2.5	2.55	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	2.55	2.9	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	2.55	2.9	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	2.9	3.13	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	2.9	3.13	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	3.13	3.7	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	3.13	3.7	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	3.7	5.82	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	3.7	5.82	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	5.82	8.59	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	16,942	23,772	20,132	18,505	32,983	36,403	13,710	16,906	19,683	16,853	15,039	9,549
35A	5.82	8.59	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	13,607	15,924	15,904	15,954	33,462	36,779	27,580	49,524	46,431	45,954	37,683	15,418
35A	8.59	9.19	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	31,486	39,531	22,499	35,430	47,862	76,484	21,102	24,298	27,051	24,221	22,407	16,940
35A	8.59	9.19	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	31,289	34,795	18,285	36,017	50,781	84,518	34,944	56,888	53,800	53,322	45,052	22,782
35A	9.19	9.43	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	31,486	39,531	22,499	35,430	47,862	76,484	21,102	24,298	27,051	24,221	22,407	16,940
35A	9.19	9.43	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	31,289	34,795	18,285	36,017	50,781	84,518	34,944	56,888	53,800	53,322	45,052	22,782
35A	9.43	11	G	0	0	10,334	1,448	23,703	32,346	38,864	67,482	50,801	65,031	29,675	26,337	20,934	24,329	31,486	39,531	22,499	35,430	47,862	76,484	21,102	24,298	27,051	24,221	22,407	16,940
35A	9.43	11	A	0	0	9,090	659	8,549	12,533	14,171	24,205	20,802	25,524	15,620	15,257	13,799	15,704	31,289	34,795	18,285	36,017	50,781	84,518	34,944	56,888	53,800	53,322	45,052	22,782

TMR ROAD	Segment Start Tdist	Segment End Tdist	Direction	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
18C	116.065	118.625	G	116,485	127,638	114,878	73,357	64,014	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	116.065	118.625	A	138,648	145,762	135,240	87,882	76,971	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	118.625	120.505	G	116,485	127,638	114,878	73,357	64,014	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	118.625	120.505	A	138,648	145,762	135,240	87,882	76,971	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	120.505	121.765	G	116,485	127,638	114,878	73,357	64,014	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	120.505	121.765	A	138,648	145,762	135,240	87,882	76,971	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	121.765	122.285	G	116,485	127,638	114,878	73,357	64,014	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	121.765	122.285	A	138,648	145,762	135,240	87,882	76,971	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	122.285	125.535	G	116,485	127,638	114,878	73,357	64,014	59,380	57,662	56,107	56,298	54,274	48,243	70,865	64,310	57,723	51,414	45,137	38,361	32,170	26,552	0	0	0	0
18C	122.285	125.535	A	138,648	145,762	135,240	87,882	76,971	72,480	70,762	69,064	67,711	66,067	63,814	86,436	79,881	73,294	66,985	60,708	55,212	52,945	24,305	0	0	0	0
18C	125.535	125.795	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	125.535	125.795	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	125.795	125.895	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	125.795	125.895	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	125.895	125.945	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	125.895	125.945	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	125.945	126.005	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	125.945	126.005	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	126.005	126.235	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	126.005	126.235	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	126.235	126.475	G	116,486	127,639	114,879	73,358	64,015	59,381	57,663	56,108	56,299	54,275	48,244	70,866	64,311	57,724	51,415	45,138	38,362	32,171	39,580	0	0	0	0
18C	126.235	126.475	A	138,659	145,773	135,251	87,893	76,982	72,491	70,773	69,075	67,722	66,078	63,825	86,447	79,892	73,305	66,996	60,719	55,223	52,956	35,860	0	0	0	0
18C	126.475	126.745	G	197,459	200,565	199,131	156,953	148,384	146,382	144,641	142,922	141,344	139,778	138,054	160,698	154,144	147,557	141,225	134,947	129,642	127,967	228,676	15,711	0	0	0
18C	126.475	126.745	A	231,340	233,401	241,987	208,284	174,059	168,802	167,061	165,342	163,764	162,198	160,474	183,119	176,564	169,977	163,645	157,367	152,062	150,387	239,991	42,038	0	0	0
35A	0	0.13	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0	0.13	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.13	0.24	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.13	0.24	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.24	0.35	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.24	0.35	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.35	0.47	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.35	0.47	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.47	0.74	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.47	0.74	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.74	0.8	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.74	0.8	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.8	1.02	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	0.8	1.02	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.02	1.22	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.02	1.22	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.22	1.27	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.22	1.27	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.27	1.72	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.27	1.72	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.72	1.93	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.72	1.93	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.93	2.5	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	1.93	2.5	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.5	2.55	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.5	2.55	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.55	2.9	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.55	2.9	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.9	3.13	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	2.9	3.13	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	3.13	3.7	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	3.13	3.7	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	3.7	5.82	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	3.7	5.82	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	5.82	8.59	G	5,772	7,321	3,619	4,628	3,213	2,515	3,809	3,826	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	5.82	8.59	A	7,982	12,263	4,783	7,503	4,900	3,680	7,065	7,984	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	8.59	9.19	G	13,141	14,712	8,901	8,719	8,238	5,431	5,977	1,585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	8.59	9.19	A	15,351	19,655	8,901	10,406	9,925	5,431	8,329	2,892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	9.19	9.43	G	13,141	14,712	8,901	8,719	8,238	5,431	5,977	1,585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	9.19	9.43	A	15,351	19,655	8,901	10,406	9,925	5,431	8,329	2,892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	9.43	11	G	13,141	14,712	8,901	8,719	8,238	5,431	5,977	1,585	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35A	9.43	11	A	15,351	19,655	8,901	10,406	9,925	5,431	8,329	2,892	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

ROAD	Start	End	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
3251	0.000 km	0.120 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.000 km	0.120 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	0.120 km	0.210 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.120 km	0.210 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	0.210 km	0.250 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.210 km	0.250 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	0.250 km	0.280 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.250 km	0.280 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	0.280 km	0.630 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.280 km	0.630 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	0.630 km	2.090 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	0.630 km	2.090 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	2.090 km	3.210 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	2.090 km	3.210 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	3.210 km	3.940 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	3.210 km	3.940 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	3.940 km	4.430 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	3.940 km	4.430 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	4.430 km	4.790 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	4.430 km	4.790 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	4.790 km	6.440 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	4.790 km	6.440 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	6.440 km	6.690 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	6.440 km	6.690 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	6.690 km	7.370 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	6.690 km	7.370 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	7.370 km	9.340 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	7.370 km	9.340 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	9.340 km	9.630 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.7%	0.7%	0.9%	0.7%	0.7%	0.7%	221.4%	232.1%	242.4%	252.4%	261.9%	271.3%	280.1%
3251	9.340 km	9.630 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	207.9%	216.2%	224.3%	232.1%	239.6%	246.7%	253.6%
3251	9.630 km	9.800 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	34.0%	35.6%	5.3%	5.1%	5.0%	4.9%	225.5%	236.1%	246.4%	256.3%	265.8%	274.9%	283.8%
3251	9.630 km	9.800 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	31.9%	33.1%	4.3%	4.2%	4.1%	4.0%	211.2%	219.6%	227.5%	235.3%	242.6%	249.7%	256.7%
3251	9.800 km	9.850 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	0.6%	0.0%	0.0%	0.0%	0.0%	34.0%	35.6%	5.3%	5.1%	5.0%	4.9%	225.5%	236.1%	246.4%	256.3%	265.8%	274.9%	283.8%
3251	9.800 km	9.850 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	31.9%	33.1%	4.3%	4.2%	4.1%	4.0%	211.2%	219.6%	227.5%	235.3%	242.6%	249.7%	256.7%
3251	9.850 km	13.580 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	134.6%	128.7%	91.4%	88.5%	86.7%	84.9%	304.0%	313.0%	321.8%	330.3%	338.5%	346.3%	353.9%
3251	9.850 km	13.580 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	107.6%	106.2%	74.9%	73.1%	71.6%	70.1%	276.0%	283.1%	289.8%	296.4%	302.7%	308.7%	314.6%
3251	13.580 km	13.750 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	134.6%	128.7%	91.4%	88.5%	86.7%	84.9%	304.0%	313.0%	321.8%	330.3%	338.5%	346.3%	353.9%
3251	13.580 km	13.750 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	107.6%	106.2%	74.9%	73.1%	71.6%	70.1%	276.0%	283.1%	289.8%	296.4%	302.7%	308.7%	314.6%
3251	13.750 km	14.920 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	134.6%	128.7%	91.4%	88.5%	86.7%	84.9%	304.0%	313.0%	321.8%	330.3%	338.5%	346.3%	353.9%
3251	13.750 km	14.920 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	107.6%	106.2%	74.9%	73.1%	71.6%	70.1%	276.0%	283.1%	289.8%	296.4%	302.7%	308.7%	314.6%
3251	14.920 km	16.410 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	134.6%	128.7%	91.4%	88.5%	86.7%	84.9%	304.0%	313.0%	321.8%	330.3%	338.5%	346.3%	353.9%
3251	14.920 km	16.410 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	107.6%	106.2%	74.9%	73.1%	71.6%	70.1%	276.0%	283.1%	289.8%	296.4%	302.7%	308.7%	314.6%
3251	16.410 km	16.680 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	134.6%	128.7%	91.4%	88.5%	86.7%	84.9%	304.0%	313.0%	321.8%	330.3%	338.5%	346.3%	353.9%
3251	16.410 km	16.680 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	107.6%	106.2%	74.9%	73.1%	71.6%	70.1%	276.0%	283.1%	289.8%	296.4%	302.7%	308.7%	314.6%
3251	16.680 km	19.900 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	191.1%	139.9%	95.2%	92.2%	90.3%	88.5%	307.4%	316.5%	325.1%	333.6%	341.6%	349.4%	356.9%
3251	16.680 km	19.900 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	161.7%	116.5%	78.0%	76.1%	74.6%	73.1%	278.9%	285.9%	292.5%	299.1%	305.3%	311.4%	317.1%
3251	19.900 km	21.460 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	675.6%	181.2%	128.0%	124.3%	121.7%	119.2%	337.6%	346.0%	354.2%	362.0%	369.6%	376.9%	383.9%
3251	19.900 km	21.460 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	616.8%	151.5%	105.0%	102.6%	100.5%	98.4%	303.8%	310.3%	316.6%	322.6%	328.5%	334.0%	339.4%
3251	21.460 km	21.970 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	675.6%	181.2%	128.0%	124.3%	121.7%	119.2%	337.6%	346.0%	354.2%	362.0%	369.6%	376.9%	383.9%
3251	21.460 km	21.970 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	616.8%	151.5%	105.0%	102.6%	100.5%	98.4%	303.8%	310.3%	316.6%	322.6%	328.5%	334.0%	339.4%
3251	21.970 km	23.140 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	675.6%	181.2%	128.0%	124.3%	121.7%	119.2%	337.6%	346.0%	354.2%	362.0%	369.6%	376.9%	383.9%
3251	21.970 km	23.140 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	616.8%	151.5%	105.0%	102.6%	100.5%	98.4%	303.8%	310.3%	316.6%	322.6%	328.5%	334.0%	339.4%
3251	23.140 km	23.590 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	675.6%	181.2%	128.0%	124.3%	121.7%	119.2%	337.6%	346.0%	354.2%	362.0%	369.6%	376.9%	383.9%
3251	23.140 km	23.590 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	616.8%	151.5%	105.0%	102.6%	100.5%	98.4%	303.8%	310.3%	316.6%	322.6%	328.5%	334.0%	339.4%
3251	23.590 km	25.060 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	0.0%	125.7%	97.9%	95.6%	93.3%	94.5%	675.6%	181.2%	128.0%	124.3%	121.7%	119.2%	337.6%	346.0%	354.2%	362.0%	369.6%	376.9%	383.9%
3251	23.590 km	25.060 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	87.7%	80.9%	78.9%	77.0%	75.9%	616.8%	151.5%	105.0%	102.6%	100.5%	98.4%	303.8%	310.3%	316.6%	322.6%	328.5%	334.0%	339.4%
3251	25.060 km	25.730 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	479.2%	380.1%	370.9%	362.1%	502.4%	772.2%	587.0%	383.6%	374.7%	366.9%	359.5%	364.7%	357.6%	350.8%	340.2%	326.7%	320.8%	315.1%
3251	25.060 km	25.730 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	418.3%	321.1%	313.3%	305.9%	419.4%	711.6%	499.2%	325.4%	315.5%	309.0%	302.8%	332.0%	325.5%	319.3%	307.4%	298.4%	293.0%	287.8%
3251	25.730 km	27.900 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	279.2%	366.0%	357.1%	348.7%	340.7%	369.7%	332.3%	320.7%	313.1%	306.6%	300.4%	306.8%	300.8%	295.1%	295.1%	283.6%	278.5%	273.6%
3251	25.730 km	27.900 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	256.1%	309.4%	302.0%	294.8%	288.0%	384.8%	291.9%	273.5%	264.7%	259.2%	254.0%	284.2%	278.6%	273.3%	270.1%	262.8%	258.0%	253.5%
3251	27.900 km	28.020 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	293.1%	368.3%	359.3%	350.9%	353.1%	399.8%	354.6%	330.8%	323.0%	316.3%	309.9%	316.1%	309.9%	304.0%	319.1%	290.5%	285.3%	280.2%
3251	27.900 km	28.020 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	291.1%	311.3%	303.8%	296.6%	315.7%	454.3%	334.5%	281.9%	272.9%	267.2%	261.8%	291.8%	286.2%	280.7%	282.7%	268.5%	263.6%	258.9%
3251	28.020 km	29.940 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	293.1%	368.3%	359.3%	350.9%	353.1%	399.8%	354.6%	330.8%	323.0%	316.3%	309.9%	316.1%	309.9%	304.0%	319.1%	290.5%	285.3%	280.2%
3251	28.020 km	29.940 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	291.1%	311.3%	303.8%	296.6%	315.7%	454.3%	334.5%	281.9%	272.9%	267.2%	261.8%	291.8%	286.2%	280.7%	282.7%	268.5%	263.6%	258.9%
3251	29.940 km	31.190 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	293.1%	368.3%	359.3%	350.9%	353.1%	399.8%	354.6%	330.8%	323.0%	316.3%	309.9%	316.1%	309.9%	304.0%	319.1%	290.5%	285.3%	280.2%
3251	29.940 km	31.190 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	291.1%	311.3%	303.8%	296.6%	315.7%	454.3%	334.5%	281.9%	272.9%	267.2%	261.8%	291.8%	286.2%	280.7%	282.7%	268.5%	263.6%	258.9%
3251	31.190 km	37.830 km	G	0.0%	0.0%	0.0%	1.4%	0.0%	17.4%	293.1%	368.3%	359.3%	350.9%	353.1%	399.8%	354.6%	330.8%	323.0%	316.3%	309.9%	316.1%	309.9%	304.0%	319.1%	290.5%	285.3%	280.2%
3251	31.190 km	37.830 km	A	0.0%	0.0%	0.0%	0.3%	0.0%	73.4%	291.1%	311.3%	303.8%	296.6%	315.7%	454.3%	334.5%	281.9%	272.9%	267.2%	261.8%	291.8%	286.2%	280.7%	282.7%	268.5%	263.6%	258.9%
3251	37.830 km	38.895 km	G	0.0%	0.0%	0.0%	1051.5%	522.4%	477.2%	672.5%	986.1%	969.3%	935.9%	789.6%	779.1%	812.1%	817.7%	811.2%	844.7%	840.8%	882.9%	854.4%	809.9%	794.1%	742.3%	716.1%	688.5%
3251	37.830 km	38.895 km	A	0.0%	0.0%	0.0%	827.4%	191.0%	253.6%	429.0%	531.5%	527.4%	526.2%	508.6%	566.7%	552.0%	537.1%	545.6%	568.9%	583.8%	612.8%	600.9%	585.1%	580.0%	551.4%	533.0%	510.9%
3251	38.950 km	44.210 km	G	0.0%	0.0%	0.0%	1051.5%	522.4%	477.2%	672.5%	986.1%	969.3%	935.9%	789.6%	779.1%	812.1%	817.7%	811.2%	844.7%	840.8%	882.9%	854.4%	809.9%	794.1%	742.3%	716.1%	688.5%
3251	38.950 km	44.210 km	A	0.0%	0.0%	0.0%	827.4%	191.0%	253.6%	429.0%	531.5%	527.4%	526.2%	508.6%	566.7%	552.0%	537.1%	545.6%	568.9%	583.8%	612.8%	600.9%	585.1%	580.0%	551.4%	533.0%	510.9%
3251	44.210 km	44.300 km	G	0.0%	0.0%	0.0%	69.9%	379.3%	421.8%	573.6%	714.4%	806.8%	752.2%	765.1%	779.1%	812.1%	794.8%	811.2%	844.7%	840.8%	882.9%	854.4%	809.9%	794.1%	742.3%	716.1%	688.5%
3251	44.210 km	44.300 km	A	0.0%	0.0%	0.0%	53.2%	160.7%	241.8%	408.0%	473.9%	493.0%	487.2%	503.4%	566.7%	552.0%	532.3%	545.6%	568.9%	583.8%	612.8%	600.9%	585.1%	580.0%	551.4%	533.0%	510.9%
3251	44.300 km	44.360 km	G	0.0%	0.0%	0.0%	69.9%	379.3%	421.8%	573.6%	714.4%	806.8%	752.2%	765.1%	779.1%	812.1%	794.8%	811.2%	844.7%	840.8%	882.9%	854.4%	809.9%	794.1%	742.3%	716.1%	688.5%
3251	44.300 km	44.360 km	A	0.0%	0.0%	0.0%	53.2%	160.7%	241.8%	408.0%	473.9%	493.0%	487.2%	503.4%	566.7%	552.0%	532.3%	545.6%	568.9%	583.8%	612.8%	600.9%	585.1%	580.0%	551.4%	533.0%	510.9%
3251	44.360 km	44.520 km	G	0.0%	1.6%	127.9%	572.2%	925.3%	1061.4%	1090.2%	1651.6%	1948.2%	1802.6%	1684.1%	1848.8%	2203.0%	2072.0%	2095.6%	2138.4%	1944.3%	2080.5%	1832.5%	1471.6%	1376.9%	1320.5%	1192.0%	1153.3%
3251	44.360 km	44.520 km	A	0.0%	2.7%	184.4%	500.3%	667.7%	831.8%	847.3%	1288.9%	1464.0%	1368.0%	1268.4%	1460.6%	1732.4%	1592.6%	1611.8%	1642.5%	1496.8%	1603.7%	1388.7%	1106.4%	1066.2%	1022.1%	927.9%	896.6%
3251	44.520 km	44.630 km	G	0.0%	1.6%	127.9%	572.2%	925.3%	1061.4%	1090.2%	1651.6%	1948.2%	1802.6%	1684.1%	1848.8%	2203.0%	2072.0%	2095.6%	2138.4%	1944.3%	2080.5%	1832.5%	1471.6%	1376.9%	1320.5%	1192.0%	1153.3%
3251	44.520 km	44.630 km	A	0.0%	2.7%	184.4%	500.3%	667.7%	831.8%	847.3%	1288.9%	1464.0%	1368.0%	1268.4%	1460.6%	1732.4%	1592.6%	1611.8%	1642.5%	1496.8%	1603.7%	1388.7%	1106.4%	1066.2%	1022.1%	927.9%	896.6%
3251	44.630 km	44.860 km	G	0.0%	1.6%	127.9%	572.2%	925.3%	1061.4%	1090.2%	1651.6%	1948.2%	1802.6%	1684.1%	1848.8%	2203.0%	2072.0%	2095.6%	2138.4%	1944.3%	2080.5%	1832.5%	1471.6%	1376.9%	1320.5%	1192.0%	1153.3%
3251	44.630 km	44.860 km	A	0.0%	2.7%	184.4%	500.3%	667.7%	831.8%	847.3%	1288.9%	1464.0%	1368.0%	1268.4%	1460.6%	1732.4%	1592.6%	1611.8%	1642.5%	1496.8%	1603.7%	1388.7%	1106.4%	1066.2%	1022.1%	927.9%	896.6%
3251	44.860 km	45.090 km	G	0.0%	1.6%	127.9%	572.2%	925.3%	1061.4%	1090.2%	1651.6%	1948.2%	1802.6%	1684.1%	1848.8%	2203.0%	2072.0%	2095.6%	2138.4%	1944.3%	2080.5%	1832.5%	1471.6%	1376.9%	1320.5%	1192.0%	1153.3%
3251	44.860 km	45.090 km	A	0.0%	2.7%	184.4%	500.3%	667.7%	831.8%	847.3%	1288.9%	1464.0%	1368.0%	1268.4%	1460.6%	1732.4%	1592.6%	1611.8%	1642.5%	1496.8%	1603.7%	1388.7%	1106.4%	1066.2%	1022.1%	927.9%	896.6%

Table F4	Maintenance Impacts (Increase in ESA Loadings)		
Project:	Surat Gas Project	Project No:	CEB06413
Prepared by:	Jessica Peters	Reviewed by:	Jeffrey Baczynksi

ROAD	Start	End	Direction	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
3251	0.000 km	0.120 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.000 km	0.120 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.120 km	0.210 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.120 km	0.210 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.210 km	0.250 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.210 km	0.250 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.250 km	0.280 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.250 km	0.280 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.280 km	0.630 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.280 km	0.630 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.630 km	2.090 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	0.630 km	2.090 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	2.090 km	3.210 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	2.090 km	3.210 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	3.210 km	3.940 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	3.210 km	3.940 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	3.940 km	4.430 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	3.940 km	4.430 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	4.430 km	4.790 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	4.430 km	4.790 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	4.790 km	6.440 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	4.790 km	6.440 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	6.440 km	6.690 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	6.440 km	6.690 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	6.690 km	7.370 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	6.690 km	7.370 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	7.370 km	9.340 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	7.370 km	9.340 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.340 km	9.630 km	G	288.7%	298.5%	304.7%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.340 km	9.630 km	A	260.4%	268.1%	272.9%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.630 km	9.800 km	G	292.3%	302.1%	306.6%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.630 km	9.800 km	A	263.3%	269.9%	273.2%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.800 km	9.850 km	G	292.3%	302.1%	306.6%	312.2%	319.7%	178.5%	148.5%	146.9%	132.9%	119.2%	105.9%	93.0%	80.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.800 km	9.850 km	A	263.3%	269.9%	273.2%	278.7%	284.6%	150.7%	122.6%	113.1%	101.6%	90.4%	79.6%	69.1%	58.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.850 km	13.580 km	G	361.2%	369.8%	373.2%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	9.850 km	13.580 km	A	320.2%	325.9%	328.2%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	13.580 km	13.750 km	G	361.2%	369.8%	373.2%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	13.580 km	13.750 km	A	320.2%	325.9%	328.2%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	13.750 km	14.920 km	G	361.2%	369.8%	373.2%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	13.750 km	14.920 km	A	320.2%	325.9%	328.2%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	14.920 km	16.410 km	G	361.2%	369.8%	373.2%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	14.920 km	16.410 km	A	320.2%	325.9%	328.2%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	16.410 km	16.680 km	G	361.2%	369.8%	373.2%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	16.410 km	16.680 km	A	320.2%	325.9%	328.2%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	16.680 km	19.900 km	G	364.1%	371.5%	373.3%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	16.680 km	19.900 km	A	322.7%	325.0%	328.0%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	19.900 km	21.460 km	G	390.8%	399.2%	373.8%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	19.900 km	21.460 km	A	344.6%	330.4%	328.1%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	21.460 km	21.970 km	G	390.8%	399.2%	373.8%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	21.460 km	21.970 km	A	344.6%	330.4%	328.1%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	21.970 km	23.140 km	G	390.8%	399.2%	373.8%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	21.970 km	23.140 km	A	344.6%	330.4%	328.1%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	23.140 km	23.590 km	G	390.8%	399.2%	373.8%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	23.140 km	23.590 km	A	344.6%	330.4%	328.1%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	23.590 km	25.060 km	G	390.8%	399.2%	373.8%	377.7%	384.1%	241.8%	210.9%	208.3%	193.3%	178.7%	164.6%	150.8%	137.6%	68.4%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	23.590 km	25.060 km	A	344.6%	330.4%	328.1%	332.8%	337.8%	203.0%	174.1%	163.8%	151.5%	139.6%	128.0%	116.8%	105.9%	49.0%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	25.060 km	25.730 km	G	302.5%	312.0%	266.6%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	25.060 km	25.730 km	A	276.9%	261.0%	242.8%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	25.730 km	27.900 km	G	268.8%	298.2%	265.4%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	25.730 km	27.900 km	A	249.0%	249.6%	241.7%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	27.900 km	28.020 km	G	287.0%	333.1%	283.4%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	27.900 km	28.020 km	A	258.5%	264.2%	248.9%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	28.020 km	29.940 km	G	287.0%	333.1%	283.4%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	28.020 km	29.940 km	A	258.5%	264.2%	248.9%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	29.940 km	31.190 km	G	287.0%	333.1%	283.4%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	29.940 km	31.190 km	A	258.5%	264.2%	248.9%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	31.190 km	37.830 km	G	287.0%	333.1%	283.4%	254.4%	250.3%	237.9%	232.6%	240.3%	236.7%	233.1%	229.6%	226.3%	337.8%	166.5%	56.6%	45.2%	34.0%	23.2%	12.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	31.190 km	37.830 km	A	258.5%	264.2%	248.9%	235.8%	232.0%	204.5%	196.6%	194.8%	191.8%	188.9%	186.1%	183.4%	248.9%	79.2%	39.3%	30.0%	20.9%	12.0%	3.4%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%
3251	37.830 km	38.895 km	G	675.6%	706.0%	614.6%	565.6%	526.6%	474.7%	431.5%	414.7%	402.9%	391.3%	380.8%	373.3%	482.5%	310.5%	197.8%	184.0%	170.3%	156.9%	146.6%	133.4%	322.6%	0.0%	0.0%	0.0%	0.0%
3251	37.830 km	38.895 km	A	495.6%	490.1%	441.4%	413.2%	385.4%	342.0%	308.7%	287.3%	278.5%	269.7%	261.8%	256.4%	320.7%	151.1%	109.6%	98.9%	88.4%	78.0%	70.1%	65.7%	243.1%	0.0%	0.0%	0.0%	0.0%
3251	38.950 km	44.210 km	G	675.6%	706.0%	614.6%	565.6%	526.6%	474.7%	431.5%	414.7%	402.9%	391.3%	380.8%	373.3%	482.5%	310.5%	197.8%	184.0%	170.3%	156.9%	146.6%	133.4%	322.6%	0.0%	0.0%	0.0%	0.0%
3251	38.950 km	44.210 km	A	495.6%	490.1%	441.4%	413.2%	385.4%	342.0%	308.7%	287.3%	278.5%	269.7%	261.8%	256.4%	320.7%	151.1%	109.6%	98.9%	88.4%	78.0%	70.1%	65.7%	243.1%	0.0%	0.0%	0.0%	0.0%
3251	44.210 km	44.300 km	G	675.6%	706.0%	614.6%	565.6%	526.6%	474.7%	431.5%	414.7%	402.9%	391.3%	380.8%	373.3%	482.5%	310.5%	197.8%	184.0%	170.3%	156.9%	146.6%	133.4%	320.3%	0.0%	0.0%	0.0%	0.0%
3251	44.210 km	44.300 km	A	495.6%	490.1%	441.4%	413.2%	385.4%	342.0%	308.7%	287.3%	278.5%	269.7%	261.8%	256.4%	320.7%	151.1%	109.6%	98.9%	88.4%	78.0%	70.1%	65.7%	241.2%	0.0%	0.0%	0.0%	0.0%
3251	44.300 km	44.360 km	G	675.6%	706.0%	614.6%	565.6%	526.6%	474.7%	431.5%	414.7%	402.9%	391.3%	380.8%	373.3%	482.5%	310.5%	197.8%	184.0%	170.3%	156.9%	146.6%	133.4%	320.3%	0.0%	0.0%	0.0%	0.0%
3251	44.300 km	44.360 km	A	495.6%	490.1%	441.4%	413.2%	385.4%	342.0%	308.7%	287.3%	278.5%	269.7%	261.8%	256.4%	320.7%	151.1%	109.6%	98.9%	88.4%	78.0%	70.1%	65.7%	241.2%	0.0%	0.0%	0.0%	0.0%
3251	44.360 km	44.520 km	G	1172.8%	1036.0%	964.5%	875.0%	831.0%	774.2%	726.2%	704.9%	688.6%	672.7%	711.1%	587.5%	693.6%	518.5%	402.9%	386.3%	369.9%	353.7%	340.8%	325.1%	509.5%	88.1%	0.0%	0.0%	0.0%
3251	44.360 km	44.520 km	A	910.9%	764.4%	719.7%	673.1%	641.1%	593.6%	556.2%	531.1%	518.5%	506.1%	538.4%	437.1%	498.8%	326.7%	282.7%	269.6%	256.7%	244.1%	234.0%	227.4%	400.9%	27.2%	0.0%	0.0%	0.0%
3251	44.520 km	44.630 km	G	1172.8%	1036.0%	964.5%	875.0%	831.0%	774.2%	726.2%	704.9%	688.6%	672.7%	711.1%	587.5%	693.6%	518.5%	402.9%	386.3%	369.9%	353.7%	340.8%	325.1%	509.5%	88.1%	0.0%	0.0%	0.0%
3251	44.520 km	44.630 km	A	910.9%	764.4%	719.7%	673.1%	641.1%	593.6%	556.2%	531.1%	518.5%	506.1%	538.4%	437.1%	498.8%	326.7%	282.7%	269.6%	256.7%	244.1%	234.0%	227.4%	400.9%	27.2%	0.0%	0.0%	0.0%
3251	44.630 km	44.860 km	G	1172.8%	1036.0%	964.5%	875.0%	831.0%	774.2%	726.2%	704.9%	688.6%	672.7%	711.1%	587.5%	693.6%	518.5%	402.9%	386.3%	369.9%	353.7%	340.8%	325.1%	509.5%	88.1%	0.0%	0.0%	0.0%
3251	44.630 km	44.860 km	A	910.9%	764.4%	719.7%	673.1%	641.1%	593.6%	556.2%	531.1%	518.5%	506.1%	538.4%	437.1%	498.8%	326.7%	282.7%	269.6%	256.7%	244.1%	234.0%	227.4%	400.9%	27.2%	0.0%	0.0%	0.0%
3251	44.860 km	45.090 km	G	1172.8%	1036.0%	964.5%	875.0%	831.0%	774.2%	726.2%	704.9%	688.6%	672.7%	711.1%	587.5%	693.6%	518.5%	402.9%	386.3%	369.9%	353.7%	340.8%	325.1%	509.5%	88.1%	0.0%	0.0%	0.0%
3251	44.860 km	45.090 km	A	910.9%	764.4%	719.7%	673.1%	641.1%	593.6%	556.2%	531.1%	518.5%	506.1%	538.4%	437.1%	498.8%	326.7%	282.7%	269.6%	256.7%	244.1%	234.0%	227.4%	400.9%	27.2%	0.0%	0.0%	0.0%

Table **F4** **Maintenance Impacts (Increase in ESA Loadings)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

Cardno Shaping the Future

ROAD	Start	End	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
3251	45.090 km	45.320 km	G	0.0%	1.6%	127.9%	572.2%	925.3%	1061.4%	1090.2%	1651.6%	1948.2%	1802.6%	1684.1%	1848.8%	2203.0%	2072.0%	2095.6%	2138.4%	1944.3%	2080.5%	1832.5%	1471.6%	1376.9%	1320.5%	1192.0%	1153.3%
3251	45.090 km	45.320 km	A	0.0%	2.7%	184.4%	500.3%	667.7%	831.8%	847.3%	1288.9%	1464.0%	1368.0%	1268.4%	1460.6%	1732.4%	1592.6%	1611.8%	1642.5%	1496.8%	1603.7%	1388.7%	1106.4%	1066.2%	1022.1%	927.9%	896.6%
3251	45.320 km	45.610 km	G	0.0%	0.5%	124.6%	276.5%	380.2%	525.1%	284.8%	639.3%	958.7%	823.3%	731.2%	917.3%	1294.4%	1190.2%	1241.6%	1308.3%	1136.2%	1299.9%	1062.5%	719.9%	626.1%	563.5%	522.9%	471.4%
3251	45.320 km	45.610 km	A	0.0%	1.8%	181.7%	256.1%	217.7%	389.0%	182.3%	453.1%	646.9%	559.4%	481.6%	691.5%	982.2%	864.5%	906.6%	957.2%	829.6%	959.2%	752.9%	485.8%	446.2%	397.0%	375.5%	333.5%
18C	80.175 km	80.365 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.7%	38.6%	34.1%	34.4%	32.1%	32.4%	32.3%	41.9%	42.5%	42.8%	44.1%	43.1%	41.3%	41.7%
18C	80.175 km	80.365 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.5%	31.8%	29.8%	29.2%	28.8%	29.2%	28.8%	37.4%	38.2%	38.4%	38.7%	39.0%	36.5%	36.7%
18C	80.365 km	80.485 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.7%	38.6%	34.1%	34.4%	32.1%	32.4%	32.3%	41.9%	42.5%	42.8%	44.1%	43.1%	41.3%	41.7%
18C	80.365 km	80.485 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.5%	31.8%	29.8%	29.2%	28.8%	29.2%	28.8%	37.4%	38.2%	38.4%	38.7%	39.0%	36.5%	36.7%
18C	80.485 km	80.615 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.7%	38.6%	34.1%	34.4%	32.1%	32.4%	32.3%	41.9%	42.5%	42.8%	44.1%	43.1%	41.3%	41.7%
18C	80.485 km	80.615 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.5%	31.8%	29.8%	29.2%	28.8%	29.2%	28.8%	37.4%	38.2%	38.4%	38.7%	39.0%	36.5%	36.7%
18C	80.615 km	80.645 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.9%	38.8%	34.7%	35.1%	32.9%	33.1%	33.1%	42.8%	43.4%	43.7%	45.1%	44.0%	42.2%	42.6%
18C	80.615 km	80.645 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.7%	32.0%	30.3%	29.8%	29.4%	29.8%	29.5%	38.2%	39.0%	39.1%	39.6%	39.8%	37.3%	37.5%
18C	80.645 km	80.705 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.9%	38.8%	34.7%	35.1%	32.9%	33.1%	33.1%	42.8%	43.4%	43.7%	45.1%	44.0%	42.2%	42.6%
18C	80.645 km	80.705 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.7%	32.0%	30.3%	29.8%	29.4%	29.8%	29.5%	38.2%	39.0%	39.1%	39.6%	39.8%	37.3%	37.5%
18C	80.705 km	80.875 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.3%	35.7%	35.7%	36.7%	37.4%	40.9%	38.8%	34.7%	35.1%	32.9%	33.1%	33.1%	42.8%	43.4%	43.7%	45.1%	44.0%	42.2%	42.6%
18C	80.705 km	80.875 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.7%	33.5%	32.6%	32.1%	31.5%	37.7%	32.0%	30.3%	29.8%	29.4%	29.8%	29.5%	38.2%	39.0%	39.1%	39.6%	39.8%	37.3%	37.5%
18C	80.875 km	81.045 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.2%	19.9%	14.8%	16.2%	17.4%	20.6%	18.8%	14.8%	15.5%	13.6%	14.1%	14.3%	24.4%	25.5%	26.0%	26.7%	27.6%	26.3%	27.1%
18C	80.875 km	81.045 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.9%	14.7%	20.6%	15.2%	13.5%	13.4%	13.2%	13.9%	13.8%	22.7%	23.9%	24.3%	24.1%	26.0%	23.9%	24.5%
18C	81.045 km	81.255 km	G	0.0%	0.0%	2.6%	14.4%	21.5%	19.2%	19.9%	14.8%	16.2%	17.4%	20.6%	18.8%	14.8%	15.5%	13.6%	14.1%	14.3%	24.4%	25.5%	26.0%	26.7%	27.6%	26.3%	27.1%
18C	81.045 km	81.255 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.9%	14.7%	20.6%	15.2%	13.5%	13.4%	13.2%	13.9%	13.8%	22.7%	23.9%	24.3%	24.1%	26.0%	23.9%	24.5%
18C	81.255 km	81.505 km	G	0.0%	0.0%	2.1%	11.2%	16.8%	15.0%	15.6%	11.5%	12.7%	13.6%	16.5%	15.0%	12.5%	12.5%	11.0%	11.1%	11.6%	19.3%	20.0%	20.4%	21.2%	21.6%	20.5%	21.2%
18C	81.255 km	81.505 km	A	0.0%	0.0%	0.3%	6.0%	16.6%	16.3%	19.9%	14.7%	14.6%	14.4%	21.8%	15.9%	16.7%	14.4%	14.5%	13.8%	15.0%	23.2%	23.7%	24.1%	25.2%	25.5%	23.4%	24.0%
18C	81.505 km	81.755 km	G	0.0%	0.0%	2.1%	11.2%	16.8%	15.0%	15.6%	11.5%	12.7%	13.6%	16.5%	15.0%	12.5%	12.5%	11.0%	11.1%	11.6%	19.3%	20.0%	20.4%	21.2%	21.6%	20.5%	21.2%
18C	81.505 km	81.755 km	A	0.0%	0.0%	0.3%	6.0%	16.6%	16.3%	19.9%	14.7%	14.6%	14.4%	21.8%	15.9%	16.7%	14.4%	14.5%	13.8%	15.0%	23.2%	23.7%	24.1%	25.2%	25.5%	23.4%	24.0%
18C	81.755 km	82.425 km	G	0.0%	0.0%	2.1%	11.2%	16.8%	15.0%	15.6%	11.5%	12.7%	13.6%	16.5%	15.0%	12.5%	12.5%	11.0%	11.1%	11.6%	19.3%	20.0%	20.4%	21.2%	21.6%	20.5%	21.2%
18C	81.755 km	82.425 km	A	0.0%	0.0%	0.3%	6.0%	16.6%	16.3%	19.9%	14.7%	14.6%	14.4%	21.8%	15.9%	16.7%	14.4%	14.5%	13.8%	15.0%	23.2%	23.7%	24.1%	25.2%	25.5%	23.4%	24.0%
18C	82.425 km	82.775 km	G	0.0%	0.0%	2.1%	11.2%	16.8%	15.0%	15.6%	11.5%	12.7%	13.6%	16.5%	15.0%	12.5%	12.5%	11.0%	11.1%	11.6%	19.3%	20.0%	20.4%	21.2%	21.6%	20.5%	21.2%
18C	82.425 km	82.775 km	A	0.0%	0.0%	0.3%	6.0%	16.6%	16.3%	19.9%	14.7%	14.6%	14.4%	21.8%	15.9%	16.7%	14.4%	14.5%	13.8%	15.0%	23.2%	23.7%	24.1%	25.2%	25.5%	23.4%	24.0%
18C	82.775 km	83.155 km	G	0.0%	0.0%	2.1%	11.2%	16.8%	15.0%	15.6%	11.5%	12.7%	13.6%	16.5%	15.0%	12.5%	12.5%	11.0%	11.1%	11.6%	19.3%	20.0%	20.4%	21.2%	21.6%	20.5%	21.2%
18C	82.775 km	83.155 km	A	0.0%	0.0%	0.3%	6.0%	16.6%	16.3%	19.9%	14.7%	14.6%	14.4%	21.8%	15.9%	16.7%	14.4%	14.5%	13.8%	15.0%	23.2%	23.7%	24.1%	25.2%	25.5%	23.4%	24.0%
18C	83.155 km	87.525 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	17.8%	18.4%	18.7%	19.4%	19.3%	18.4%	18.9%
18C	83.155 km	87.525 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	21.0%	21.4%	21.6%	22.6%	22.4%	20.4%	20.9%
18C	87.525 km	89.805 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	17.8%	18.4%	18.7%	19.4%	19.3%	18.4%	18.9%
18C	87.525 km	89.805 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	21.0%	21.4%	21.6%	22.6%	22.4%	20.4%	20.9%
18C	89.805 km	90.315 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	17.8%	18.4%	18.7%	19.4%	19.3%	18.4%	18.9%
18C	89.805 km	90.315 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	21.0%	21.4%	21.6%	22.6%	22.4%	20.4%	20.9%
18C	90.315 km	90.335 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	17.8%	18.4%	18.7%	19.4%	19.3%	18.4%	18.9%
18C	90.315 km	90.335 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	21.0%	21.4%	21.6%	22.6%	22.4%	20.4%	20.9%
18C	90.335 km	90.955 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	14.7%	15.0%	15.1%	15.7%	15.4%	14.2%	14.6%
18C	90.335 km	90.955 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	18.3%	18.5%	18.5%	19.3%	18.9%	16.7%	17.0%
18C	90.955 km	91.665 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	11.0%	11.4%	11.1%	9.8%	9.7%
18C	90.955 km	91.665 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.0%	14.6%	14.4%	15.0%	14.7%	12.3%	12.2%
18C	91.665 km	95.015 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	11.0%	11.4%	11.1%	9.8%	9.7%
18C	91.665 km	95.015 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.0%	14.6%	14.4%	15.0%	14.7%	12.3%	12.2%
18C	95.015 km	96.275 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	11.0%	11.4%	11.1%	9.8%	9.7%
18C	95.015 km	96.275 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.0%	14.6%	14.4%	15.0%	14.7%	12.3%	12.2%
18C	96.275 km	97.355 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	16.0%	16.5%	12.2%	13.5%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	11.0%	11.4%	11.1%	9.8%	9.7%
18C	96.275 km	97.355 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.0%	14.6%	14.4%	15.0%	14.7%	12.3%	12.2%
18C	97.355 km	97.425 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.4%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	10.9%	11.2%	10.9%	9.5%	9.3%
18C	97.355 km	97.425 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.7%	15.3%	15.0%	15.5%	15.1%	12.7%	12.5%
18C	97.425 km	97.575 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.4%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	10.9%	11.2%	10.9%	9.5%	9.3%
18C	97.425 km	97.575 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.7%	15.3%	15.0%	15.5%	15.1%	12.7%	12.5%
18C	97.575 km	98.965 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.4%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	10.9%	11.2%	10.9%	9.5%	9.3%
18C	97.575 km	98.965 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.7%	15.3%	15.0%	15.5%	15.1%	12.7%	12.5%
18C	98.965 km	104.235 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.4%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	10.9%	11.2%	10.9%	9.5%	9.3%
18C	98.965 km	104.235 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.7%	15.3%	15.0%	15.5%	15.1%	12.7%	12.5%
18C	104.235 km	104.435 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.4%	14.4%	17.5%	15.9%	13.3%	13.2%	11.7%	11.8%	12.3%	11.3%	11.1%	10.9%	11.2%	10.9%	9.5%	9.3%
18C	104.235 km	104.435 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.6%	20.2%	15.0%	14.8%	14.7%	22.1%	16.2%	17.0%	14.6%	14.7%	14.0%	15.2%	15.7%	15.3%	15.0%	15.5%	15.1%	12.7%	12.5%
18C	104.435 km	106.355 km	G	0.0%	0.0%	2.2%	11.9%	17.8%	15.7%	16.5%	12.2%	13.3%	14.4%	17.5%	15.8%	13.3%	13.2%	11.7%	11.6%	12.1%	15.2%	15.1%	15.1%	15.2%	15.1%	14.2%	14.1%
18C	104.435 km	106.355 km	A	0.0%	0.0%	0.3%	6.1%	16.9%	16.5%	20.2%	15.0%	14.8%	14.6%	22.1%	16.2%	17.0%	14.6%	14.7%	13.9%	15.2%	20.4%	20.1%	20.0%	20.3%	20.1%	18.1%	18.0%
18C	106.355 km	108.855 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	106.355 km	108.855 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	108.855 km	109.405 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	108.855 km	109.405 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	109.405 km	109.445 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	109.405 km	109.445 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	109.445 km	109.815 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	109.445 km	109.815 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	109.815 km	110.045 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	109.815 km	110.045 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	110.045 km	110.105 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	110.045 km	110.105 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	110.105 km	111.465 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	110.105 km	111.465 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	111.465 km	112.375 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	111.465 km	112.375 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	112.375 km	112.735 km	G	0.0%	0.0%	2.1%	11.7%	17.5%	15.4%	16.2%	12.0%	13.1%	14.1%	17.2%	15.5%	13.0%	12.9%	11.5%	11.4%	11.9%	14.9%	14.9%	14.9%	15.0%	14.8%	13.9%	13.9%
18C	112.375 km	112.735 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.4%	20.0%	14.8%	14.6%	14.5%	21.9%	16.0%	16.8%	14.5%	14.5%	13.8%	15.0%	20.2%	19.9%	19.8%	20.1%	19.9%	17.9%	17.8%
18C	112.735 km	113.585 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.2%	15.6%	13.1%	13.1%	11.6%	11.7%	12.4%	15.2%	15.1%	15.2%	15.2%	15.0%	14.3%	14.2%
18C	112.735 km	113.585 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.0%	16.5%	16.9%	14.8%	14.7%	14.4%	15.9%	20.4%	20.2%	20.1%	20.3%	20.1%	18.2%	18.0%
18C	113.585 km	115.465 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.2%	15.6%	13.1%	13.1%	11.6%	11.7%	12.4%	15.2%	15.1%	15.2%	15.2%	15.0%	14.3%	14.2%
18C	113.585 km	115.465 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.0%	16.5%	16.9%	14.8%	14.7%	14.4%	15.9%	20.4%	20.2%	20.1%	20.3%	20.1%	18.2%	18.0%
18C	115.465 km	116.065 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.2%	15.6%	13.1%	13.1%	11.6%	11.7%	12.4%	15.2%	15.1%	15.2%	15.2%	15.0%	14.3%	14.2%
18C	115.465 km	116.065 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.0%	16.5%	16.9%	14.8%	14.7%	14.4%	15.9%	20.4%	20.2%	20.1%	20.3%	20.1%	18.2%	18.0%

Table **F4** — **Maintenance Impacts (Increase in ESA Loadings)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

Cardno Shaping the Future

ROAD	Start	End	Direction	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
3251	45.090 km	45.320 km	G	1172.8%	1036.0%	964.5%	875.0%	831.0%	774.2%	726.2%	704.9%	688.6%	672.7%	711.1%	587.5%	693.6%	518.5%	402.9%	386.3%	369.9%	353.7%	340.8%	325.1%	509.5%	88.1%	0.0%	0.0%	0.0%
3251	45.090 km	45.320 km	A	910.9%	764.4%	719.7%	673.1%	641.1%	593.6%	556.2%	531.1%	518.5%	506.1%	538.4%	437.1%	498.8%	326.7%	282.7%	269.6%	256.7%	244.1%	234.0%	227.4%	400.9%	27.2%	0.0%	0.0%	0.0%
3251	45.320 km	45.610 km	G	456.0%	481.8%	425.3%	354.4%	318.0%	261.7%	211.9%	194.6%	172.0%	155.4%	147.0%	140.7%	174.2%	264.0%	179.1%	165.5%	152.1%	138.9%	128.9%	115.8%	85.0%	63.4%	0.0%	0.0%	0.0%
3251	45.320 km	45.610 km	A	319.0%	306.9%	274.5%	243.2%	217.5%	170.4%	131.6%	109.8%	91.9%	79.0%	72.7%	68.3%	70.0%	116.5%	97.8%	87.3%	76.9%	66.7%	59.0%	54.7%	50.3%	6.8%	0.0%	0.0%	0.0%
18C	80.175 km	80.365 km	G	44.0%	41.7%	41.3%	41.0%	38.9%	29.3%	26.8%	25.6%	24.7%	23.6%	22.2%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.175 km	80.365 km	A	38.0%	36.6%	36.3%	36.1%	34.4%	26.9%	24.9%	24.1%	23.1%	22.1%	21.1%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.365 km	80.485 km	G	44.0%	41.7%	41.3%	41.0%	38.9%	29.3%	26.8%	25.6%	24.7%	23.6%	22.2%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.365 km	80.485 km	A	38.0%	36.6%	36.3%	36.1%	34.4%	26.9%	24.9%	24.1%	23.1%	22.1%	21.1%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.485 km	80.615 km	G	44.0%	41.7%	41.3%	41.0%	38.9%	29.3%	26.8%	25.6%	24.7%	23.6%	22.2%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.485 km	80.615 km	A	38.0%	36.6%	36.3%	36.1%	34.4%	26.9%	24.9%	24.1%	23.1%	22.1%	21.1%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.615 km	80.645 km	G	45.3%	42.7%	42.7%	41.6%	39.5%	29.6%	27.3%	25.9%	24.8%	23.7%	22.5%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.615 km	80.645 km	A	39.1%	37.4%	37.5%	36.6%	34.9%	27.2%	25.3%	24.3%	23.3%	22.3%	21.4%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.645 km	80.705 km	G	45.3%	42.7%	42.7%	41.6%	39.5%	29.6%	27.3%	25.9%	24.8%	23.7%	22.5%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.645 km	80.705 km	A	39.1%	37.4%	37.5%	36.6%	34.9%	27.2%	25.3%	24.3%	23.3%	22.3%	21.4%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.705 km	80.875 km	G	45.3%	42.7%	42.7%	41.6%	39.5%	29.6%	27.3%	25.9%	24.8%	23.7%	22.5%	21.9%	24.3%	6.7%	4.9%	4.6%	4.4%	4.1%	3.9%	3.7%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.705 km	80.875 km	A	39.1%	37.4%	37.5%	36.6%	34.9%	27.2%	25.3%	24.3%	23.3%	22.3%	21.4%	20.5%	22.9%	8.1%	6.5%	6.2%	6.0%	5.8%	5.5%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	80.875 km	81.045 km	G	28.5%	28.2%	28.4%	28.5%	26.7%	17.2%	14.9%	14.4%	13.6%	12.6%	11.4%	10.9%	9.4%	6.4%	6.0%	5.5%	5.1%	4.8%	4.3%	3.8%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	80.875 km	81.045 km	A	25.0%	25.3%	25.5%	25.6%	24.2%	16.8%	15.0%	14.7%	13.8%	12.9%	12.0%	11.2%	10.4%	7.8%	7.4%	7.0%	6.7%	6.3%	5.9%	5.5%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	81.045 km	81.255 km	G	28.5%	28.2%	28.4%	28.5%	26.7%	17.2%	14.9%	14.4%	13.6%	12.6%	11.4%	10.9%	9.4%	6.4%	6.0%	5.5%	5.1%	4.8%	4.3%	3.8%	3.2%	0.0%	0.0%	0.0%	0.0%
18C	81.045 km	81.255 km	A	25.0%	25.3%	25.5%	25.6%	24.2%	16.8%	15.0%	14.7%	13.8%	12.9%	12.0%	11.2%	10.4%	7.8%	7.4%	7.0%	6.7%	6.3%	5.9%	5.5%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	81.255 km	81.505 km	G	22.3%	22.2%	22.7%	22.6%	21.2%	13.4%	12.0%	11.5%	10.7%	9.9%	9.3%	8.5%	7.3%	5.0%	4.7%	4.3%	4.0%	3.7%	3.4%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%
18C	81.255 km	81.505 km	A	24.5%	24.8%	25.1%	25.2%	23.8%	16.5%	14.7%	14.4%	13.5%	12.7%	11.9%	11.0%	10.2%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	81.505 km	81.755 km	G	22.3%	22.2%	22.7%	22.6%	21.2%	13.4%	12.0%	11.5%	10.7%	9.9%	9.3%	8.5%	7.3%	5.0%	4.7%	4.3%	4.0%	3.7%	3.4%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%
18C	81.505 km	81.755 km	A	24.5%	24.8%	25.1%	25.2%	23.8%	16.5%	14.7%	14.4%	13.5%	12.7%	11.9%	11.0%	10.2%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	81.755 km	82.425 km	G	22.3%	22.2%	22.7%	22.6%	21.2%	13.4%	12.0%	11.5%	10.7%	9.9%	9.3%	8.5%	7.3%	5.0%	4.7%	4.3%	4.0%	3.7%	3.4%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%
18C	81.755 km	82.425 km	A	24.5%	24.8%	25.1%	25.2%	23.8%	16.5%	14.7%	14.4%	13.5%	12.7%	11.9%	11.0%	10.2%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	82.425 km	82.775 km	G	22.3%	22.2%	22.7%	22.6%	21.2%	13.4%	12.0%	11.5%	10.7%	9.9%	9.3%	8.5%	7.3%	5.0%	4.7%	4.3%	4.0%	3.7%	3.4%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%
18C	82.425 km	82.775 km	A	24.5%	24.8%	25.1%	25.2%	23.8%	16.5%	14.7%	14.4%	13.5%	12.7%	11.9%	11.0%	10.2%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	82.775 km	83.155 km	G	22.3%	22.2%	22.7%	22.6%	21.2%	13.4%	12.0%	11.5%	10.7%	9.9%	9.3%	8.5%	7.3%	5.0%	4.7%	4.3%	4.0%	3.7%	3.4%	3.0%	2.5%	0.0%	0.0%	0.0%	0.0%
18C	82.775 km	83.155 km	A	24.5%	24.8%	25.1%	25.2%	23.8%	16.5%	14.7%	14.4%	13.5%	12.7%	11.9%	11.0%	10.2%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	83.155 km	87.525 km	G	19.9%	19.8%	19.9%	20.1%	19.2%	11.6%	10.7%	10.2%	9.5%	8.9%	8.5%	7.8%	6.8%	5.2%	4.9%	4.5%	4.2%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	83.155 km	87.525 km	A	21.3%	21.5%	21.4%	21.7%	20.8%	14.1%	12.8%	12.6%	11.9%	11.2%	10.6%	10.0%	9.3%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	87.525 km	89.805 km	G	19.9%	19.8%	19.9%	20.1%	19.2%	11.6%	10.7%	10.2%	9.5%	8.9%	8.5%	7.8%	6.8%	5.2%	4.9%	4.5%	4.2%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	87.525 km	89.805 km	A	21.3%	21.5%	21.4%	21.7%	20.8%	14.1%	12.8%	12.6%	11.9%	11.2%	10.6%	10.0%	9.3%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	89.805 km	90.315 km	G	19.9%	19.8%	19.9%	20.1%	19.2%	11.6%	10.7%	10.2%	9.5%	8.9%	8.5%	7.8%	6.8%	5.2%	4.9%	4.5%	4.2%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	89.805 km	90.315 km	A	21.3%	21.5%	21.4%	21.7%	20.8%	14.1%	12.8%	12.6%	11.9%	11.2%	10.6%	10.0%	9.3%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	90.315 km	90.335 km	G	19.9%	19.8%	19.9%	20.1%	19.2%	11.6%	10.7%	10.2%	9.5%	8.9%	8.5%	7.8%	6.8%	5.2%	4.9%	4.5%	4.2%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	90.315 km	90.335 km	A	21.3%	21.5%	21.4%	21.7%	20.8%	14.1%	12.8%	12.6%	11.9%	11.2%	10.6%	10.0%	9.3%	7.7%	7.3%	6.9%	6.5%	6.2%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	90.335 km	90.955 km	G	15.5%	15.1%	15.1%	15.2%	14.6%	8.5%	8.0%	7.8%	7.4%	7.0%	6.9%	6.4%	5.6%	6.0%	5.5%	5.0%	4.5%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	90.335 km	90.955 km	A	17.2%	17.2%	17.0%	17.2%	16.5%	11.0%	10.2%	10.1%	9.7%	9.2%	8.8%	8.4%	8.0%	8.3%	7.8%	7.3%	6.7%	6.3%	5.8%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	90.955 km	91.665 km	G	10.4%	9.9%	10.0%	9.7%	9.4%	5.1%	5.2%	5.1%	5.0%	4.9%	5.0%	4.8%	4.2%	5.7%	5.3%	4.8%	4.4%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	90.955 km	91.665 km	A	12.2%	12.0%	11.9%	11.6%	11.3%	7.6%	7.3%	7.4%	7.2%	7.0%	6.9%	6.7%	6.5%	8.1%	7.6%	7.1%	6.6%	6.1%	5.7%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	91.665 km	95.015 km	G	10.4%	9.9%	10.0%	9.7%	9.4%	5.1%	5.2%	5.1%	5.0%	4.9%	5.0%	4.8%	4.2%	5.7%	5.3%	4.8%	4.4%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	91.665 km	95.015 km	A	12.2%	12.0%	11.9%	11.6%	11.3%	7.6%	7.3%	7.4%	7.2%	7.0%	6.9%	6.7%	6.5%	8.1%	7.6%	7.1%	6.6%	6.1%	5.7%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	95.015 km	96.275 km	G	10.4%	9.9%	10.0%	9.7%	9.4%	5.1%	5.2%	5.1%	5.0%	4.9%	5.0%	4.8%	4.2%	5.7%	5.3%	4.8%	4.4%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	95.015 km	96.275 km	A	12.2%	12.0%	11.9%	11.6%	11.3%	7.6%	7.3%	7.4%	7.2%	7.0%	6.9%	6.7%	6.5%	8.1%	7.6%	7.1%	6.6%	6.1%	5.7%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	96.275 km	97.355 km	G	10.4%	9.9%	10.0%	9.7%	9.4%	5.1%	5.2%	5.1%	5.0%	4.9%	5.0%	4.8%	4.2%	5.7%	5.3%	4.8%	4.4%	3.9%	3.5%	3.1%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	96.275 km	97.355 km	A	12.2%	12.0%	11.9%	11.6%	11.3%	7.6%	7.3%	7.4%	7.2%	7.0%	6.9%	6.7%	6.5%	8.1%	7.6%	7.1%	6.6%	6.1%	5.7%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	97.355 km	97.425 km	G	10.0%	9.4%	9.4%	9.0%	8.7%	4.4%	4.4%	4.5%	4.4%	4.4%	4.5%	4.4%	3.8%	6.4%	5.8%	5.2%	4.7%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	97.355 km	97.425 km	A	12.4%	12.1%	11.9%	11.6%	11.1%	6.9%	6.5%	6.4%	6.3%	6.2%	6.2%	6.1%	5.9%	8.5%	7.9%	7.2%	6.6%	6.1%	5.6%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	97.425 km	97.575 km	G	10.0%	9.4%	9.4%	9.0%	8.7%	4.4%	4.4%	4.5%	4.4%	4.4%	4.5%	4.4%	3.8%	6.4%	5.8%	5.2%	4.7%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	97.425 km	97.575 km	A	12.4%	12.1%	11.9%	11.6%	11.1%	6.9%	6.5%	6.4%	6.3%	6.2%	6.2%	6.1%	5.9%	8.5%	7.9%	7.2%	6.6%	6.1%	5.6%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	97.575 km	98.965 km	G	10.0%	9.4%	9.4%	9.0%	8.7%	4.4%	4.4%	4.5%	4.4%	4.4%	4.5%	4.4%	3.8%	6.4%	5.8%	5.2%	4.7%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	97.575 km	98.965 km	A	12.4%	12.1%	11.9%	11.6%	11.1%	6.9%	6.5%	6.4%	6.3%	6.2%	6.2%	6.1%	5.9%	8.5%	7.9%	7.2%	6.6%	6.1%	5.6%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	98.965 km	104.235 km	G	10.0%	9.4%	9.4%	9.0%	8.7%	4.4%	4.4%	4.5%	4.4%	4.4%	4.5%	4.4%	3.8%	6.4%	5.8%	5.2%	4.7%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	98.965 km	104.235 km	A	12.4%	12.1%	11.9%	11.6%	11.1%	6.9%	6.5%	6.4%	6.3%	6.2%	6.2%	6.1%	5.9%	8.5%	7.9%	7.2%	6.6%	6.1%	5.6%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	104.235 km	104.435 km	G	10.0%	9.4%	9.4%	9.0%	8.7%	4.4%	4.4%	4.5%	4.4%	4.4%	4.5%	4.4%	3.8%	6.4%	5.8%	5.2%	4.7%	4.1%	3.6%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	104.235 km	104.435 km	A	12.4%	12.1%	11.9%	11.6%	11.1%	6.9%	6.5%	6.4%	6.3%	6.2%	6.2%	6.1%	5.9%	8.5%	7.9%	7.2%	6.6%	6.1%	5.6%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	104.435 km	106.355 km	G	14.9%	14.2%	14.3%	14.4%	13.6%	7.4%	6.9%	7.1%	6.8%	6.5%	6.4%	6.1%	5.3%	7.7%	6.9%	6.1%	5.4%	4.6%	3.9%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	104.435 km	106.355 km	A	18.0%	17.6%	17.5%	17.7%	16.6%	10.1%	9.0%	8.7%	8.4%	8.1%	7.8%	7.5%	7.1%	9.5%	8.7%	7.8%	7.1%	6.3%	5.7%	5.4%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	106.355 km	108.855 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	106.355 km	108.855 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	108.855 km	109.405 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	108.855 km	109.405 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	109.405 km	109.445 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	109.405 km	109.445 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	109.445 km	109.815 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	109.445 km	109.815 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	109.815 km	110.045 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	109.815 km	110.045 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	110.045 km	110.105 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	110.045 km	110.105 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	110.105 km	111.465 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	110.105 km	111.465 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	111.465 km	112.375 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	111.465 km	112.375 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	112.375 km	112.735 km	G	14.7%	14.0%	14.1%	14.1%	13.4%	7.2%	6.7%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	112.375 km	112.735 km	A	17.9%	17.5%	17.3%	17.5%	16.4%	10.0%	8.9%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	112.735 km	113.585 km	G	14.8%	14.4%	14.2%	14.4%	13.5%	7.7%	7.3%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	112.735 km	113.585 km	A	18.0%	17.8%	17.4%	17.7%	16.5%	10.2%	9.2%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	113.585 km	115.465 km	G	14.8%	14.4%	14.2%	14.4%	13.5%	7.7%	7.3%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	113.585 km	115.465 km	A	18.0%	17.8%	17.4%	17.7%	16.5%	10.2%	9.2%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	115.465 km	116.065 km	G	14.8%	14.4%	14.2%	14.4%	13.5%	7.7%	7.3%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	115.465 km	116.065 km	A	18.0%	17.8%	17.4%	17.7%	16.5%	10.2%	9.2%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%

Table **F4** **Maintenance Impacts (Increase in ESA Loadings)**

Project:	Surat Gas Project	Project No:	CEB06413
Prepared by:	Jessica Peters	Reviewed by:	Jeffrey Baczynksi

Cardno Shaping the Future

ROAD	Start	End	Direction	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
18C	116.065 km	118.625 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.3%	15.7%	13.2%	13.5%	11.9%	12.3%	12.8%	15.6%	15.5%	15.6%	15.6%	15.5%	14.7%	14.6%
18C	116.065 km	118.625 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.3%	16.5%	17.2%	16.3%	15.4%	16.0%	16.6%	20.9%	20.6%	20.5%	20.7%	20.5%	18.6%	18.4%
18C	118.625 km	120.505 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.3%	15.7%	13.2%	13.5%	11.9%	12.3%	12.8%	15.6%	15.5%	15.6%	15.6%	15.5%	14.7%	14.6%
18C	118.625 km	120.505 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.3%	16.5%	17.2%	16.3%	15.4%	16.0%	16.6%	20.9%	20.6%	20.5%	20.7%	20.5%	18.6%	18.4%
18C	120.505 km	121.765 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.3%	15.7%	13.2%	13.5%	11.9%	12.3%	12.8%	15.6%	15.5%	15.6%	15.6%	15.5%	14.7%	14.6%
18C	120.505 km	121.765 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.3%	16.5%	17.2%	16.3%	15.4%	16.0%	16.6%	20.9%	20.6%	20.5%	20.7%	20.5%	18.6%	18.4%
18C	121.765 km	122.285 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.3%	15.7%	13.2%	13.5%	11.9%	12.3%	12.8%	15.6%	15.5%	15.6%	15.6%	15.5%	14.7%	14.6%
18C	121.765 km	122.285 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.3%	16.5%	17.2%	16.3%	15.4%	16.0%	16.6%	20.9%	20.6%	20.5%	20.7%	20.5%	18.6%	18.4%
18C	122.285 km	125.535 km	G	0.0%	0.0%	2.1%	11.7%	17.4%	15.4%	16.1%	12.0%	13.1%	14.1%	17.3%	15.7%	13.2%	13.5%	11.9%	12.3%	12.8%	15.6%	15.5%	15.6%	15.6%	15.5%	14.7%	14.6%
18C	122.285 km	125.535 km	A	0.0%	0.0%	0.3%	6.1%	16.7%	16.5%	20.0%	14.8%	14.8%	14.6%	22.3%	16.5%	17.2%	16.3%	15.4%	16.0%	16.6%	20.9%	20.6%	20.5%	20.7%	20.5%	18.6%	18.4%
18C	125.535 km	125.795 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	125.535 km	125.795 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	125.795 km	125.895 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	125.795 km	125.895 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	125.895 km	125.945 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	125.895 km	125.945 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	125.945 km	126.005 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	125.945 km	126.005 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	126.005 km	126.235 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	126.005 km	126.235 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	126.235 km	126.475 km	G	0.0%	0.0%	2.1%	11.7%	17.7%	15.7%	16.5%	12.3%	13.5%	14.6%	17.6%	16.2%	13.6%	13.8%	12.3%	12.6%	13.2%	16.0%	16.6%	16.4%	16.1%	15.6%	15.3%	15.0%
18C	126.235 km	126.475 km	A	0.0%	0.0%	0.3%	6.2%	17.6%	17.4%	20.6%	15.1%	15.7%	15.4%	22.9%	17.3%	17.6%	16.7%	15.8%	16.3%	17.0%	21.3%	21.3%	21.0%	21.0%	20.6%	18.9%	18.7%
18C	126.475 km	126.745 km	G	0.0%	0.0%	4.4%	28.1%	37.9%	35.5%	36.6%	31.7%	31.8%	33.1%	34.3%	33.3%	30.1%	28.7%	27.6%	26.4%	26.6%	29.7%	29.8%	28.9%	28.2%	26.8%	26.6%	26.8%
18C	126.475 km	126.745 km	A	0.0%	0.0%	0.9%	21.1%	38.3%	37.7%	41.2%	35.0%	34.4%	34.4%	40.0%	34.9%	34.5%	31.9%	31.5%	30.4%	30.8%	36.3%	37.9%	37.4%	36.0%	33.0%	31.9%	32.8%
35A	0.000 km	0.130 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.000 km	0.130 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.130 km	0.240 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.130 km	0.240 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.240 km	0.350 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.240 km	0.350 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.350 km	0.470 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.350 km	0.470 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.470 km	0.740 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.470 km	0.740 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.740 km	0.800 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.740 km	0.800 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	0.800 km	1.020 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	0.800 km	1.020 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	1.020 km	1.220 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	1.020 km	1.220 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	1.220 km	1.270 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	1.220 km	1.270 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	1.270 km	1.720 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	1.270 km	1.720 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	1.720 km	1.930 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	1.720 km	1.930 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	1.930 km	2.500 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	1.930 km	2.500 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	2.500 km	2.550 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	2.500 km	2.550 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	2.550 km	2.900 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	2.550 km	2.900 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	2.900 km	3.130 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	2.900 km	3.130 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	3.130 km	3.700 km	G	0.0%	0.0%	4.9%	0.7%	10.7%	14.2%	16.6%	28.1%	20.6%	25.8%	11.5%	10.0%	7.8%	8.8%	6.0%	8.3%	6.9%	6.2%	10.8%	11.7%	4.3%	5.2%	6.0%	5.0%
35A	3.130 km	3.700 km	A	0.0%	0.0%	3.8%	0.3%	3.3%	4.8%	5.3%	8.8%	7.3%	8.8%	5.3%	5.0%	4.4%	4.9%	4.2%	4.8%	4.7%	4.6%	9.5%	10.3%	7.5%	13.3%	12.2%	11.9%
35A	3.700 km	5.820 km	G	0.0%	0.0%	4.6%	0.6%	9.9%	13.2%	15.4%	26.1%	19.2%	24.0%	10.7%	9.3%	7.2%	8.2%	5.6%	7.7%	6.4%	5.7%	10.0%	10.9%	4.0%	4.9%	5.6%	4.7%
35A	3.700 km	5.820 km	A	0.0%	0.0%	5.3%	0.4%	4.7%	6.8%	7.5%	12.4%	10.4%	12.5%	7.5%	7.1%	6.3%	7.0%	5.9%	6.8%	6.7%	6.6%	13.5%	14.5%	10.7%	18.9%	17.4%	16.9%
35A	5.820 km	8.590 km	G	0.0%	0.0%	4.6%	0.6%	9.9%	13.2%	15.4%	26.1%	19.2%	24.0%	10.7%	9.3%	7.2%	8.2%	5.6%	7.7%	6.4%	5.7%	10.0%	10.9%	4.0%	4.9%	5.6%	4.7%
35A	5.820 km	8.590 km	A	0.0%	0.0%	5.3%	0.4%	4.7%	6.8%	7.5%	12.4%	10.4%	12.5%	7.5%	7.1%	6.3%	7.0%	5.9%	6.8%	6.7%	6.6%	13.5%	14.5%	10.7%	18.9%	17.4%	16.9%
35A	8.590 km	9.190 km	G	0.0%	0.0%	4.6%	0.6%	9.9%	13.2%	15.4%	26.1%	19.2%	24.0%	10.7%	9.3%	7.2%	8.2%	10.4%	12.8%	7.1%	11.0%	14.6%	22.8%	6.2%	7.0%	7.6%	6.7%
35A	8.590 km	9.190 km	A	0.0%	0.0%	5.3%	0.4%	4.7%	6.8%	7.5%	12.4%	10.4%	12.5%	7.5%	7.1%	6.3%	7.0%	13.7%	14.9%	7.7%	14.8%	20.5%	33.4%	13.6%	21.7%	20.1%	19.6%
35A	9.190 km	9.430 km	G	0.0%	0.0%	4.6%	0.6%	9.9%	13.2%	15.4%	26.1%	19.2%	24.0%	10.7%	9.3%	7.2%	8.2%	10.4%	12.8%	7.1%	11.0%	14.6%	22.8%	6.2%	7.0%	7.6%	6.7%
35A	9.190 km	9.430 km	A	0.0%	0.0%	5.3%	0.4%	4.7%	6.8%	7.5%	12.4%	10.4%	12.5%	7.5%	7.1%	6.3%	7.0%	13.7%	14.9%	7.7%	14.8%	20.5%	33.4%	13.6%	21.7%	20.1%	19.6%
35A	9.430 km	11.000 km	G	0.0%	0.0%	4.6%	0.6%	9.9%	13.2%	15.4%	26.1%	19.2%	24.0%	10.7%	9.3%	7.2%	8.2%	10.4%	12.8%	7.1%	11.0%	14.6%	22.8%	6.2%	7.0%	7.6%	6.7%
35A	9.430 km	11.000 km	A	0.0%	0.0%	5.3%	0.4%	4.7%	6.8%	7.5%	12.4%	10.4%	12.5%	7.5%	7.1%	6.3%	7.0%	13.7%	14.9%	7.7%	14.8%	20.5%	33.4%	13.6%	21.7%	20.1%	19.6%

ROAD	Start	End	Direction	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
18C	116.065 km	118.625 km	G	15.5%	14.8%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	116.065 km	118.625 km	A	18.6%	18.1%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	118.625 km	120.505 km	G	15.5%	14.8%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	118.625 km	120.505 km	A	18.6%	18.1%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	120.505 km	121.765 km	G	15.5%	14.8%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	120.505 km	121.765 km	A	18.6%	18.1%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	121.765 km	122.285 km	G	15.5%	14.8%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	121.765 km	122.285 km	A	18.6%	18.1%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	122.285 km	125.535 km	G	15.5%	14.8%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	2.6%	0.0%	0.0%	0.0%	0.0%
18C	122.285 km	125.535 km	A	18.6%	18.1%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	2.4%	0.0%	0.0%	0.0%	0.0%
18C	125.535 km	125.795 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	125.535 km	125.795 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	125.795 km	125.895 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	125.795 km	125.895 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	125.895 km	125.945 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	125.895 km	125.945 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	125.945 km	126.005 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	125.945 km	126.005 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	126.005 km	126.235 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	126.005 km	126.235 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	126.235 km	126.475 km	G	15.6%	15.2%	14.8%	15.9%	14.1%	8.8%	7.6%	6.9%	6.6%	6.4%	6.3%	6.0%	5.2%	7.6%	6.8%	6.0%	5.3%	4.6%	3.8%	3.2%	3.8%	0.0%	0.0%	0.0%	0.0%
18C	126.235 km	126.475 km	A	18.6%	18.3%	17.9%	18.5%	16.9%	10.8%	9.3%	8.6%	8.3%	8.0%	7.7%	7.4%	7.1%	9.4%	8.6%	7.8%	7.0%	6.3%	5.6%	5.3%	3.6%	0.0%	0.0%	0.0%	0.0%
18C	126.475 km	126.745 km	G	26.3%	26.0%	25.0%	25.0%	24.4%	18.9%	17.6%	17.1%	16.6%	16.2%	15.8%	15.4%	15.0%	17.2%	16.2%	15.3%	14.5%	13.7%	12.9%	12.6%	22.2%	1.5%	0.0%	0.0%	0.0%
18C	126.475 km	126.745 km	A	32.3%	32.2%	29.9%	29.7%	30.2%	25.6%	21.1%	20.1%	19.6%	19.1%	18.6%	18.2%	17.7%	20.0%	19.0%	18.0%	17.1%	16.2%	15.5%	15.1%	23.8%	4.1%	0.0%	0.0%	0.0%
35A	0.000 km	0.130 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.000 km	0.130 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.130 km	0.240 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.130 km	0.240 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.240 km	0.350 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.240 km	0.350 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.350 km	0.470 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.350 km	0.470 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.470 km	0.740 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.470 km	0.740 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.740 km	0.800 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.740 km	0.800 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.800 km	1.020 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	0.800 km	1.020 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.020 km	1.220 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.020 km	1.220 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.220 km	1.270 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.220 km	1.270 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.270 km	1.720 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.270 km	1.720 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.720 km	1.930 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.720 km	1.930 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.930 km	2.500 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	1.930 km	2.500 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.500 km	2.550 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.500 km	2.550 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.550 km	2.900 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.550 km	2.900 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.900 km	3.130 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	2.900 km	3.130 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	3.130 km	3.700 km	G	4.4%	2.7%	1.6%	2.0%	1.0%	1.2%	0.9%	0.7%	1.0%	1.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	3.130 km	3.700 km	A	9.6%	3.9%	2.0%	3.0%	1.1%	1.8%	1.1%	0.8%	1.6%	1.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	3.700 km	5.820 km	G	4.1%	2.6%	1.5%	1.9%	0.9%	1.2%	0.8%	0.6%	0.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	3.700 km	5.820 km	A	13.6%	5.5%	2.8%	4.2%	1.6%	2.5%	1.6%	1.2%	2.2%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	5.820 km	8.590 km	G	4.1%	2.6%	1.5%	1.9%	0.9%	1.2%	0.8%	0.6%	0.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	5.820 km	8.590 km	A	13.6%	5.5%	2.8%	4.2%	1.6%	2.5%	1.6%	1.2%	2.2%	2.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	8.590 km	9.190 km	G	6.1%	4.5%	3.5%	3.8%	2.3%	2.2%	2.0%	1.3%	1.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	8.590 km	9.190 km	A	16.3%	8.1%	5.4%	6.7%	3.0%	3.5%	3.2%	1.7%	2.6%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	9.190 km	9.430 km	G	6.1%	4.5%	3.5%	3.8%	2.3%	2.2%	2.0%	1.3%	1.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	9.190 km	9.430 km	A	16.3%	8.1%	5.4%	6.7%	3.0%	3.5%	3.2%	1.7%	2.6%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	9.430 km	11.000 km	G	6.1%	4.5%	3.5%	3.8%	2.3%	2.2%	2.0%	1.3%	1.4%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35A	9.430 km	11.000 km	A	16.3%	8.1%	5.4%	6.7%	3.0%	3.5%	3.2%	1.7%	2.6%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table **F4** — **Maintenance Impacts (Increase in ESA Loadings)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

									BACKGROUND		WITH DEVELOPMENT			
ROAD	Start	End	Direction	Surveyed Roughness	Roughness Year	Deterioration Rate	Base Year Roughness	Adopted Terminal Roughness	BKG Rehab Date	Breakpoint ESA	Break Year	WD Rehab Date	Bring Forward	Bring Forward?
3251	0.000 km	0.120 km	G	197.50	2013	3.0	197.5	200.0	**2013.83**	37,727	2013	**2013.83**	0.00	No
3251	0.000 km	0.120 km	A	197.50	2013	3.0	197.5	200.0	**2013.83**	45,691	2013	**2013.83**	0.00	No
3251	0.120 km	0.210 km	G	187.00	2013	3.0	187.0	190.0	**2014.00**	41,212	2014	**2014.00**	0.00	No
3251	0.120 km	0.210 km	A	187.00	2013	3.0	187.0	190.0	**2014.00**	49,912	2014	**2014.00**	0.00	No
3251	0.210 km	0.250 km	G	243.00	2013	3.0	243.0	250.0	**2015.33**	70,107	2015	**2015.33**	0.00	No
3251	0.210 km	0.250 km	A	243.00	2013	3.0	243.0	250.0	**2015.33**	84,908	2015	**2015.33**	0.00	No
3251	0.250 km	0.280 km	G	243.00	2013	3.0	243.0	250.0	**2015.33**	70,107	2015	**2015.33**	0.00	No
3251	0.250 km	0.280 km	A	243.00	2013	3.0	243.0	250.0	**2015.33**	84,908	2015	**2015.33**	0.00	No
3251	0.280 km	0.630 km	G	158.51	2013	3.0	158.5	160.0	**2013.50**	30,657	2013	**2013.50**	0.00	No
3251	0.280 km	0.630 km	A	158.51	2013	3.0	158.5	160.0	**2013.50**	37,129	2013	**2013.50**	0.00	No
3251	0.630 km	2.090 km	G	97.28	2013	3.0	97.3	120.0	**2020.57**	193,889	2020	**2020.55**	0.02	No
3251	0.630 km	2.090 km	A	97.28	2013	3.0	97.3	120.0	**2020.57**	234,822	2020	**2020.57**	0.00	No
3251	2.090 km	3.210 km	G	86.40	2013	3.0	86.4	120.0	**2024.20**	289,318	2024	**2024.17**	0.03	No
3251	2.090 km	3.210 km	A	86.40	2013	3.0	86.4	120.0	**2024.20**	350,396	2024	**2024.19**	0.01	No
3251	3.210 km	3.940 km	G	72.47	2013	3.0	72.5	120.0	**2028.84**	423,287	2028	**2028.79**	0.05	No
3251	3.210 km	3.940 km	A	72.47	2013	3.0	72.5	120.0	**2028.84**	512,647	2028	**2028.81**	0.03	No
3251	3.940 km	4.430 km	G	75.69	2013	3.0	75.7	120.0	**2027.77**	391,097	2027	**2027.72**	0.05	No
3251	3.940 km	4.430 km	A	75.69	2013	3.0	75.7	120.0	**2027.77**	473,662	2027	**2027.74**	0.03	No
3251	4.430 km	4.790 km	G	99.81	2013	3.0	99.8	120.0	**2019.73**	172,867	2019	**2019.71**	0.02	No
3251	4.430 km	4.790 km	A	99.81	2013	3.0	99.8	120.0	**2019.73**	209,362	2019	**2019.73**	0.00	No
3251	4.790 km	6.440 km	G	75.96	2013	3.0	76.0	120.0	**2027.68**	388,450	2027	**2027.63**	0.05	No
3251	4.790 km	6.440 km	A	75.96	2013	3.0	76.0	120.0	**2027.68**	470,456	2027	**2027.65**	0.03	No
3251	6.440 km	6.690 km	G	70.80	2013	3.0	70.8	120.0	**2029.40**	440,213	2029	**2029.11**	0.29	No
3251	6.440 km	6.690 km	A	70.80	2013	3.0	70.8	120.0	**2029.40**	533,147	2029	**2029.12**	0.28	No
3251	6.690 km	7.370 km	G	89.91	2013	3.0	89.9	120.0	**2023.03**	257,606	2023	**2023.01**	0.02	No
3251	6.690 km	7.370 km	A	89.91	2013	3.0	89.9	120.0	**2023.03**	311,989	2023	**2023.03**	0.00	No
3251	7.370 km	9.340 km	G	77.53	2013	3.0	77.5	120.0	**2027.16**	373,051	2027	**2027.11**	0.05	No
3251	7.370 km	9.340 km	A	77.53	2013	3.0	77.5	120.0	**2027.16**	451,806	2027	**2027.13**	0.03	No
3251	9.340 km	9.630 km	G	65.31	2013	3.0	65.3	120.0	**2031.23**	497,198	2029	**2029.69**	1.54	Yes
3251	9.340 km	9.630 km	A	65.31	2013	3.0	65.3	120.0	**2031.23**	602,161	2029	**2029.72**	1.51	Yes
3251	9.630 km	9.800 km	G	100.59	2013	3.0	100.6	120.0	**2019.47**	166,459	2019	**2019.45**	0.02	No
3251	9.630 km	9.800 km	A	100.59	2013	3.0	100.6	120.0	**2019.47**	201,600	2019	**2019.47**	0.00	No
3251	9.800 km	9.850 km	G	141.00	2013	3.0	141.0	150.0	**2016.00**	84,859	2015	**2015.99**	0.01	No
3251	9.800 km	9.850 km	A	141.00	2013	3.0	141.0	150.0	**2016.00**	102,774	2015	**2016.00**	0.00	No
3251	9.850 km	13.580 km	G	73.63	2013	3.0	73.6	120.0	**2028.46**	411,653	2023	**2023.43**	5.03	Yes
3251	9.850 km	13.580 km	A	73.63	2013	3.0	73.6	120.0	**2028.46**	498,558	2023	**2023.97**	4.49	Yes
3251	13.580 km	13.750 km	G	84.24	2013	3.0	84.2	120.0	**2024.92**	309,256	2021	**2021.52**	3.40	Yes
3251	13.580 km	13.750 km	A	84.24	2013	3.0	84.2	120.0	**2024.92**	374,544	2021	**2021.96**	2.96	Yes
3251	13.750 km	14.920 km	G	86.19	2013	3.0	86.2	120.0	**2024.27**	291,285	2021	**2021.16**	3.11	Yes
3251	13.750 km	14.920 km	A	86.19	2013	3.0	86.2	120.0	**2024.27**	352,778	2021	**2021.57**	2.70	Yes
3251	14.920 km	16.410 km	G	95.35	2013	3.0	95.3	120.0	**2021.22**	210,232	2019	**2019.51**	1.71	Yes
3251	14.920 km	16.410 km	A	95.35	2013	3.0	95.3	120.0	**2021.22**	254,614	2019	**2019.77**	1.45	Yes
3251	16.410 km	16.680 km	G	76.78	2013	3.0	76.8	120.0	**2027.41**	380,461	2022	**2022.92**	4.49	Yes
3251	16.410 km	16.680 km	A	76.78	2013	3.0	76.8	120.0	**2027.41**	460,781	2023	**2023.41**	4.00	Yes
3251	16.680 km	19.900 km	G	81.48	2013	3.0	81.5	120.0	**2025.84**	335,142	2022	**2022.04**	3.80	Yes
3251	16.680 km	19.900 km	A	81.48	2013	3.0	81.5	120.0	**2025.84**	405,894	2022	**2022.52**	3.32	Yes
3251	19.900 km	21.460 km	G	77.85	2013	3.0	77.8	120.0	**2027.05**	369,978	2022	**2022.72**	4.33	Yes
3251	19.900 km	21.460 km	A	77.85	2013	3.0	77.8	120.0	**2027.05**	448,085	2023	**2023.06**	3.99	Yes
3251	21.460 km	21.970 km	G	77.10	2013	3.0	77.1	120.0	**2027.30**	377,319	2022	**2022.86**	4.44	Yes
3251	21.460 km	21.970 km	A	77.10	2013	3.0	77.1	120.0	**2027.30**	456,975	2023	**2023.10**	4.20	Yes
3251	21.970 km	23.140 km	G	78.36	2013	3.0	78.4	120.0	**2026.88**	365,019	2022	**2022.62**	4.26	Yes
3251	21.970 km	23.140 km	A	78.36	2013	3.0	78.4	120.0	**2026.88**	442,079	2023	**2023.04**	3.84	Yes
3251	23.140 km	23.590 km	G	103.22	2013	3.0	103.2	120.0	**2018.59**	145,139	2018	**2018.26**	0.33	No
3251	23.140 km	23.590 km	A	103.22	2013	3.0	103.2	120.0	**2018.59**	175,780	2018	**2018.31**	0.28	No
3251	23.590 km	25.060 km	G	68.50	2013	3.0	68.5	120.0	**2030.17**	463,852	2023	**2023.38**	6.79	Yes
3251	23.590 km	25.060 km	A	68.50	2013	3.0	68.5	120.0	**2030.17**	561,777	2023	**2023.55**	6.62	Yes
3251	25.060 km	25.730 km	G	72.72	2013	3.0	72.7	120.0	**2028.76**	420,776	2020	**2020.24**	8.52	Yes
3251	25.060 km	25.730 km	A	72.72	2013	3.0	72.7	120.0	**2028.76**	509,607	2020	**2020.43**	8.33	Yes
3251	25.730 km	27.900 km	G	79.86	2013	3.0	79.9	120.0	**2026.38**	350,579	2020	**2020.09**	6.29	Yes

Table **F5** **Rehabilitation Impacts (Bring Forward Period)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD	Start	End	Direction	Surveyed Roughness	Roughness Year	Deterioration Rate	Base Year Roughness	Adopted Terminal Roughness	BKG Rehab Date	Breakpoint ESA	Break Year	WD Rehab Date	Bring Forward	Bring Forward?
3251	25.730 km	27.900 km	A	79.86	2013	3.0	79.9	120.0	**2026.38**	424,590	2020	**2020.16**	6.22	Yes
3251	27.900 km	28.020 km	G	75.17	2013	3.0	75.2	120.0	**2027.94**	396,270	2020	**2020.45**	7.49	Yes
3251	27.900 km	28.020 km	A	75.17	2013	3.0	75.2	120.0	**2027.94**	479,927	2020	**2020.53**	7.41	Yes
3251	28.020 km	29.940 km	G	78.78	2013	3.0	78.8	120.0	**2026.74**	360,961	2020	**2020.14**	6.60	Yes
3251	28.020 km	29.940 km	A	78.78	2013	3.0	78.8	120.0	**2026.74**	437,164	2020	**2020.18**	6.56	Yes
3251	29.940 km	31.190 km	G	74.66	2013	3.0	74.7	120.0	**2028.11**	401,351	2020	**2020.49**	7.62	Yes
3251	29.940 km	31.190 km	A	74.66	2013	3.0	74.7	120.0	**2028.11**	486,080	2020	**2020.58**	7.53	Yes
3251	31.190 km	37.830 km	G	66.02	2013	3.0	66.0	120.0	**2030.99**	489,682	2021	**2021.25**	9.74	Yes
3251	31.190 km	37.830 km	A	66.02	2013	3.0	66.0	120.0	**2030.99**	593,059	2021	**2021.44**	9.55	Yes
3251	37.830 km	38.895 km	G	81.96	2013	3.0	82.0	120.0	**2025.68**	330,632	2016	**2016.09**	9.59	Yes
3251	37.830 km	38.895 km	A	81.96	2013	3.0	82.0	120.0	**2025.68**	400,432	2016	**2016.95**	8.73	Yes
3251	38.950 km	44.210 km	G	74.97	2013	3.0	75.0	120.0	**2028.01**	398,172	2016	**2016.57**	11.44	Yes
3251	38.950 km	44.210 km	A	74.97	2013	3.0	75.0	120.0	**2028.01**	482,231	2017	**2017.78**	10.23	Yes
3251	44.210 km	44.300 km	G	66.00	2013	3.0	66.0	120.0	**2031.00**	489,870	2018	**2018.98**	12.02	Yes
3251	44.210 km	44.300 km	A	66.00	2013	3.0	66.0	120.0	**2031.00**	593,287	2019	**2019.94**	11.06	Yes
3251	44.300 km	44.360 km	G	93.00	2013	3.0	93.0	120.0	**2022.00**	230,420	2017	**2017.17**	4.83	Yes
3251	44.300 km	44.360 km	A	93.00	2013	3.0	93.0	120.0	**2022.00**	279,064	2017	**2017.93**	4.07	Yes
3251	44.360 km	44.520 km	G	115.38	2013	3.0	115.4	120.0	**2014.54**	52,868	2014	**2014.23**	0.31	No
3251	44.360 km	44.520 km	A	115.38	2013	3.0	115.4	120.0	**2014.54**	64,029	2014	**2014.18**	0.36	No
3251	44.520 km	44.630 km	G	123.00	2013	3.0	123.0	130.0	**2015.33**	70,107	2014	**2014.58**	0.75	No
3251	44.520 km	44.630 km	A	123.00	2013	3.0	123.0	130.0	**2015.33**	84,908	2014	**2014.46**	0.87	No
3251	44.630 km	44.860 km	G	100.91	2013	3.0	100.9	120.0	**2019.36**	163,799	2015	**2015.49**	3.87	Yes
3251	44.630 km	44.860 km	A	100.91	2013	3.0	100.9	120.0	**2019.36**	198,379	2015	**2015.46**	3.90	Yes
3251	44.860 km	45.090 km	G	105.39	2013	3.0	105.4	120.0	**2017.87**	127,898	2015	**2015.25**	2.62	Yes
3251	44.860 km	45.090 km	A	105.39	2013	3.0	105.4	120.0	**2017.87**	154,899	2015	**2015.19**	2.68	Yes
3251	45.090 km	45.320 km	G	101.74	2013	3.0	101.7	120.0	**2019.09**	157,035	2015	**2015.45**	3.64	Yes
3251	45.090 km	45.320 km	A	101.74	2013	3.0	101.7	120.0	**2019.09**	190,187	2015	**2015.41**	3.68	Yes
3251	45.320 km	45.610 km	G	92.03	2013	3.0	92.0	120.0	**2022.32**	238,914	2016	**2016.60**	5.72	Yes
3251	45.320 km	45.610 km	A	92.03	2013	3.0	92.0	120.0	**2022.32**	289,351	2016	**2016.80**	5.52	Yes
18C	80.175 km	80.365 km	G	95.74	2013	3.0	95.7	120.0	**2021.09**	3,680,882	2019	**2019.91**	1.18	Yes
18C	80.175 km	80.365 km	A	95.74	2013	3.0	95.7	120.0	**2021.09**	4,378,590	2020	**2020.07**	1.02	Yes
18C	80.365 km	80.485 km	G	141.42	2013	3.0	141.4	150.0	**2015.86**	1,455,034	2015	**2015.73**	0.13	No
18C	80.365 km	80.485 km	A	141.42	2013	3.0	141.4	150.0	**2015.86**	1,730,835	2015	**2015.81**	0.05	No
18C	80.485 km	80.615 km	G	158.35	2013	3.0	158.3	160.0	**2013.55**	566,258	2013	**2013.55**	0.00	No
18C	80.485 km	80.615 km	A	158.35	2013	3.0	158.3	160.0	**2013.55**	673,592	2013	**2013.55**	0.00	No
18C	80.615 km	80.645 km	G	163.00	2013	3.0	163.0	170.0	**2015.33**	1,247,258	2015	**2015.27**	0.06	No
18C	80.615 km	80.645 km	A	163.00	2013	3.0	163.0	170.0	**2015.33**	1,483,675	2015	**2015.31**	0.02	No
18C	80.645 km	80.705 km	G	163.33	2013	3.0	163.3	170.0	**2015.22**	1,203,516	2015	**2015.17**	0.05	No
18C	80.645 km	80.705 km	A	163.33	2013	3.0	163.3	170.0	**2015.22**	1,431,641	2015	**2015.21**	0.01	No
18C	80.705 km	80.875 km	G	134.79	2013	3.0	134.8	140.0	**2014.74**	1,014,690	2014	**2014.72**	0.02	No
18C	80.705 km	80.875 km	A	134.79	2013	3.0	134.8	140.0	**2014.74**	1,207,023	2014	**2014.73**	0.01	No
18C	80.875 km	81.045 km	G	75.62	2013	3.0	75.6	120.0	**2027.79**	6,971,212	2026	**2026.10**	1.69	Yes
18C	80.875 km	81.045 km	A	75.62	2013	3.0	75.6	120.0	**2027.79**	8,292,600	2026	**2026.30**	1.49	Yes
18C	81.045 km	81.255 km	G	75.45	2013	3.0	75.5	120.0	**2027.85**	7,000,062	2026	**2026.14**	1.71	Yes
18C	81.045 km	81.255 km	A	75.45	2013	3.0	75.5	120.0	**2027.85**	8,326,919	2026	**2026.35**	1.50	Yes
18C	81.255 km	81.505 km	G	105.60	2013	3.0	105.6	120.0	**2017.80**	2,876,945	2017	**2017.44**	0.36	No
18C	81.255 km	81.505 km	A	105.60	2013	3.0	105.6	120.0	**2017.80**	2,722,376	2017	**2017.50**	0.30	No
18C	81.505 km	81.755 km	G	64.96	2013	3.0	65.0	120.0	**2031.35**	11,412,620	2029	**2029.66**	1.69	Yes
18C	81.505 km	81.755 km	A	64.96	2013	3.0	65.0	120.0	**2031.35**	10,799,457	2029	**2029.44**	1.91	Yes
18C	81.755 km	82.425 km	G	115.65	2013	3.0	115.6	120.0	**2014.45**	1,159,688	2014	**2014.44**	0.01	No
18C	81.755 km	82.425 km	A	115.65	2013	3.0	115.6	120.0	**2014.45**	1,097,382	2014	**2014.45**	0.00	No
18C	82.425 km	82.775 km	G	102.71	2013	3.0	102.7	120.0	**2018.76**	3,399,164	2018	**2018.29**	0.47	No
18C	82.425 km	82.775 km	A	102.71	2013	3.0	102.7	120.0	**2018.76**	3,216,538	2018	**2018.32**	0.44	No
18C	82.775 km	83.155 km	G	106.92	2013	3.0	106.9	120.0	**2017.36**	2,642,717	2017	**2017.06**	0.30	No
18C	82.775 km	83.155 km	A	106.92	2013	3.0	106.9	120.0	**2017.36**	2,500,733	2017	**2017.12**	0.24	No
18C	83.155 km	87.525 km	G	91.09	2013	3.0	91.1	120.0	**2022.64**	5,303,254	2021	**2021.72**	0.92	No
18C	83.155 km	87.525 km	A	91.09	2013	3.0	91.1	120.0	**2022.64**	5,244,645	2021	**2021.72**	0.92	No
18C	87.525 km	89.805 km	G	89.92	2013	3.0	89.9	120.0	**2023.03**	5,523,370	2022	**2022.07**	0.96	No
18C	87.525 km	89.805 km	A	89.92	2013	3.0	89.9	120.0	**2023.03**	5,462,328	2022	**2022.06**	0.97	No
18C	89.805 km	90.315 km	G	84.12	2013	3.0	84.1	120.0	**2024.96**	6,656,201	2023	**2023.77**	1.19	Yes

Table **F5** **Rehabilitation Impacts (Bring Forward Period)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD	Start	End	Direction	Surveyed Roughness	Roughness Year	Deterioration Rate	Base Year Roughness	Adopted Terminal Roughness	BKG Rehab Date	Breakpoint ESA	Break Year	WD Rehab Date	Bring Forward	Bring Forward?
18C	89.805 km	90.315 km	A	84.12	2013	3.0	84.1	120.0	**2024.96**	6,582,639	2023	**2023.72**	1.24	Yes
18C	90.315 km	90.335 km	G	88.00	2013	3.0	88.0	120.0	**2023.67**	5,894,207	2022	**2022.63**	1.04	Yes
18C	90.315 km	90.335 km	A	88.00	2013	3.0	88.0	120.0	**2023.67**	5,829,066	2022	**2022.60**	1.07	Yes
18C	90.335 km	90.955 km	G	83.68	2013	3.0	83.7	120.0	**2025.11**	6,744,504	2023	**2023.90**	1.21	Yes
18C	90.335 km	90.955 km	A	83.68	2013	3.0	83.7	120.0	**2025.11**	6,669,966	2023	**2023.85**	1.26	Yes
18C	90.955 km	91.665 km	G	79.66	2013	3.0	79.7	120.0	**2026.45**	7,560,434	2025	**2025.11**	1.34	Yes
18C	90.955 km	91.665 km	A	79.66	2013	3.0	79.7	120.0	**2026.45**	7,476,879	2025	**2025.03**	1.42	Yes
18C	91.665 km	95.015 km	G	66.59	2013	3.0	66.6	120.0	**2030.80**	10,375,370	2029	**2029.12**	1.68	Yes
18C	91.665 km	95.015 km	A	66.59	2013	3.0	66.6	120.0	**2030.80**	10,260,705	2028	**2028.96**	1.84	Yes
18C	95.015 km	96.275 km	G	66.30	2013	3.0	66.3	120.0	**2030.90**	10,440,289	2029	**2029.21**	1.69	Yes
18C	95.015 km	96.275 km	A	66.30	2013	3.0	66.3	120.0	**2030.90**	10,324,907	2029	**2029.05**	1.85	Yes
18C	96.275 km	97.355 km	G	60.66	2013	3.0	60.7	120.0	**2032.78**	11,734,443	2030	**2030.96**	1.82	Yes
18C	96.275 km	97.355 km	A	60.66	2013	3.0	60.7	120.0	**2032.78**	11,604,758	2030	**2030.75**	2.03	Yes
18C	97.355 km	97.425 km	G	98.43	2013	3.0	98.4	120.0	**2020.19**	3,952,003	2019	**2019.53**	0.66	No
18C	97.355 km	97.425 km	A	98.43	2013	3.0	98.4	120.0	**2020.19**	3,908,327	2019	**2019.55**	0.64	No
18C	97.425 km	97.575 km	G	115.50	2013	3.0	115.5	120.0	**2014.50**	1,114,689	2014	**2014.49**	0.01	No
18C	97.425 km	97.575 km	A	115.50	2013	3.0	115.5	120.0	**2014.50**	1,102,370	2014	**2014.50**	0.00	No
18C	97.575 km	98.965 km	G	66.55	2013	3.0	66.6	120.0	**2030.82**	10,382,993	2029	**2029.13**	1.69	Yes
18C	97.575 km	98.965 km	A	66.55	2013	3.0	66.6	120.0	**2030.82**	10,268,244	2028	**2028.97**	1.85	Yes
18C	98.965 km	104.235 km	G	73.06	2013	3.0	73.1	120.0	**2028.65**	8,950,912	2027	**2027.13**	1.52	Yes
18C	98.965 km	104.235 km	A	73.06	2013	3.0	73.1	120.0	**2028.65**	8,851,990	2027	**2027.01**	1.64	Yes
18C	104.235 km	104.435 km	G	61.37	2013	3.0	61.4	120.0	**2032.54**	11,567,799	2030	**2030.74**	1.80	Yes
18C	104.235 km	104.435 km	A	61.37	2013	3.0	61.4	120.0	**2032.54**	11,439,955	2030	**2030.52**	2.02	Yes
18C	104.435 km	106.355 km	G	67.05	2013	3.0	67.1	120.0	**2030.65**	10,271,070	2028	**2028.98**	1.67	Yes
18C	104.435 km	106.355 km	A	67.05	2013	3.0	67.1	120.0	**2030.65**	10,157,558	2028	**2028.82**	1.83	Yes
18C	106.355 km	108.855 km	G	95.02	2013	3.0	95.0	120.0	**2021.33**	4,651,442	2020	**2020.57**	0.76	No
18C	106.355 km	108.855 km	A	95.02	2013	3.0	95.0	120.0	**2021.33**	4,563,470	2020	**2020.56**	0.77	No
18C	108.855 km	109.405 km	G	99.01	2013	3.0	99.0	120.0	**2020.00**	3,916,993	2019	**2019.36**	0.64	No
18C	108.855 km	109.405 km	A	99.01	2013	3.0	99.0	120.0	**2020.00**	3,842,912	2019	**2019.38**	0.62	No
18C	109.405 km	109.445 km	G	105.00	2013	3.0	105.0	120.0	**2018.00**	2,859,173	2017	**2017.61**	0.39	No
18C	109.405 km	109.445 km	A	105.00	2013	3.0	105.0	120.0	**2018.00**	2,805,098	2017	**2017.67**	0.33	No
18C	109.445 km	109.815 km	G	72.55	2013	3.0	72.6	120.0	**2028.82**	9,223,234	2027	**2027.31**	1.51	Yes
18C	109.445 km	109.815 km	A	72.55	2013	3.0	72.6	120.0	**2028.82**	9,048,798	2027	**2027.18**	1.64	Yes
18C	109.815 km	110.045 km	G	57.85	2013	3.0	57.8	120.0	**2033.72**	12,619,968	2031	**2031.77**	1.95	Yes
18C	109.815 km	110.045 km	A	57.85	2013	3.0	57.8	120.0	**2033.72**	12,381,290	2031	**2031.50**	2.22	Yes
18C	110.045 km	110.105 km	G	58.08	2013	3.0	58.1	120.0	**2033.64**	12,563,246	2031	**2031.70**	1.94	Yes
18C	110.045 km	110.105 km	A	58.08	2013	3.0	58.1	120.0	**2033.64**	12,325,641	2031	**2031.43**	2.21	Yes
18C	110.105 km	111.465 km	G	79.85	2013	3.0	79.8	120.0	**2026.38**	7,657,566	2025	**2025.08**	1.30	Yes
18C	110.105 km	111.465 km	A	79.85	2013	3.0	79.8	120.0	**2026.38**	7,512,741	2024	**2024.99**	1.39	Yes
18C	111.465 km	112.375 km	G	86.15	2012	3.0	89.1	120.0	**2023.28**	5,774,893	2022	**2022.31**	0.97	No
18C	111.465 km	112.375 km	A	86.15	2012	3.0	89.1	120.0	**2023.28**	5,665,674	2022	**2022.29**	0.99	No
18C	112.375 km	112.735 km	G	66.46	2012	3.0	69.5	120.0	**2029.85**	9,911,492	2028	**2028.27**	1.58	Yes
18C	112.375 km	112.735 km	A	66.46	2012	3.0	69.5	120.0	**2029.85**	9,724,039	2028	**2028.12**	1.73	Yes
18C	112.735 km	113.585 km	G	51.64	2012	3.0	54.6	120.0	**2034.79**	13,402,746	2032	**2032.72**	2.07	Yes
18C	112.735 km	113.585 km	A	51.64	2012	3.0	54.6	120.0	**2034.79**	13,149,264	2032	**2032.40**	2.39	Yes
18C	113.585 km	115.465 km	G	54.83	2013	3.0	54.8	120.0	**2034.72**	13,357,136	2032	**2032.66**	2.06	Yes
18C	113.585 km	115.465 km	A	54.83	2013	3.0	54.8	120.0	**2034.72**	13,104,516	2032	**2032.35**	2.37	Yes
18C	115.465 km	116.065 km	G	64.01	2013	3.0	64.0	120.0	**2031.66**	11,158,446	2029	**2029.91**	1.75	Yes
18C	115.465 km	116.065 km	A	64.01	2013	3.0	64.0	120.0	**2031.66**	10,947,410	2029	**2029.70**	1.96	Yes
18C	116.065 km	118.625 km	G	48.88	2013	3.0	48.9	120.0	**2036.71**	14,848,733	2034	**2034.42**	2.29	Yes
18C	116.065 km	118.625 km	A	48.88	2013	3.0	48.9	120.0	**2036.71**	14,567,903	2034	**2034.02**	2.69	Yes
18C	118.625 km	120.505 km	G	51.15	2013	3.0	51.2	120.0	**2035.95**	14,270,644	2033	**2033.74**	2.21	Yes
18C	118.625 km	120.505 km	A	51.15	2013	3.0	51.2	120.0	**2035.95**	14,000,747	2033	**2033.36**	2.59	Yes
18C	120.505 km	121.765 km	G	56.36	2013	3.0	56.4	120.0	**2034.21**	12,980,876	2032	**2032.18**	2.03	Yes
18C	120.505 km	121.765 km	A	56.36	2013	3.0	56.4	120.0	**2034.21**	12,735,372	2031	**2031.86**	2.35	Yes
18C	121.765 km	122.285 km	G	69.04	2013	3.0	69.0	120.0	**2029.99**	10,005,173	2028	**2028.37**	1.62	Yes
18C	121.765 km	122.285 km	A	69.04	2013	3.0	69.0	120.0	**2029.99**	9,815,948	2028	**2028.18**	1.81	Yes
18C	122.285 km	125.535 km	G	61.05	2013	3.0	61.1	120.0	**2032.65**	11,852,469	2030	**2030.77**	1.88	Yes
18C	122.285 km	125.535 km	A	61.05	2013	3.0	61.1	120.0	**2032.65**	11,628,306	2030	**2030.50**	2.15	Yes
18C	125.535 km	125.795 km	G	81.79	2013	3.0	81.8	120.0	**2025.74**	7,254,178	2024	**2024.46**	1.28	Yes

Table **F5** **Rehabilitation Impacts (Bring Forward Period)**

Project:	Surat Gas Project	*Project No:*	CEB06413
Prepared by:	Jessica Peters	*Reviewed by:*	Jeffrey Baczynksi

ROAD	Start	End	Direction	Surveyed Roughness	Roughness Year	Deterioration Rate	Base Year Roughness	Adopted Terminal Roughness	BKG Rehab Date	Breakpoint ESA	Break Year	WD Rehab Date	Bring Forward	Bring Forward?
18C	125.535 km	125.795 km	A	81.79	2013	3.0	81.8	120.0	**2025.74**	7,116,982	2024	**2024.36**	1.38	Yes
18C	125.795 km	125.895 km	G	65.30	2013	3.0	65.3	120.0	**2031.23**	10,858,799	2029	**2029.47**	1.76	Yes
18C	125.795 km	125.895 km	A	65.30	2013	3.0	65.3	120.0	**2031.23**	10,653,430	2029	**2029.23**	2.00	Yes
18C	125.895 km	125.945 km	G	43.30	2013	3.0	43.3	120.0	**2038.57**	16,294,479	2036	**2036.05**	2.52	Yes
18C	125.895 km	125.945 km	A	43.30	2013	3.0	43.3	120.0	**2038.57**	15,986,306	2035	**2035.60**	2.97	Yes
18C	125.945 km	126.005 km	G	41.08	2013	3.0	41.1	120.0	**2039.31**	16,881,558	2036	**2036.72**	2.59	Yes
18C	125.945 km	126.005 km	A	41.08	2013	3.0	41.1	120.0	**2039.31**	16,562,281	2036	**2036.26**	3.05	Yes
18C	126.005 km	126.235 km	G	44.37	2013	3.0	44.4	120.0	**2038.21**	16,013,168	2035	**2035.73**	2.48	Yes
18C	126.005 km	126.235 km	A	44.37	2013	3.0	44.4	120.0	**2038.21**	15,710,315	2035	**2035.28**	2.93	Yes
18C	126.235 km	126.475 km	G	49.21	2013	3.0	49.2	120.0	**2036.60**	14,764,514	2034	**2034.27**	2.33	Yes
18C	126.235 km	126.475 km	A	49.21	2013	3.0	49.2	120.0	**2036.60**	14,485,276	2033	**2033.86**	2.74	Yes
18C	126.475 km	126.745 km	G	72.04	2013	3.0	72.0	120.0	**2028.99**	9,336,299	2025	**2025.90**	3.09	Yes
18C	126.475 km	126.745 km	A	72.04	2013	3.0	72.0	120.0	**2028.99**	9,159,724	2025	**2025.76**	3.23	Yes
35A	0.000 km	0.130 km	G	124.69	2013	3.0	124.7	130.0	**2014.77**	564,920	2014	**2014.73**	0.04	No
35A	0.000 km	0.130 km	A	124.69	2013	3.0	124.7	130.0	**2014.77**	649,963	2014	**2014.74**	0.03	No
35A	0.130 km	0.240 km	G	77.73	2013	3.0	77.7	120.0	**2027.09**	3,629,657	2025	**2025.72**	1.37	Yes
35A	0.130 km	0.240 km	A	77.73	2013	3.0	77.7	120.0	**2027.09**	4,176,065	2026	**2026.53**	0.56	No
35A	0.240 km	0.350 km	G	83.09	2013	3.0	83.1	120.0	**2025.30**	3,129,218	2024	**2024.03**	1.27	Yes
35A	0.240 km	0.350 km	A	83.09	2013	3.0	83.1	120.0	**2025.30**	3,600,290	2024	**2024.80**	0.50	No
35A	0.350 km	0.470 km	G	92.67	2013	3.0	92.7	120.0	**2022.11**	2,282,098	2021	**2021.18**	0.93	No
35A	0.350 km	0.470 km	A	92.67	2013	3.0	92.7	120.0	**2022.11**	2,625,644	2021	**2021.74**	0.37	No
35A	0.470 km	0.740 km	G	71.11	2013	3.0	71.1	120.0	**2029.30**	4,274,034	2027	**2027.84**	1.46	Yes
35A	0.470 km	0.740 km	A	71.11	2013	3.0	71.1	120.0	**2029.30**	4,917,446	2028	**2028.66**	0.64	No
35A	0.740 km	0.800 km	G	113.00	2013	3.0	113.0	120.0	**2015.33**	685,622	2015	**2015.28**	0.05	No
35A	0.740 km	0.800 km	A	113.00	2013	3.0	113.0	120.0	**2015.33**	788,835	2015	**2015.30**	0.03	No
35A	0.800 km	1.020 km	G	58.64	2013	3.0	58.6	120.0	**2033.45**	5,567,220	2031	**2031.78**	1.67	Yes
35A	0.800 km	1.020 km	A	58.64	2013	3.0	58.6	120.0	**2033.45**	6,405,307	2032	**2032.58**	0.87	No
35A	1.020 km	1.220 km	G	71.10	2013	3.0	71.1	120.0	**2029.30**	4,275,144	2027	**2027.85**	1.45	Yes
35A	1.020 km	1.220 km	A	71.10	2013	3.0	71.1	120.0	**2029.30**	4,918,723	2028	**2028.67**	0.63	No
35A	1.220 km	1.270 km	G	86.00	2013	3.0	86.0	120.0	**2024.33**	2,865,582	2023	**2023.12**	1.21	Yes
35A	1.220 km	1.270 km	A	86.00	2013	3.0	86.0	120.0	**2024.33**	3,296,966	2023	**2023.87**	0.46	No
35A	1.270 km	1.720 km	G	57.96	2013	3.0	58.0	120.0	**2033.68**	5,640,660	2031	**2031.99**	1.69	Yes
35A	1.270 km	1.720 km	A	57.96	2013	3.0	58.0	120.0	**2033.68**	6,489,803	2032	**2032.79**	0.89	No
35A	1.720 km	1.930 km	G	75.38	2013	3.0	75.4	120.0	**2027.87**	3,854,812	2026	**2026.48**	1.39	Yes
35A	1.720 km	1.930 km	A	75.38	2013	3.0	75.4	120.0	**2027.87**	4,435,114	2027	**2027.29**	0.58	No
35A	1.930 km	2.500 km	G	63.63	2013	3.0	63.6	120.0	**2031.79**	5,036,835	2030	**2030.24**	1.55	Yes
35A	1.930 km	2.500 km	A	63.63	2013	3.0	63.6	120.0	**2031.79**	5,795,078	2031	**2031.03**	0.76	No
35A	2.500 km	2.550 km	G	82.00	2013	3.0	82.0	120.0	**2025.67**	3,229,571	2024	**2024.37**	1.30	Yes
35A	2.500 km	2.550 km	A	82.00	2013	3.0	82.0	120.0	**2025.67**	3,715,749	2025	**2025.15**	0.52	No
35A	2.550 km	2.900 km	G	111.14	2013	3.0	111.1	120.0	**2015.95**	819,589	2015	**2015.90**	0.05	No
35A	2.550 km	2.900 km	A	111.14	2013	3.0	111.1	120.0	**2015.95**	942,969	2015	**2015.91**	0.04	No
35A	2.900 km	3.130 km	G	95.09	2013	3.0	95.1	120.0	**2021.30**	2,078,015	2020	**2020.50**	0.80	No
35A	2.900 km	3.130 km	A	95.09	2013	3.0	95.1	120.0	**2021.30**	2,390,838	2020	**2020.99**	0.31	No
35A	3.130 km	3.700 km	G	100.93	2013	3.0	100.9	120.0	**2019.36**	1,600,551	2018	**2018.92**	0.44	No
35A	3.130 km	3.700 km	A	100.93	2013	3.0	100.9	120.0	**2019.36**	1,841,497	2019	**2019.18**	0.18	No
35A	3.700 km	5.820 km	G	63.42	2013	3.0	63.4	120.0	**2031.86**	5,439,568	2030	**2030.40**	1.46	Yes
35A	3.700 km	5.820 km	A	63.42	2013	3.0	63.4	120.0	**2031.86**	4,105,298	2030	**2030.81**	1.05	Yes
35A	5.820 km	8.590 km	G	85.77	2013	3.0	85.8	120.0	**2024.41**	3,103,908	2023	**2023.27**	1.14	Yes
35A	5.820 km	8.590 km	A	85.77	2013	3.0	85.8	120.0	**2024.41**	2,342,552	2023	**2023.75**	0.66	No
35A	8.590 km	9.190 km	G	105.13	2013	3.0	105.1	120.0	**2017.96**	1,366,176	2017	**2017.72**	0.24	No
35A	8.590 km	9.190 km	A	105.13	2013	3.0	105.1	120.0	**2017.96**	1,031,067	2017	**2017.80**	0.16	No
35A	9.190 km	9.430 km	G	94.58	2013	3.0	94.6	120.0	**2021.47**	2,280,142	2020	**2020.69**	0.78	No
35A	9.190 km	9.430 km	A	94.58	2013	3.0	94.6	120.0	**2021.47**	1,720,847	2021	**2021.03**	0.44	No
35A	9.430 km	11.000 km	G	115.97	2013	3.0	116.0	120.0	**2014.34**	510,768	2014	**2014.33**	0.01	No
35A	9.430 km	11.000 km	A	115.97	2013	3.0	116.0	120.0	**2014.34**	385,482	2014	**2014.32**	0.02	No