SUPPLEMENTARY ROAD IMPACT ASSESSMENT

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SUPPLEMENTARY REPORT TO THE EIS

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Supplementary Road Impact Assessment

Bowen Gas Project SREIS

CEB06466

Prepared for
Arrow Energy Pty Ltd via URS Australia Pty Ltd

March 2014

Cardno
Shaping the Future

Document Information

Prepared for	Arrow Energy Pty Ltd via URS Australia Pty Ltd
Project Name	Bowen Gas Project SREIS
File Reference	6466 BGP SREIS RIA V3 2014 02 05.docx
Job Reference	CEB06466
Date	March 2014

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	Description of Revision	Author Initials	Author Signature	Reviewer Initials	Reviewed Signature
V1	6 Dec 2013	Issue for URS review	JJP	-	JDB	-
V2	9 Jan 2014	Issue for Arrow review	JJP	-	JDB	-
V3	5 Feb 2014	Final issue	JJP		JDB	

Version	Reason for Issue / Stage of Deliverable	Approver Initials	Approved Signature	Approved Release Date
V1	Issued for URS review	SRH	-	
V2	Issued for Arrow review	SRH	-	
V3	Final issue	SRH		5 Feb 2014

Executive Summary

Arrow Energy Pty Ltd (Arrow) proposes expansion of its Coal Seam Gas (CSG) operations in the Bowen Basin through the Bowen Gas Project (the Project). As part of the Environmental Impact Statement (EIS) assessment, URS Australia Pty Ltd (URS) prepared a Road Impact Assessment (RIA) to assess the significance of the potential road impacts associated with the Project.

Since publication of the EIS for public comment in early 2013, the Project's field development plan and conceptual design has advanced. The advancement is the result of further exploration activities which have improved the understanding of the gas resource in addition to refinement of the development and operational processes. The recent changes to Project planning warrant additional assessment to validate the road impacts previously reported within the EIS RIA. Consequently Cardno (Qld) Pty Ltd (Cardno) has been commissioned to prepare an updated RIA to form part of the Supplementary Report to the Environmental Impact Statement (SREIS) referred to herein as the SREIS RIA.

The Project is now planned to include the establishment, operation and decommissioning of 4,000 production wells (approximately), two Central Gas Processing Facilities (CGPFs), two Water Treatment Facilities (WTFs), 33 Field Compression Facilities (FCFs), and associated workforce accommodation and logistics facilities. The Project development area covers approximately 8,000sq.km extending some 200km south west of Mackay, with the bulk of the area extending from approximately 100km north to approximately 100km south of Moranbah.

The SREIS RIA presents a strategic assessment of the intensity and context of the potential road impacts associated with the Project and assesses the significance of the residual road impacts post-implementation of the planned management strategies. Impacts associated with other transport modes (e.g. sea, air, rail and pipeline) are beyond the scope of the SREIS RIA.

The SREIS RIA assumes that the road related approval conditions applied to the Project will establish the mechanisms by which the safety, efficiency and service life of the road network will be maintained. It has been assumed that, consistent with other recently approved CSG projects, the road related conditions applied to the Project will establish broad requirements in relation to the following:

- Post-EIS Road Impact Assessments (Post-EIS RIAs) – which will identify the Project's impact on the safety, efficiency and service life of the road network following detailed planning (i.e. post-EIS approval, site selection and road authority engagement).
- Post-EIS Road-use Management Plans (Post-EIS RMPs) – which will summarise the Project's transport task, transport routes, safety strategies and any required road upgrades or contributions.
- Post-EIS Infrastructure Agreements (Post-EIS IAs) – which will formalise the amount of and timing of any required contributions towards road upgrades or pavement activities identified in the Post-EIS RIAs.

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 contributions ultimately required to support the Project. The identification of all the specific works and contributions required to support the Project will occur via the preparation of Post-EIS RIAs. The specific works and contributions identified in the Post-EIS RIAs will ultimately be included in the Post-EIS IAs established with road authorities. This assessment approach is consistent with typical practice for large, geographically dispersed projects in Queensland as a comprehensive list of works and contributions is not required to inform the drafting of EIS approval conditions.

To inform the SREIS RIA, road condition data has been sourced for the roads in and within proximity to the Project development area. The data is presented as an update to the condition data summarised in the EIS RIA for an expanded set of roads. Interrogation of the updated and expanded dataset broadly identifies that no significant changes have occurred to road conditions since preparation of the EIS RIA.

The SREIS RIA has identified other projects, predominately associated with gas and coal production, that have the potential to contribute to long term growth in traffic demands on the road network and therefore

influence cumulative impacts. When forecasting future baseline traffic demands it has been assumed that a comparable level of traffic demand increase will continue to occur for the foreseeable future to that which has historically occurred. This assumption is conservative as the number of projects anticipated to occur over the foreseeable future is substantially less than those that have occurred during the recent mining investment boom. Furthermore, it has been assumed that pavement loadings will increase at 3% per annum consistent with the typically adopted approach for forecasting future pavement loadings in Queensland.

The 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 the different phases are likely to be undertaken concurrently across the Project development area. The traffic generation potential of each of the Project activities has been refined since preparation of the EIS RIA to capture the results of recent logistics planning and to ensure a worst-case scenario has been assessed. The updated estimates also reflect the stated intent to minimise the use of private vehicles by transporting the Project workforce by bus.

A Simulation and Assignment of Traffic to Urban Road Networks (SATURN) traffic model was developed to forecast the transport tasks and traffic demands likely to be associated with the Project. Using a strategic modelling process, combined with the estimated traffic generation potential associated with the construction, operation and decommissioning of each Project facility, the Project's traffic demands on each road link over the Project life have been forecast. This process provided transport task and traffic demand forecasts such as the total transport task, peak traffic demands and peak pavement loadings associated with the Project.

Traffic modelling indicates that the Project's peak transport task is anticipated to occur during 2018 which is significantly earlier than the 2045 peak timing previously identified in the EIS RIA. Traffic modelling also indicates that the Project traffic demands forecast as part of the SREIS RIA process are significantly lower at 2045 as compared to the forecasts previously prepared as part of the EIS RIA process. These differences can be attributed to the different Project schedules assessed and the greater level of modelling sophistication informing the SREIS RIA.

The vast majority of the Project's transport task is anticipated to occur on the Department of Transport and Main Road's (TMR's) and Isaac Regional Council's (IRC's) road networks with limited use of other authorities' road networks. At its peak, the Project is anticipated to increase the level of total travel occurring on the State-controlled road network within the extent of the SREIS RIA Study Area by approximately 0.2% compared to existing levels.

A literature review has been undertaken to collate best practice guidance in relation to appropriate traffic engineering thresholds to maintain the safety, efficiency and service life of the road network. The contemporary guidance has informed the formulation of the Project's planned management strategies. The strategies establish generic responses to common engineering situations which are likely to occur over the life of the Project. The strategies are typical responses only and consideration of site constraints will ultimately need to occur to ensure appropriate engineering outcomes are realised at each individual location. Nevertheless the planned management strategies establish the framework upon which the works ultimately identified in the Post-EIS RIAs, and included in the Post-EIS IAs, will be determined.

The SREIS RIA expands upon the work previously undertaken as part of the EIS RIA by documenting both a traditional traffic engineering assessment in addition to an updated environmental values assessment. Both assessments undertaken to support the SREIS RIA seek to determine the significance of the residual road impacts post-application of typical approval conditions and post-implementation of the planned management strategies. The inclusion of both approaches within the SREIS RIA provides road authorities confidence that the planned management strategies will preserve key road environmental values whilst also exceeding or at least meeting typical traffic engineering practice requirements.

The traditional traffic engineering assessment presented within the SREIS RIA is consistent with the principles established within TMR's *Guidelines for Assessment of Road Impacts of Development* (GARID). The SREIS RIA includes a traditional scoping assessment, level of service assessment, pavement impact assessment and case study assessments.

The scoping assessment considers the extent of the road network over which Project traffic demands may significantly increase surveyed traffic in accordance with GARID requirements. The assessment indicates that the Project has the potential to significantly increase traffic demands on three State-controlled roads: Fitzroy Developmental Road, Collinsville-Elphinstone Road and Suttor Developmental Road. This finding is

generally consistent with the outcome previously documented within the EIS RIA which identified that the Project would significantly increase baseline traffic demands on a limited number of roads.

The level of service assessment considers the performance of the road network accounting for traffic growth associated with the cumulative impact of other projects. The assessment identified that all scoped road sections will continue to operate at a level of service "A" irrespective of the presence of Project traffic demands. The level of service assessment has identified that while Project traffic demands are likely to significantly increase baseline traffic on sections of the road network; this increase is unlikely to significantly affect the level of service afforded by the road network. This finding is generally consistent with the outcome previously documented within the EIS RIA which also identified that the Project would not significantly affect the level of service afforded by the road network.

The pavement impact assessment considers the impact that pavement loadings associated with Project traffic demands may have on the required levels of maintenance activity and the service life of the road network. The assessment identified that the Project is likely to significantly impact TMR's pavement maintenance and rehabilitation activities. This finding is additional to the outcomes previously documented within the EIS RIA which did not specifically consider the impact that Project traffic demands may have on pavement maintenance and rehabilitation activities

Field inspections were undertaken during October 2013 to inform the case study application of the planned management strategies. Defined access routes were identified for each of the case study project sites based on existing road conditions. The case study assessments identified the potential requirement for road upgrades along the defined access routes. This includes the potential provision of upgraded sealed roads and intersection forms. This finding is different to that presented within the EIS RIA which did not identify the requirement for any specific road works to facilitate safe and efficient access to project facilities. The assessment also identified that implementation of the planned management strategies will result in outcomes that exceed or at least meet typical traffic engineering practice requirements.

An environmental values assessment was also undertaken for a worst-case scenario to confirm the effectiveness of the planned management strategies. The environmental values assessment methodology has been refined from that previously presented within the EIS RIA. The environmental values assessment considers the level of significance of the Project's potential road impacts both pre- and post-implementation of the planned management strategies. The assessment has identified that there are unlikely to be residual impacts of higher order significance post-implementation of the planned management strategies. Furthermore, the SREIS RIA has confirmed that application of the planned management strategies will result in intervention works which exceed or at least meet standard traffic engineering practice requirements.

The Post-EIS RIAs ultimately prepared will identify the specific works required to provide safe and efficient access to all Project facilities in addition to the contributions required to preserve the service life of the road network. The associated Post-EIS IAs established with relevant road authorities will capture the value and timing of the identified works and contributions.

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Abbreviations

Abbreviation	Description
AADT	Annual Average Daily Traffic
Arrow	Arrow Energy Pty Ltd
Cardno	Cardno (Qld) Pty Ltd
CGPF	Central Gas Processing Facility
CHRC	Central Highlands Regional Council
CSG	Coal Seam Gas
EIS	Environmental Impact Statement
ESA	Equivalent Standard Axle
FCF	Field Compression Facility
FFU	Fit for Use
GARID	Guidelines for Assessment of Road Impacts of Development
IA	Infrastructure Agreement
IPF	Integrated Processing Facility
IVMS	In Vehicle Monitoring System
IRC	Isaac Regional Council
LNG	Liquefied Natural Gas
MCV	Multi-Combination Vehicle
MRC	Mackay Regional Council
Post-EIS IA	Post-EIS Infrastructure Agreement
Post-EIS RIA	Post-EIS Road Impact Assessment
Post-EIS RMP	Post-EIS Road-use Management Plan
QPS	Queensland Police Service
RIA	Road Impact Assessment
RMP	Road-use Management Plan
SATURN	Simulation and Assignment of Traffic to Urban Road Networks
SREIS	Supplementary Report to the Environmental Impact Statement
TCC	Townsville City Council
ToR	Terms of Reference
TMR	Department of Transport and Main Roads
TWAF	Temporary Workers Accommodation Facility
URS	URS Australia Pty Ltd
VKT	Vehicle Kilometres of Travel
WRC	Whitsunday Regional Council
WTF	Water Treatment Facility

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1 Report Overview

1.1 Report Context

Cardno (Qld) Pty Ltd (Cardno) has been commissioned by URS Australia Pty Ltd (URS) on behalf of Arrow Energy Pty Ltd (Arrow), to complete a Road Impact Assessment (RIA) as part of the Supplementary Report to the Environmental Impact Statement (SREIS) for the Bowen Gas Project (the Project). The SREIS RIA prepared by Cardno expands upon the Environmental Impact Statement (EIS) RIA previously prepared for the Project by URS.

Arrow proposes expansion of its Coal Seam Gas (CSG) operations in the Bowen Basin through the Project. The need for the Project arises from the growing demand for gas in the domestic market, global demands and the associated expansion of liquefied natural gas (LNG) export markets. The RIA considers the road impacts potentially associated with the Project based on the Project Description chapter (Section 3) of the SREIS.

1.2 Report Structure

Table 1-1 summarises the report structure while Table 1-2 summarises the content of the report appendices.

Table 1-1 Report Sections

Section		Description
1	Report Overview	Describes the context of the report including the report structure and limitations.
2	Proponent and Project Overview	Describes the proponent, the Project and the assessed Project schedule.
3	Assessment Overview	Identifies the need for the SREIS and the adopted assessment approach, methodology and extents.
4	Legislative Overview	Outlines the legislative requirement to prepare a RIA to inform the EIS process.
5	Existing Road Conditions	Documents the existing road conditions in and within proximity to the Project development area and contrasts these to the conditions previously considered within the EIS RIA.
6	Future Baseline Traffic Demands	Details other projects likely to influence future traffic demands on the road network and the traffic forecasting approach adopted for the SREIS RIA to capture the associated cumulative impacts.
7	Project Activities	Identifies the traffic generating activities associated with the various phases of the Project for each Project facility type.
8	Project Transport Task and Traffic Demands	Summarises the traffic modelling undertaken to inform the SREIS RIA and presents the Project's transport task and associated traffic demands. A comparison of the traffic forecasts previously reported within the EIS RIA is also presented.
9	Literature Review	Summarises the contemporary standards which informed formulation of the planned management strategies.
10	Planned Management Strategies	Presents the planned management strategies formulated to maintain the safety, efficiency and service life of the road network.
11	Management Strategies Application	Demonstrates the application of the management strategies for the defined access routes servicing case study project sites and the resultant road infrastructure.
12	Traditional Traffic Engineering Assessment	Presents the results of a traditional scoping assessment, level of service assessment, pavement impact assessment and case study assessments.
13	Management Strategies Effectiveness	Compares the management strategy outcomes to the traditional traffic engineering assessment outcomes to verify the effectiveness of the management strategies.
14	Environmental Values Assessment	Presents the results of an alternative environmental values assessment including consideration of the Project's impact pre- and post-implementation of the planned management strategies.
15	Conclusions	Presents the assessment conclusions.

Table 1-2 Report Appendices

Appendix		Description
A	Data Descriptions	Reproduces data descriptions associated with the presented data.
B	Location of Other Projects	Identifies the location of the other projects referenced in Section 6.
C	Project Activities and Traffic Generation	Provides a detailed breakdown of the traffic generation potential assessed for each Project facility.
D	Annual Project Traffic Demand Forecasts	Presents the Project traffic demands forecast for each Project year.
E	Literature Review	Presents further details of the road standards which informed the formulation of the planned management strategies for a technical audience.
F	Pavement Impact Assessment	Presents further details of the pavement impact assessment for a technical audience.
G	Traffic Engineering Case Study Assessments	Presents further details of the traditional traffic engineering road standard case study assessments for a technical audience.

1.3 Limitations

Cardno has undertaken the SREIS RIA in accordance with the usual care and thoroughness of the engineering profession. The assessment is based on accepted traffic engineering practices and standards applicable at the time.

The adopted assessment methodology and sources of information utilised by Cardno are outlined in the SREIS RIA. Cardno has made no independent verification of the supplied Project information or existing road condition data beyond the agreed scope of works. Within the extent of the assessment scope no indications were found however that the supplied Project information or existing road condition data relied upon was inaccurate.

The assessment was undertaken between July 2013 and January 2014 and is based upon the road conditions encountered and the Project information available at the time. Cardno disclaims responsibility for any changes to Project planning or road conditions that may occur after completion of the assessment.

2 Proponent and Project Overview

2.1 Project Proponent

Arrow is a leading cleaner energy company with five CSG projects, ownership of one, and interests in two other gas-fired power stations with plans to deliver LNG to the international market through a world class plant in Gladstone. Arrow is focused on the exploration, extraction and use of CSG, a naturally occurring and comparatively clean burning gas that is commonly used to fuel electricity generation.

Arrow's activities are integrated, in that they cover the spectrum of CSG activities ranging from exploration to production, transportation and electricity generation. Arrow has developed and operated a strong domestic gas supply business since 2004, and is currently working to explore and develop the vast and largely untapped CSG resources in Queensland.

Arrow is owned by Shell and PetroChina who formed a joint venture partnership to acquire Arrow in 2010.

2.2 Project Description

The Project development area extends over approximately 8,000sq.km located some 200 km south west of Mackay, with the bulk of the area extending from approximately 100 km north of Moranbah to approximately 100 km south of Moranbah. The extent of the Project development area is shown on Figure 2-1. The location of the Project's drainage areas are shown on Figure 2-2.

The Project involves the establishment, operation and decommissioning of approximately 4,000 production wells, two Central Gas Processing Facilities (CGPFs), two Water Treatment Facilities (WTFs), 33 Field Compression Facilities (FCFs), and associated workforce accommodation and logistics facilities. Activities associated with the Project including the drilling of production wells are expected to commence in 2015. Representative locations of the key Project facilities assessed as part of the SREIS RIA are shown on Figure 2-3.

To aid brevity a detailed reproduction of the project description is not included within this technical report. Instead readers who require a detailed description of the Project should refer to the Project Description chapter (Section 3) of the SREIS. Table 2-1 summarises the current Project description and compares it to that previously assessed as part of the EIS RIA. Section 6 of this report describes the Project's traffic generating activities sufficient to inform assessment of the Project's potential road impacts.

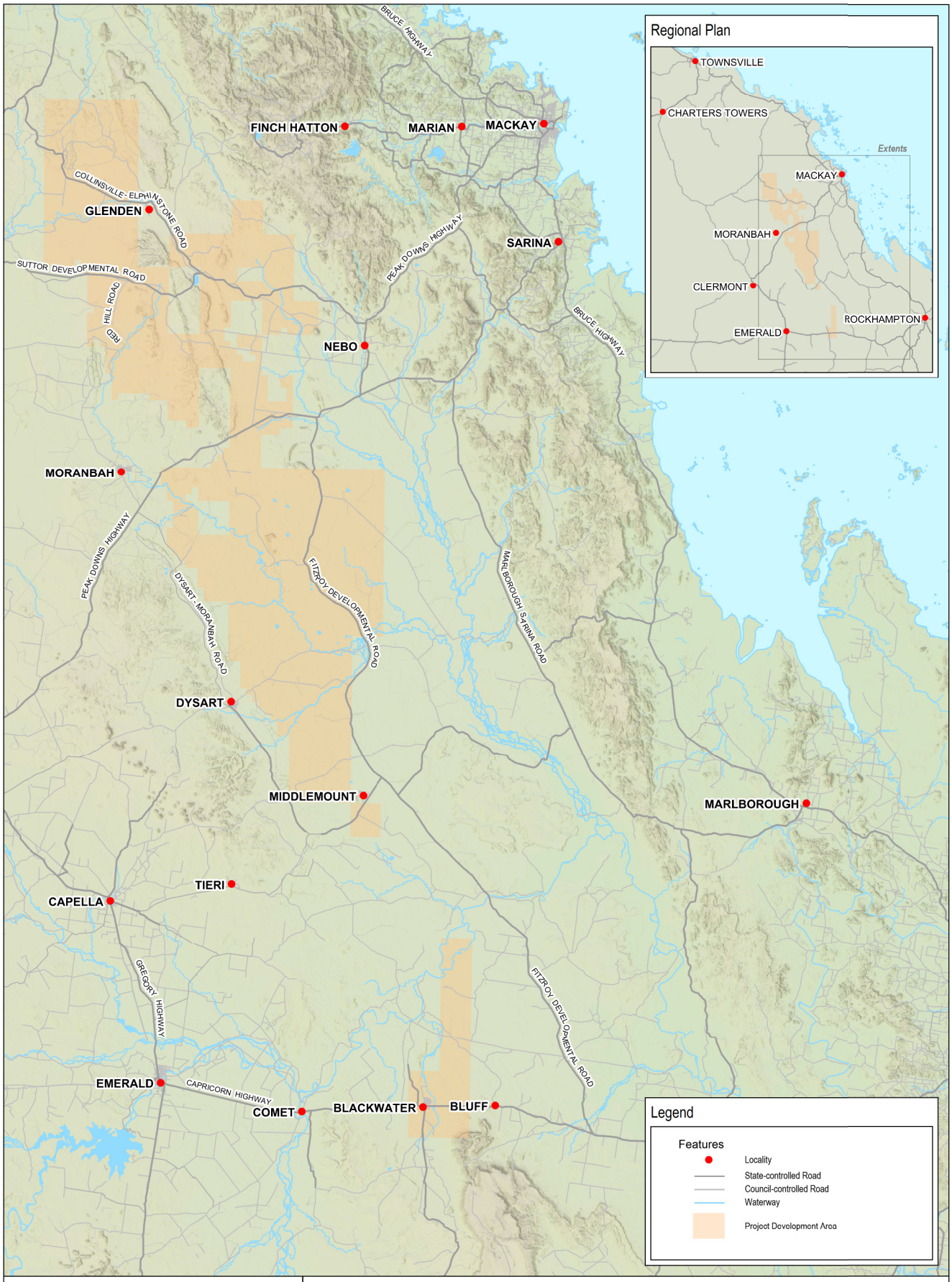
Table 2-1 Summary of Project Description Changes

EIS RIA Project Description	SREIS RIA Project Description
2017 Ready for Start Up	2018 Ready for Start Up
2016 first construction activity	2015 first construction activity
2073 final decommissioning activity	2056 final decommissioning activity
▪ 8,000 km^2 Project development area ▪ 14 development regions ▪ 17 drainage areas (12 km radius)	▪ 8,000 km^2 Project development area ▪ 9 development regions ▪ 33 drainage areas (6 km radius)
Well count: 6,625	Well count: 4,000 (approximately)
Estimated total water produced: 276,000 ML	Estimated total water produced: 153,000 ML
▪ Well type: Surface-In-Seam Chevrons and Multi-seam hydraulically fractured ▪ No multi-well pads	▪ Well type: Horizontal Surface-In-Seam Multi Branch Lateral (MBL) and Multi-seam hydraulically fractured ▪ Max of 6 MBLs on a multi-well pad
4 Integrated Processing Facilities (IPFs) including water treatment and nearby Accommodation Villages	2 CGPF with co-located WTF and Accommodation Villages The option of a third WTF in the Blackwater region remains to be confirmed for the second development stage The accommodation villages may be supported by temporary villages to minimise travel distances
3 Gas (only) Processing Facilities.	No Gas (only) Processing Facilities
10 FCF	33 FCF
4 central depots located at IPFs	Marshalling Yard located in Mackay supported by two depots co-located with CGPFs

2.3 Project Schedule

For the purposes of the SREIS RIA, a Project schedule has been formulated which details potential establishment, operational and decommissioning periods for all wells and facilities associated with the Project. The assessed schedule has been prepared to present a worst-case development scenario from a traffic engineering perspective. In particular, the assessed Project schedule assumes rapid establishment of the wells and facilities supporting the Project. The schedule assumes that the majority of facilities are established in the year prior to the individual facilities commencing operations. In addition, the assessed Project schedule assumes that all 4,000 production wells (approximately) are ultimately established, operated and decommissioned. The number of production wells established may ultimately be less than the 4,000 production wells (approximately) assessed as a result of further optimisation of the Project.

The use of the assessed Project schedule therefore provides conservative (i.e. high) estimates of both the Project's peak traffic demands and the Project's total transport task. The adopted worst-case assessment approach provides road authorities confidence that the Project's road impacts are unlikely to be worse than that reported herein.



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Locality Map

Figure No:

2-1

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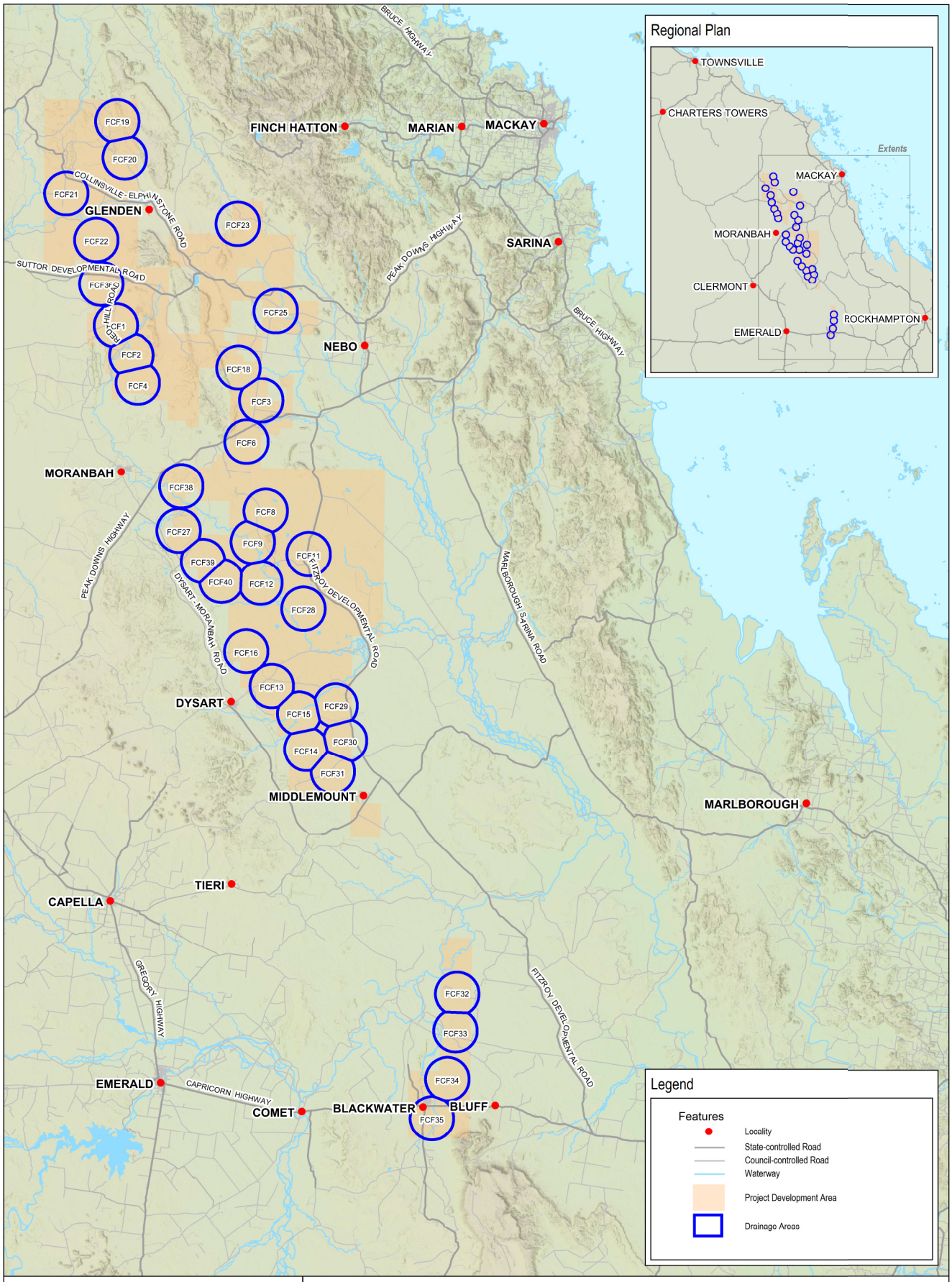

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Drainage Areas

Figure No: **2-2**

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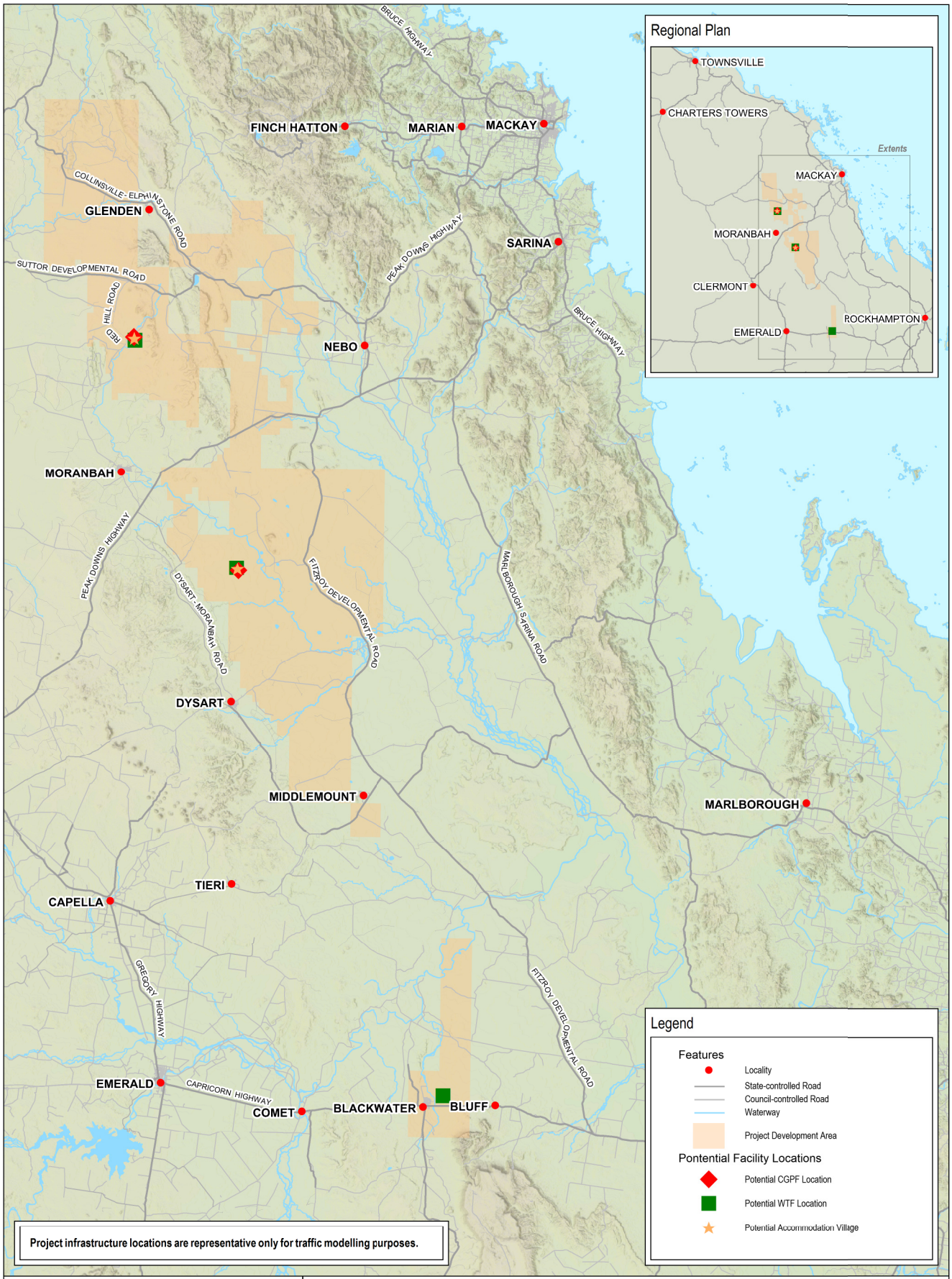

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Representative Facility Locations

Figure No: **2-3**

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3 Assessment Overview

3.1 Need for Further Assessment

Since publication of the EIS for public comment in early 2013, the Project's field development plan and conceptual design has advanced. The advancement is the result of further exploration activities which have improved the understanding of the gas resource in addition to refinement of the planned development and operational processes.

The recent changes to Project planning warrant additional assessment to validate the impacts previously reported within the EIS RIA.

3.2 Road Related Conditions

This assessment has been undertaken on the basis that the road related conditions applied to the Project will establish the mechanisms by which the safety, efficiency and service life of the public road network will be maintained. It has been assumed that, consistent with other recently approved CSG projects, the road related conditions applied to the Project will establish broad requirements in relation to the following:

- Post-EIS RIAs – which will identify the Project's impact on the safety, efficiency and service life of the road network following detailed planning (i.e. post-EIS approval, site selection and road authority engagement).
- Post-EIS Road-use Management Plans (RMPs) – which will summarise the Project's transport task, transport routes, safety strategies and any required road upgrades or contributions.
- Post-EIS Infrastructure Agreements (IAs) – which will formalise the amount of and timing of any required contributions towards road upgrades or pavement activities identified in the Post-EIS RIAs.

3.3 Assessment Approach

The SREIS RIA presents a strategic assessment of the intensity and context of the potential road impacts associated with the Project. Impacts associated with other transport modes (e.g. sea, air, rail and pipeline) are beyond the scope of the SREIS RIA.

Typical of major projects with dispersed activity, detailed planning including the selection of all Project sites is yet to be finalised. The SREIS RIA therefore seeks to establish if there are likely to be any road impacts that cannot be effectively managed through the application of typical approval requirements, supported by the implementation 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-application of typical approval requirements and post-implementation of the planned management strategies) that would necessarily preclude approval of the Project.

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 contributions ultimately required to support the Project. The identification of all the specific works and contributions required to support the Project will occur via the preparation of Post-EIS RIAs. The specific works and contributions identified in the Post-EIS RIAs will ultimately be included in the Post-EIS IAs established with road authorities. This assessment approach is consistent with typical practice for large, geographically dispersed Projects in Queensland as a comprehensive list of works and contributions is not required to inform the drafting of effective EIS approval conditions.

3.4 SREIS RIA Methodology

The Terms of Reference (ToR) requires both the intensity and context of the Project's impacts to be assessed to establish the significance of the Project's potential impacts.

The SREIS RIA expands upon the work previously undertaken as part of the EIS RIA by 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 confidence that the planned management strategies will preserve key road environmental values whilst also exceeding or at least meeting typical traffic engineering practice requirements.

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

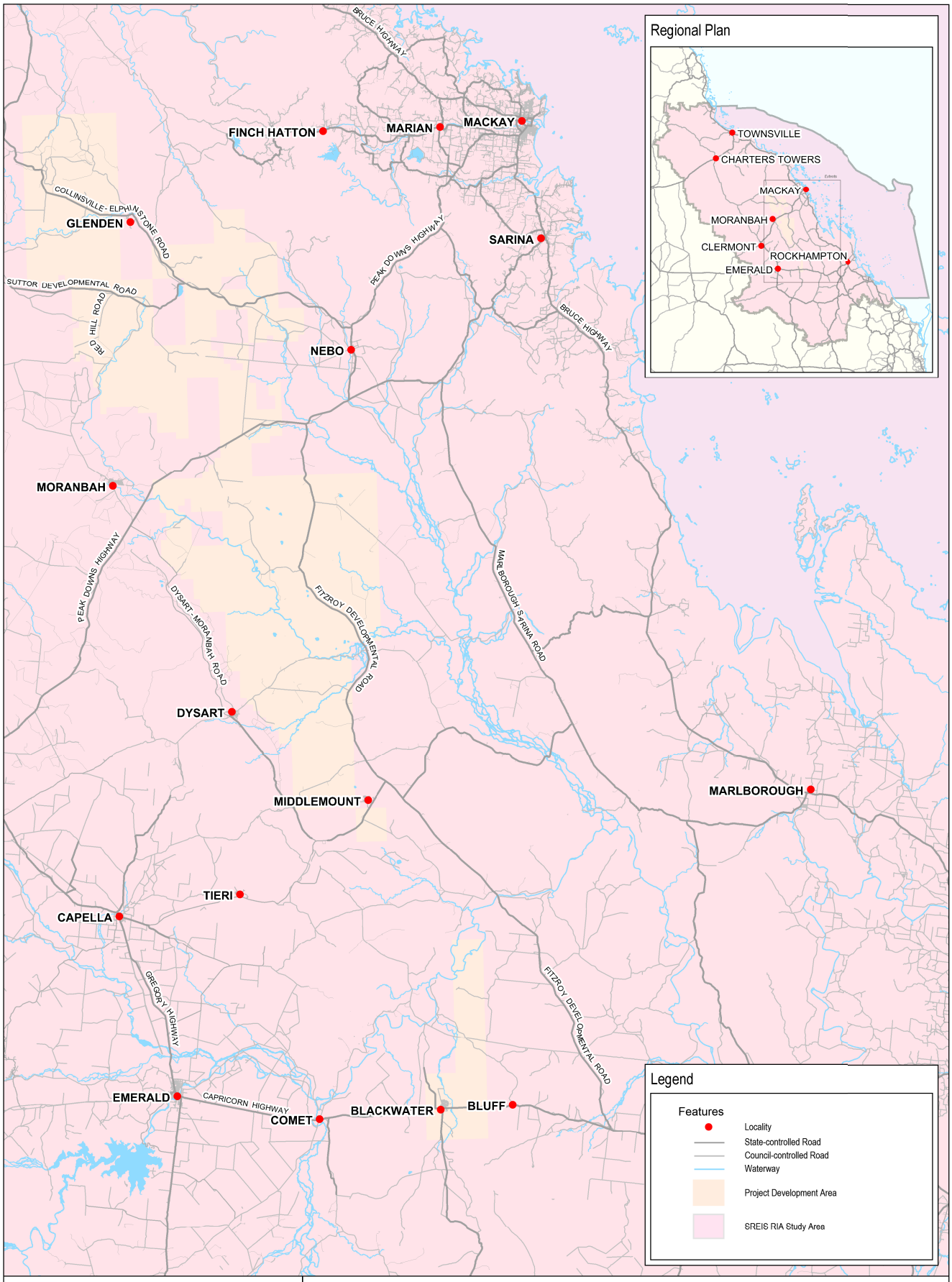
- Collection of updated data from relevant authorities pertaining to existing road conditions including, for example, traffic volumes, traffic growth, vehicle crash history and pavement condition.
- Inspection of the road network potentially servicing case study project sites to further characterise existing road conditions.
- Review of historical traffic growth and consideration of potential future traffic growth associated with the cumulative impact of other Projects.
- 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 types.
- Estimation of the Project's traffic demands based upon consideration of the activities scheduled to occur in any given year, the traffic generation potential of each of the individual scheduled activities and the location of the activities.
- Formulation of planned management strategies to avoid, minimise and mitigate the Project's potential road impacts.
- Assessment of the effectiveness of the planned management strategies utilising both a traditional traffic engineering assessment approach and also an environmental values assessment approach.

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

3.5 Assessment Extents

The SREIS RIA has considered the impact of the Project's traffic on all roads, including both State and Council-controlled within the combined spatial extents of the Department of Transport and Main Roads (TMR) Mackay/Whitsunday Region, former Northern Region and former Fitzroy Region. The extents of the SREIS RIA Study Area are shown on Figure 3-1.

The use of former TMR region boundaries facilitates meaningful impact analysis compared to the use of the recently enlarged TMR region boundaries. The use of the recently enlarged TMR region boundaries would have resulted in the Project's reported impacts being substantially diluted. The adopted SREIS RIA Study Area extents are appropriate to inform consideration of the Project's impact by road authorities.



Roads, place names, watercourses and water-bodies supplied by Queensland State Government.
Project information supplied by Arrow Energy.
Data shown in Regional Plan inset may be incomplete.

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SREIS RIA Study Area

Figure No:
3-1

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4 Legislative Overview

4.1 Context

The legislative context for the SREIS RIA was detailed in Section 3 of the EIS RIA. The legislative processes and powers utilised by TMR and Council 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 content previously presented within the EIS RIA.

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5 Existing Road Conditions

5.1 Overview

To inform the SREIS RIA, existing condition data has been sourced for the road network in and within proximity to the Project development area. The data is provided as an update to that previously presented in the EIS RIA for an expanded set of roads. A comparison of the existing road condition data presented within the SREIS RIA compared to the EIS RIA is provided where relevant to identify any changes that have occurred in the underlying conditions since preparation of the EIS RIA. Relevant descriptions for the presented data are provided at Appendix A

5.2 Road Classification

5.2.1 Road Authority Jurisdictions

Figure 5-1 presents the TMR regions responsible for the State-controlled road network. In addition, the spatial extents of the Council-controlled road networks are shown on Figure 5-1. Former TMR region boundaries have been presented as they align with the SREIS RIA Study Area extents. The updated and expanded dataset identifies that no significant changes to the road authority jurisdictions have occurred since preparation of the EIS RIA apart from the amalgamation of TMR regions.

5.2.2 Functional Road Hierarchy

Figure 5-2 summarises the functional hierarchy of the road network consistent with the definitions adopted within the EIS RIA, as follows:

- Highway: a high order road facilitating connectivity between regional centres.
- Regional Connecting Road: a high order road facilitating connectivity between townships.
- Local Connecting Road: lower order road facilitating connectivity between higher order roads and/or facilitating access.

Further details of the typical characteristics of each road type are provided in Section 6 of the EIS RIA.

The definition of two roads has been refined since preparation of the EIS RIA. Firstly, the road previously referenced as Collinsville-Elphinstone Road (north of Glenden) is now referred to as the ‘former Collinsville-Elphinstone Road’ with the road previously referred to as Newlands Access Road forming what is now known as Collinsville-Elphinstone Road (west of Glenden). Given this, the SREIS RIA considers the former Collinsville-Elphinstone Road to be a Local Connecting Road while Collinsville-Elphinstone Road is considered to remain a Regional Connecting Road. Secondly, Dysart-Moranbah Road has been redefined as a Local Connecting Road due to its lower order nature when compared to alternative north-south routes such as the Gregory Highway and Fitzroy Developmental Road.

5.3 Traffic Characteristics

5.3.1 Traffic Volumes

Figure 5-3 summarises the 2012 Annual Average Daily Traffic (AADT) volume data supplied by TMR for the State-controlled road network. The data is provided as an update to the 2011 AADT volume data included in the EIS RIA for an expanded set of roads. The updated AADT data is more disaggregated than that presented in the EIS RIA and therefore provides a better representation of the variability of traffic volumes along the various segments of individual roads. In particular, Figure 5-3 more accurately demonstrates the variability of traffic volumes along the Peak Downs Highway between Mackay and Nebo compared to the EIS RIA. The updated and expanded dataset identifies that accounting for the increased disaggregation of traffic volume data no significant changes in recorded AADT have occurred since preparation of the EIS RIA.

Table 5-1 summarises the Vehicle Kilometres of Travel (VKT) that occurred on the State-controlled road network during 2012, broken down by TMR region and vehicle class. These values provide a high level indication of the current (2012) level of transport facilitated by the State-controlled road network within the extents of the SREIS RIA Study Area. Similar statistics for the Council-controlled road networks are not

publicly available. VKT data was not previously presented in the EIS RIA and therefore consideration of changes that may have occurred since preparation of the EIS RIA is not warranted.

Table 5-1 SREIS RIA Study Area Transport Demand (2012)

TMR Region	Light Vehicle VKT	Heavy Vehicle VKT	Total VKT
Former Fitzroy Region	1,924 million	451 million	2,375 million
Mackay/Whitsunday Region	1,720, million	284 million	2,004 million
Former Northern Region	1,349 million	174 million	1,522 million
SREIS RIA Study Area	**5,185 million**	**986 million**	**6,171 million**

5.3.2 Traffic Growth

Figure 5-4 summarises the ten year traffic volume growth data (2002 to 2012) supplied by TMR for the State-controlled road network. The data is provided as an update to the 2011 ten year growth data presented in the EIS RIA for an expanded set of roads. The updated road condition data is more disaggregated than that presented in the EIS RIA and therefore provides a better representation of the variability of growth rates experienced across the road network. The updated dataset identifies that accounting for the increased disaggregation no significant changes in the level of recorded traffic growth have occurred since preparation of the EIS RIA.

5.3.3 Pavement Loadings

Figure 5-5 summarises the 2012 Equivalent Standard Axle (ESA) loadings for the State-controlled road network. The existing loadings have been determined by applying the ESA factors for each vehicle class identified in Austroads *Research Report AP-R394-11 Establishment of a New Pavement Maintenance Database – Stage 1 and 2 Analysis* to classified AADT (2012) data supplied by TMR. TMR's Mackay/Whitsunday Region did not provide data for a portion of the road network not likely to be utilised by Project traffic, as a result data is not presented on Figure 5-5 for some sections of the State-controlled road network. Existing pavement loading data was not previously presented in the EIS RIA and therefore consideration of changes that may have occurred to road conditions since preparation of the EIS RIA are not warranted.

5.3.4 Road Safety

Figure 5-6 identifies the location of all reported crashes based upon data supplied by TMR for the most recent available five year period (1 January 2006 to 31 December 2010) including crashes on both State and Council-controlled roads. In addition, Figure 5-6 presents calculated road section crash rates per 100 million VKT for the State-controlled road network for which AADT data is publicly available in a spatial format.

The calculated road section crash rates have been determined generally in accordance with the road section calculation methodology outlined within the Austroad's *Road Safety Engineering Risk Assessment Part 7: Crash Rates Database*. Adopting a similar calculation approach ensures that the calculated road section crash rates can be generally compared to the generic thresholds documented in the research report. In applying the Austroad's methodology a larger spatial buffer around each road section (ten times larger) has however been adopted for the SREIS RIA. This calculation approach is extremely conservative (i.e. results in higher crash rate estimates) as it tends to capture additional crashes which would not have been captured by the standard Austroads methodology. The adopted calculation approach ensures that the calculated road section crash rates are conservative estimates (i.e. high estimates) of the crash rate experienced. Readers should be aware of this level of conservatism bias in the calculated crash rates when comparing to the generic Austroads thresholds.

The Austroad's road safety report indicates that a road section 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 5-6 indicates that the majority of State-controlled road network has generally experienced lower than typically expected crash rates. The SREIS RIA applies the Austroad's methodology to the calculation of road section crash rates while the EIS RIA utilised an alternative methodology. The adoption of two different calculation methodologies results in variances in the reported crash rates and therefore does not allow direct comparison of the two datasets. The outcome of the SREIS

RIA crash data analysis is however generally consistent to the EIS RIA in concluding that the majority of the State-controlled road network has historically experienced lower than typically expected crash rates.

5.4 Infrastructure Attributes

5.4.1 Pavement Seal Width

Figure 5-7 summarises the pavement seal width data supplied by TMR between August and September 2013 for the State-controlled road network. The summarised seal width data is a weighted average over the road sections adopted for the SREIS RIA modelling. TMR's Mackay/Whitsunday Region did not provide data for a portion of the road network not likely to be utilised by Project traffic, as a result data is not presented on Figure 5-7 for some sections of the State-controlled road network. Pavement seal data was not previously presented in the EIS RIA and therefore consideration of changes that may have occurred to road conditions since preparation of the EIS RIA is not warranted.

5.4.2 Road Roughness

Figure 5-8 summarises the road roughness data supplied by TMR between August and September 2013 for the State-controlled road network. The road data is based upon road surveys undertaken between 2009 and 2013. The presented road roughness data is a weighted average over the road sections adopted for the SREIS RIA modelling. TMR's Mackay/Whitsunday Region did not provide data for a portion of the road network not likely to be utilised by Project traffic, and as a result data is not presented on Figure 5-8 for some sections of the State-controlled road network. Road roughness data was not previously presented in the EIS RIA and therefore consideration of changes that may have occurred to road conditions since preparation of the EIS RIA is not warranted.

5.4.3 Road Maintenance

Figure 5-9 summarises the road maintenance data supplied by TMR's Central Queensland and North Queensland Regions between August and September 2013 for the State-controlled road network. The identified annual road maintenance rates are for the time period of the supplied data for each road segment, typically being a recent five year period. The presented road maintenance data is an average over the road sections adopted for the SREIS RIA modelling. TMR's Mackay/Whitsunday Region did not make available detailed road maintenance data to inform the SREIS RIA and therefore maintenance rates are not presented on Figure 5-9 for the road network under its jurisdiction. Road maintenance data was not previously presented in the EIS RIA and therefore consideration of changes that may have occurred since preparation of the EIS RIA is not warranted.

5.4.4 Rail Infrastructure

Figure 5-10 identifies existing rail infrastructure based upon data supplied by Queensland Rail in August 2013 and Aurizon in October 2013. The dataset presented as part of the SREIS RIA is more comprehensive than that previously presented and as a result identifies significantly more existing rail infrastructure than previously considered within the EIS RIA.

5.4.5 Motorist Stopping Areas

Figure 5-11 identifies the location of motorist stopping areas based upon data supplied by the Queensland Government in August 2013. The updated data identifies that no significant changes to the location of motorist stopping areas have occurred since preparation of the EIS RIA.

5.5 Road Users

5.5.1 Multi-Combination Vehicle Routes

Figure 5-12 identifies the designated Multi-Combination Vehicle (MCV) routes based upon data supplied by TMR in August 2013. The data is provided as an update to the data included in the EIS RIA. Figure 5-12 identifies that the MCV routes are less restrictive than previously presented in the EIS RIA. That is, all road train restrictions previously reported in the EIS RIA including for Dysart-Moranbah Road and for Collinsville-Elphinstone Road are understood to have been incorrect. It has therefore been assumed within the SREIS RIA that these previously reported restrictions will not influence the routing of Project traffic.

5.5.2 School Bus Routes

Figure 5-13 identifies the location of school bus routes based upon data supplied by the Queensland Government in August 2013. The updated data identifies that no significant changes to school bus routes have occurred since preparation of the EIS RIA.

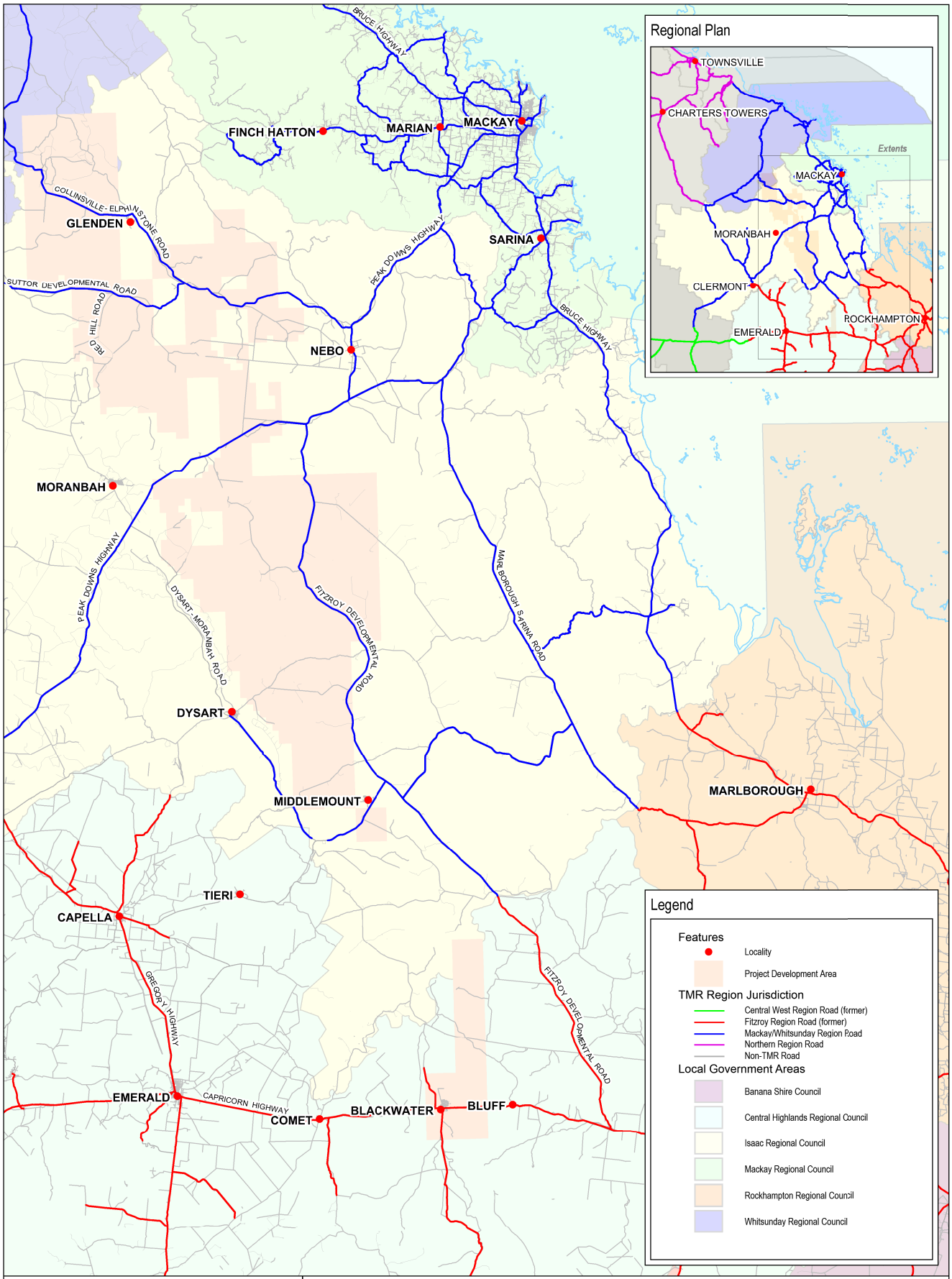
5.5.3 Stock Routes

Figure 5-14 identifies the location of stock routes based upon data supplied by the Queensland Government in August 2013. The updated data identifies that no significant changes to stock routes have occurred since preparation of the EIS RIA.

5.6 Active Transport

5.6.1 Pedestrian and Cycle Networks

The majority of towns within proximity to the Project development area have basic pedestrian and cycle infrastructure in built-up areas. Roads outside of the townships typically do not include dedicated cycle facilities such as designated on-road cycle lanes. No significant changes to the pedestrian and cyclist networks have occurred since preparation of the EIS RIA.



Roads, place names and coast line supplied by Queensland State Government.
Project information supplied by Arrow Energy.
Data shown in Regional Plan inset may be incomplete.

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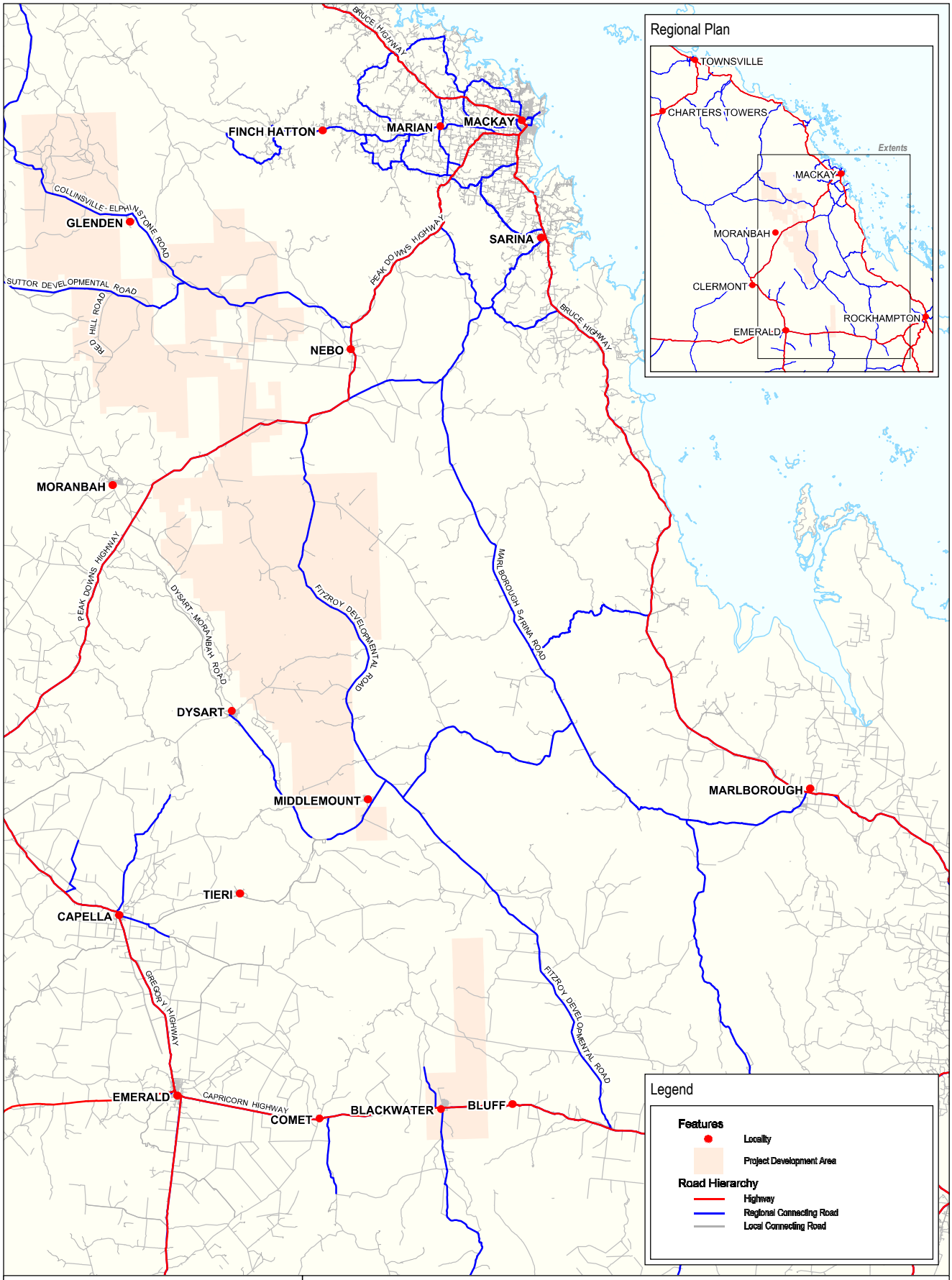
Road Authority Jurisdictions

Figure No:
5-1



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Functional Road Hierarchy

Figure No: **5-2**

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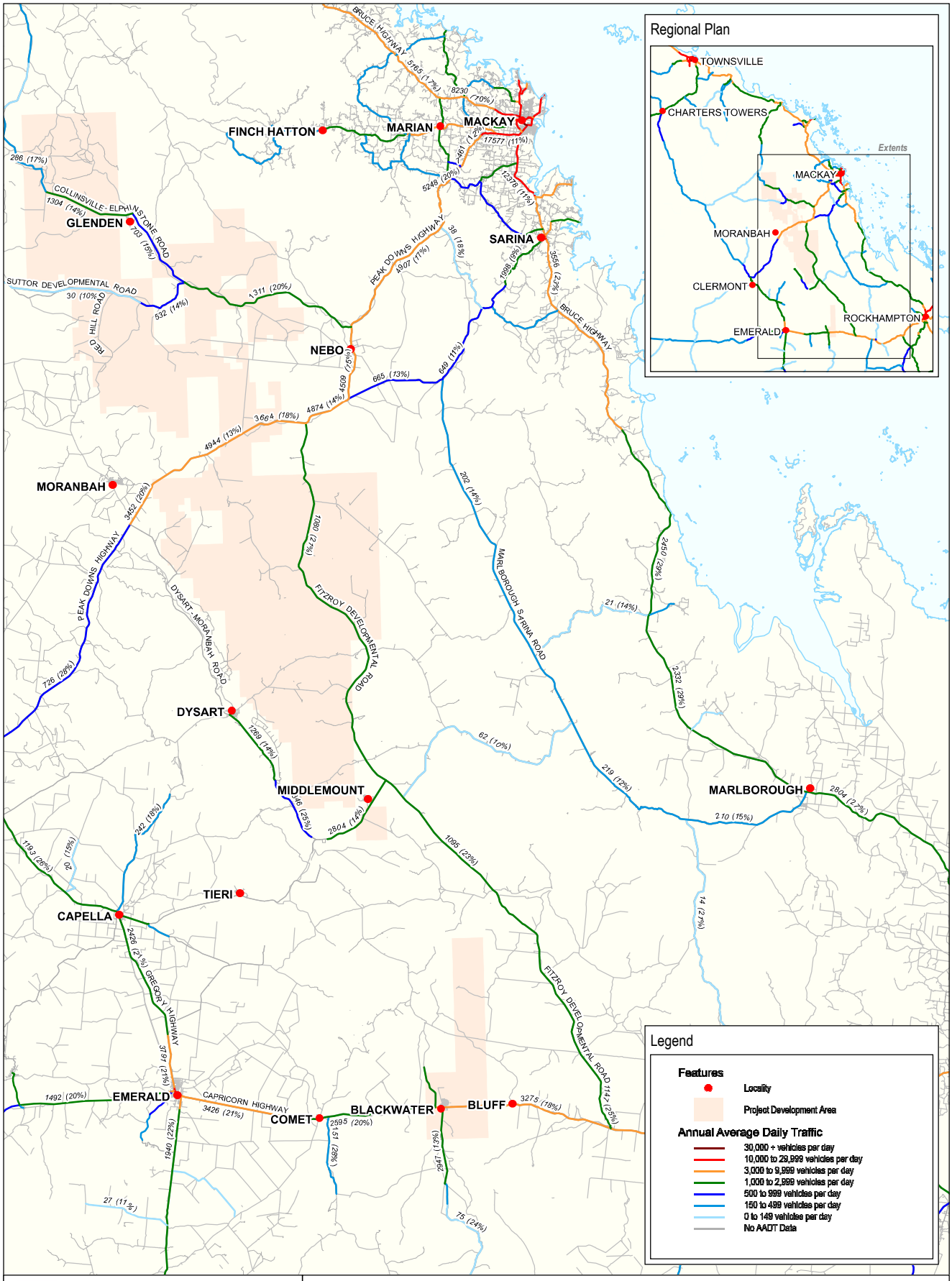

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Annual Average Daily Traffic Volumes (2012)

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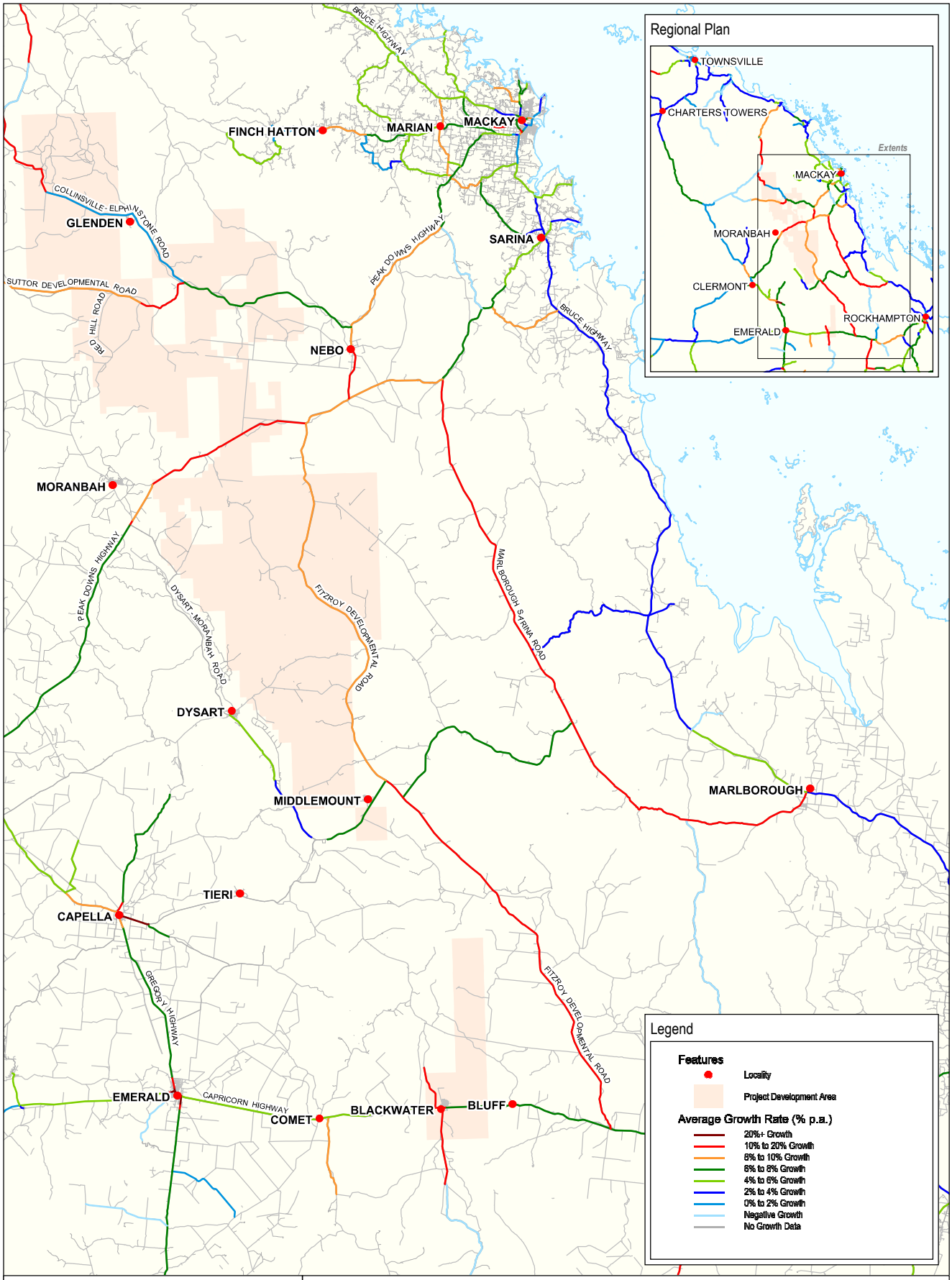

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10 Year Annual Traffic Growth (2002-2012)

Figure No: **5-4**

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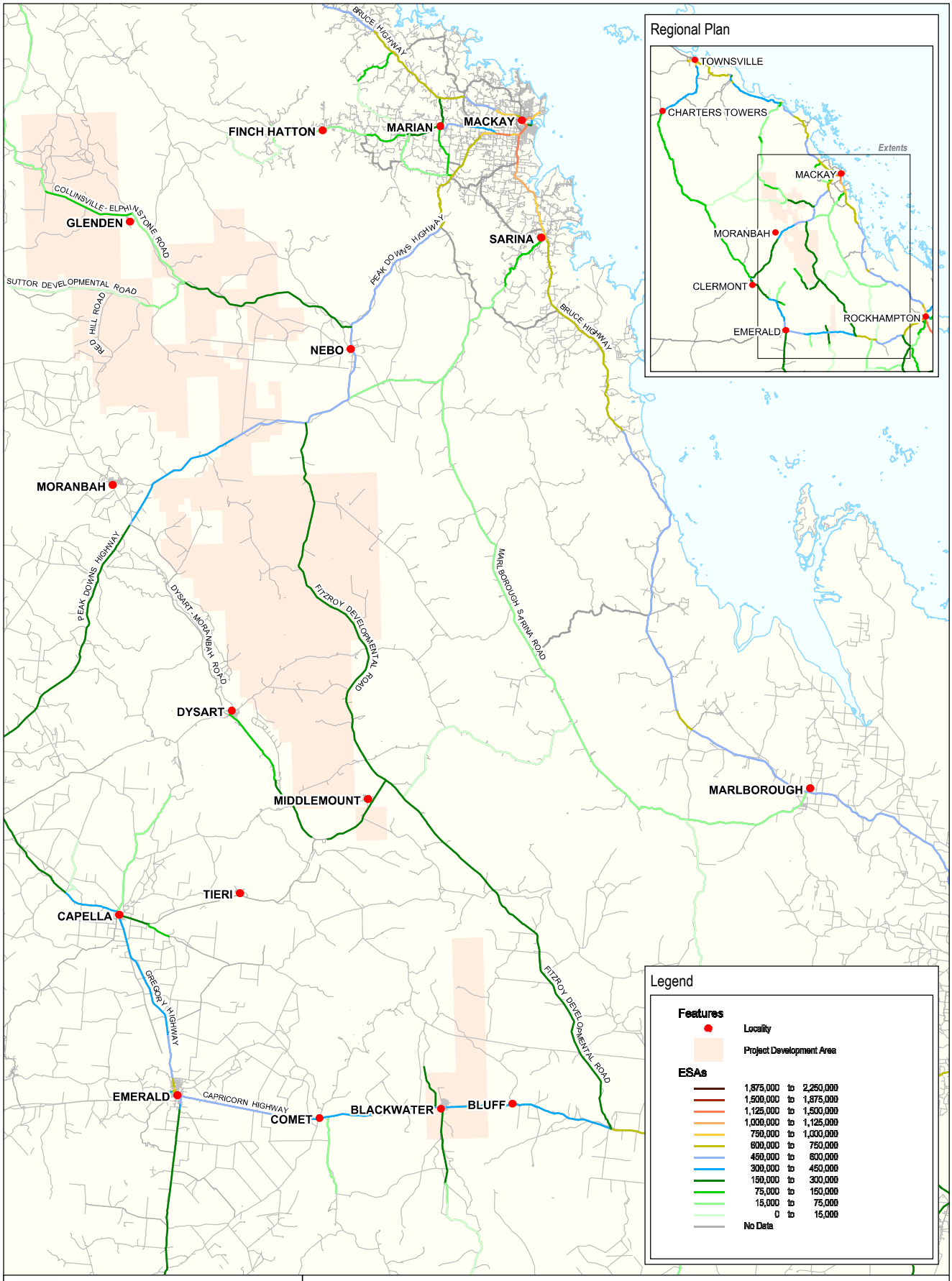

Roads, place names and coast line supplied by Queensland State Government.
Project information supplied by Arrow Energy.
Traffic count data supplied by Department of Transport and Main Roads.
Data shown in Regional Plan inset may be incomplete.
ESAs calculated using Austroads average ESA/HV factors for Austroads classes (Austroads 2011).

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Equivalent Standard Axle Loadings (2012)

Figure No: **5-5**

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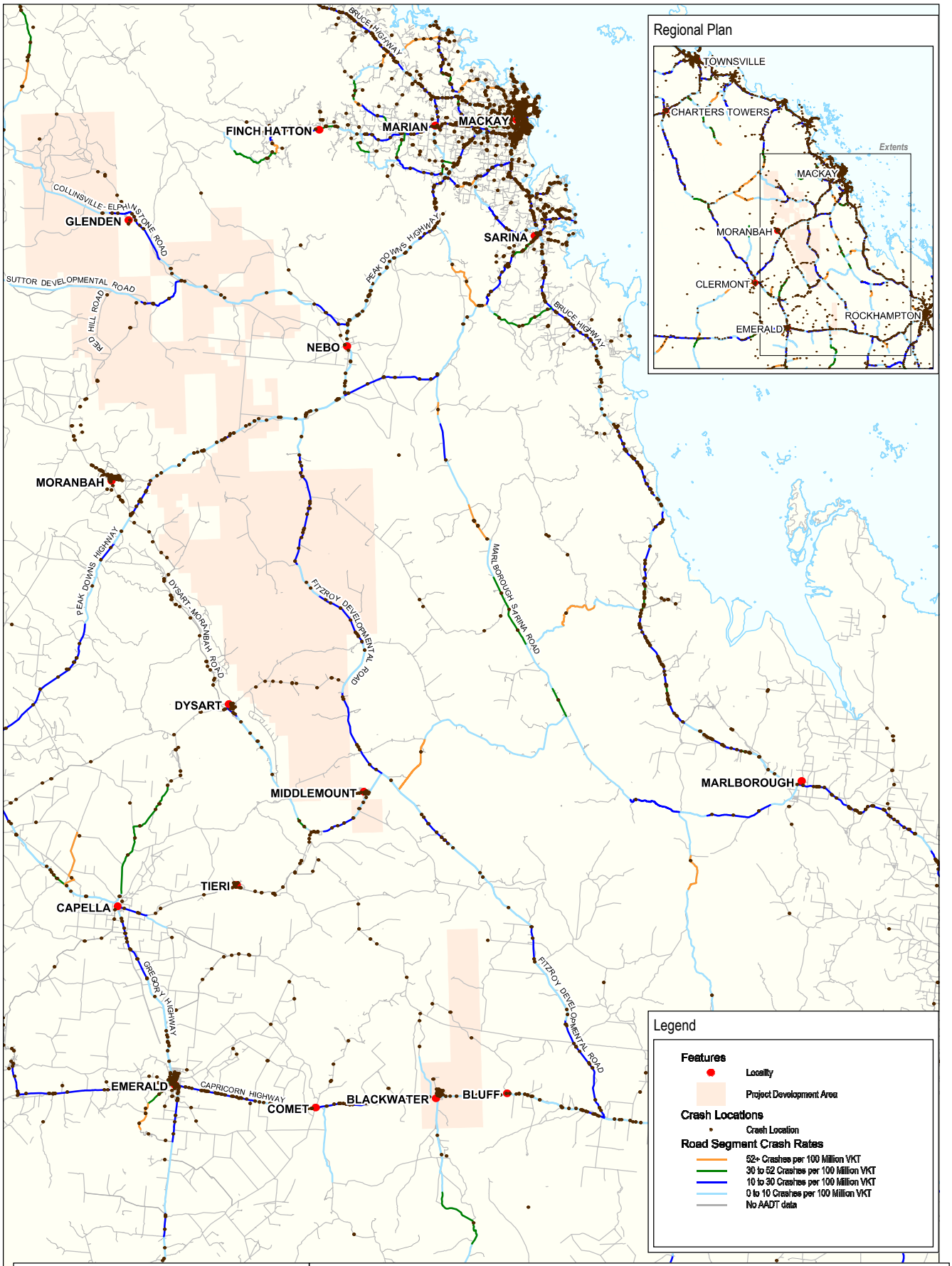

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Historic Crash Locations and Road Section Rates (2006 to 2010)

Figure No: **5-6**

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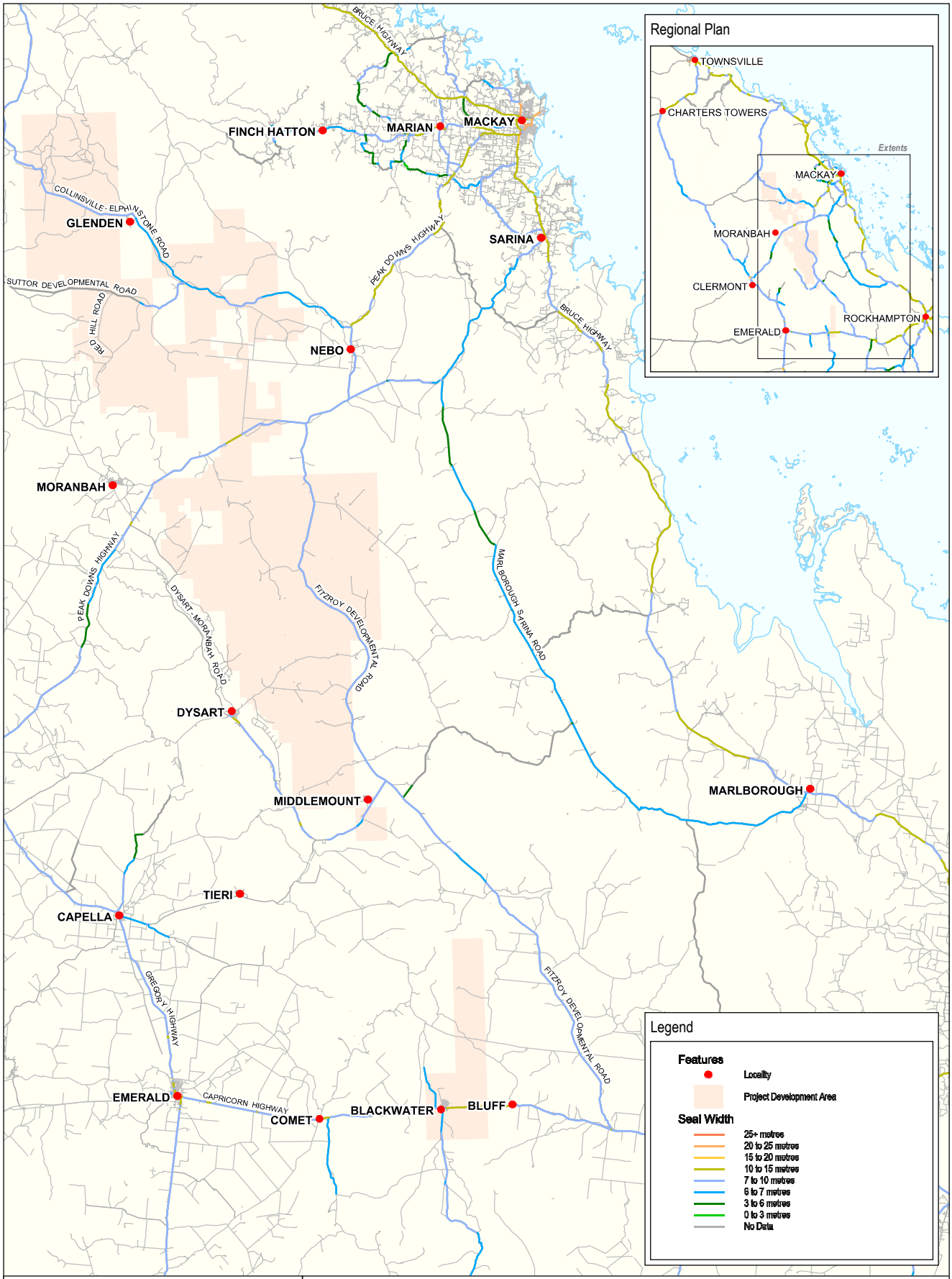

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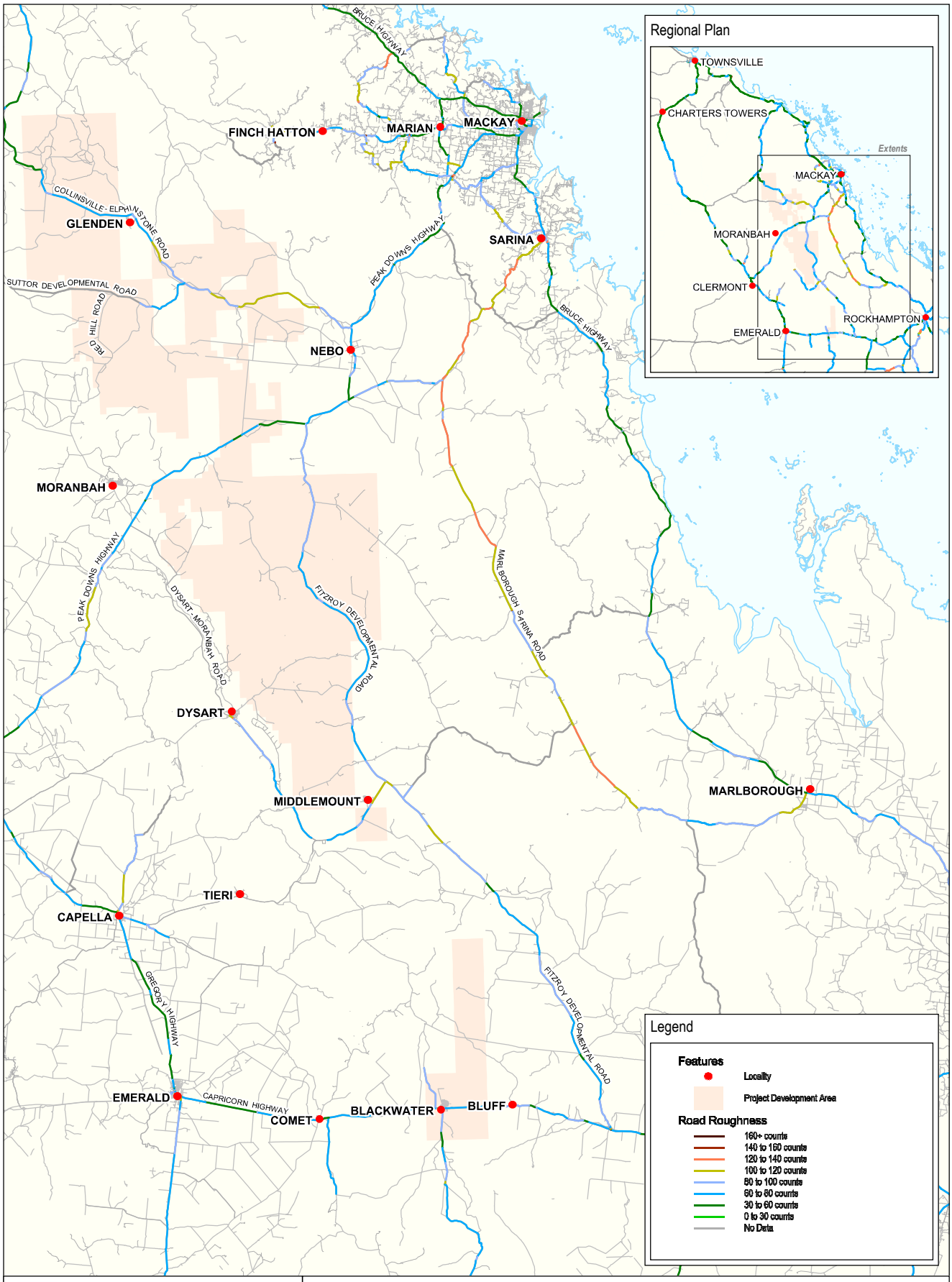
Road Seal Width

Figure No: **5-7**



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Road Roughness

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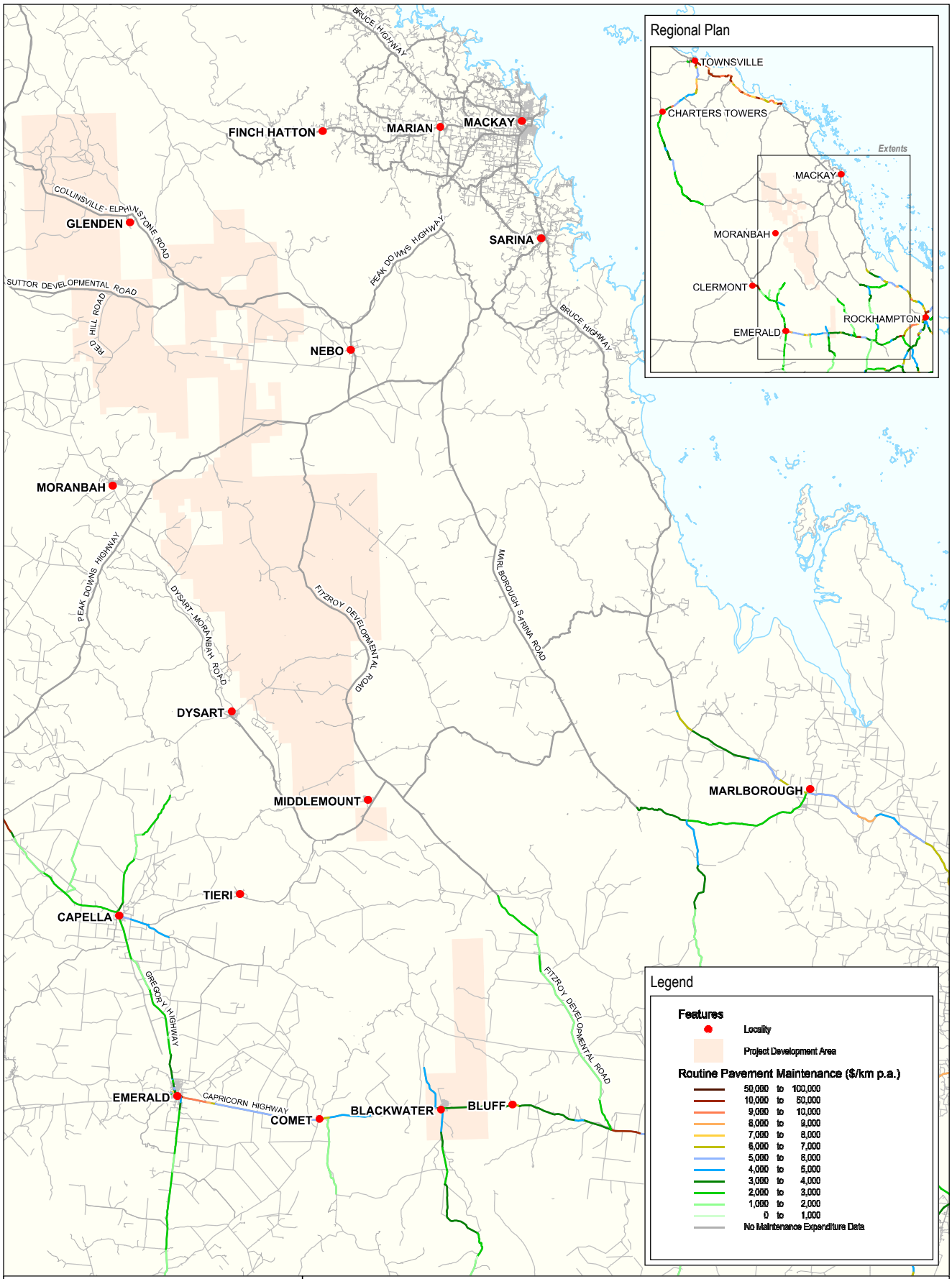

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Maintenance Rates

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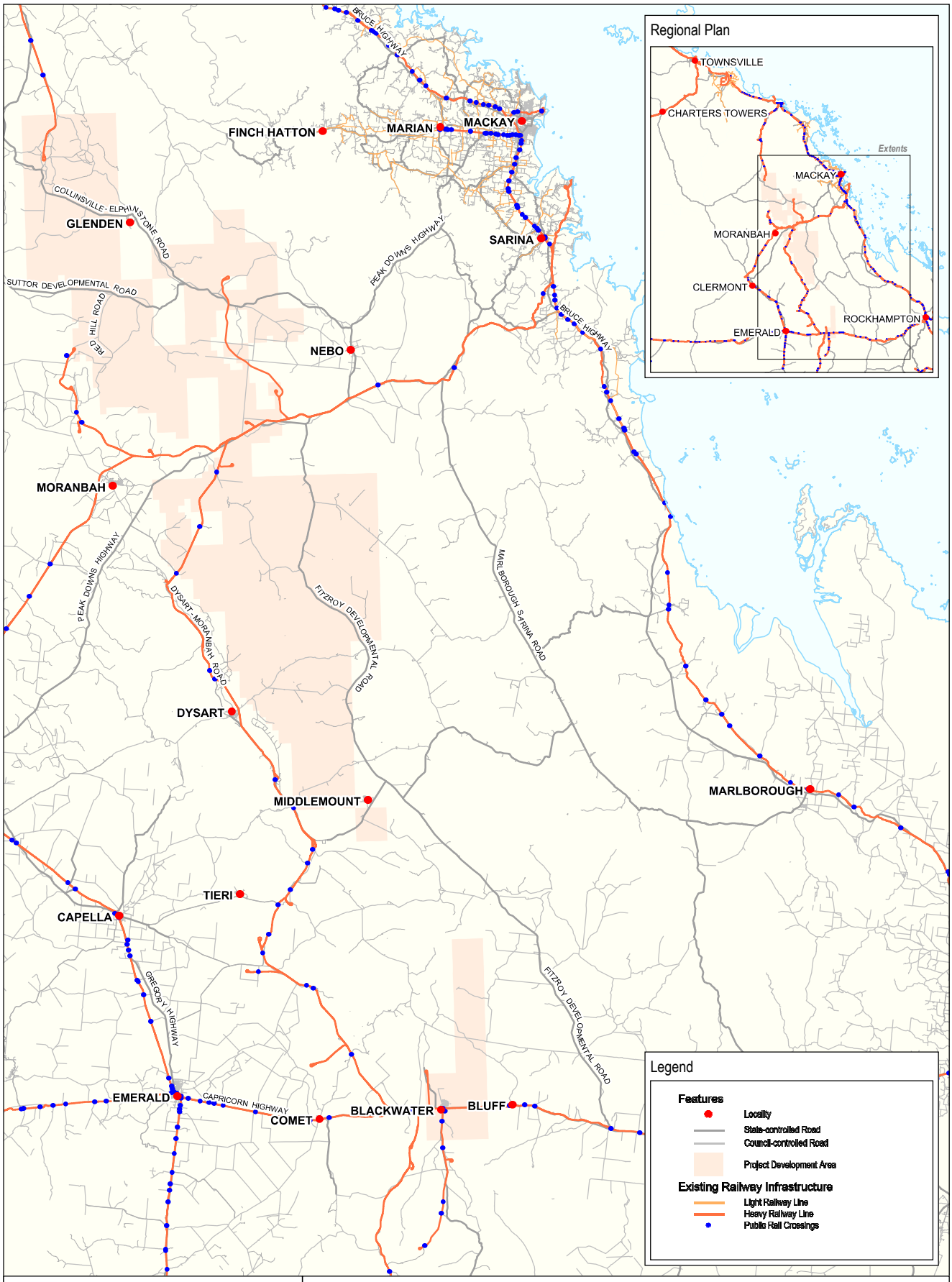

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Existing Rail Infrastructure

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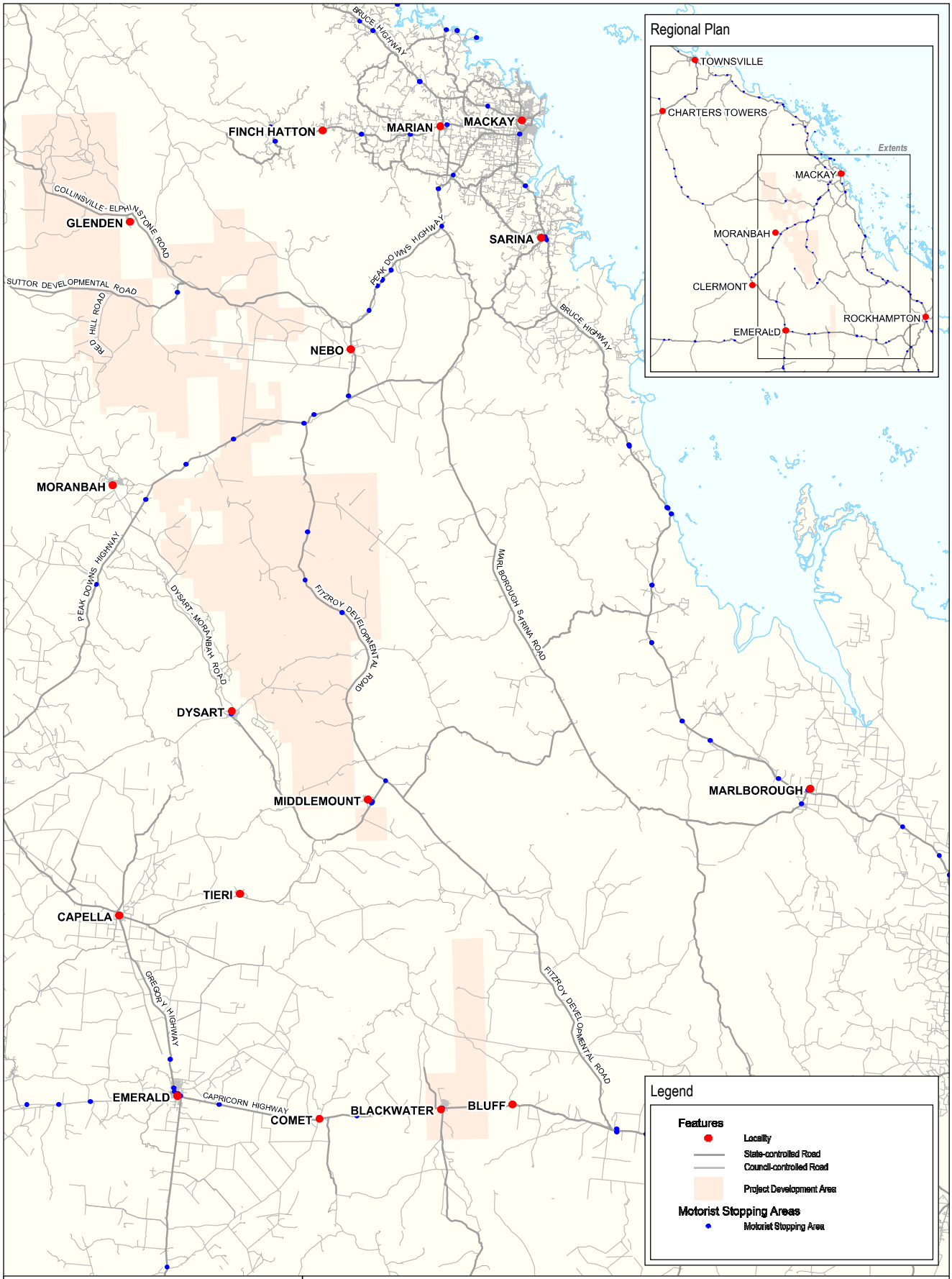

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Motorist Stopping Areas

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5-11

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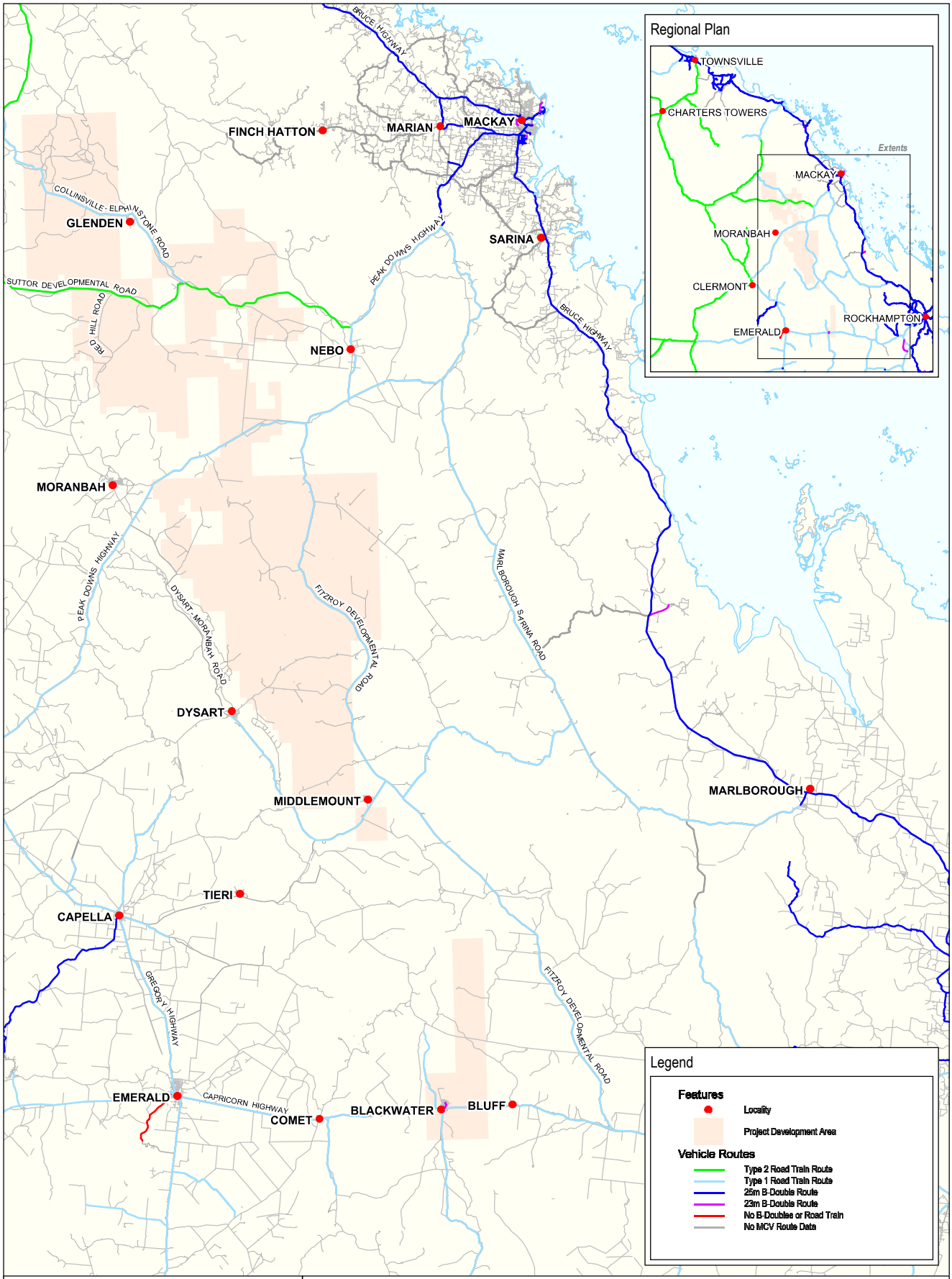

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Multi-Combination Vehicle Routes

Figure No:

5-12

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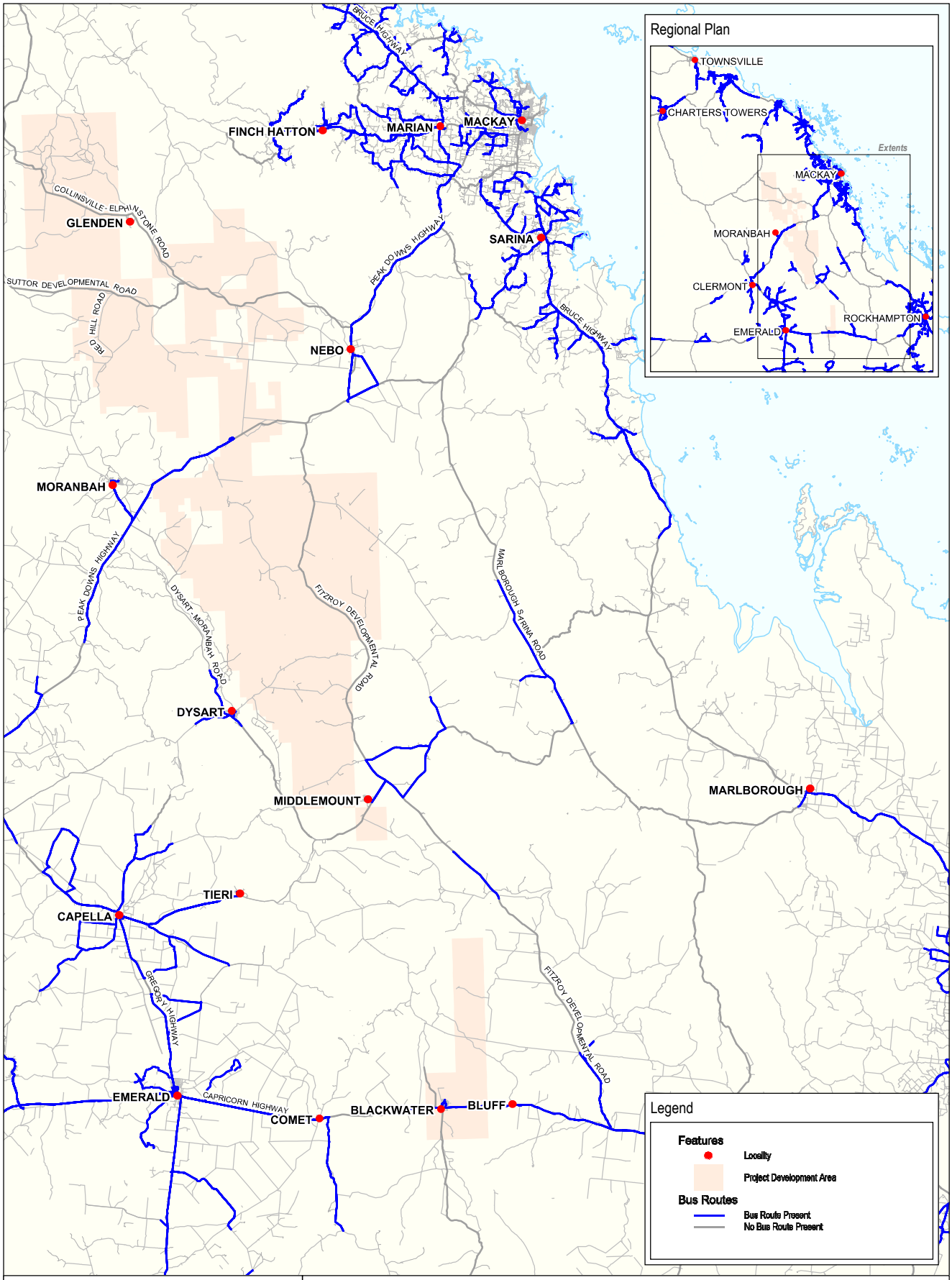

Cardno Shaping the Future	Bowen Gas Project 08-January-2014	arrow energy go further	School Bus Routes	Figure No: 5-13

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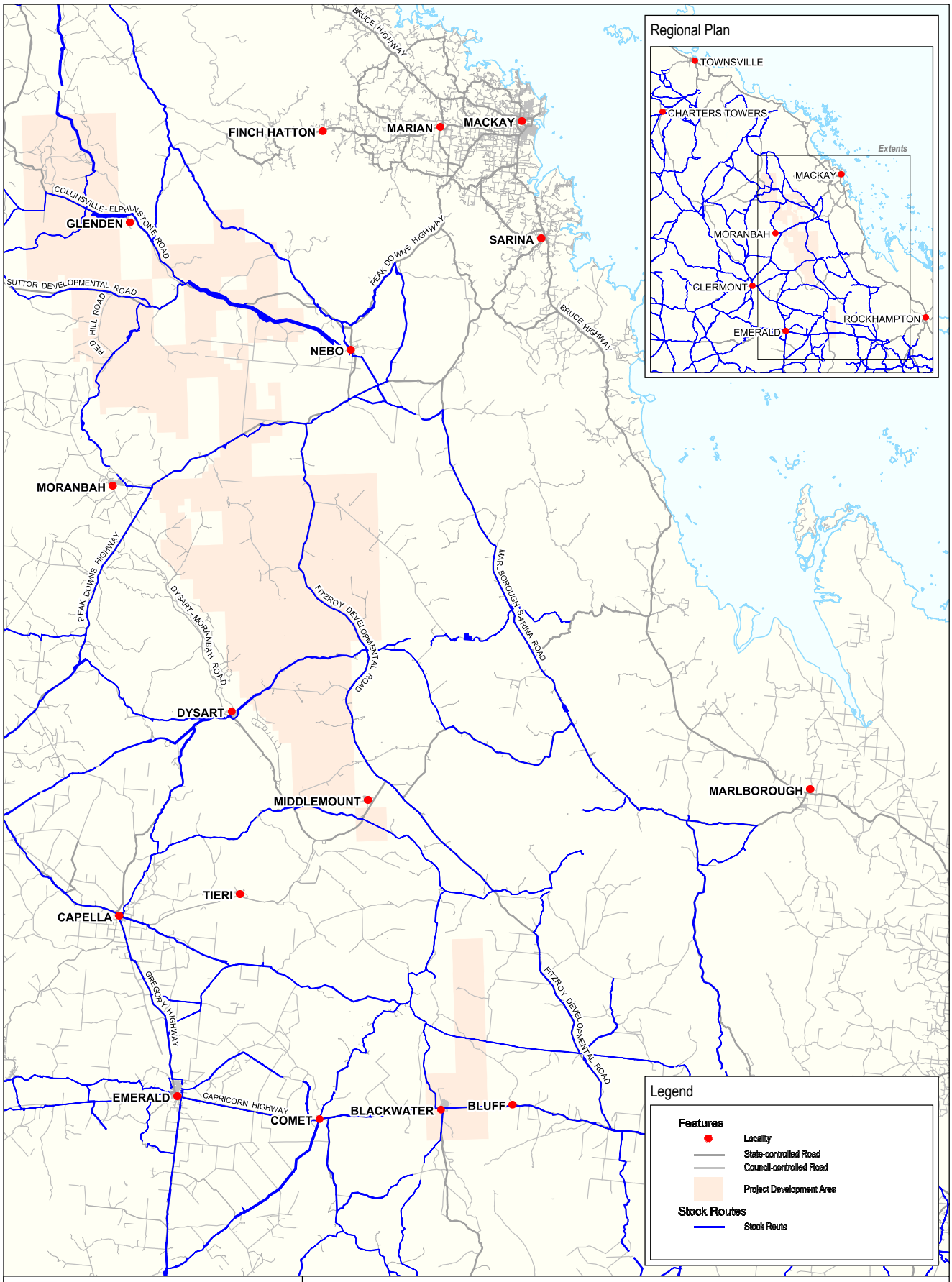

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Stock Routes

Figure No:

5-14

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6 Future Baseline Traffic Forecasts

6.1 Other Projects with Potential Cumulative Impacts

Table 6-1 provides a summary of the projects recently commenced or currently under investigation in and within proximity to the Project development area with the location of the projects detailed at Appendix B. The project data is provided as an update to that presented within the EIS RIA.

Table 6-1 Other Projects Considered within SREIS RIA

Project	Proponent	Estimated Start Date	Estimated Project Duration
Caval Ridge Mine	BMA	2012	
Red Hill Mining Lease	BMA	2020	20-25 years
Daunia Mine	BMA	2011	30 years
Byerwen Coal	QCoal and JFE Steel	2012	50 years
Connors River Dam and Pipeline	SunWater	Unknown	Unknown
Ellensfield Coal Mine Project	Vale Australia	2012	20 years
Foxleigh Plains Project	Anglo Coal	2013	15 years
Minyango Project	Blackwater Coal	2014	25 years
Washpool Coal Mine Project	Washpool Coal	2012	16 years
Eagle Downs Coal Project	Bowen Central Coal Joint Venture	2012	47 years
Grosvenor Coal Project	Anglo Coal	2012	50 years
Middlemount Coal Project	Middlemount Coal	2011	Unknown
Eaglefield Expansion Project	Peabody	2012	22 years
Codrilla Coal Mine Project	Macarthur Coal	2012	13-14 years
Saraji East Coal Mine	BMA	2014	25-30 years
Arrow Bowen Pipeline	Arrow	2016	Ongoing
Northern Bowen Basin Transmission Network Reinforcement Project	Powerlink Queensland	2014	Ongoing
Goonyella to Abbot Point Rail Project	BHP Billiton Group	2015	Ongoing
Moranbah South Project	Anglo American Metallurgical Coal	2014	30 years
Central Queensland Integrated Rail Project	Aurizon	Pre 2016	Ongoing

Of the projects listed in Table 6-1, those with a higher traffic generating potential over an extended period of time are generally the larger resource projects predominately associated with gas and coal production. These projects typically have 20 to 40 year timeframes and therefore have the potential to contribute to traffic growth on the road network over the longer term and therefore influence cumulative impacts. However the infrastructure projects (e.g. rail or pipelines) would only impact regional traffic during their relatively brief (203 years) construction phases.

6.2 Future Baseline Traffic Demands

For the purposes of the SREIS RIA when forecasting future baseline traffic demands (i.e. in the absence of traffic associated with the Project) it has been assumed that a comparable level of traffic demand increase will continue to occur for the foreseeable future to that which has historically occurred. For example, if traffic demands on a particular road segment have increased by an average of 100 vehicles per year for the past decade than it has been assumed that the road segment will continue to experience an increase of 100 vehicles per year for the foreseeable future.

The data presented in Table 6-1 identifies that this assumption is conservative (i.e. results in high baseline traffic volume forecasts) as the number of projects anticipated to occur over the foreseeable future is substantially less than that which has occurred during the recent mining investment boom. The baseline traffic demand forecasting approach adopted for the SREIS RIA is considered to result in more representative forecasts than the global growth rate approach adopted for the EIS RIA. The forecasting approach adopted for the SREIS RIA provides road authorities confidence that a worst-case scenario has been assessed.

It is acknowledged that the Post-EIS RIAs undertaken to inform the Post-EIS IAs may need to include more localised consideration of the impact that other projects may have on future baseline traffic volumes. The adopted approach of projecting historic growth forward is however considered suitable to inform the SREIS RIA given the conservative forecasts produced.

6.3 Future Baseline Pavement Loadings

For the purposes of the SREIS RIA when forecasting future baseline pavement loadings it has been assumed that existing pavement loadings will increase at 3% per annum (linear). This generic global growth rate assumption is consistent with standard practice in Queensland as documented in TMR's *Assessment of Road Impacts of Development Proposals Notes for Contribution Calculations Version 28*.

The adopted forecasting approach for baseline pavement loadings utilising a global growth rate is considered to be conservative. The adopted rate of 3% growth per annum is anticipated to result in relatively low estimates of future baseline pavement loadings and therefore result in high estimates of the Project's proportional impact.

The adoption of an alternative forecasting methodology for baseline pavement loadings as compared to baseline traffic demands ensures that worst-case scenarios are assessed for service life and efficiency/safety impacts respectively. The adopted pavement loading forecasting approach is therefore appropriate to inform the SREIS RIA.

7 Project Activities

7.1 Project Activities

The 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 activities:
  - Production well installation
  - Gathering infrastructure installation
  - Project facility establishment
- Operation and Maintenance activities:
  - Production well operation and maintenance including well workovers
  - Gathering infrastructure operation and maintenance
  - Project facility operation and maintenance
- Decommissioning and Rehabilitation activities:
  - Production well decommissioning and rehabilitation
  - Gathering infrastructure decommissioning and rehabilitation
  - Project facility decommissioning and rehabilitation.

The SREIS RIA assumes that the majority of delivery types will be co-ordinated from a single marshalling yard located in Mackay. However due to port infrastructure limitations at Mackay Port, it has been assumed that containerised materials will be initially transported by sea to Townsville Port and then transported by road to Mackay. Furthermore, it is anticipated that a limited number of deliveries will originate from Rockhampton. To avoid inefficient double handling it is also expected that bulk materials such as quarry products will be transported direct from suppliers to Project sites rather than via the marshalling yard located in Mackay.

7.2 Traffic Generation of Project Activities

Table 7-1 provides a summary of the traffic generation potential of each of the Project activities. A detailed breakdown of the traffic generating potential of each Project activity is summarised at Appendix C. These assumptions reflect the refined logistics planning which has occurred since preparation of the EIS RIA.

Table 7-1 Traffic Generation Potential of Project Activities

Activity	Quantity	Activity Duration	External Traffic Generation (One-Way Trips per Facility)		
			Heavy Vehicle	Bus	Light Vehicle
Construction Activities (trips are per facility **for the duration** of construction of each facility)					
Production Wells	4,078 wells	67 days	232	206	28
Gathering Infrastructure	4,078 sections	8 days	95	14	-
CGPFs	2 facilities	52 weeks	2,858	2,730	-
WTF	3 facilities	52 weeks	9,126[1]	764	-
FCFs	33 facilities	26 weeks	1,516	728	-
Village	2 villages	4 weeks	8,390	-	-
Operation and Maintenance Activities (trips are per facility **for each year** of operation of each facility)					
Production Wells	4,078 wells	23 years	8	4	-
Gathering Infrastructure	4,078 sections	23 years	-	-	-
CGPFs	2 facilities	38 years	104	-	52
WTF	3 facilities	30-39 years	2,200	-	52
FCFs	33 facilities	9-37 years	20	-	52
Village	2 villages	42 years	5,720	260	1,300
Decommissioning and Rehabilitation Activities (tips are per facility **for duration** of decommissioning of each facility)					
Production Wells	4,078 wells	2 days	42	2	8
Gathering Infrastructure	4,078 sections	2 days	30	-	-
CGPFs	2 facilities	35 weeks	1,190	980	3,268
WTF	3 facilities	32 weeks	680	1,972	6,572
FCFs	33 facilities	17 weeks	424	238	794
Village	2 villages	16 weeks	7,284	-	3,734

[1]This conservatively assumes water for construction of dams is imported rather than using CSG water.

Table 7-1 conservatively assumes higher levels of heavy vehicle activity associated with most Project activities (i.e. results in higher Project heavy vehicle traffic forecasts) than considered within the EIS RIA to ensure a worst-case scenario is assessed. The updated estimates also reflect the stated intent to minimise the use of private vehicles by transporting the Project workforce by bus.

For the purposes of the SREIS RIA, activity durations have been identified to ensure that each individual facility is operational for the full life of the serviced drainage area/s. In some instances, the activity duration identified in Table 7-1 is longer than the typical operational life identified in the project description. The assessed activity durations are therefore conservative as they assume that Project facilities may potentially generate operational traffic for longer periods.

It is expected that the Post-EIS RIAs are likely to ultimately assess lower potential traffic generations as future logistics planning is expected to identify opportunities to further optimise Project transportation. Following completion of detailed logistics planning the use of lower Project activity traffic generation estimates will likely be able to be justified. However, in the absence of detailed logistics planning having occurred at this time, the assessment of the conservative traffic generation estimates presented in Table 7-1 ensures that the SREIS RIA presents a worst-case assessment.

8 Project Transport Task and Traffic Demands

8.1 Project Traffic Model

A strategic traffic model has been developed to forecast the transport task and traffic demands likely to be associated with the Project. The forecasting methodology adopted for the 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 reliable 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 Project. Planning has progressed sufficiently to enable a reasonable understanding of the total extent of infrastructure likely to be established across the Project development area. However the precise location of each component of Project infrastructure is still to be finalised post-EIS assessment, together with finalisation of detailed constraints analysis. It is known however that the production wells and multi-well pads will have a relatively constant spacing within each drainage area and that all other Project infrastructure will be located to service the wells. It is therefore possible to make reliable 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 an urban area and when considering the transport infrastructure required to support the modelled area.

A SATURN traffic model was developed to forecast the Project traffic demands for each year of the Project utilising the following methodology:

- The infrastructure likely to be established, operated and decommissioned within each activity zone (e.g. drainage area 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 summarised in Section 7.
- The generated traffic from each activity zone was assigned to the external road network consistent with the origin and destination data presented in Appendix C.
- Traffic volumes on each individual road link were identified for all Project years.

The SATURN traffic model included the following:

- 4,454 modelled road links
- 145 centroids representing the Project activity zones
- 840 demands matrices for the 42 Project years and 20 vehicle types considered which included separate consideration of loaded and unloaded vehicles.

Figure 8-1 illustrates the traffic model elements. The representative locations have a relatively high level of disaggregation, which facilitates reasonably accurate Project traffic forecasts particularly on the 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 the drafting of EIS conditions. The Post-EIS RIAs will capture any changes to the location of Project infrastructure that may occur during detailed planning as Arrow's appreciation of the constraints which may exist at Project sites is refined.

8.2 Forecast Project Transport Task

The total Project transport task represents the total VKT likely to be travelled by traffic associated with the Project on the State and Council-controlled road networks and the access networks internal to private land over the entire Project life within the extent of the SREIS RIA Study Area. The total Project transport task statistic provides a high level overview of the level of traffic activity potentially generated by the Project over its life.

8.2.1 Project Transport Task

Table 8-1 summarises the total Project transport task estimated over the entire Project life by vehicle type while Chart 8-1 provides a stacked summary of the yearly profile of the Project transport task by vehicle type. The estimates are for the road network contained within the extent of the SREIS RIA Study Area.

Table 8-1 Project Transport Task by Vehicle Type

Vehicle	Project Transport Task (VKT)
Light Vehicle	33 Million
Buses	61 Million
Heavy Vehicle	274 Million
TOTAL	368 Million

Chart 8-1 Project Transport Task by Vehicle Type and Project Year

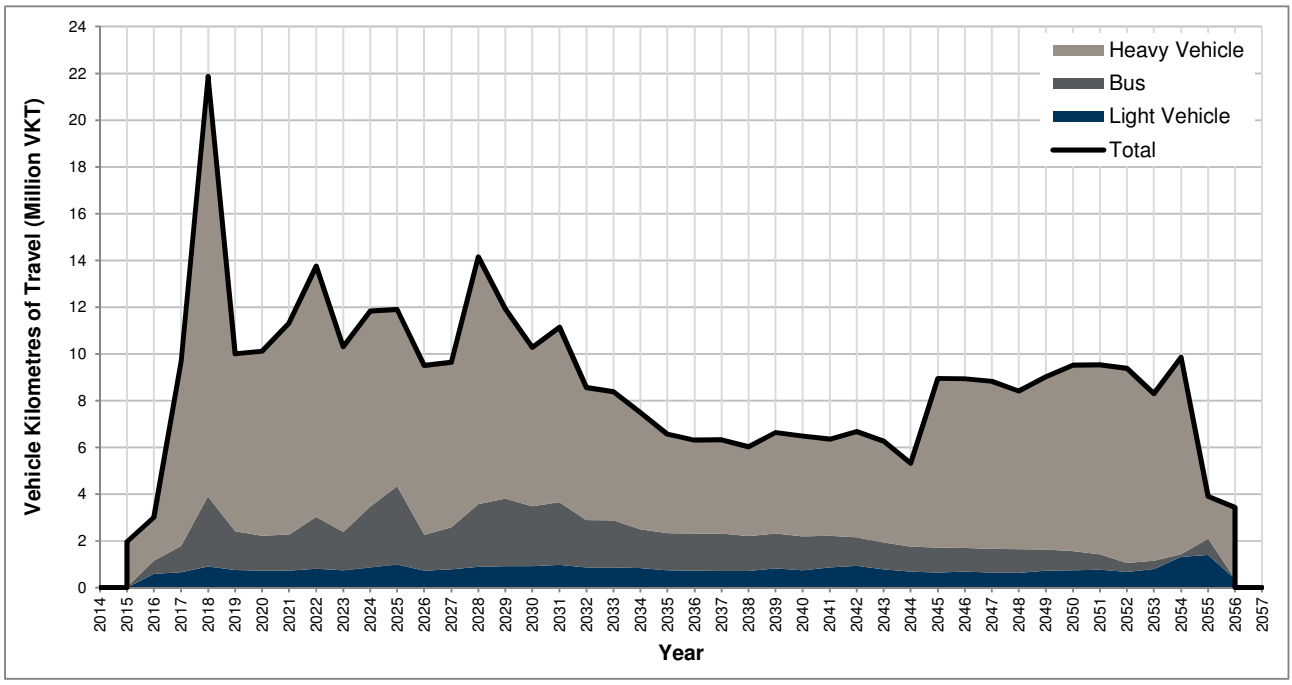
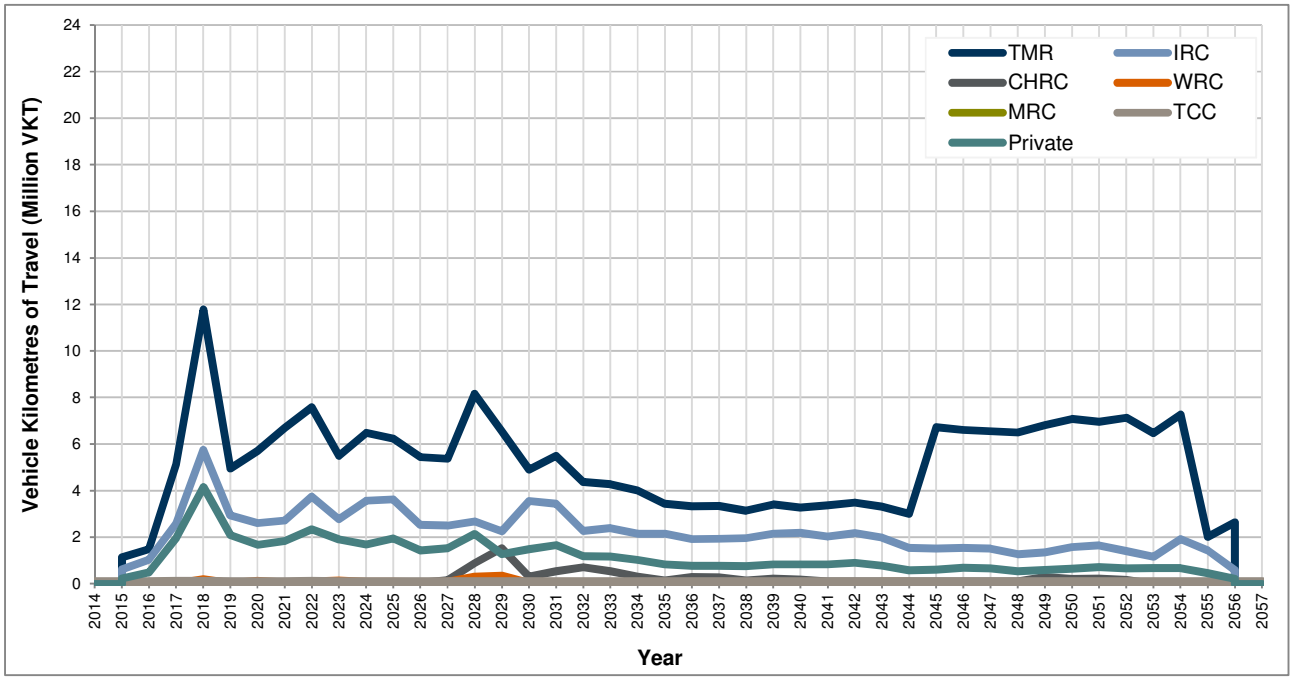


Chart 8-1 indicates that the Project's peak transport task is anticipated to occur during 2018 which is significantly earlier than the 2045 timing previously identified in the EIS RIA. The 2018 activity spike reflects the Project schedule assessed as part of the SREIS RIA which conservatively assumes more rapid establishment of both wells and facilities as compared to the EIS RIA. The EIS RIA previously assumed that several hundred production wells per year would continue to be established as late as 2045 while the SREIS RIA assumes that the majority of wells will be established by 2030. Furthermore, Chart 8-1 reflects the SREIS RIA assumption that final decommissioning activities will occur around 2056 as compared to the EIS RIA that assumed final decommissioning activities will occur around 2073.

Chart 8-2 summarises the VKT that is anticipated to occur on TMR's, Isaac Regional Council's (IRC's), Central Highlands Regional Council's (CHRC), Mackay Regional Council's (MRC), Whitsunday Regional Council's (WRC) and Townsville City Council's (TCC) road networks as well as on private access roads.

Chart 8-2 Project Transport Task by Road Authority



The results presented in Chart 8-2 indicate that the vast majority (84%) of the Project transport task is anticipated to occur on TMR's and IRC's road networks with 13% on private roads. Very limited travel (i.e. the remaining 3%) is forecast to occur on MRC's, WRC's, TCC's and CHRC's road networks.

8.2.2 TMR's Road Network Project Transport Task

Chart 8-3 provides a stacked summary of the Project's transport task on the State-controlled road network over the Project life by vehicle type within the extent of the SREIS RIA Study Area.

Chart 8-3 Project Transport Task on TMR Road Network by Vehicle Type

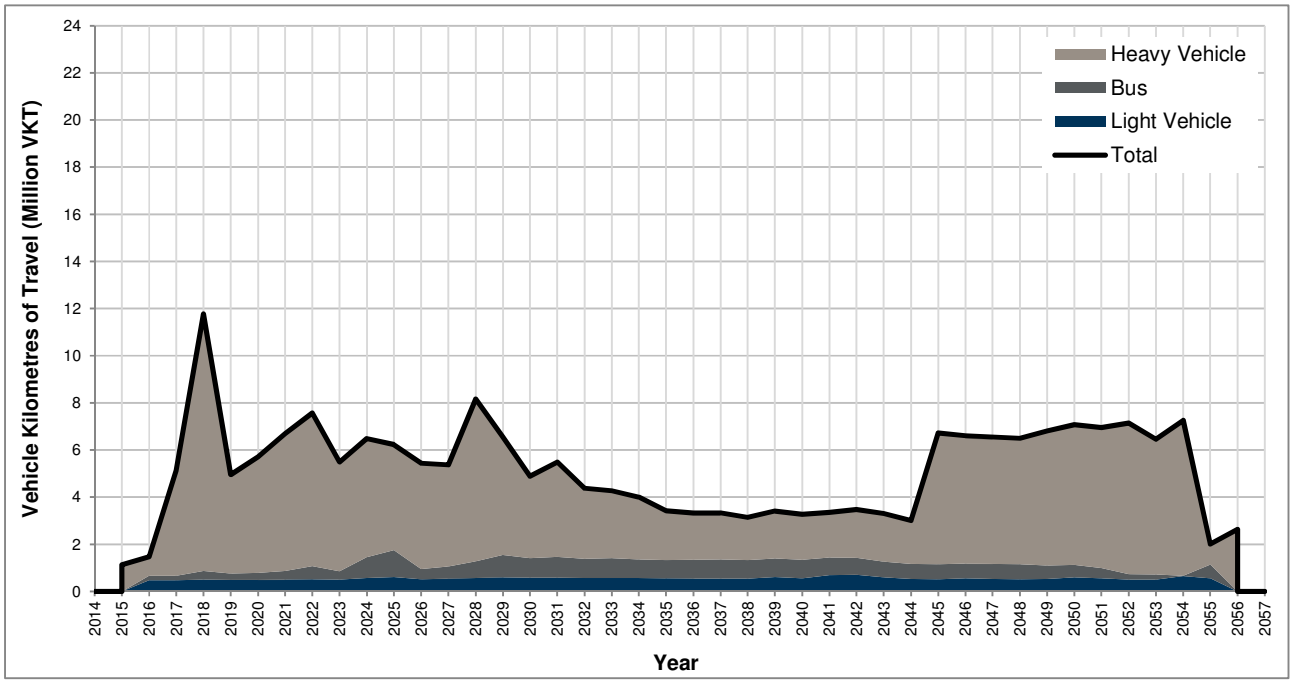


Chart 8-3 identifies that the State-controlled road network is expected to facilitate a higher portion of the Project's heavy vehicle transport task as compared to the Council-controlled road networks. This is a result of the origins and destinations typically associated with heavy vehicle movements being predominately serviced by the strategic State-controlled road network.

Chart 8-4 provides a further breakdown of the Project's transport task anticipated to occur on the State-controlled road network by TMR region including Mackay/Whitsunday Region, former Northern Region and former Fitzroy Region.

Chart 8-4 Project Transport Task by TMR Region

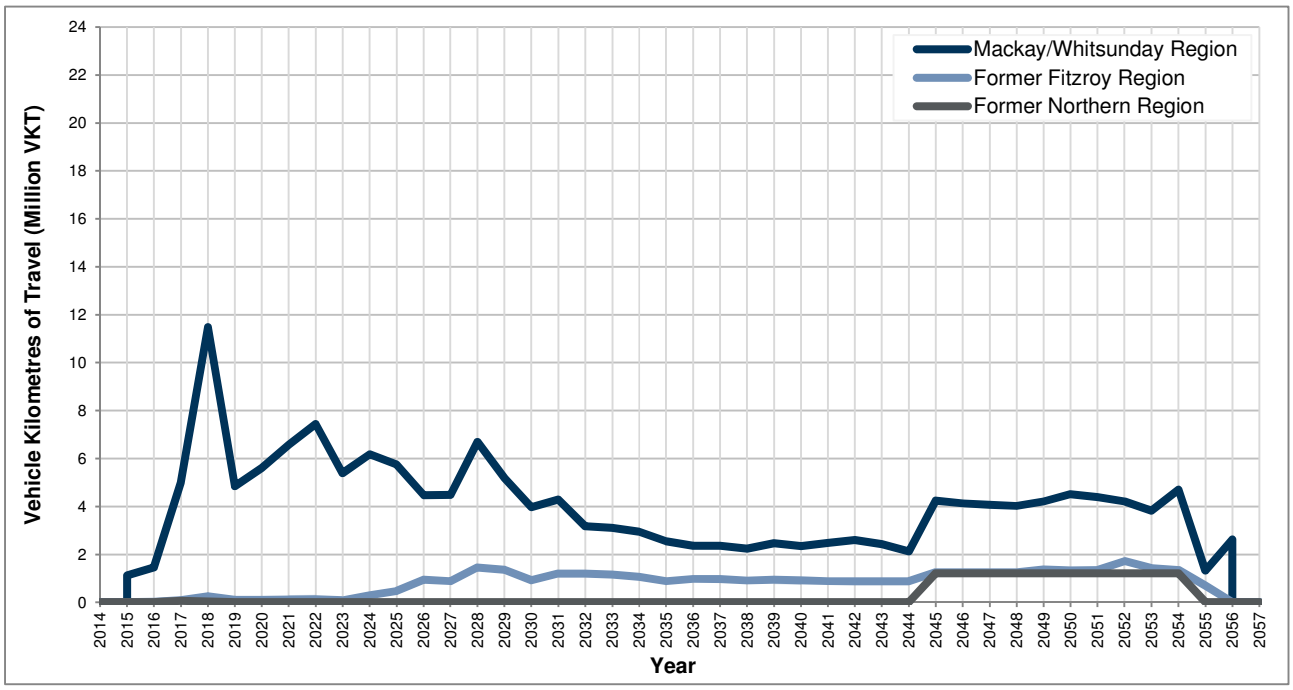


Chart 8-4 identifies that the majority of the Project's transport task on the State-controlled road network is expected to occur on the roads under the jurisdiction of TMR's Mackay/Whitsunday Region. Furthermore, the use of the former Fitzroy Region's road network by Project traffic is not anticipated to significantly occur until around 2024 once activity associated with the Project facilities in the vicinity of Blackwater commences. Finally, the use of the former Northern Region's road network is not anticipated to significantly occur until around 2045 being associated with the worst-case assumption of brine movement to a waste disposal facility in Townsville. It is noted that it is actually expected that a third-party landfill operator will pursue the commercial opportunity of developing a landfill local to the WTFs, and therefore the identified level of travel on the former Northern Region's road may not actually occur.

8.2.3 Comparative Analysis of the Project Transport Task

Chart 8-5 summarises the level of travel anticipated to be generated by the Project on the State-controlled road network as a percentage of the level of travel that occurred within the extents of the SREIS RIA Study Area during 2012 on this network.

Chart 8-5 Project Impact on Existing (2012) Transport Task occurring within SREIS RIA Study Area

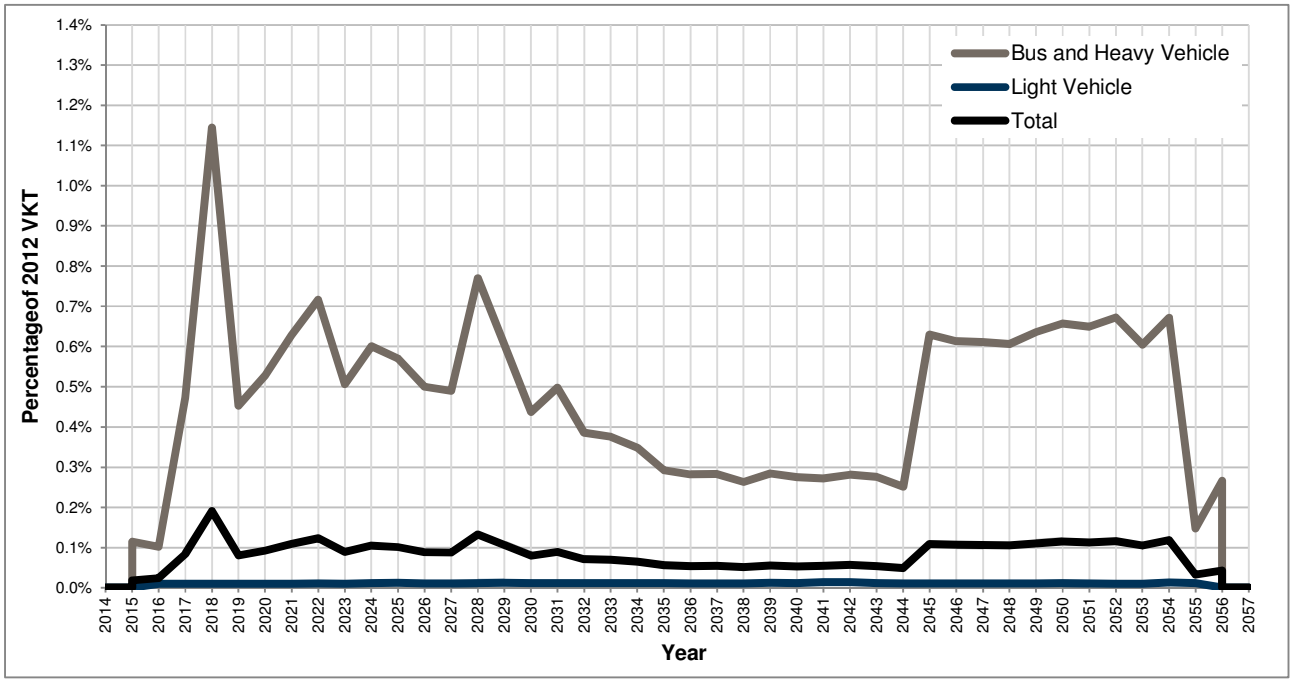


Chart 8-5 indicates that at its peak (around 2018) the Project is anticipated to increase the level of total travel facilitated by the State-controlled road network by approximately 0.2%. Bus and heavy vehicle activity is anticipated to increase by about 1.1% as a result of the Project.

8.3 Forecast Project Traffic Demands

8.3.1 Project Transport Task

Figure 8-2 summarises the total transport task performed by each individual road link over the full Project life. The modelling results presented on Figure 8-2 identify that the key roads servicing the Project will include the Peak Downs Highway, Dysart-Moranbah Road, Suttor Developmental Road, Collinsville-Elphinstone Road, Red Hill Road, Moranbah Access Road and the northern section of Fitzroy Developmental Road. Other roads in and within proximity to the Project development area will generally perform a lower order function from a Project logistics perspective.

8.3.2 Project AADT

Figure 8-3 identifies the average Project AADT demands on each road link over the Project life. The modelling results presented on Figure 8-3 identify that the vast majority of the road network will experience an average increase in AADT of less than 40 vehicles per day as a result of the Project over the full Project life.

Figure 8-4 identifies the peak Project AADT demands for each individual road link over the full life of the Project. The highest peak Project traffic demands are expected to occur on the sections of the road network already identified as being the key roads servicing the Project. That is, the roads which perform the highest total transport task over the life of the Project are also expected to experience the highest peak Project AADT demands.

Figure 8-5 identifies the year in which peak Project AADT demands are anticipated to occur on each individual link. Importantly, the peak Project AADT demands are not anticipated to coincide for each individual road link with the peak demand years instead being generally spread over a 15 year period between 2015 and 2029. The exceptions to this generalisation are the two routes servicing Townsville which are anticipated to experience peak Project AADT demands between 2045 and 2055. The peak Project AADT demands on these two routes are associated with the default worst-case assumption of brine movement to a waste disposal facility in Townsville which has been assessed to occur late in the Project life.

Figures D-1 to D-42 at Appendix D summarise the forecast Project traffic demands for each individual road link for each individual Project year.

8.4 Comparison of EIS RIA and SREIS RIA Project Traffic Demands

Table 8-2 compares the Project traffic demands previously forecast within the EIS RIA as compared to the Project traffic demands now forecast as part of the SREIS RIA for 2045.

Table 8-2 2045 Project Traffic Demands Comparison (EIS RIA vs. SREIS RIA)

Road	Start	End	2045 EIS Project Traffic AADT	2045 SREIS Project Traffic AADT	2045 SREIS as % of 2045 EIS
Peak Downs Highway	Mackay	Nebo	114	22	19%
	Nebo	Fitzroy Developmental Road	72	11	15%
	Fitzroy Developmental Road	Coppabella	72	11-14	15%-19%
	Coppabella	Moranbah	93	14	15%
Capricorn Highway	Rockhampton	Dingo	231	0	-
	Dingo	Blackwater	57	1	2%
Suttor Developmental Road	Nebo	Elphinstone	116	5-25	4%-22%
	Elphinstone	Red Hill Road	265	29	11%
Collinsville - Elphinstone Road	Elphinstone	Glenden	166	13	8%
Collinsville - Elphinstone Road[1]	Glenden	Newlands Mine	166	0	-
Fitzroy Developmental Road	Mount Flora	Middlemount	106	1-5	1%-5%
	Middlemount	Junee Road	214	9	42%
	Junee Road	Dingo	214	1-9	1%-4%
Moranbah - Dysart Road	Moranbah	Dysart	378	18-41	5%-11%
Dysart - Middlemount Road	Dysart	German Creek	357	5-18	1%-5%
	German Creek	Middlemount	320	9	3%

[1]Previously referred to as Newlands Access Road

Table 8-2 identifies that the Project traffic demands forecast as part of the SREIS RIA process are significantly lower at 2045 as compared to the forecasts prepared as part of the EIS RIA process. This difference is largely attributed to the revised Project schedule assessed as part of the SREIS RIA as compared to the EIS RIA.

Table 8-3 compares the previously forecast EIS RIA 2045 Project traffic demands as compared to the peak Project demands forecast to occur on each individual link as part of the SREIS RIA.

Table 8-3 Peak Year Project Traffic Demands Comparison (EIS RIA vs. SREIS RIA)

Road	Start	End	2045 EIS Project Traffic AADT	SREIS Peak Year(s) for Link	SREIS Peak Year Project Traffic AADT	Peak Year SREIS as % of 2045 EIS
Peak Downs Highway	Mackay	Nebo	114	2018	130	114%
	Nebo	Fitzroy Developmental Road	72	2018	97	135%
	Fitzroy Developmental Road	Coppabella	72	2018,2025	53-115	74%-160%
	Coppabella	Moranbah	93	2018	66-95	71%-102%
Capricorn Highway	Rockhampton	Dingo	231	2018	3	1%
	Dingo	Blackwater	57	2026-2028	17-64	89%-112%
Suttor Developmental Road	Nebo	Elphinstone	116	2018	10-70	9%-60%
	Elphinstone	Red Hill Road	265	2018	51	19%
Collinsville - Elphinstone Road	Elphinstone	Glenden	166	2025-2029	37-49	22%-30%
Collinsville - Elphinstone Road[1]	Glenden	Newlands Mine	166	2029	19	11%
Fitzroy Developmental Road	Mount Flora	Middlemount	106	2018, 2021, 2022, 2024, 2028	20-182	19%-172%
	Middlemount	Junee Road	214	2028	21	10%
	Junee Road	Dingo	214	2026, 2028	17-21	8%-10%
Moranbah - Dysart Road	Moranbah	Dysart	378	2018,2030	49-147	13%-39%
Dysart - Middlemount Road	Dysart	German Creek	357	2030, 2049, 2051	13-49	4%-14%
	German Creek	Middlemount	320	2049, 2050	13-16	4%-5%

[1]Previously referred to as Newlands Access Road

Table 8-3 identifies a much higher level of consistency between the peak Project traffic demand forecasts prepared as part of the SREIS RIA as compared to the EIS RIA process. The comparative results still indicate variances between the two traffic forecasts however these differences can be attributed to Project planning refinement and the greater level of modelling sophistication informing the SREIS RIA.

8.5 Forecast Project Pavement Loadings

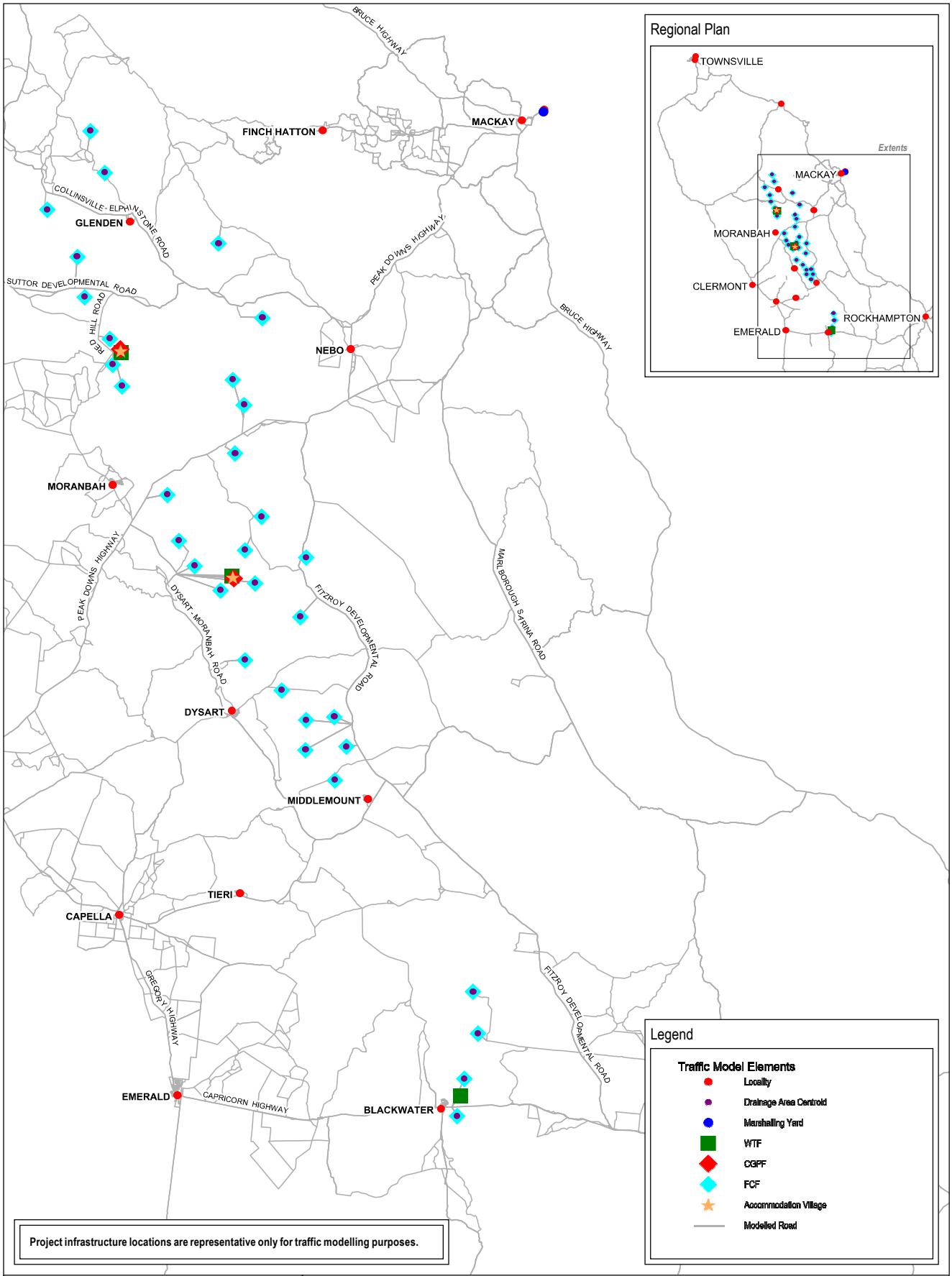
Figure 8-6 summarises the total pavement loadings measured in ESAs for each individual road link over the full life of the Project. The modelling results presented on Figure 8-6 generally align with the key roads servicing the Project identified on Figure 8-2. The forecast pavement loadings utilise loaded and unloaded ESA values for each class. This means that vehicles are conservatively assumed to be fully loaded when loaded.

8.6 Forecast Project Pedestrian and Cyclist Demands

The Project will not significantly 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.

8.7 Forecast Public Transport Demands

The Project will not significantly increase the demand for public transport services and therefore modelling of demands associated with the Project has not been undertaken.



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Bowen Gas Project

08-January-2014

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Traffic Model Elements

Figure No: **8-1**

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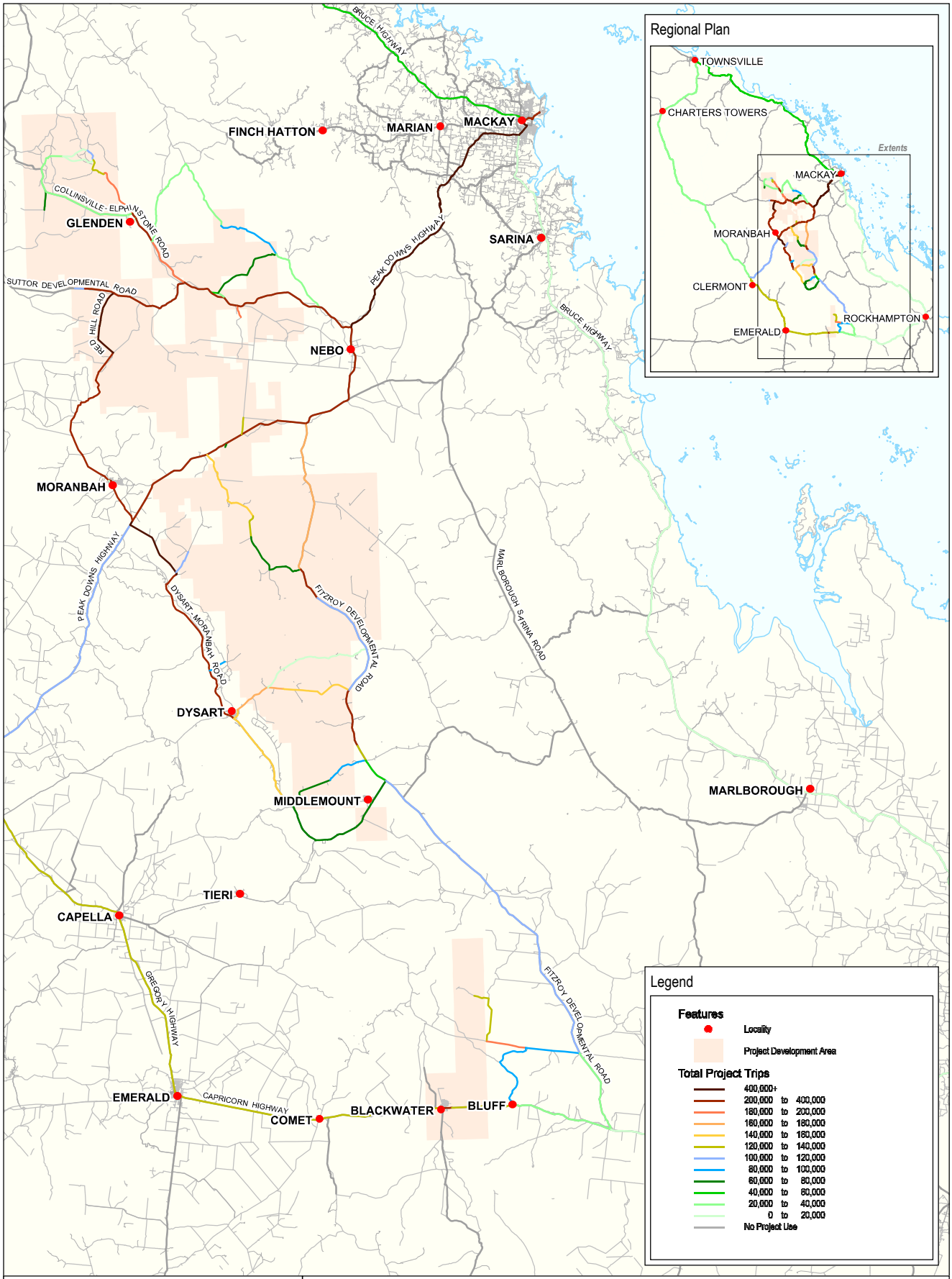

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Project Transport Task (2015-2056)

Figure No:

8-2

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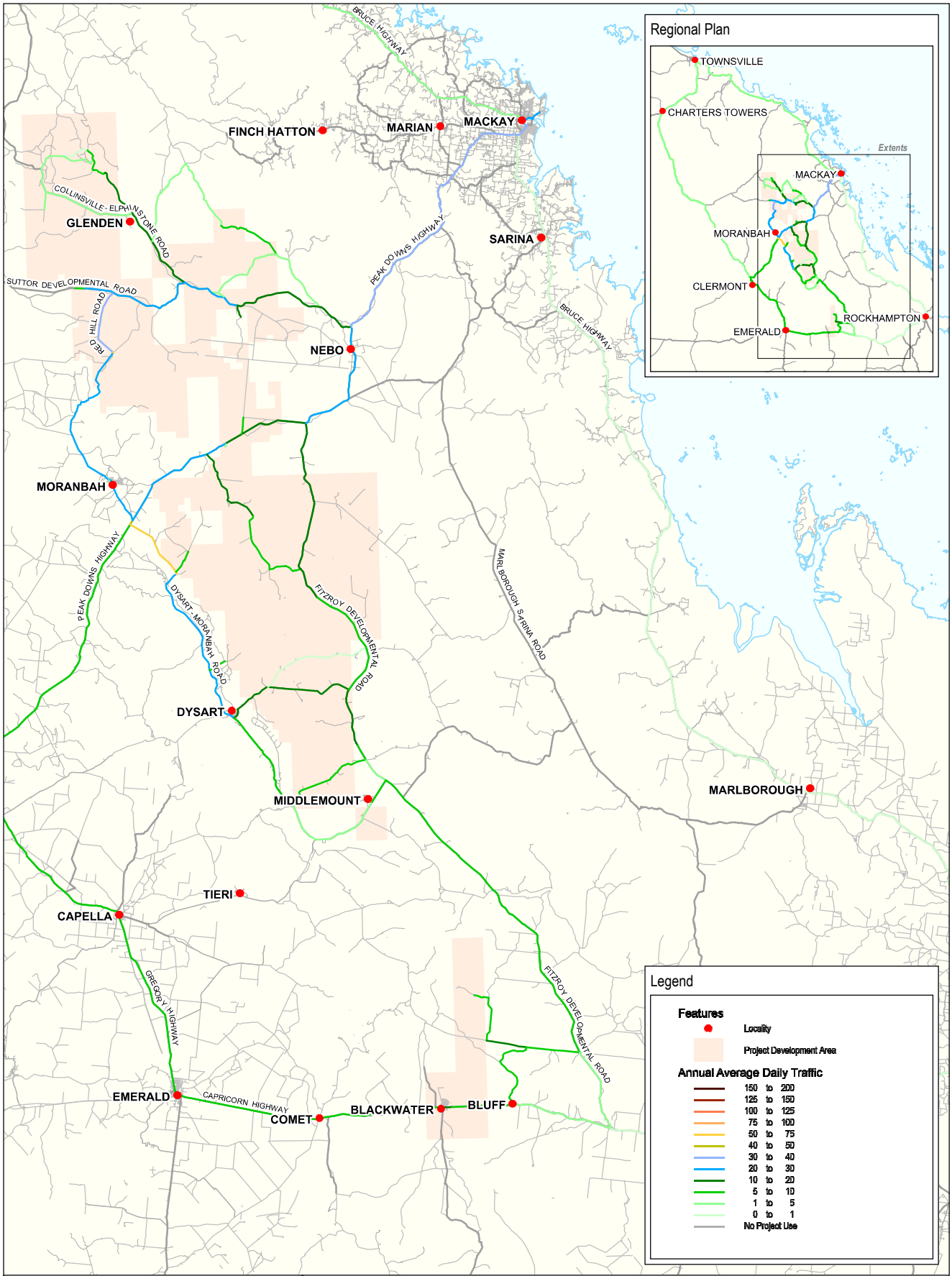

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Average Project AADT (2015-2056)

Figure No:

8-3

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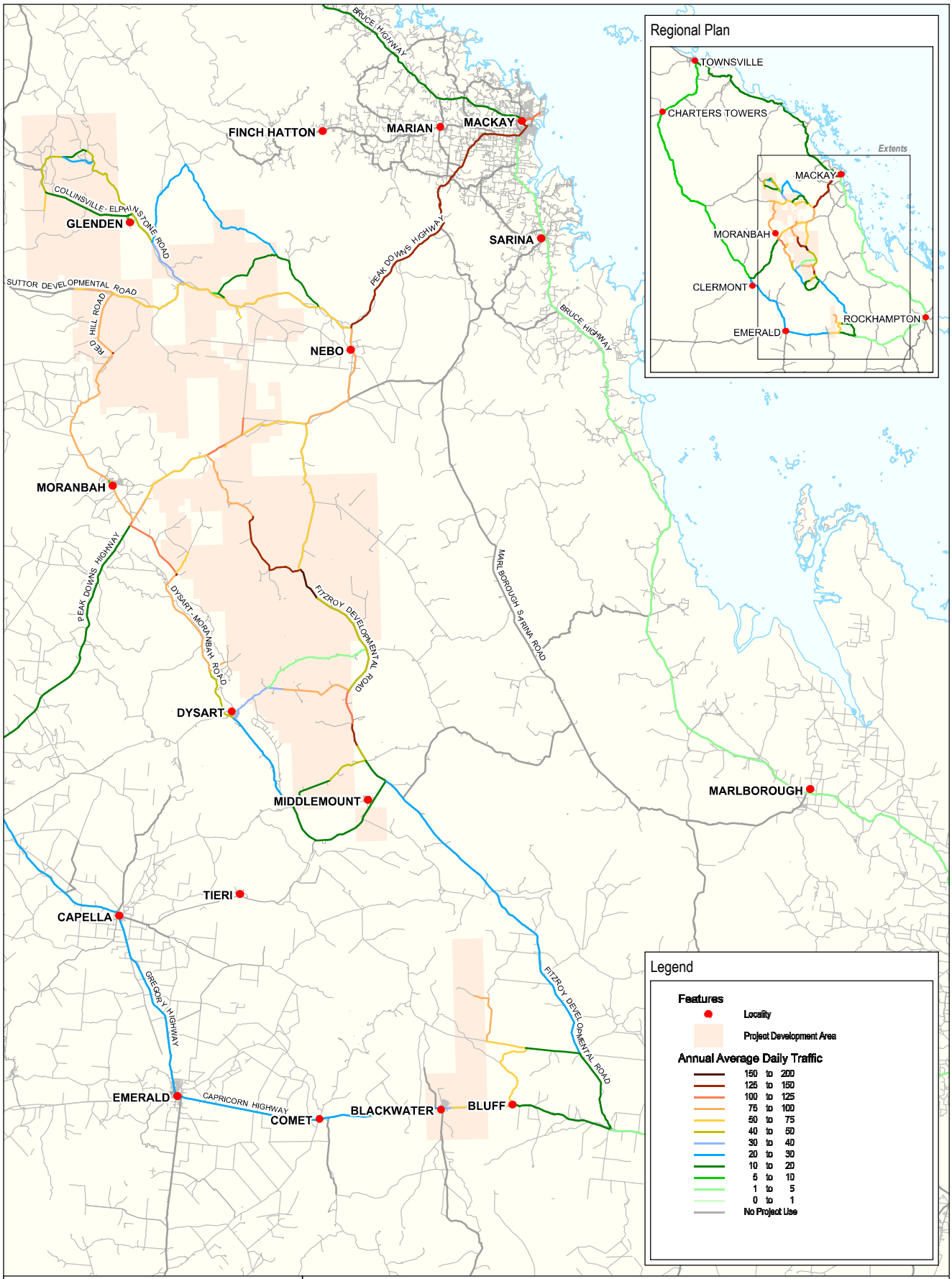

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Maximum Project AADT (Peak Year for Individual Links)

Figure No: **8-4**

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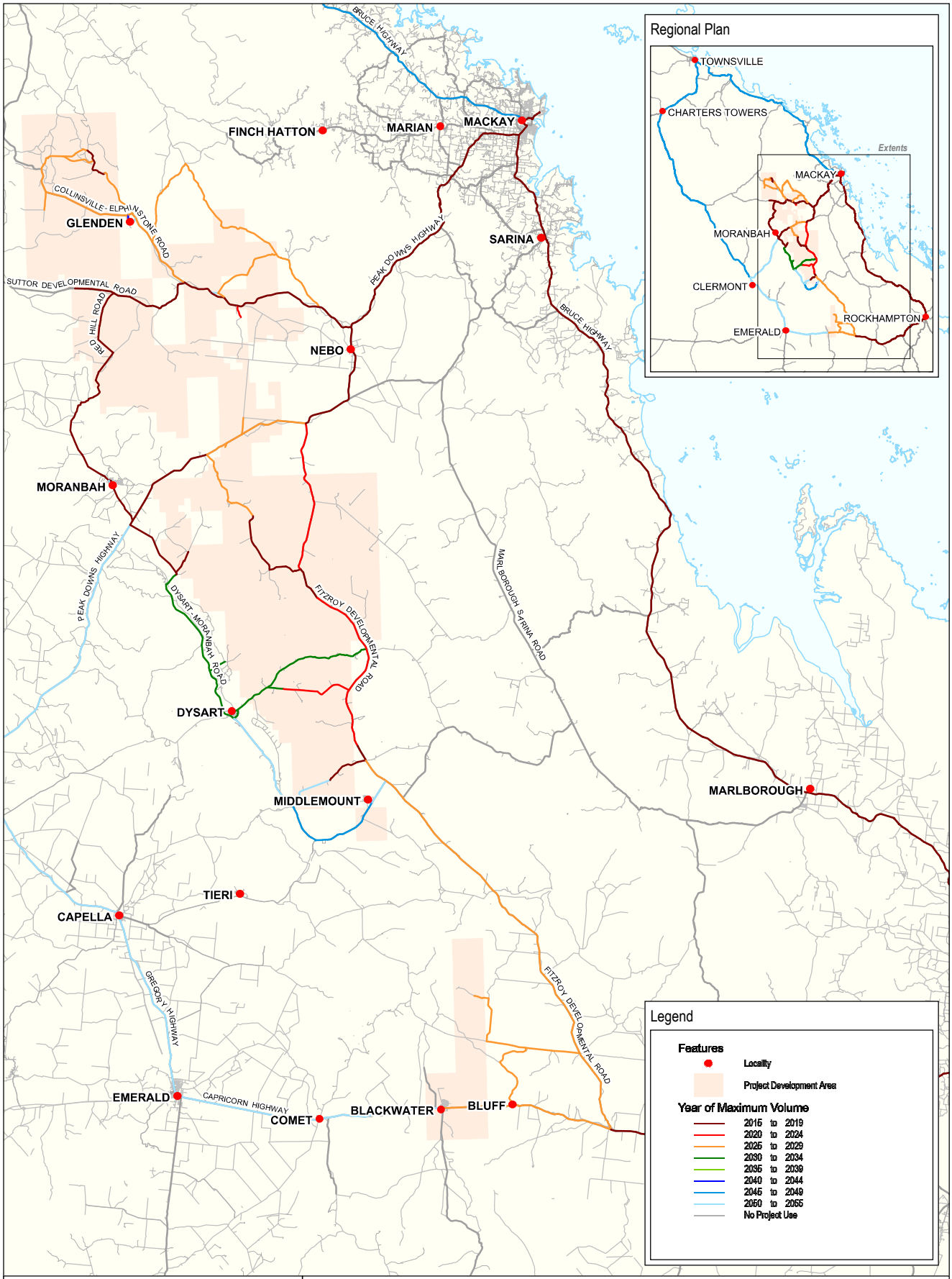

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Year of Maximum Project AADT for Individual Links

Figure No: **8-5**

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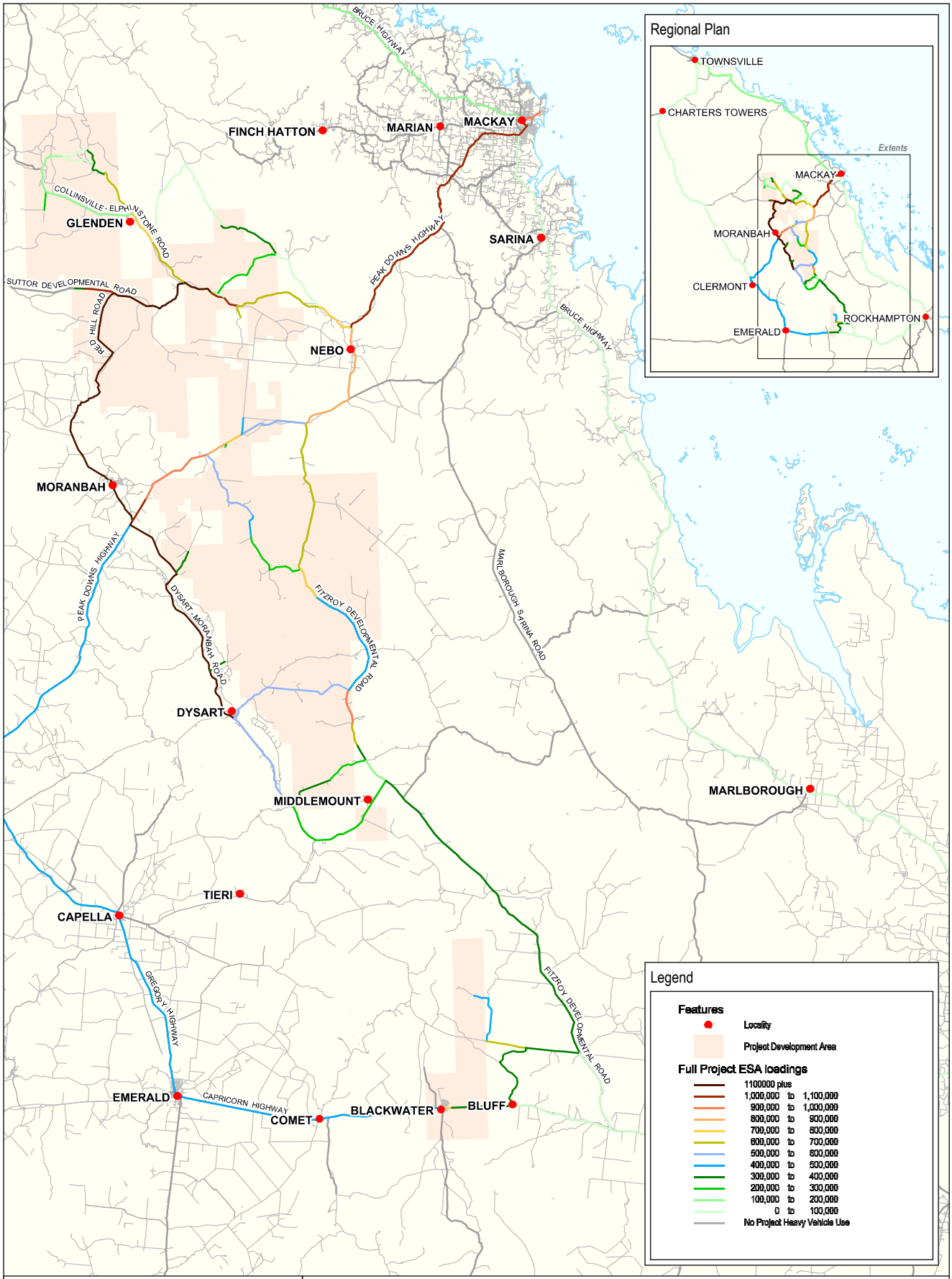

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Total Project Pavement Loadings (2015-2056)

Figure No: **8-6**

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9 Literature Review

9.1 Context

A literature review has been undertaken to collate best practice guidance in relation to appropriate traffic engineering thresholds to maintain the safety, efficiency and service life of the road network. The intent of the review has been to collate contemporary guidance in a concise format to inform the formulation of the planned road management strategies. The guidance is also presented to enable road authorities to interrogate the technical basis of the planned management strategies.

9.2 Best Practice Guidance

Table 9-1 summarises the best practice guidance relied upon when formulating the Project's planned road management strategies. Further details of the guidance are provided in Appendix E for a technical audience.

Table 9-1 Referenced Best Practice Guidance

Aspect	Guidance	Section
Sealed Road	Austroads *Rural Road Design Manual*	E.1.1
Unsealed Road	ARRB *Unsealed Roads Manual Guidelines to Good Practice*	E.1.2
Intersection Performance	TMR *Guidelines for Assessment of Road Impacts of Development* RMS *Guide to Traffic Generating Developments*	E.2.1
Intersection Turn Treatment	Austroads *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*	E.2.2
Intersection Sight Distance	Austroads *Guide to Road Design Part 4A: Unsignalised Intersections*	E.2.3
School Bus Routes	TMR *Guide for the Road Safety Management of Rural School Bus Routes and Bus Stops*	E.3
Rail Crossings	*Australian Level Crossing Assessment Model: Crossing Assessment Handbook*	E.4

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10 Planned Management Strategies

10.1 Overview

Management strategies have been formulated to manage the Project's potential impacts on the safety, efficiency and service life of the road network. The planned management strategies establish generic responses to common engineering situations which are likely to occur over the life of the Project. The strategies are typical responses only and consideration of site constraints will ultimately need to occur to ensure appropriate engineering outcomes are realised at each individual location. Nevertheless, the planned management strategies establish the framework upon which the works ultimately identified in the Post-EIS RIAs and included in the Post-EIS IAs will be determined.

As detailed in the EIS RIA the Post-EIS RMPs will summarise the specific management strategies ultimately required to be implemented at individual locations. The Post-EIS RMPs will be prepared in accordance with TMR's *Road-use Management Plan General Guidelines Document*. In preparing and maintaining the Post-EIS RMPs Arrow will engage with relevant stakeholders including TMR, Councils, Queensland Police Service (QPS), rail authorities, school bus operators and school principals.

The Post-EIS RMPs will include Fit for Use (FFU) Road Registers. The FFU Road Registers will identify the roads currently suitable or suitable after the application of management measures to accommodate Project traffic demands. The FFU Road Registers will also identify, where appropriate, any restricted hours that may apply to the use of individual roads. The FFU inspections will be undertaken prior to roads being significantly utilised by Project traffic and will be informed by road authorities engagement. The Post-EIS RMPs will identify how use of only the defined transport routes will be ensured throughout the life of the Project.

The Post-EIS RMPs will outline the permit condition and escort requirements for over-dimension vehicles and will define measures for vehicle movements particularly during and following wet weather periods. Transportation methods for hazardous and dangerous goods will also be detailed within the Post-EIS RMPs. Fatigue management measures including requirements in relation to induction training and the monitoring of motor vehicles via an In-Vehicle Monitoring System (IVMS) will be detailed. Measures to keep the community updated regarding Project progression and to address community concerns as the Project develops will also be identified.

The planned management strategies are detailed in Table 10-1 to Table 10-7. For example Table 10-2 identifies that typically it is expected that unsealed road sections which form part of the defined access route to a major facility such as a CGPF will be sealed to ensure safe and efficient access to the facility.

10.2 Planned Management Strategies

Table 10-1 Management Strategies for Sealed Road Sections of Defined Access Routes

Facility Type	Strategies
▪ All Facilities	▪ Undertake FFU inspections to identify if the existing condition of the sealed sections of the defined access route is suitable for the anticipated vehicle types and demands. ▪ Summarise any significant works required in Post-EIS RMPs and identify the value and timing of significant works in Post-EIS IAs. ▪ Establish within Post-EIS IAs contributions as appropriate towards increased pavement activities along the defined access route.
▪ Well Site ▪ Gathering Infrastructure ▪ FCF	Implement requirements applicable to all facilities plus: ▪ Implement, as appropriate, temporary road management measures along the defined access route.
▪ CGPF ▪ WTF ▪ TWAF	Implement requirements applicable to all facilities plus: ▪ Upgrade, as appropriate, the defined access route to a sealed two lane standard including sealed shoulders with appropriate line marking.

Table 10-2 Management Strategies for Unsealed Road Sections of Defined Access Routes

Facility Type	Strategies
▪ All Facilities	▪ Undertake FFU inspections to identify if the existing condition of the unsealed sections of the defined access route is suitable for the anticipated vehicle types and demands. ▪ Summarise any significant works required in Post-EIS RMPs and identify the value and timing of significant works in Post-EIS IAs. ▪ Establish within Post-EIS IAs an obligation to restore unsealed road sections along the defined access route to no worse a state of repair as compared with the condition at the start of significant Project activity. ▪ Establish within Post-EIS IAs contributions as appropriate towards increased road maintenance activities along the defined access route. ▪ Mitigate to the greatest extent feasible dust generated by Project traffic along the defined access route to minimise impacts to road safety and nearby homesteads.
▪ Well Sites ▪ Gathering Infrastructure ▪ FCF	Implement requirements applicable to all facilities plus: ▪ Implement, as appropriate, temporary road management measures along the defined access route.
▪ CGPF ▪ WTF ▪ TWAF	Implement requirements applicable to all facilities plus: ▪ Upgrade, as appropriate, the defined access route to a sealed two lane standard including sealed shoulders with appropriate line marking. Alternatively establish an agreement with the road authority to maintain the defined access route to a well maintained gravelled road standard.

Table 10-3 Management Strategies for Intersections along Defined Access Routes

Facility Type	Strategies
▪ All Facilities	▪ Undertake FFU inspections to identify if the existing condition of the intersections along the defined access route is suitable for the anticipated vehicle types and demands. ▪ Summarise any significant works required in Post-EIS RMPs and identify the value and timing of significant works in Post-EIS IAs. ▪ Ensure appropriate sight distances are achieved at intersections along the defined access route.
▪ Well Site ▪ Gathering Infrastructure ▪ FCF	Implement requirements applicable to all facilities plus: ▪ Implement, as appropriate, temporary traffic control measures at intersections along the defined access route.
▪ CGPF ▪ WTF ▪ TWAF	Implement requirements applicable to all facilities plus: ▪ Construct, as appropriate, turn lane treatments at intersections along the defined access route. The use of short turn lane treatments is to be avoided where possible.

Table 10-4 Management Strategies for Rail Crossings along Defined Access Routes

Facility	Strategies
All Facilities	▪ Consult with rail authorities and where appropriate undertake a threshold assessment to determine if upgrading of a rail crossing is warranted. ▪ Implement, as appropriate, temporary traffic control measures or other works as determined from the threshold assessment. ▪ Summarise any significant works required in Post-EIS RMPs.

Table 10-5 Management Strategies for Bridges along Defined Access Routes

Facility	Strategies
All Facilities	▪ Consult with road authorities to confirm the location of sub-standard bridges for the anticipated vehicle types and demands along the defined access route. ▪ Undertake FFU inspections, as appropriate, to confirm the existing condition of the bridges along the defined access route. ▪ Investigate, as appropriate, alternative routes which avoid the use of sub-standard bridges. ▪ Summarise any significant bridge works required in Post-EIS RMPs and identify the value and timing of significant works in Post-EIS IAs.

Table 10-6 Management Strategies for School Bus Routes along Defined Access Routes

Facility	Strategies
All Facilities	▪ Identify within the Post-EIS RMPs FFU Roads Register the road sections along which school buses operate. ▪ Identify within the Post-EIS RMPs measures to limit or manage Project traffic on the road sections utilised by school bus routes during pick-up and set-down times on school days. ▪ Inform the Project workforce of the presence of school bus routes as well as typical pick-up and drop-off times.

Table 10-7 Management Strategies for Stock Routes along Defined Access Routes

Facility	Strategies
All Facilities	▪ Realign or replace any permanent disruptions to the stock route network with corridors of similar width and suitable country type to allow for the uninterrupted flow of travelling stock. ▪ Rehabilitate any part of the stock route network disturbed or affected by Project activities including the provision of native vegetation including pastures to return the stock route to its natural state. ▪ Consider the interaction between stock and freight routes and implement risk management procedures as necessary including increased signage and communications with land owners on the location of stock.

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11 Management Strategies Application

11.1 Overview

This section applies the planned management strategies documented in Section 10 to the defined access routes servicing case study Project facility locations to provide “real-world” examples of the road network outcomes achieved. It is noted that the assessed case study project sites and the associated defined access routes are representative only and subject to further environmental, social, engineering and commercial constraints analysis during detailed Project planning post-EIS approval.

11.2 Case Study Management Strategy Applications

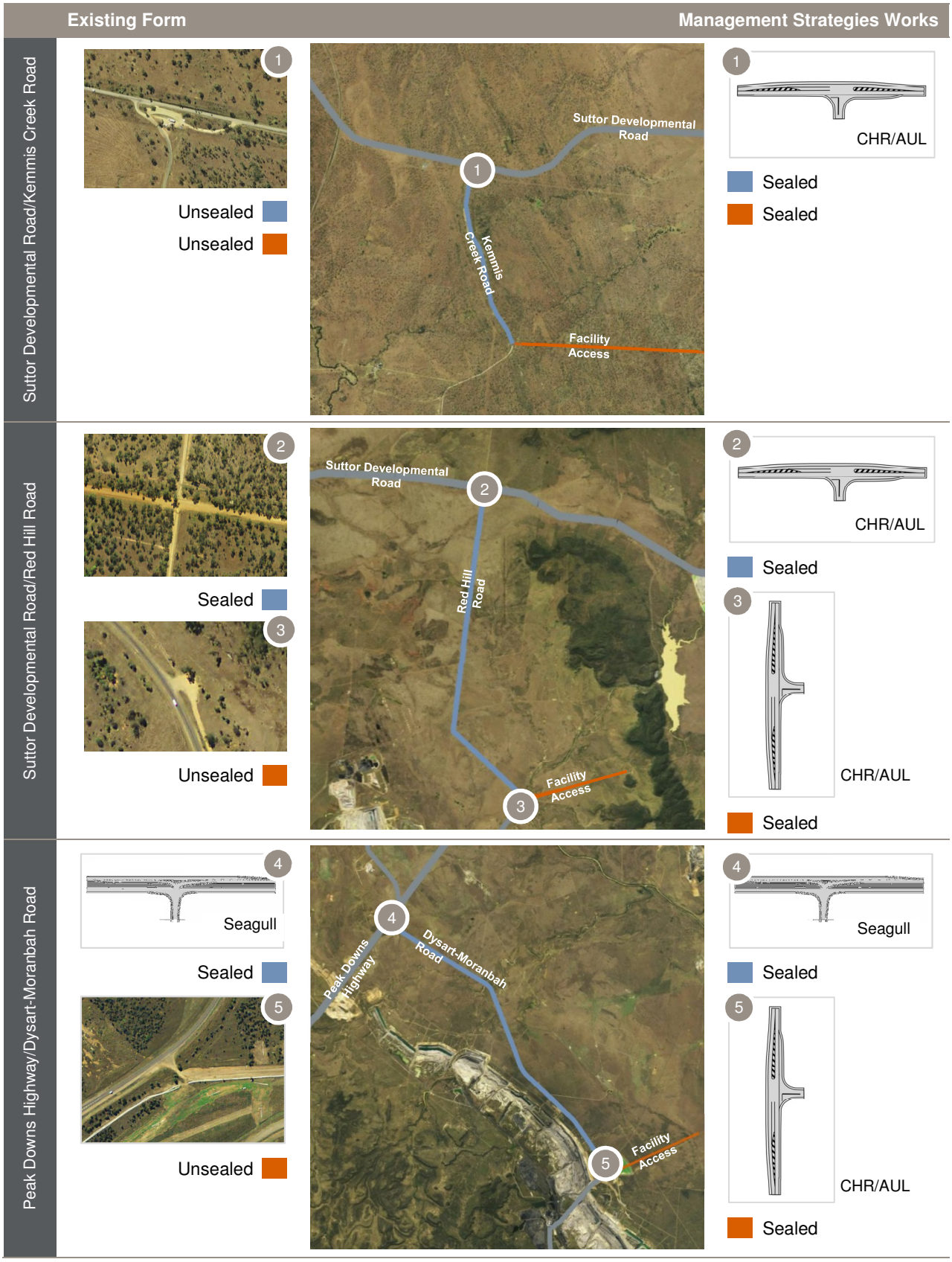
Field inspections were undertaken during October 2013 to inform the case study application of the planned management strategies. During the field inspection preliminary defined access routes were identified for each of the case study Project facility locations based on the existing road conditions. The planned management strategies have been applied to each of the defined access routes servicing the case study locations.

As an example Table 10-2 outlines the following management strategies for the unsealed road sections of the defined access route servicing a major facility such as a CGPF:

- Undertake FFU inspections to identify if the existing condition of the unsealed sections of the defined access route is suitable for the anticipated vehicle types and demands.
- Upgrade, as appropriate, the defined access route to a sealed two lane standard including sealed shoulders with appropriate line marking. Alternatively establish an agreement with the road authority to maintain the defined access route to a well maintained gravelled road standard.
- Summarise any significant works required in Post-EIS RMPs and identify the value and timing of significant works in Post-EIS IAs.
- Establish within Post-EIS IAs contributions as appropriate towards increased road maintenance activities along the defined access route.
- Establish within Post-EIS IAs an obligation to restore any road sections not ultimately sealed along the defined access route to no worse a state of repair as compared with the condition at the start of significant project activity.
- Mitigate to the greatest extent feasible dust generated by Project traffic on any road sections not ultimately sealed along the defined access route to minimise impacts to road safety and nearby homesteads.

Figure 11-1 provides a summary of the collective outcome of applying the planned management strategies to the defined access routes servicing the case study project sites. It is important to note that for the unsealed sections of the defined access routes an agreement could alternatively be established with road authorities to maintain the unsealed road sections to a well maintained gravelled road standard. This would include an obligation to restore roads to no worse a state of repair as compared with the condition at the commencement of significant Project activities and to mitigate the generation of dust by Project traffic.

Figure 11-1 Management Strategies Case Study Outcomes



12 Traditional Traffic Engineering Assessment

12.1 Overview

The SREIS RIA expands upon the work previously undertaken as part of the EIS RIA by documenting both a traditional traffic engineering assessment in addition to an updated environmental values assessment. Both assessments undertaken to support the SREIS RIA seek to determine the significance of the residual road impacts post-application of typical approval conditions and post-implementation of the planned management strategies. The inclusion of both approaches within the SREIS RIA provides road authorities greater certainty that the impact of the Project can be effectively managed.

The traffic engineering requirements applied in this assessment are consistent with 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 can reasonably be conditioned.

12.2 Scoping Assessment

A scoping assessment has been undertaken to identify the extent of the road network over which Project traffic demands may potentially significantly increase surveyed traffic demands in accordance with GARID requirements. The GARID states that road impacts should be considered at all direct accesses to the road network. In addition, the GARID stipulates that all intersections and links where Project traffic demands exceed 5% of surveyed traffic demands should also be assessed.

Figure 12-1 identifies the locations at which Project traffic demands are anticipated to increase existing AADT traffic demands (2012) by 5% or more. The SREIS RIA scoping assessment is based upon consideration of the Project's maximum traffic impact on each individual road link for all years of the Project, not for a single Project year as previously documented in the EIS RIA. In addition, the SREIS RIA scoping assessment is based upon unadjusted 2012 surveyed traffic demands. That is, the reported proportional impact of Project traffic demands is relative to 2012 surveyed traffic demands not 2045 forecast baseline traffic demands as previously reported in the EIS RIA.

The SREIS RIA scoping assessment identifies that the Project has the potential to increase existing AADT demands on three State-controlled roads being Fitzroy Developmental Road, Collinsville-Elphinstone Road and Suttor Developmental Road. This finding is generally consistent with the outcome previously documented within the EIS RIA which identified that the Project has the potential to increase baseline AADT demands on a limited number of roads.

12.3 Level of Service Assessment

Level of service relates to the operating conditions encountered by traffic. It is a qualitative measure of factors such as speed, trip time, interruptions, interference, freedom to overtake, ability to manoeuvre, safety, comfort, convenience and vehicle operating costs.

The performance of the scoped road links were analysed including and excluding project traffic using the link level of service methodology detailed in Austroad's *Guide to Traffic Engineering Practice Part 2 Roadway Capacity.* Table 12-1 identifies the level of service for each scoped link during the future year in which Project traffic demands are forecast to be greatest for each individual link. The level of service assessment accounts for the traffic growth associated with the cumulative impact of other projects.

Table 12-1 Level of Service Assessment for Significantly Impacted Road Sections

Road	Chainage	Baseline Level of Service	With Project Level of Service
Collinsville-Elphinstone Road (5307)	23.124km to 29.71km	A	A
	55.116km to 79.739km	A	A
Suttor Developmental Road (82A)	0km to 88.65km	A	A
Fitzroy Developmental Road (85C)	133.155km to 147.285km	A	A
	182.775km to 192.12km	A	A

Table 12-1 identifies that all scoped road sections will continue to operate at a level of service "A" irrespective of the presence of Project traffic demands. The level of service assessment has therefore identified that while Project traffic demands are likely to significantly increase baseline traffic demands on sections of the road network; this increase is unlikely to significantly affect the level of service afforded by the assessed road network. This finding is generally consistent with the outcome previously documented within the EIS RIA which also identified that the Project would not significantly affect the level of service afforded by the road network.

It is therefore concluded that the scale of traffic demand increases associated with the Project can be effectively managed through the application of typical EIS approval requirements including the obligation to reassess potential impacts during detailed design within Post-EIS RIAs.

12.4 Pavement Impact Assessment

Proponents are typically required to make contributions towards road authorities having to undertake increased pavement activities as a result of the pavement loadings associated with Project traffic. Contributions are typically required towards the costs associated with both significantly increased annual pavement maintenance activities and the costs associated with significantly bringing forward the timing of pavement rehabilitation activities.

Figure 12-2 identifies the potential increase in pavement maintenance activities based on the increase in future pavement loadings and accounting for the proportion of maintenance activity attributable to heavy vehicle activity. The reported impact is the worst-case impact for the two travel directions of each individual road link. Figure 12-3 summarises the extents over which Project pavement loadings are likely to significantly increase future pavement maintenance activities by more than 5% for any year of the Project. Chart 12-1 identifies the length of the State-controlled road network over which Project traffic demands are likely to significantly increase future pavement maintenance activities for each Project year.

Chart 12-1 Road Length Over Which The Project May Significantly Increase Maintenance Activity

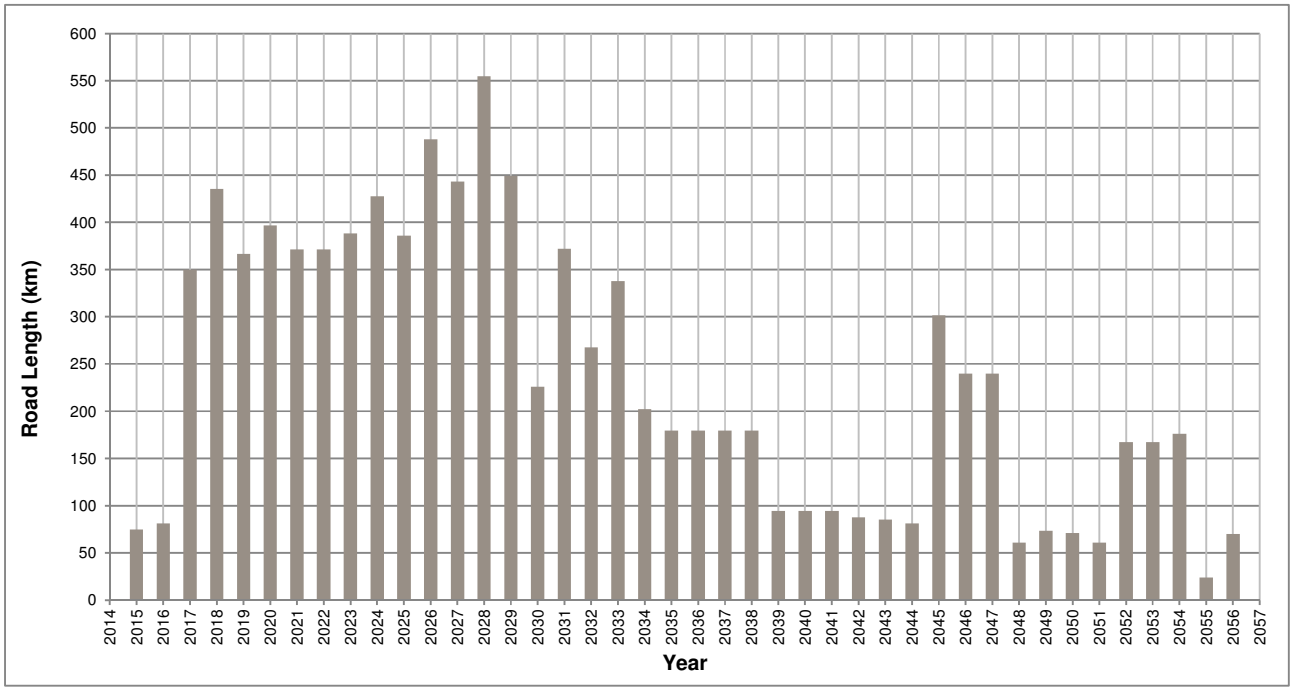


Chart 12-1 indicates that in any year, the greatest extent of road network likely to be impacted is 555km in 2028 (of approximately 7,850km of the State-controlled road network contained within the SREIS RIA Study Area). Therefore, while Figure 12-3 identifies maintenance impacts over 708km of the State-controlled road network, the data presented in Chart 12-1 confirms that the peak impact year for individual links will not all coincide.

As a reality check of the maintenance impact analysis it was previously identified in Chart 8-5 that the Project would increase the existing level of heavy vehicle and bus activity occurring on the State-controlled road network within the SREIS RIA Study Area by approximately 1.1%. As pavement maintenance and rehabilitation activity is typically attributed to heavy vehicle loadings and environmental effects, the estimate identified in Chart 8-5 provides a basic indication of the potential impact of the Project. Comparison of the results presented in Chart 8-5 and Chart 12-1 indicates that they broadly align and therefore provides road authorities confidence that the impact of the Project on pavement maintenance activities has been accurately forecast.

Figure 12-4 identifies the reduction in pavement service life as a result of the pavement loadings associated with Project traffic. In accordance with TMR's GARID, Projects are defined as having a significant impact on the timing of pavement rehabilitation only where the acceleration time exceeds one year. Figure 12-5 summarises the road segments for which the Project traffic demands are likely to significantly impact the forecast timing of rehabilitation activities (i.e. bring forward required rehabilitation activities by more than one year). The reported impact is the worst-case impact for the two travel directions of each individual road link.

The SREIS RIA pavement analysis indicates that the traffic demands associated with the Project are likely to have a significant impact on TMR's pavement maintenance and rehabilitation activities. This finding is different to the outcome previously documented within the EIS RIA which did not specifically consider the impact that Project traffic demands would have on pavement maintenance and rehabilitation activities.

An indicative proponent contribution towards pavement activities could not be determined as part of the SREIS RIA assessment due to pavement maintenance data not being supplied for the majority of the assessed State-controlled road network. The alternative use of placeholder maintenance data is unlikely to enable a sufficiently accurate estimate to provide meaningful insight. Previous investigations have indicated that generic maintenance rate data historically supplied by road authorities enables limited insight. The analysis presented herein is nevertheless sufficient to indicate the scale of the Project's impact on pavement maintenance and rehabilitation activities.

The Project's identified level of impact on pavement maintenance and rehabilitation activities is able to be readily and effectively managed through the application of typical EIS requirements including the obligation

to enter into Post-EIS IAs with road authorities. The Post-EIS RIAs will need to identify the exact contributions to be captured within the Post-EIS IAs to offset the costs associated with the increased level of pavement activities generated by Project traffic demands. The establishment of contributions will ensure that there are no significant residual impacts.

Appendix F presents further details of the pavement impact assessment analysis for a technical audience.

12.5 Case Study Traditional Traffic Engineering Assessments

Road standard assessments were undertaken for the preliminary defined access routes for several case study Project sites based upon applying typical traffic engineering practice requirements. The identification of the works required along the defined access routes demonstrates that the planned management strategies deliver outcomes exceeding or at least meeting typical engineering practice requirements. Field inspections were undertaken during October 2013 to inform the traffic engineering case study assessments. This included a detailed review of various road cross-section and intersection geometry aspects including, for example, available sight distances. In addition, a desktop review of historical crash data was completed. The intent of the assessment was to identify if any road deficiencies exist which warrant road upgrades to ensure safe and efficient transport along the defined access routes to the case study project sites.

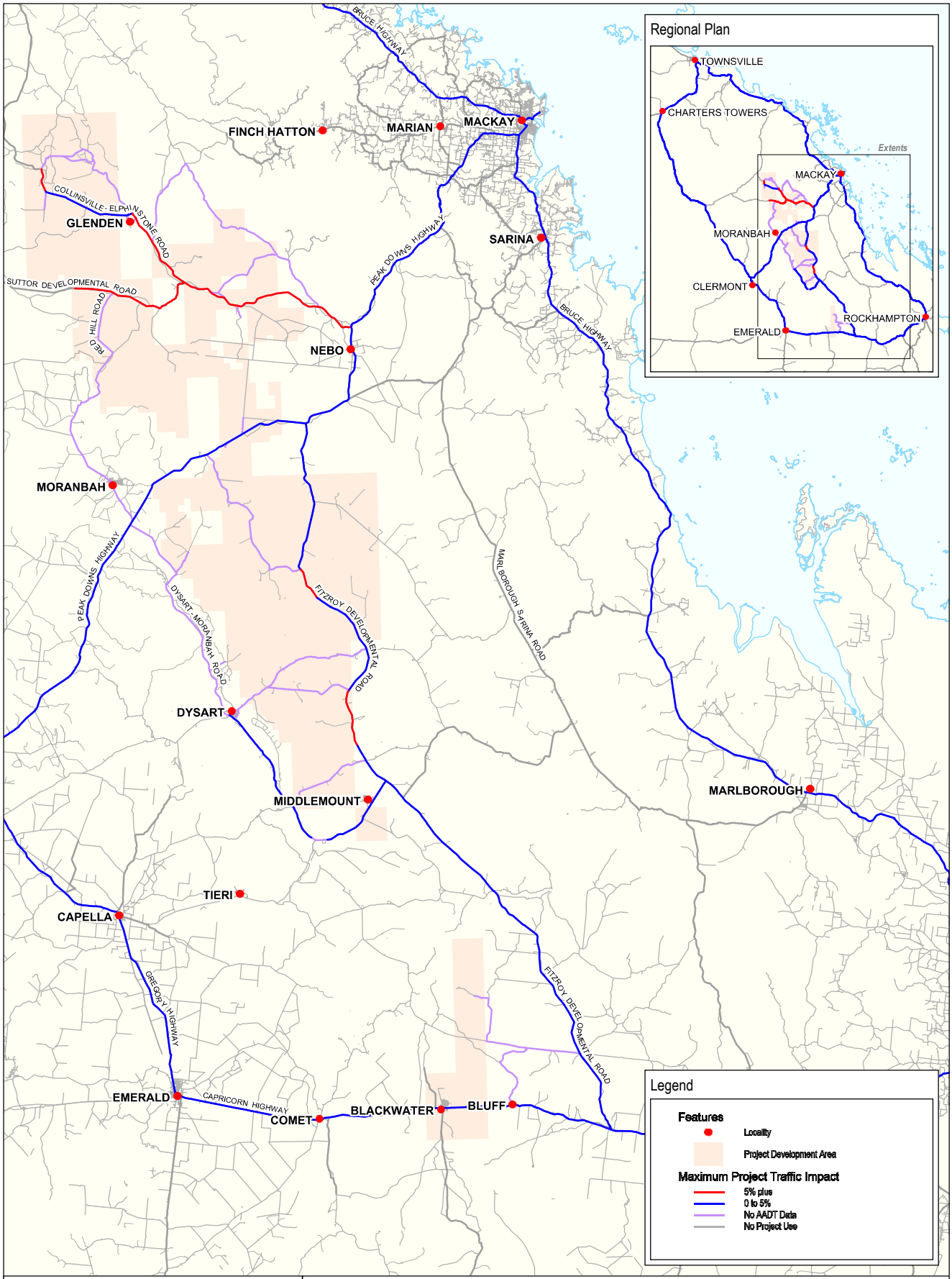
Intersection turn warrant and performance analysis was also undertaken for each of the key intersections along the defined access routes servicing the case study project sites. The intent of the turn warrant analysis was to identify the turn lane treatments that would be required to safely and efficiently accommodate Project traffic demands. The intent of the intersection capacity analysis was to quantify the impact of Project traffic demands on the operation of the assessed intersections (e.g. vehicular delays and queues) and to identify any required intersection upgrades.

The collective outcome of the various components of the road standard assessments are summarised on Figure 12-5. The results presented on Figure 12-5 indicate that the application of standard traffic engineering requirements would warrant the provision of upgraded road infrastructure at the assessed case study locations. This includes the potential provision of upgraded sealed roads and intersection forms. This finding is different to that presented within the EIS RIA which did not identify the requirement for any specific road works to facilitate safe and efficient access to Project facilities.

The intent of the traffic engineering case study assessment is to establish the works likely to be required along the preliminary defined access routes servicing the case study project sites based upon standard traffic engineering practice requirements. This enables a comparison of the case study outcomes obtained via the application of the planned management strategies to typical traffic engineering practice requirements to be provided in Section 13.

The traffic engineering case study assessment does not seek to identify all of the proponent funded works and contributions ultimately required to facilitate safe and efficient access to Project facilities. Identification of these works at this time is premature as the specific location of all facilities and the exact Project schedule is yet to be finalised. The Post-EIS RIAs will instead identify the precise works required to support the Project which will ultimately inform the Post-EIS IAs.

Appendix G presents further details of the analysis road standard analysis for a technical audience.



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Scoping Assessment

Figure No:

12-1

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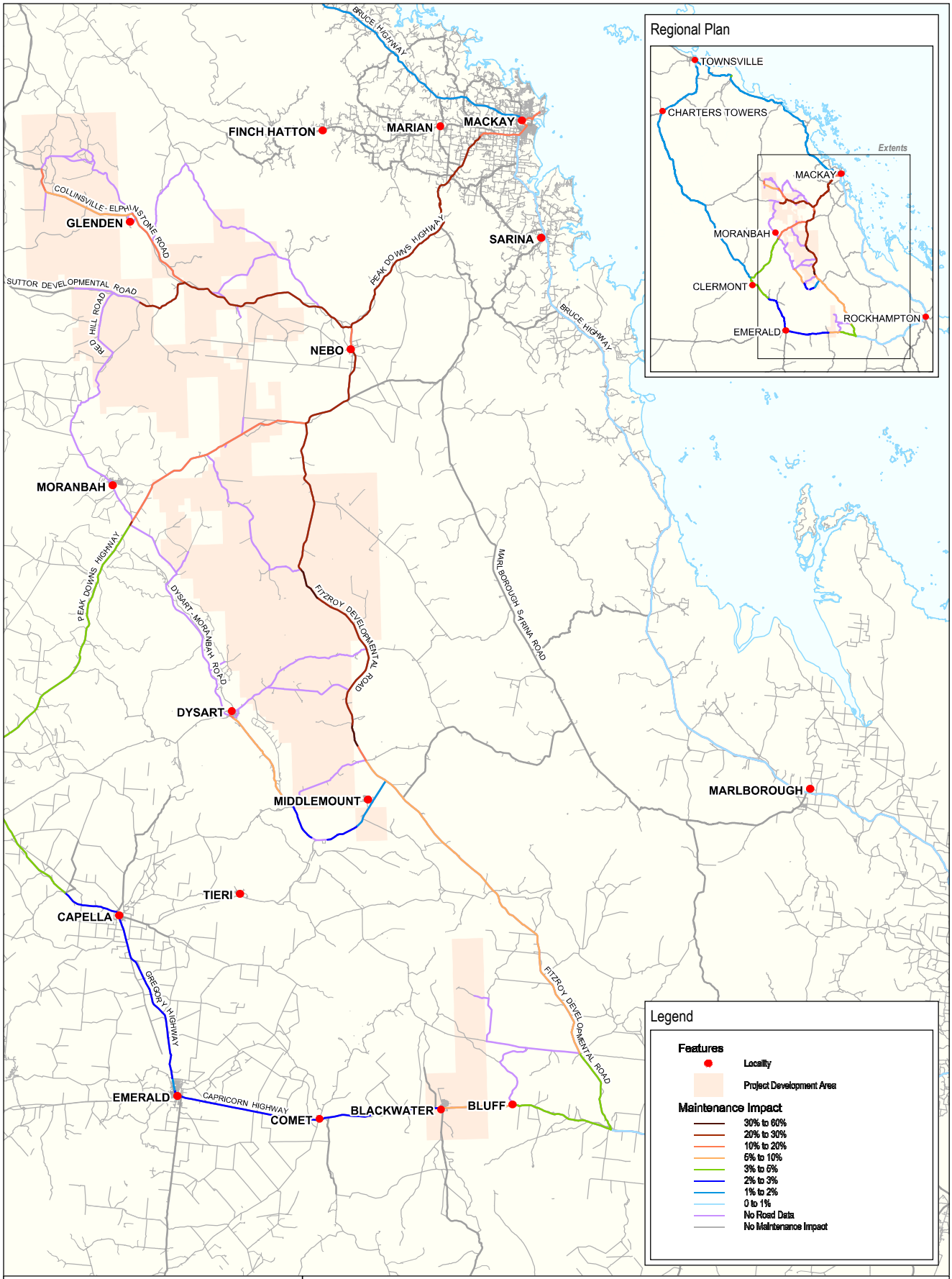

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Peak Annual Maintenance Impact

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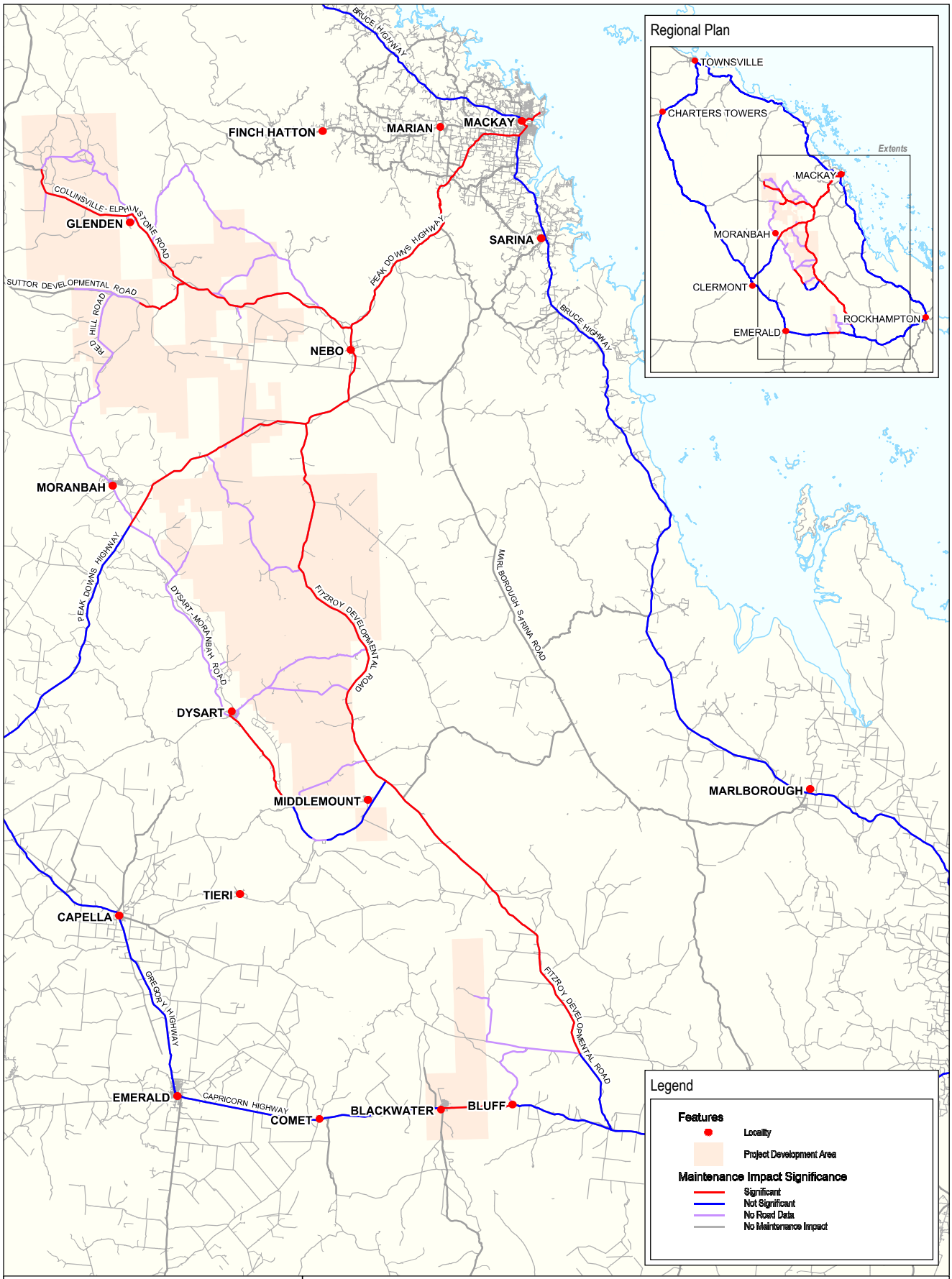

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Peak Annual Maintenance Impact Significance

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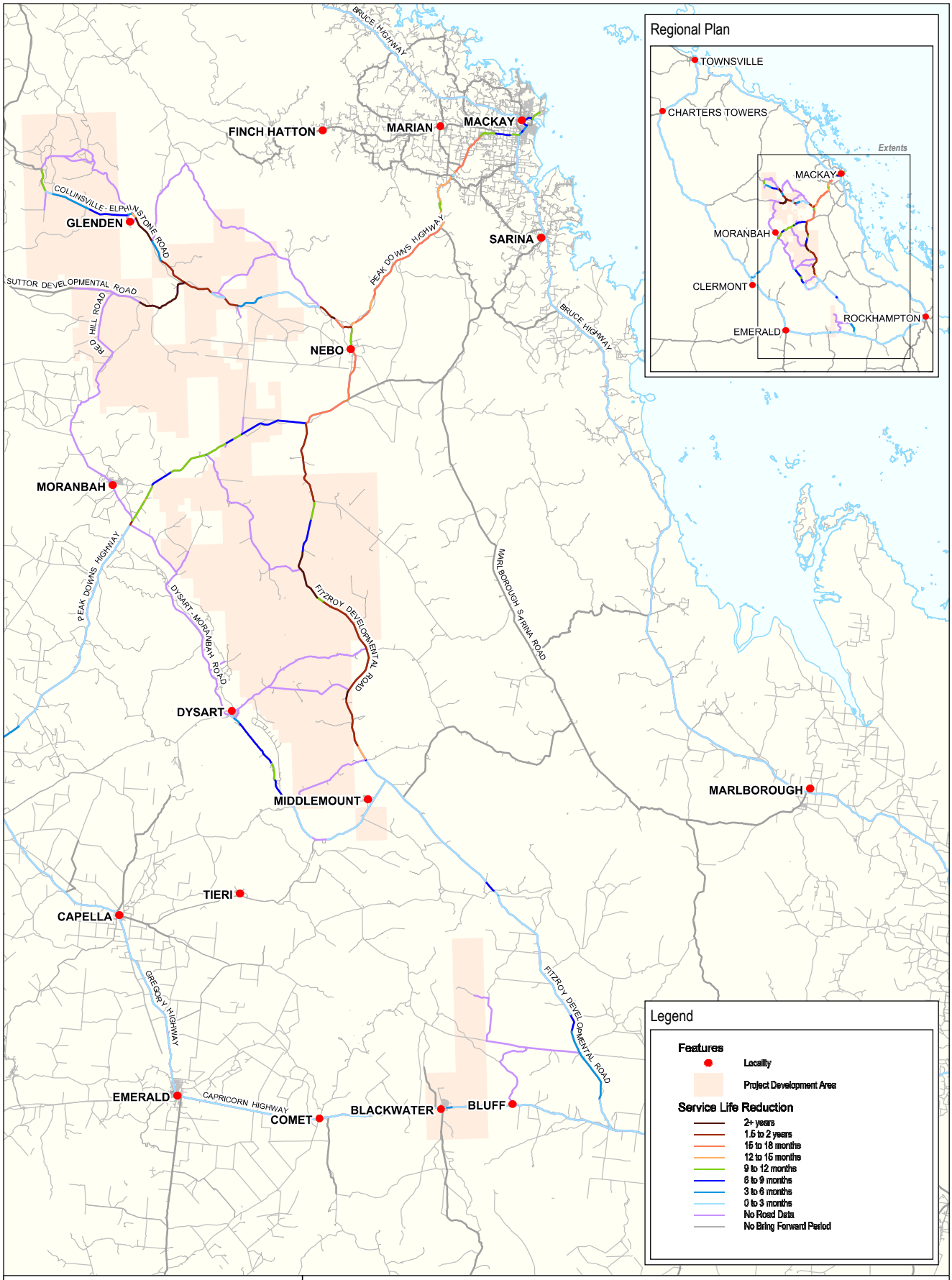

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Pavement Service Life Reduction

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12-4

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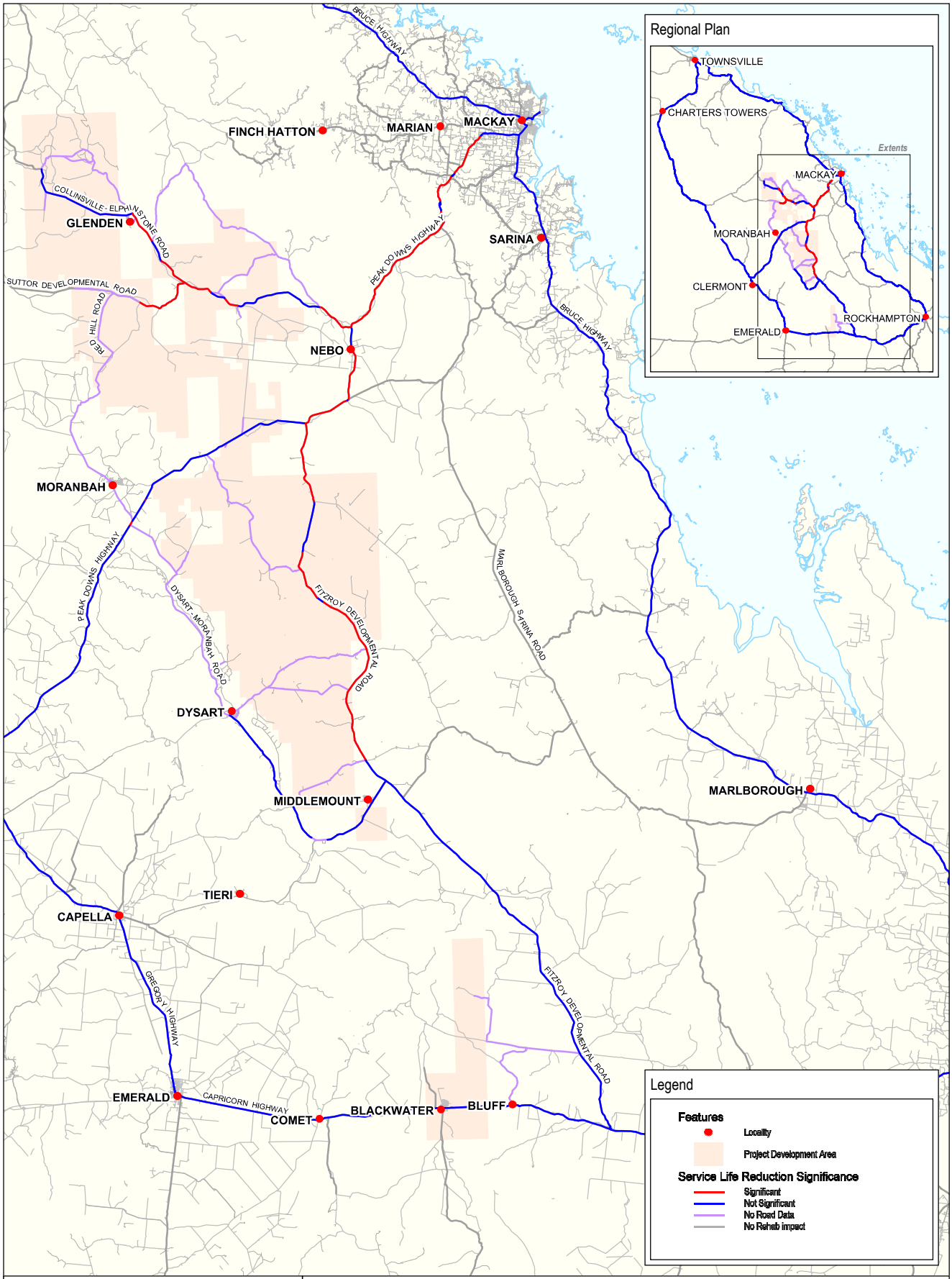

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Pavement Service Life Reduction Significance

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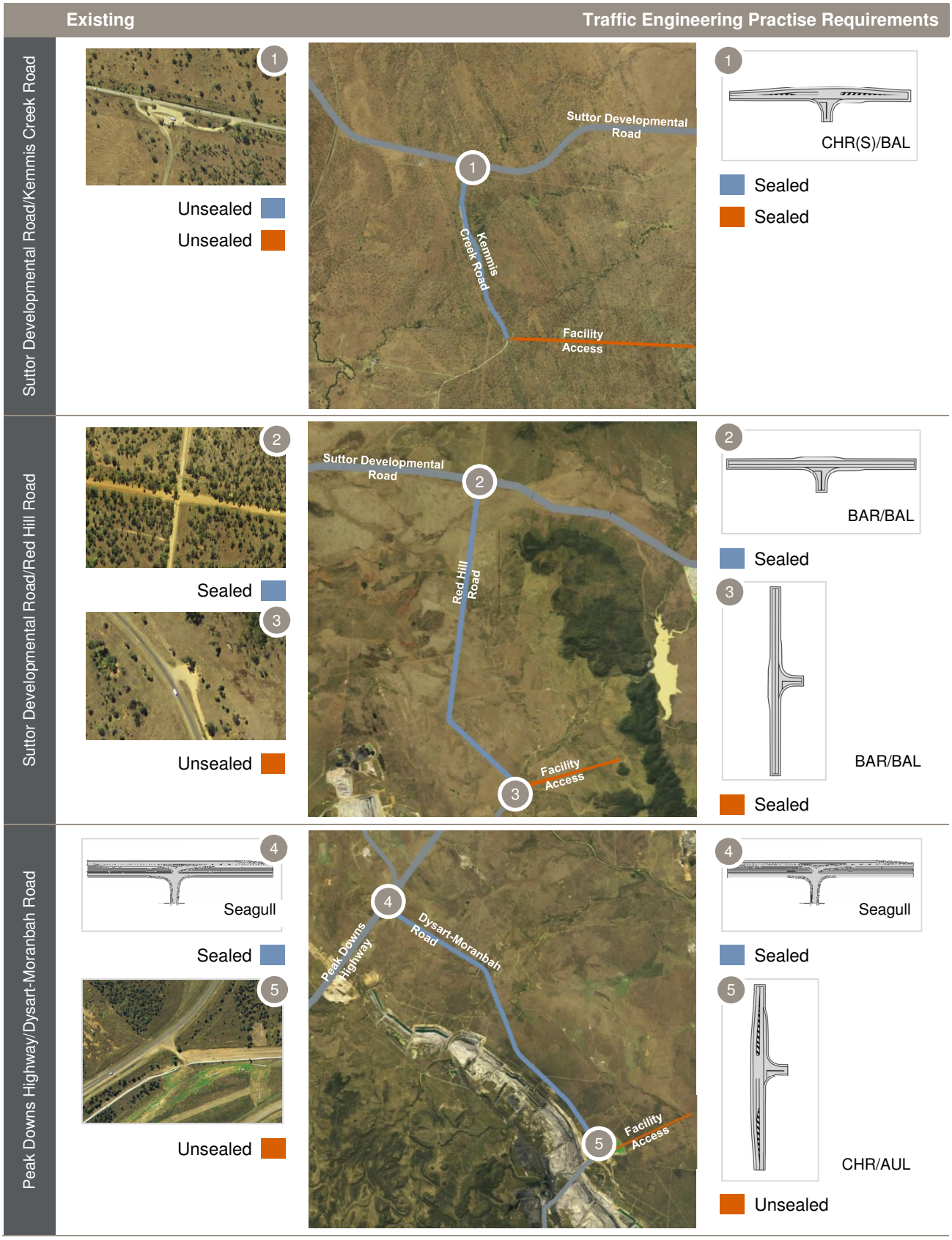
Figure 12-6 Traffic Engineering Case Study Outcomes



13 Management Strategies Effectiveness

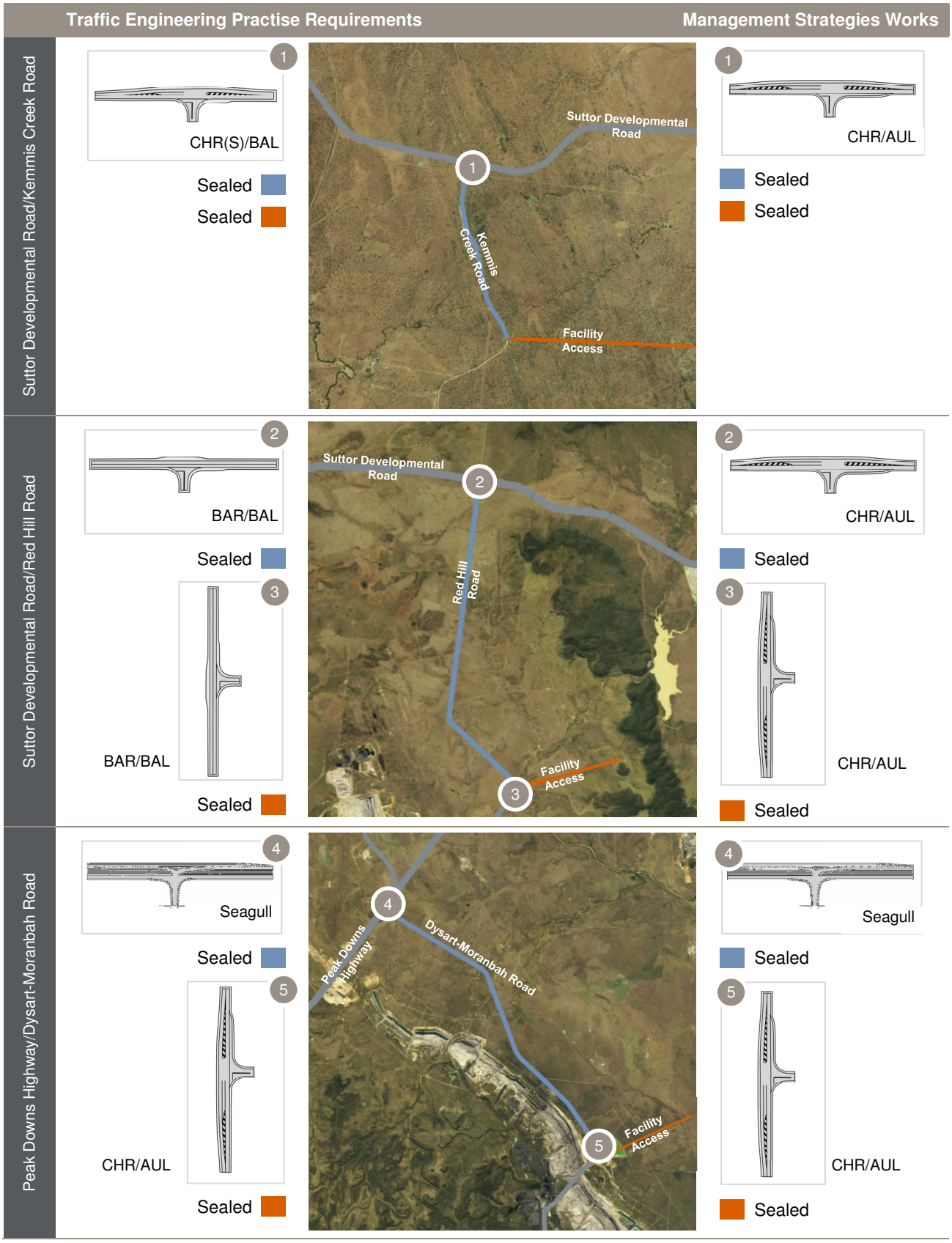
13.1 Overview

The SREIS RIA has sought to establish if the planned management strategies will result in outcomes that exceed or at least meet typical traffic engineering practice requirements. Section 11 identifies the outcomes resulting from the application of the planned management strategies to the "real-world" defined access routes servicing the case study Project locations. Section 12 identifies the outcomes resulting from the application of typical traffic engineering practice requirements to the same preliminary defined access routes. This enables comparison of the outcomes achieved by applying the two approaches to confirm if the planned management strategies will result in outcomes that exceed or at least meet typical traffic engineering practice requirements.

13.2 Case Study Outcome Comparison

Figure 13-1 compares the identified road upgrade works for the case study locations. This identifies that application of the planned management strategies will result in outcomes that exceed or at least meet typical traffic engineering practice requirements. This critical finding confirms the appropriateness of the planned management strategies as their application will result in outcomes which exceed or at least meet typical traffic engineering practice requirements. This outcome confirms that the application of typical EIS approval requirements and the implementation of the planned management strategies will ensure that potential impacts associated with the Project can be effectively managed. It is therefore unlikely that there will be any residual road impacts associated with the Project that are so significant that they should preclude approval of the Project. Identification of a set of planned management strategies ensures that Arrow commits to providing appropriate road infrastructure to facilitate safe and efficient transport to Project facilities.

Figure 13-1 Defined Access Route Required Upgrades Comparison



14 Environmental Values Assessment

14.1 Overview

The Project EIS must assess both the intensity of the impact and the context in which it would occur to determine whether the impact is or is not significant. The potential impacts of the Project on environmental values for each environmental aspect are assessed using one of three methodologies; significance assessment, risk assessment or compliance assessment.

The significance assessment method is particularly relevant for technical studies such as the SREIS RIA where an understanding of the vulnerability of the environmental asset or resource is important. Thus, this approach has been used for the SREIS RIA. For further details in relation to the selection of the adopted environmental values assessment methodology see the Impact Assessment Method chapter (Section 6) of the EIS and Section 6 of the EIS RIA. For brevity, the content previously presented has not been reproduced in detail herein.

The environmental values assessment approach establishes the significance of the Project's potential impacts through consideration of:

> the sensitivity of each environmental value: determined based on consideration of its susceptibility or vulnerability to threatening processes or as a consequence of its intrinsic value.
> the magnitude of the Project's potential impact upon the value: determined based on consideration of the impact's severity.

To enable the effectiveness of the planned management strategies to be assessed, the level of significance of the potential impacts has been considered both pre- and post-implementation of the planned management strategies. The significance of impacts are a function of the sensitivity of the values to change and the magnitude of the change experienced. Table 14-1 summarises the significance of impact given the sensitivity of an environmental value and the magnitude of impact.

Table 14-1 Significance of Impact Matrix

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

The SREIS RIA adopts updated significance of impact definitions from that previously considered in the EIS RIA. The updated significance definitions provide greater clarity in relation to the level of Project impact. The impact definitions adopted for the SREIS RIA are as follows:

> 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.

14.2 Adopted Magnitude Thresholds

The magnitude thresholds adopted for the SREIS RIA have been updated from those previously considered as part of the EIS RIA to reflect input provided through road authority submissions. The updated thresholds also enable assessment of roads for which traffic count data is not publicly available thus enabling a more comprehensive assessment than previously presented within the EIS RIA. For the SREIS RIA 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.

14.3 Adopted Sensitivity Thresholds

Table 14-2 and Table 14-3 summarise the adopted environmental values and their sensitivities both pre- and post-implementation of the planned management strategies respectively. While the sensitivities adopted for the SREIS RIA for each road type remain the same as those adopted for the EIS RIA, some typical observation values have been refined based upon an enhanced understanding of the existing road conditions gained since preparation of the EIS RIA.

Table 14-2 Summary of Sensitivity Values Pre-Implementation of Management Strategies

	Characteristic	Value		
		Highway	Regional Connecting Road	Local Connecting Road
Description	Function	A high order road facilitating connectivity between regional centres	A high order road facilitating connectivity between townships	Lower order road facilitating connectivity between higher order roads or facilitating access
Typical Observations				
Efficiency	Volumes	1,000+ vehicles	300+ vehicles	300 or less vehicles
	Pavement	Sealed	Sealed	Sealed/unsealed
	Standard of intersection control	High order	Varies	Low order
Sensitivity of Efficiency		**Low**	**Moderate**	**High**
Safety	Bridges	Common	Common	Uncommon
	Cattle grids	Uncommon	Uncommon	Common
	Standard of rail crossing control	Active	Passive	Passive
	School bus route presence	Present	Present	Present
	Composition of traffic	High proportion heavy vehicles	Moderate proportion of heavy vehicles	Low number of heavy vehicles
	Driver fatigue controls	Present	Uncommon	Uncommon
Sensitivity of Safety		**Low**	**Moderate**	**High**
Amenity	Stock route co-location	Present	Present	Present
	Sensitivity of adjacent land uses	Low	Moderate	Moderate
	Potential for dust nuisance issues	Low	Low	Potential
	Potential for light glare issues	Low	Low	Potential
Sensitivity of Amenity		**Low**	**Moderate**	**High**

Table 14-3 Summary of Sensitivity Values Post-Implementation of Management Strategies

	Characteristic	Value		
		Highway	Regional Connecting Road	Local Connecting 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
Typical Observations				
Efficiency	Volumes	1,000+ vehicles	300+ vehicles	300 or less vehicles
	Pavement	Sealed with improvements	Sealed with improvements	Sealed with improvements
	Standard of intersection control	High order	High order	Low order with improvements
Sensitivity of Efficiency		**Low**	**Low**	**Moderate**
Safety	Bridges	Frequent and high standard	Frequent and high standard	Infrequent and high standard
	Cattle grids	Uncommon	Uncommon	Frequent and higher standard
	Standard of rail crossing control	Active	Investigate exposure threshold	Investigate exposure threshold
	School bus route presence	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
	Driver fatigue controls	Present plus driver fatigue management plan	Uncommon plus driver fatigue management plan	Uncommon plus driver fatigue management plan
Sensitivity of Safety		**Low**	**Low**	**Moderate**
Amenity	Stock route co-location	Present but disturbances managed	Present but disturbances managed	Present but disturbances managed
	Sensitivity of adjacent land uses	Low	Low	Moderate
	Potential for dust nuisance issues	Low but managed	Low but managed	Potential but managed
	Potential for light glare issues	Low but managed	Low but managed	Potential but managed
Sensitivity of Amenity		**Low**	**Low**	**Moderate**

14.4 Adopted Significance Thresholds

Table 14-4 and 14-5 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 14-4 Significance of Impacts: Pre-Implementation of Management Strategies Matrix

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

Table 14-5 Significance of Impacts: Post-Implementation of Management Strategies Matrix

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

14.5 Significance of Impacts Pre-Implementation of Management Strategies

Figure 14-1 spatially summarises the level of significance of the Project's potential road impacts based upon the environmental values assessment approach pre-implementation of the planned management strategies. The figure identifies that in the absence of the planned management strategies being implemented, the traffic demands associated with the Project could result in negligible to moderate impacts on the road environmental values. The highest levels of impacts are typically forecast to occur on the lower order roads providing access to major facilities such as CGPFs.

The EIS RIA previously identified that pre-implementation of the planned management strategies the impact of Project traffic demands on all assessed roads would be negligible with the exception of Suttor Developmental Road which would experience low level impacts between Elphinstone and Red Hill Road. The SREIS RIA has identified higher levels of potential impact pre-implementation of the planned management strategies as a result of the refined Project traffic demand forecasts and as a result of the updated impact magnitude thresholds adopted for the SREIS RIA.

14.6 Significance of Impacts Post-Implementation of 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 Project activities which the 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.

Figure 14-2 spatially summarises the level of significance of the Project's potential road impacts based upon the environmental values assessment approach post-implementation of the planned management strategies. The figure identifies that the Project's potential significance of impact is anticipated to range from negligible to low.

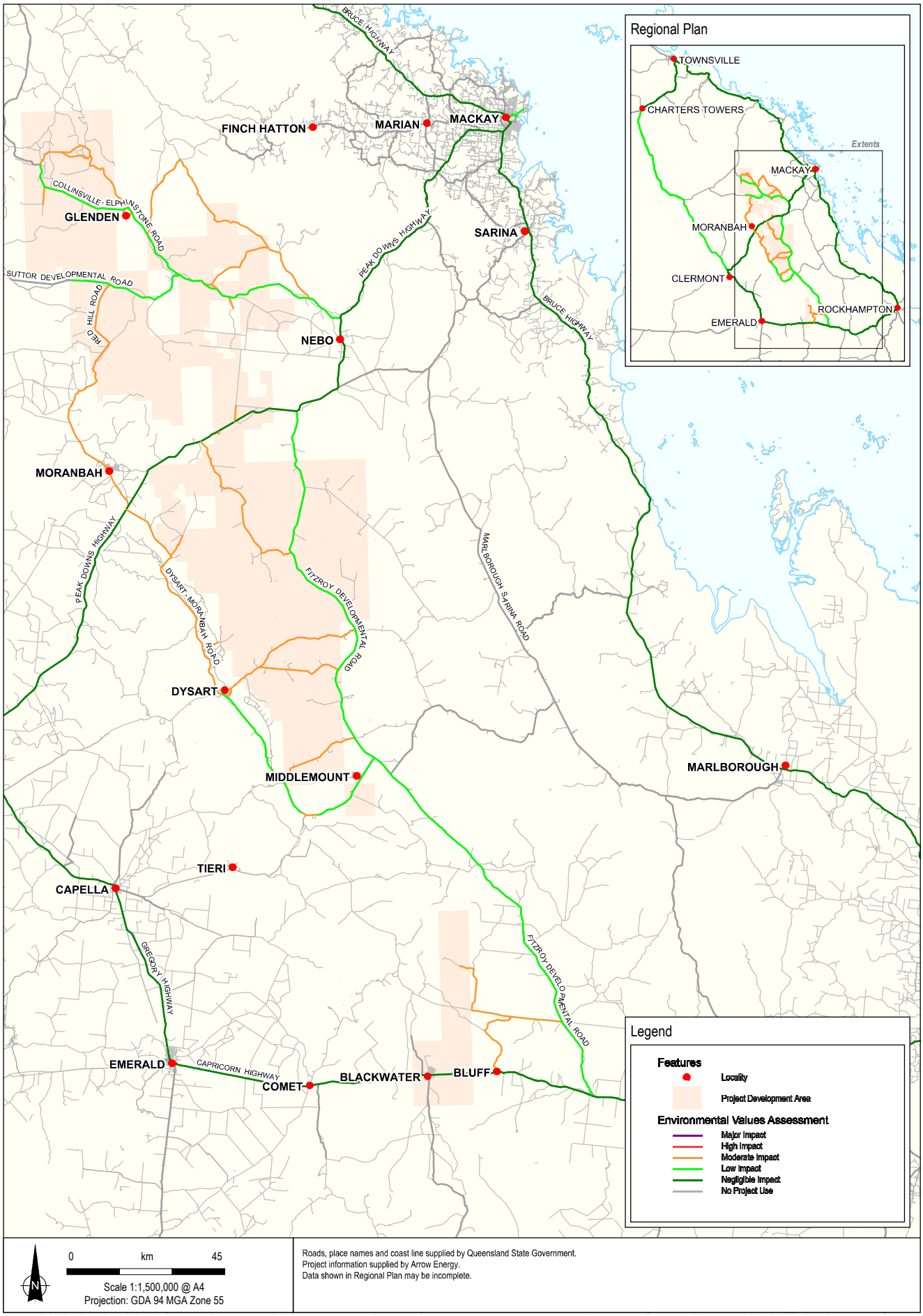
The EIS RIA previously identified that post-implementation of the planned management strategies the impact of Project traffic demands on all assessed roads would be negligible. The SREIS RIA has identified higher levels of impact post-implementation of the planned management strategies as a result of the refined Project traffic demand forecasts and as a result of the updated impact magnitude thresholds adopted for the SREIS RIA. The higher levels of potential impact identified by the SREIS RIA are however still within acceptable limits.

14.7 Environmental Values Assessment Summary

The environmental values assessment identifies that there are unlikely to be residual impacts of higher order significance (high or major) post-implementation of the planned management strategies.

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 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 high or major road impacts associated with the Project.

The SREIS RIA environmental values assessment identifies that the planned management strategies will be effective at avoiding, minimising or mitigating road impacts of major and high significance associated with the Project.



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Significance of Impacts Pre-Management Strategies

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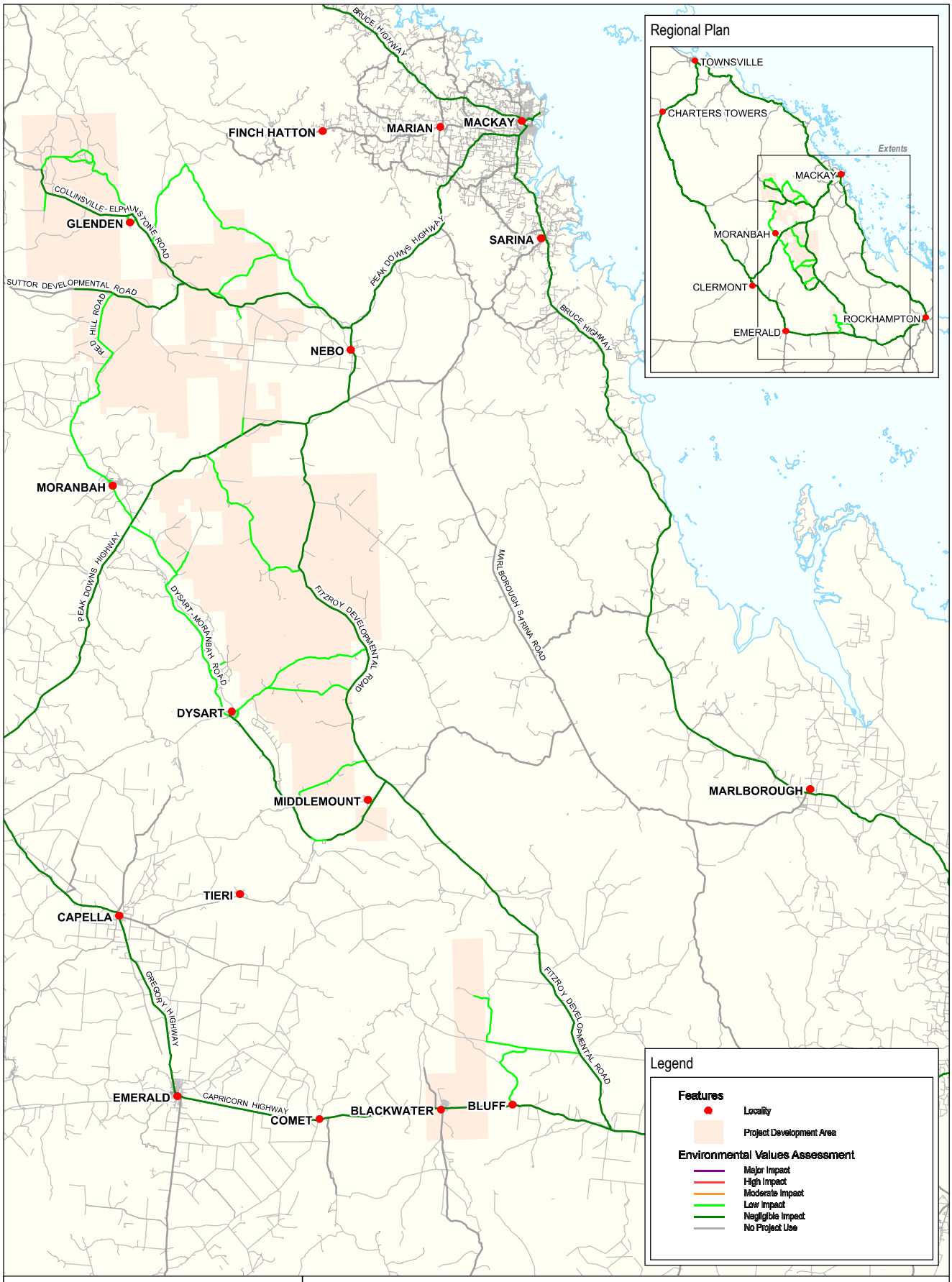

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Significance of Impacts Post-Management Strategies

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15 Conclusions

The SREIS RIA has been undertaken to assess the road impacts associated with the Bowen Gas Project. The SREIS RIA has sought to establish if there are likely to be any road impacts that cannot be effectively managed through the application of typical EIS approval requirements and the implementation of the planned management strategies. The assessment has identified the following:

- Existing traffic conditions including traffic volumes, levels of traffic growth, the presence of school bus and stock routes remain broadly consistent with that previously considered in the EIS RIA.
- The traffic generation estimates of the various activities associated with the Project have been refined from that presented within the EIS RIA based upon the findings of recent logistics planning and to ensure that a worst-case scenario is considered within the SREIS RIA.
- Traffic modelling identifies that as a result of the revised traffic generation assumptions and the updated Project planning, the Project's peak transport task is anticipated to occur much earlier than previously forecast within the EIS RIA.
- The traditional traffic engineering assessment has identified that Project traffic demands have the potential to increase baseline traffic demands however this increase is unlikely to significantly affect the level of service afforded by the road network.
- The pavement assessment has established that Project traffic demands have the potential to increase the required maintenance works and potentially reduce the pavement service life of various road sections. The identified level of impact can however be effectively managed through the establishment of Post-EIS IAs with road authorities to mitigate the increased pavement activities.
- The traffic engineering case study assessment has identified the potential requirement for road upgrades for the defined access routes. This includes the potential provision of upgraded sealed roads and intersection forms. This finding is different to that presented within the EIS RIA which only identified a high level potential requirement for future upgrades. The assessment also identified that implementation of the planned management strategies will result in outcomes that exceed or at least meet typical traffic engineering practice requirements.
- An environmental values significance assessment has also confirmed the effectiveness of the planned management strategies to avoid, minimise and mitigate all significant road impacts.

The SREIS RIA has established that there is unlikely to be any residual road impacts that cannot be managed via infrastructure agreements with road authorities, post-implementation of the planned management strategies, and that residual impacts should not be significant enough to preclude approval of the Project.

Future Post-EIS RIAs will identify the need for specific works to provide safe and efficient access to all Project facilities in addition to the contributions required to preserve the service life of the road network. If required, post-EIS IAs established with relevant road authorities will capture the value and timing of the identified works and contributions.

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Glossary

Word, Phrase or Term	Definition
Annual Average Daily Traffic	The total volume of traffic passing a roadside observation point over the period of a calendar year, divided by the number of days in that year (365 or 366 days).
Austroads	The association of Australian and New Zealand road transport and traffic authorities whose purpose is to contribute to the achievement of improved road transport outcomes.
Baseline traffic	The expected volume of traffic at a particular point without the addition of the traffic associated with the project under consideration.
Buses	vehicles larger than a light vehicle van which transport people
Council	Isaac Regional Council (IRC), Central Highlands Regional Council (CHRC), Mackay Regional Council (MRC), Whitsunday Regional Council (WRC) and/or Townsville City Council (TCC) 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 of travel, 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.
Equivalent Standard Axle	The number of standard axle loads that are equivalent in damaging effect on a pavement to a given vehicle or axle loading.
Guidelines for Assessment of Road Impacts of Development	Guideline which provides developers with advice on how to assess the traffic and pavement impacts of a proposed development on state-controlled roads. The content is particularly relevant where a development application has been referred to the state as part of the IDAS process or where a Coordinated Project has been referred to the department under the State Development and Public Works Organisation Act 1971.
Growth rate	The annual percent change in the number of vehicles passing a given point on a road.
Heavy Vehicle	A heavy vehicle is defined as any vehicle with three or more axles or with dual tyres on the rear axle.
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.
Light Vehicle	Sedans, wagons, vans, utilities, four wheel drive and motorcycles
Post-EIS Infrastructure Agreements	Formalises the amount of, and timing of payments for any required contributions towards road upgrades or pavement activities identified in the Post-EIS RIAs.
Post-EIS Road Impact Assessments	Considers the impacts on the safety, efficiency and service life of the road network following detailed Project planning (i.e. post-EIS approval, site selection and road authority engagement.
Post-EIS Road-use Management Plans	Summarise aspects including the Project's transport task, transport routes, safety strategies and any required road upgrades or contributions.
Project	Bowen Gas Project.
Project development area	The area for which Arrow is seeking approval to develop through the EIS assessment process.
Road Impact Assessment	An assessment which identifies the potential road impacts of a proposed development and appropriate management strategies in accordance with the requirements of the Department of Transport and Main Roads *Guidelines for Assessment of Road*

Word, Phrase or Term	Definition
	Impacts of Development.
Road-use Management Plan	A Road-use Management Plan is a "living" document which provides the latest information about traffic generation, impact assessment in accordance with TMR's "Guidelines for the 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.
State-controlled road	A road declared to be controlled by the Department of Transport and Main Roads, including all AusLink National Roads in Queensland.
Unsealed road	Generic terminology adopted within the Road Impact Assessment to identify a road that has generally not been constructed using a bituminous material to form a protected road surface.
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).

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APPENDIX A
Data Descriptions

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Data Descriptions

ID	Description/Disclaimer/Information Supplied
AUR-1 Aurizon Level Crossings Central Queensland	"© Aurizon Network Pty Ltd 2013" "Based on or contains data provided by Aurizon Network Pty Ltd 2013 © Aurizon Network Pty Ltd. In consideration of Aurizon Network Pty Ltd permitting use of this data you acknowledge and agree that Aurizon Network Pty Ltd gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws."
DRNM-1 Physical road network	*"This dataset is a digital representation of the physical position of Queensland's road transportation network. The physical network is incomplete and is progressively being completed."* "© State of Queensland (Department of Natural Resources and Mines) [2012]" "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."
DRNM-2 General purpose mapping	*"This dataset contains the relief layer of Queensland. It is a version derived from the DNRM regional mapping series which depicts road classification, markers and distances, railways, drainage, populated centres, coast, reef and relief. See additional information also."* "© State of Queensland (Department of Natural Resources and Mines) [2012]" "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."
DNRM-3 Local government areas	*"The Cadastral dataset is the spatial representation of property boundaries and descriptions in the above local government area. It is a fundamental reference layer for spatial information systems in Queensland. This is a complete extract from the Digital Cadastral Database (DCDB)."* "© State of Queensland (Department of Natural Resources and Mines) [2012]" "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."
DNRM-4 Coastline Queensland	*"This data depicts the coastline of mainland Queensland and its offshore marine islands. The coastline generally follows the mean high water springs tidal line. However, where this line is obscured by vegetation and in particular mangroves, the seaward edge of the vegetation is adopted as the coastline as per the Queensland Topographic Specifications (QTOS) 1988."* "© State of Queensland (Department of Natural Resources and Mines) [2012]″ "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."

DNRM-5 Rail Network	*"This dataset is a digital representation of the physical position of Queensland's rail transportation network."* "© State of Queensland (Department of Natural Resources and Mines) [2012]" "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."
DRNM-6 Stock Routes	*"Queensland's stock route network (SRN) provides pastoralists with a means of moving stock 'on the hoof' around the state's main pastoral districts, as an alternative to trucking and other contemporary transport methods.Approximately 72 000 kilometres (2.6 million hectares) of Queensland's road network is declared as stock route. These routes, together with reserves for travelling stock, make up the Queensland SRN.The Land Protection (Pest and Stock Route Management) Act 2002 (Land Protection Act) regulates the use of the SRN."* "© State of Queensland (Department of Natural Resources and Mines) [2012]" "Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines [2012]. In consideraiton of the State permitting use of this data you acknowledge and agree that the State give no warrantly in realtion to the data (includign accuarcy, reliabilty, completeness, currency or suitability) and accepts no liability (including withou limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in break of the priavcy laws."
QR-1 Queensland Rail Level Crossings	*"Defines level crossing locations along the QR railway network. Level crossings are locations which enable vehicles and/or pedestrians to cross the railway line at the same level as the railway track, i.e. without the need for bridges or tunnels. Level rossings have a range of safety protection measures, from simple signage to more complex mechanisms such as boom gates and flashing lights. Also contains closed, removed and proposed crossings locations."* "© Queensland Rail Limited 2013" "Based on or contains data provided by the Queensland Rail Limited 2013. In consideration of Queensland Rail Limited permitting use of this data you acknowledge and agree that Queensland Rail Limited gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws."
TMR-1 Queensland Transport Regional Boundaries	"*Queensland Transport (former) is broken into 5 operational areas - Northern, Southern, Central, South East Queensland (South), South East Queensland (North). This dataset depicts those regional boundaries. Regional boundaries define each regional offices' area of responsibility. They are predominately based on local government boundaries. Although Queensland Transport (former) and Main Roads (former) are now one entity, operational boundaries have not been standardised across the Department."* "© State of Queensland (Department of Transport and Main Roads) 2010. Updated data available at http://dds.information.qld.gov.au/dds/"
TMR-2 School Bus Routes	*"As part of the School Transport Assistance Scheme (STAS), TMR approves the designated routes for bus operators to transport students to and from school. The School Kilometric Bus Route dataset depicts these routes. There are many different operators and routes throughout the State. Routes are generated by each regional TMR office, and merged to form this dataset."* "© State of Queensland (Department of Transport and Main Roads) 2013."
TMR-3 Points of Interest	"Although this points of interest information has been produced and processed from sources believed to be reliable, The Department of Transport and Main Roads makes no warranty express or implied regarding the accuracy, adequacy, completeness, legality, reliability or usefulness of any information provided. The coordinates for roadside amenities have been calculated from a geographic information system (GIS) based on best known location advice; accuracy may vary from 10 metres to 200 metres. This points of interest information is intended to be used as an information source only. If you wish to utilise this information, it is your responsibility to satisfy yourself of the suitability of the information for your use and its compatibility with your hardware. The Department of Transport and Main Roads expressly disclaims all liability for any damage to property, including but not limited to the hardware onto which the information is downloaded, associated with the accessing, downloading, installing or use of points of interest information.

	Any party using points of interest information releases and indemnifies the State of Queensland against all responsibility and liability (including negligence, negligent misstatement and pure economic loss) for all expenses, losses, damages and costs incurred as a consequence of such loss. Be aware that while every effort is made to ensure the currency of the information, electronic data can be altered subsequent to original distribution and data can also quickly become out-of-date. The Department of Transport and Main Roads is under no obligation to maintain the currency of points of interest information or to notify you of any updates to the information provided to you."
TMR-4 Central Region Crash Data	**Reporting Periods for Crash Data** The Department of Transport and Main Roads (TMR) is able to provide all characteristics (e.g. location, contributing factors etc) of Queensland crash data for: ▪ Fatal crashes to 31 May 2013 ▪ Hospitalisation crashes to 28 February 2013 ▪ Medical Treatment, Minor Injury and Property Damage Only crashes to 31 December 2010 A limited range of crash data for all crash severities at a state-wide level is also available through to 31 March 2013. This data set can be provided by severity, month/year, road user/unit types, gender and age. However, crash location, contributing factors and other characteristics are not available.
TMR-5 North Queensland Crash Data	**Reporting Periods for Crash Data** The Department of Transport and Main Roads (TMR) is able to provide all characteristics (e.g. location, contributing factors etc) of Queensland crash data for: ▪ Fatal crashes to 31 May 2013 ▪ Hospitalisation crashes to 31 March 2013 ▪ Medical Treatment and Minor Injury crashes to 31 July 2011 ▪ Property Damage Only crashes (PDOs) to 31 December 2010 A limited range of crash data for all crash severities at a state-wide level is also available through to 30 April 2013. This data set can be provided by severity, month/year, road user/unit types, gender and age. However, crash location, contributing factors and other characteristics are not available.

APPENDIX B
Location of Other Projects

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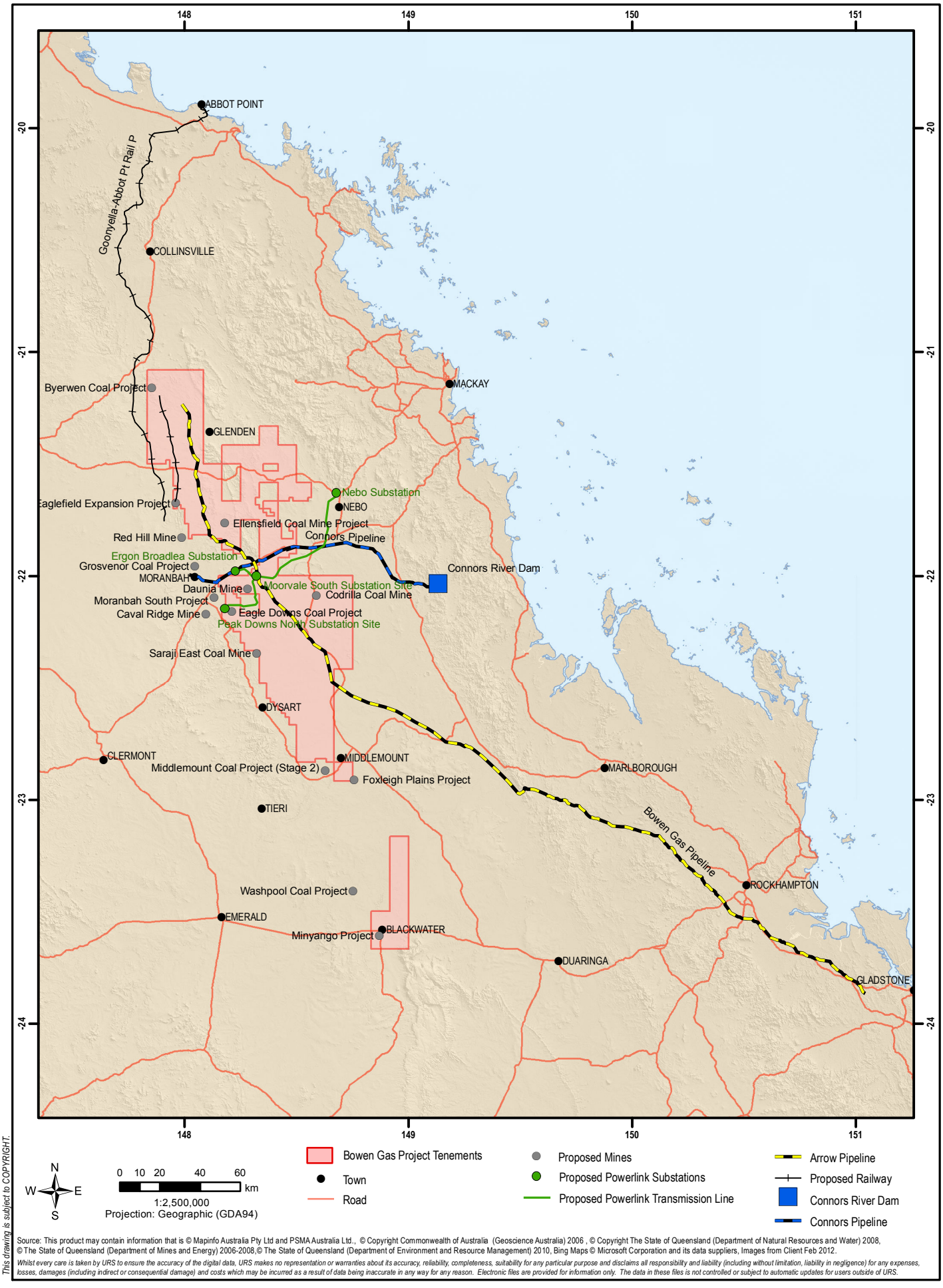

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BOWEN GAS PROJECT SREIS

PROJECTS RELEVANT TO THE STUDY AREA

URS

SUPPLEMENTARY ROAD IMPACT ASSESSMENT

Figure: **B-1**

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Bowen Gas Project SREIS

APPENDIX C
Project Activities and Traffic Generation

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[Appendix C is available on request]

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APPENDIX D
Annual Project Traffic Demand Forecasts

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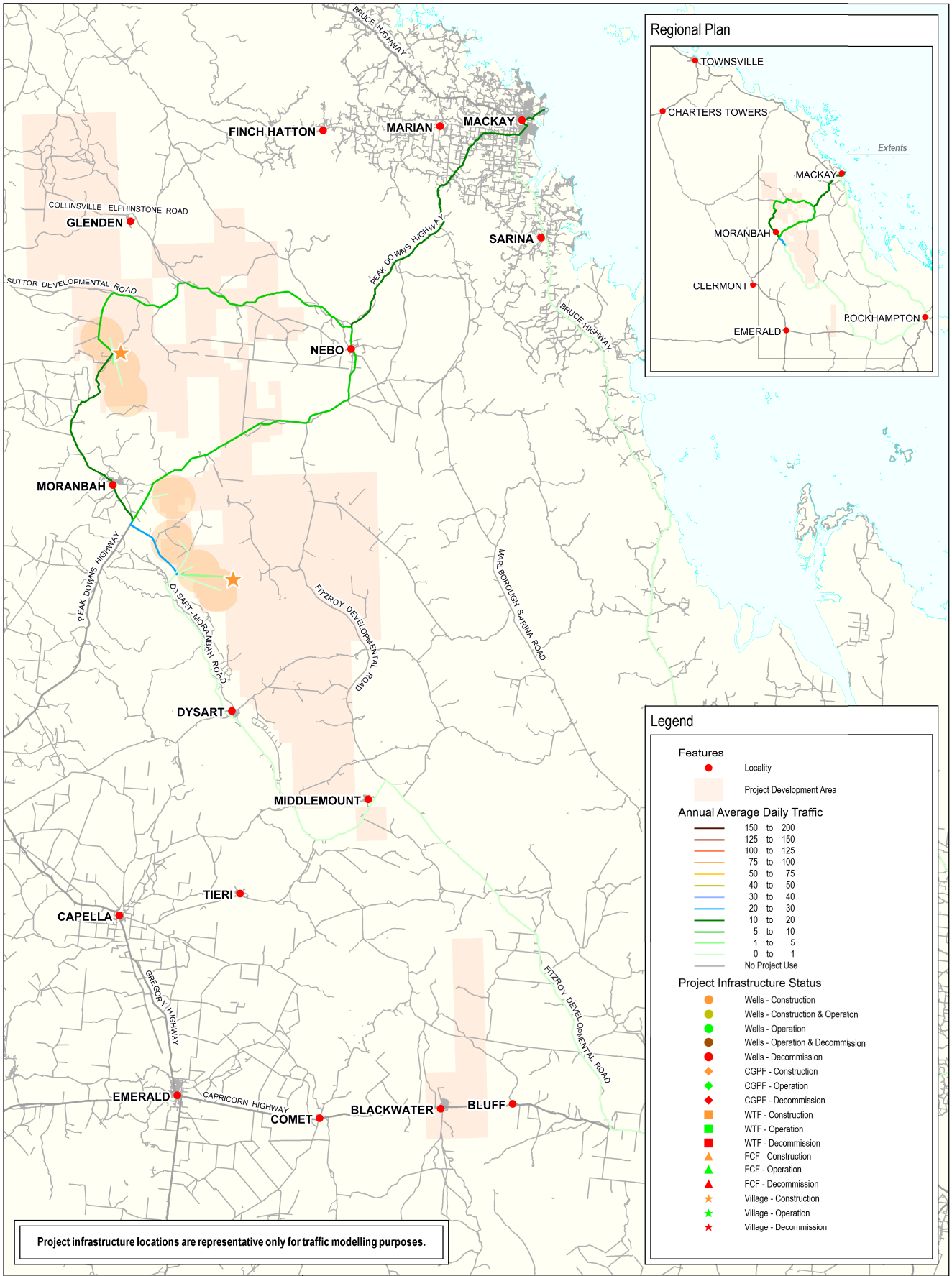

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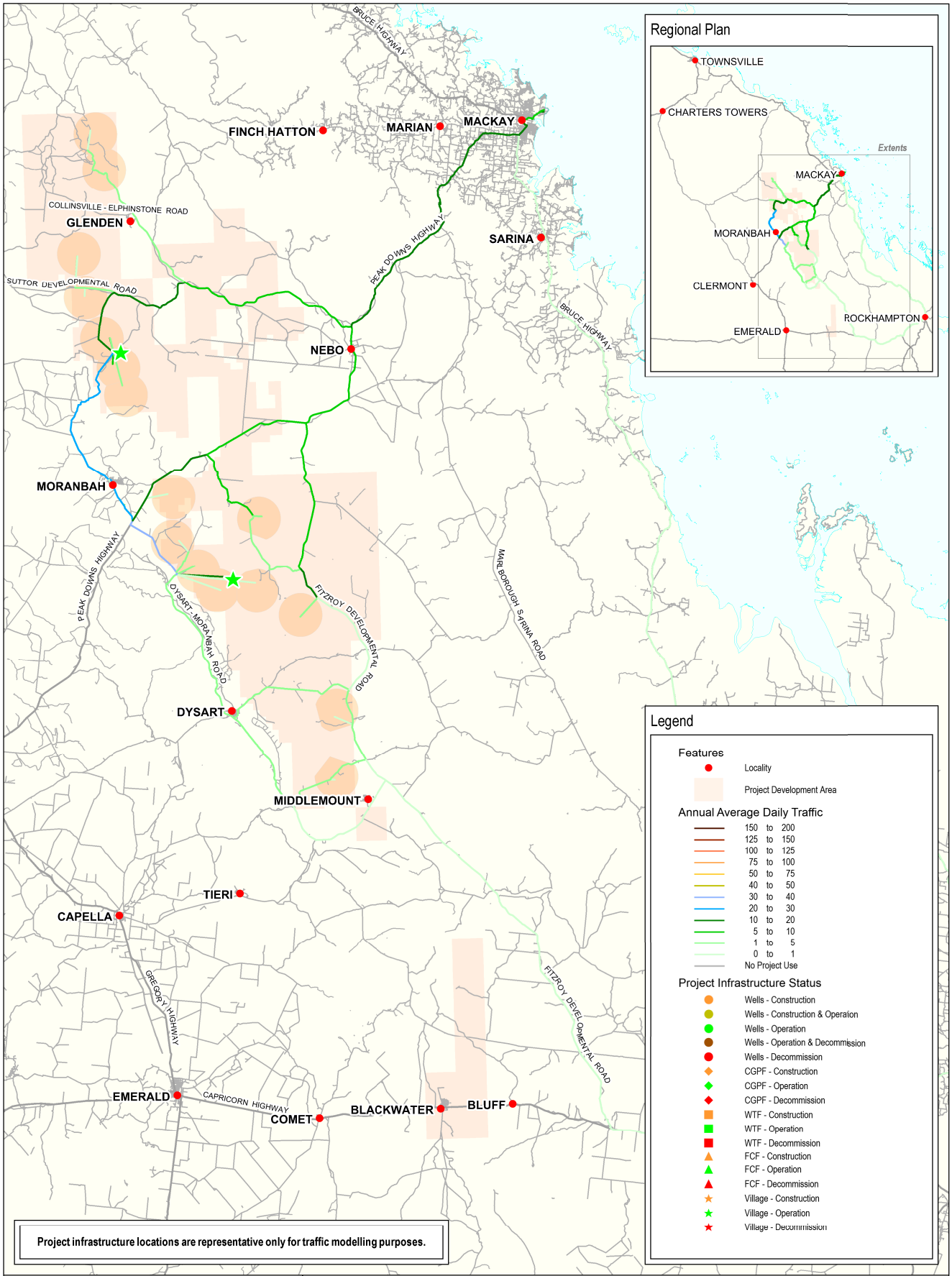
Project Traffic Volumes for 2015

Figure No: **D-1**



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Project Traffic Volumes for 2016

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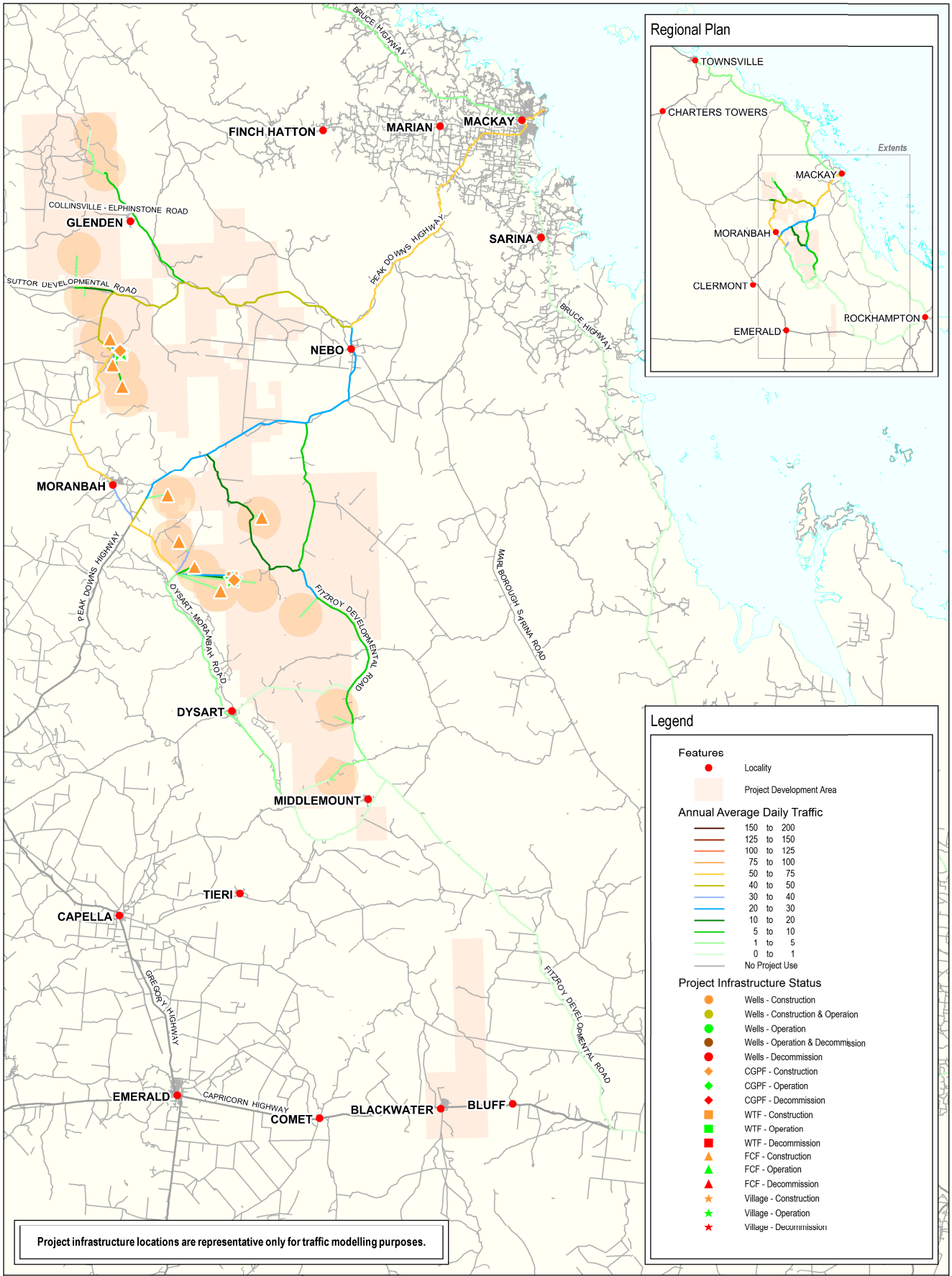

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Project Traffic Volumes for 2017

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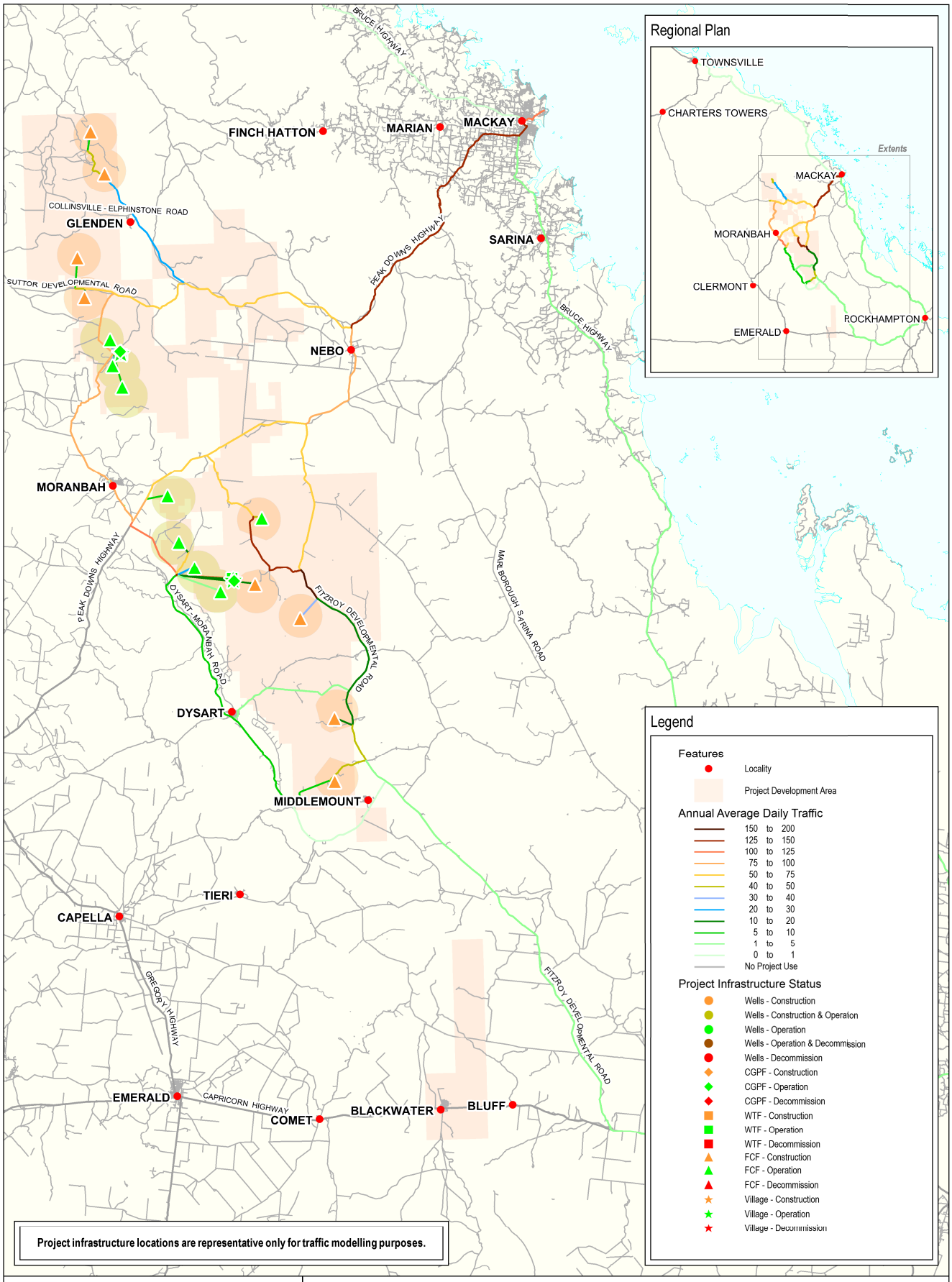

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Project Traffic Volumes for 2018

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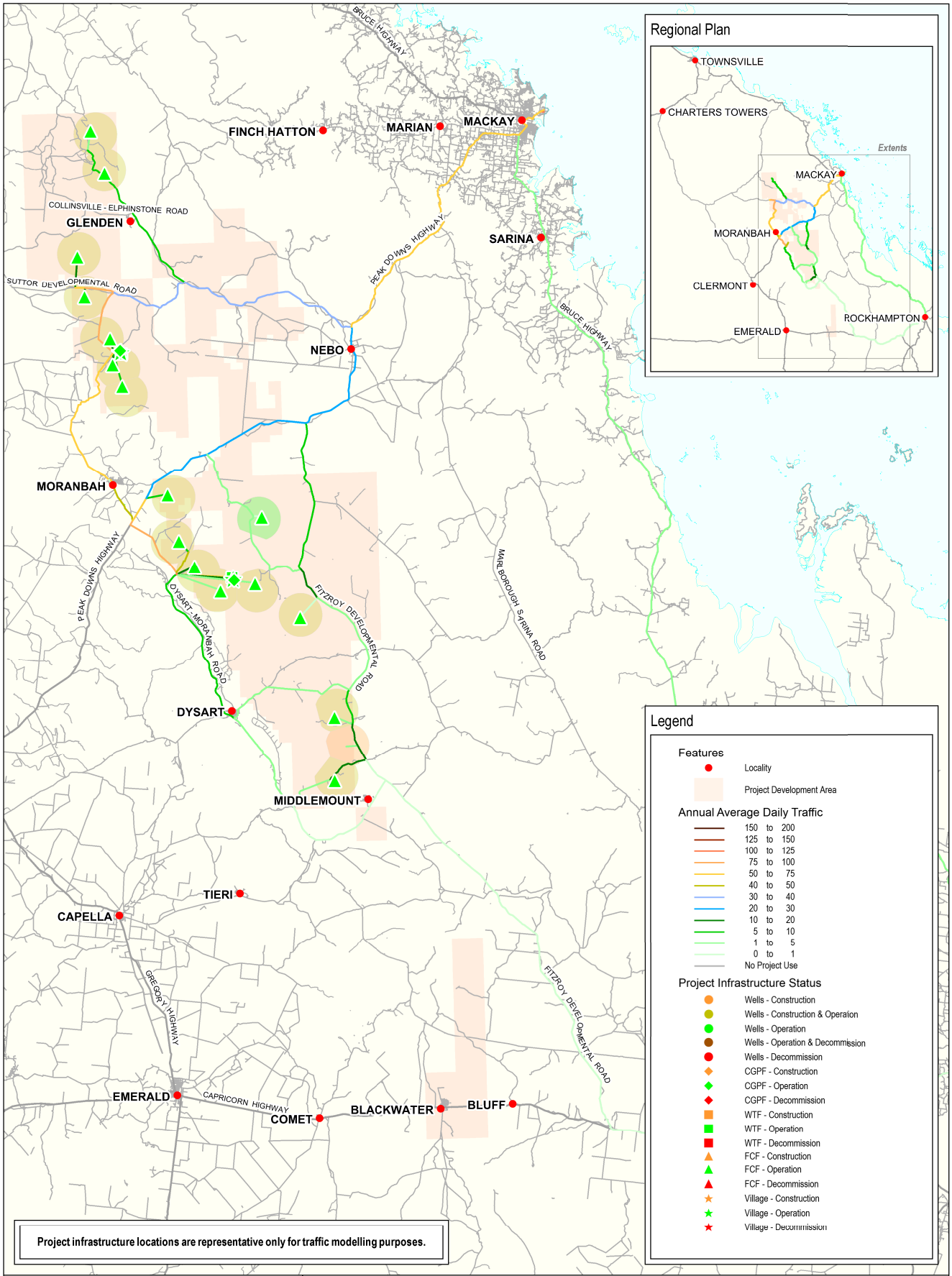

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Project Traffic Volumes for 2019

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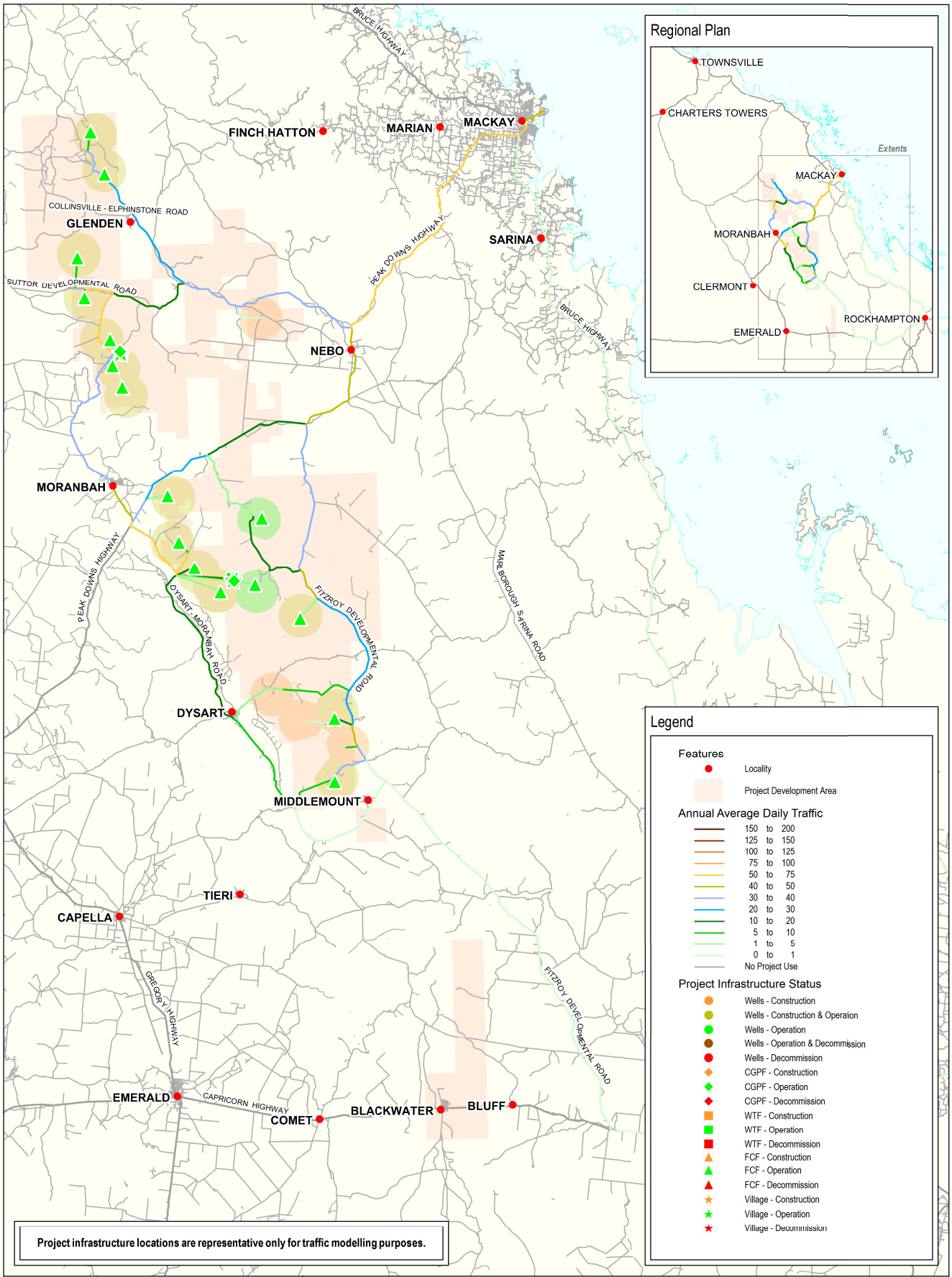

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Project Traffic Volumes for 2020

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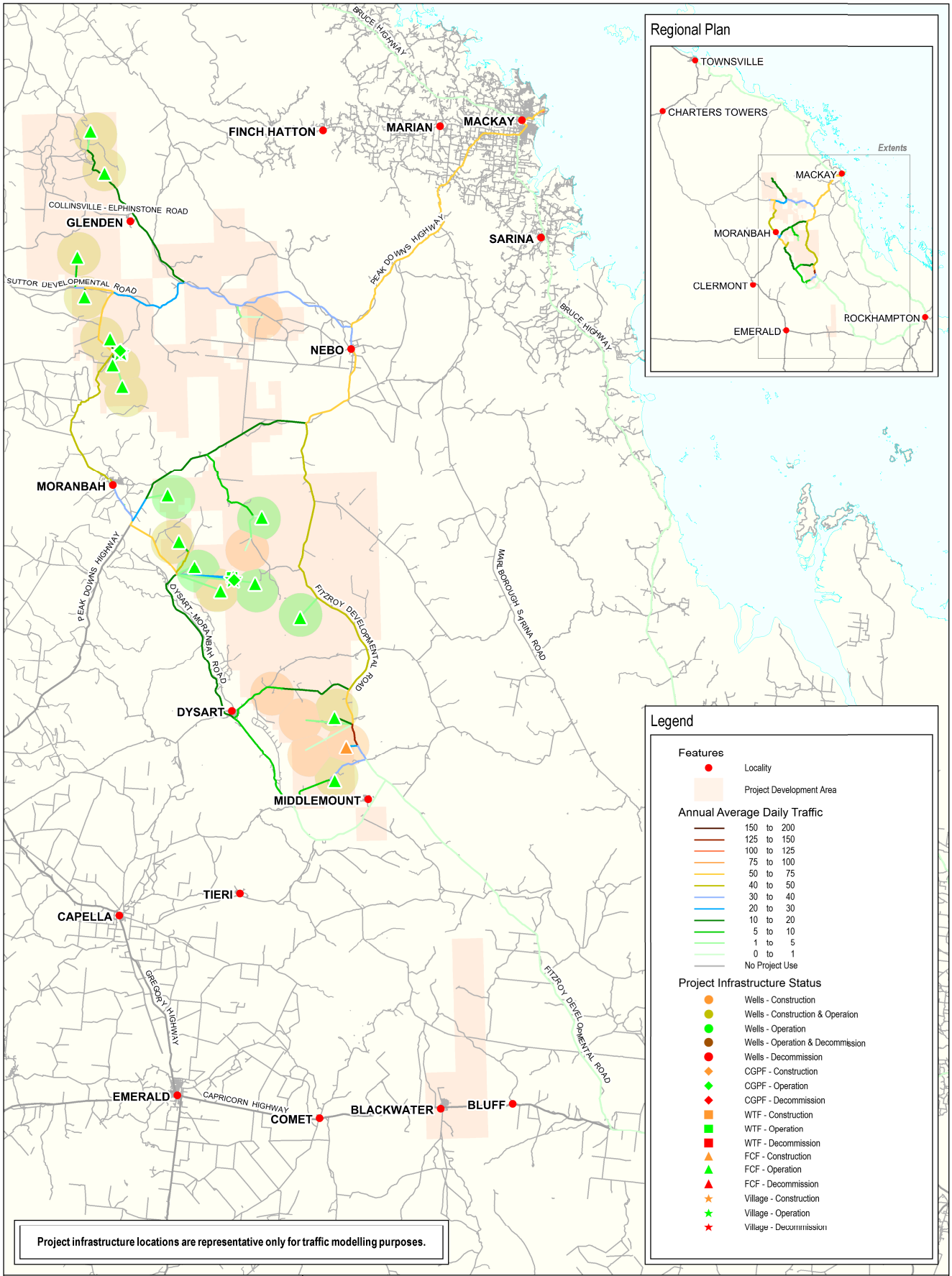

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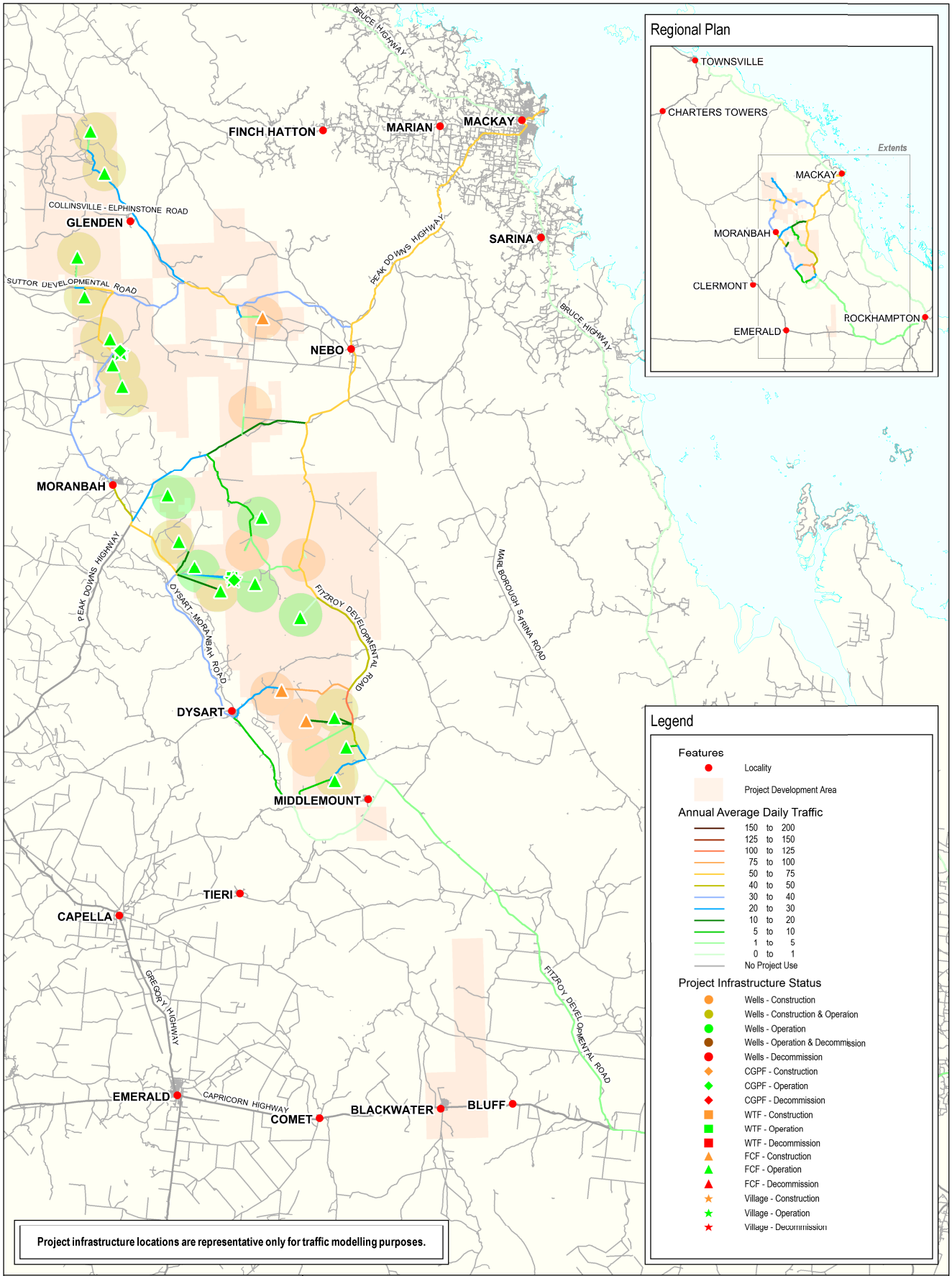
Project Traffic Volumes for 2021

Figure No:

D-7



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Project Traffic Volumes for 2022

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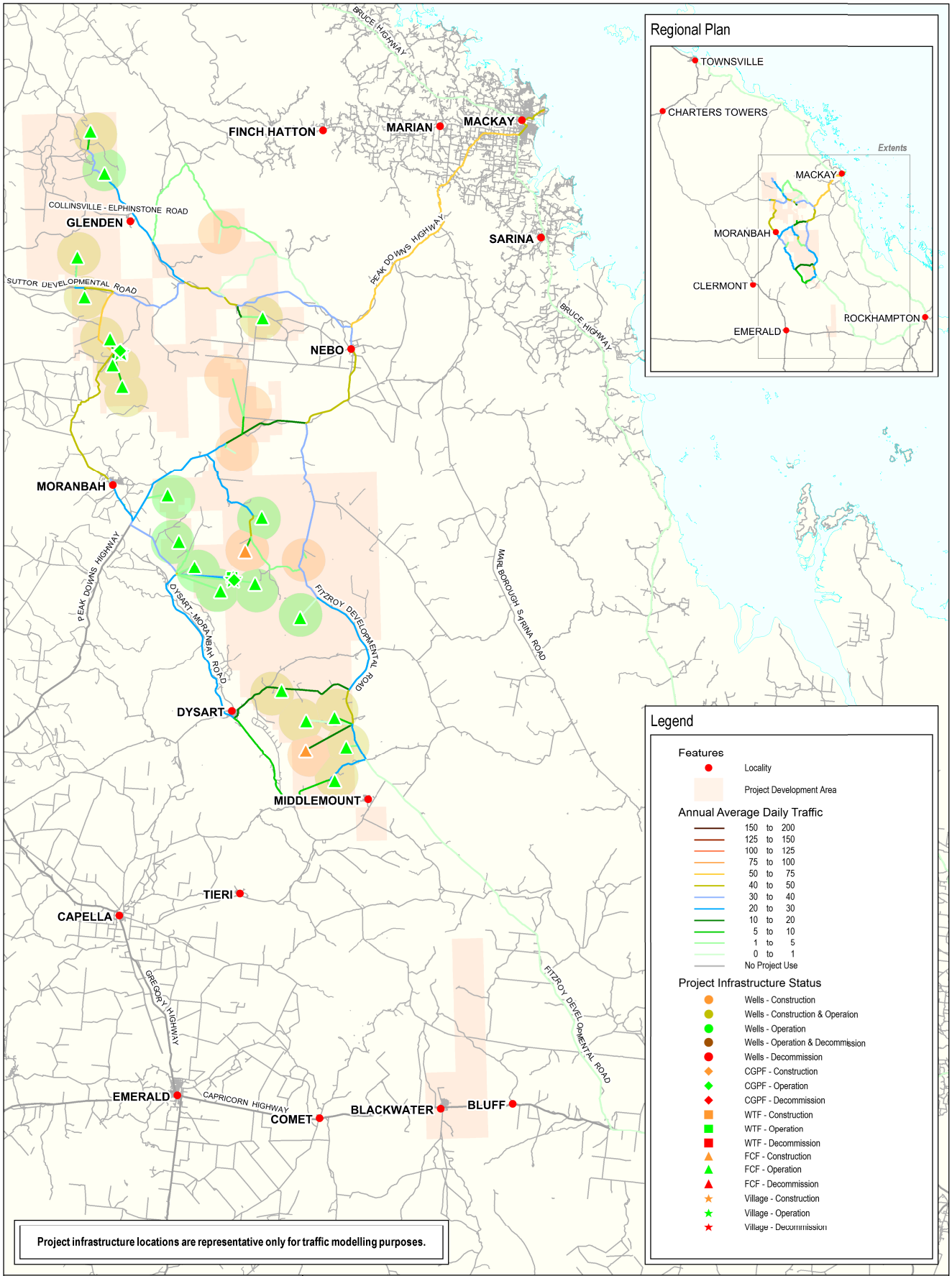

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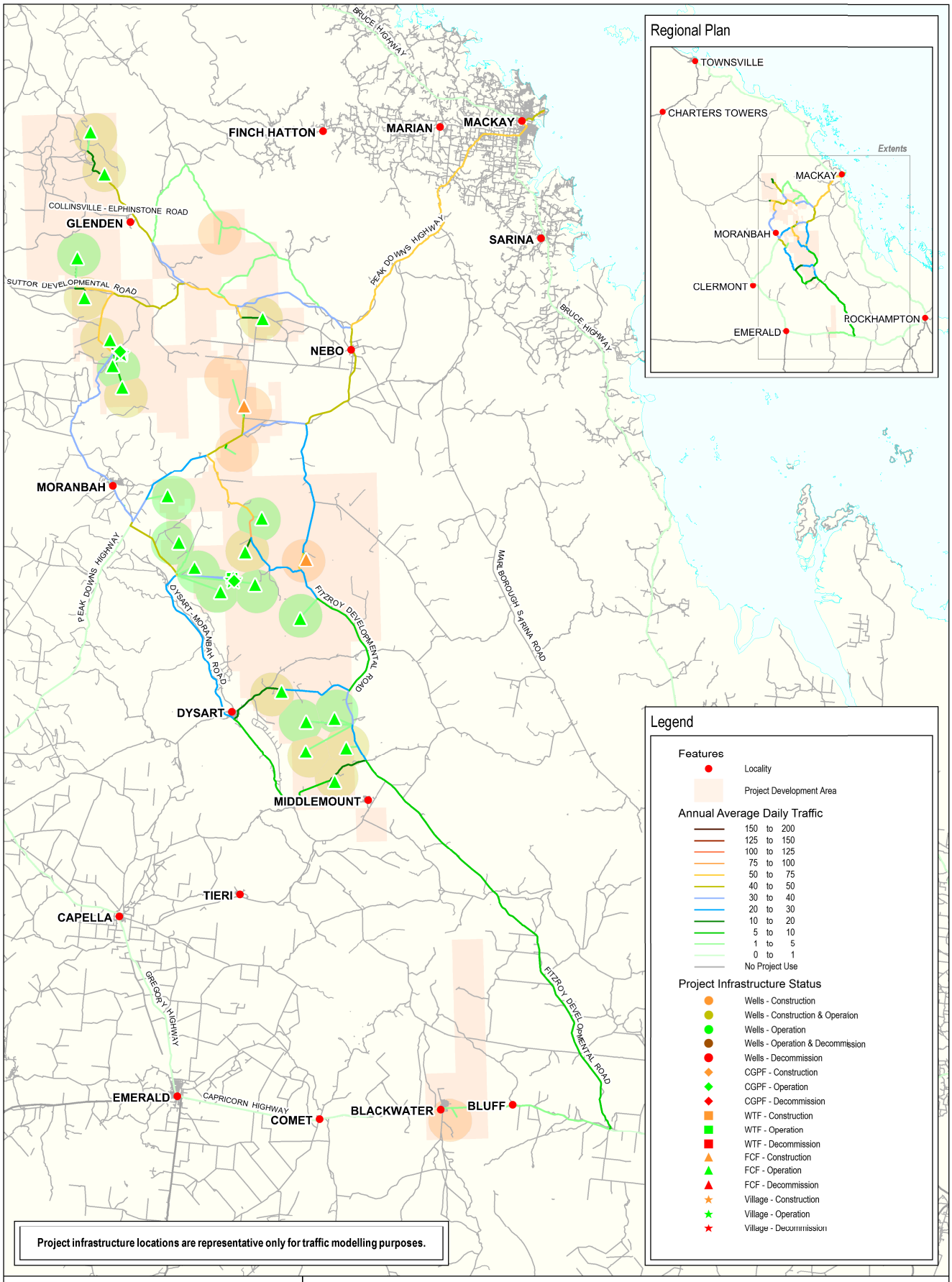
Project Traffic Volumes for 2023

Figure No:

D-9



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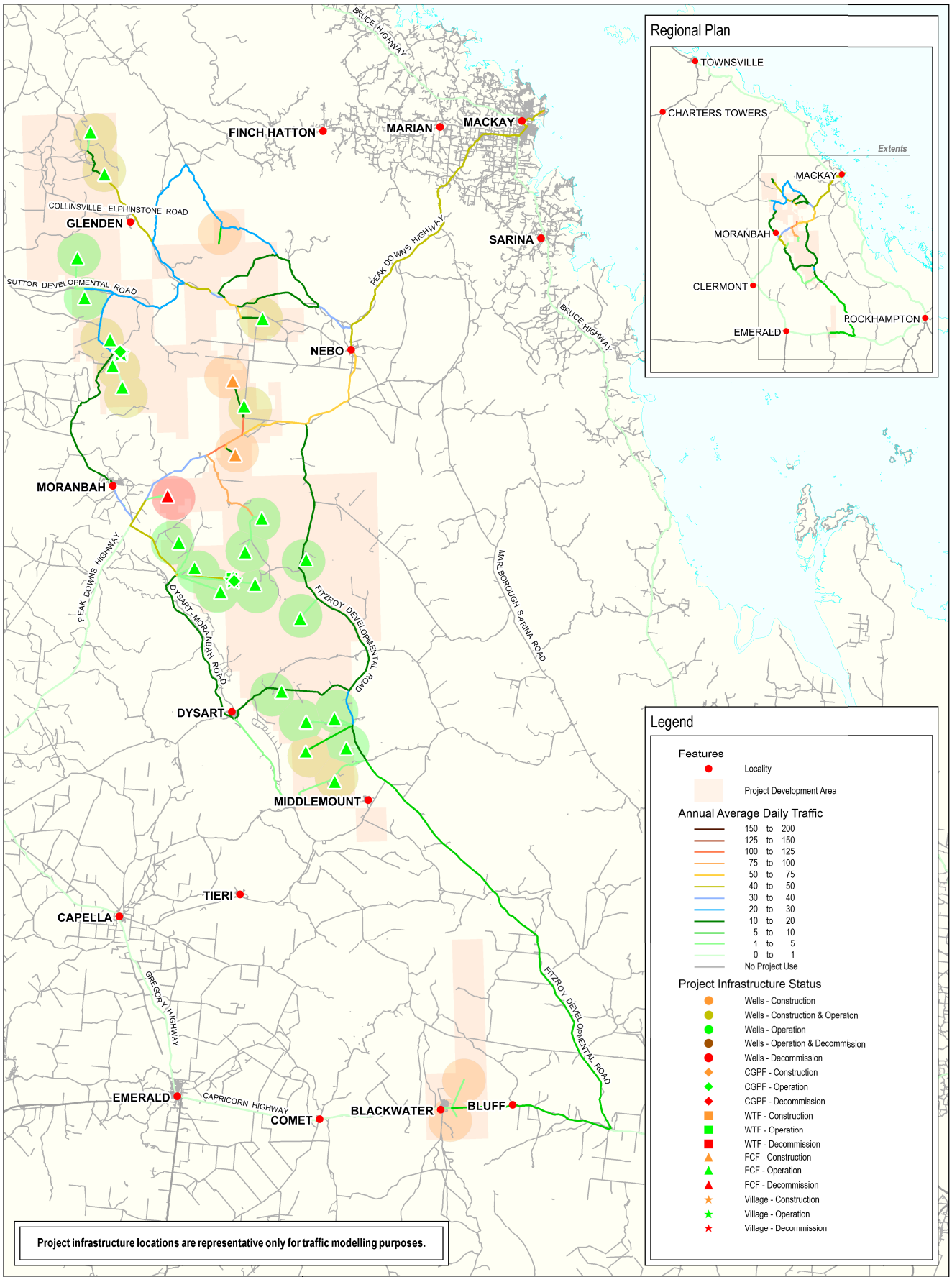
Project Traffic Volumes for 2024

Figure No:

D-10



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Project Traffic Volumes for 2025

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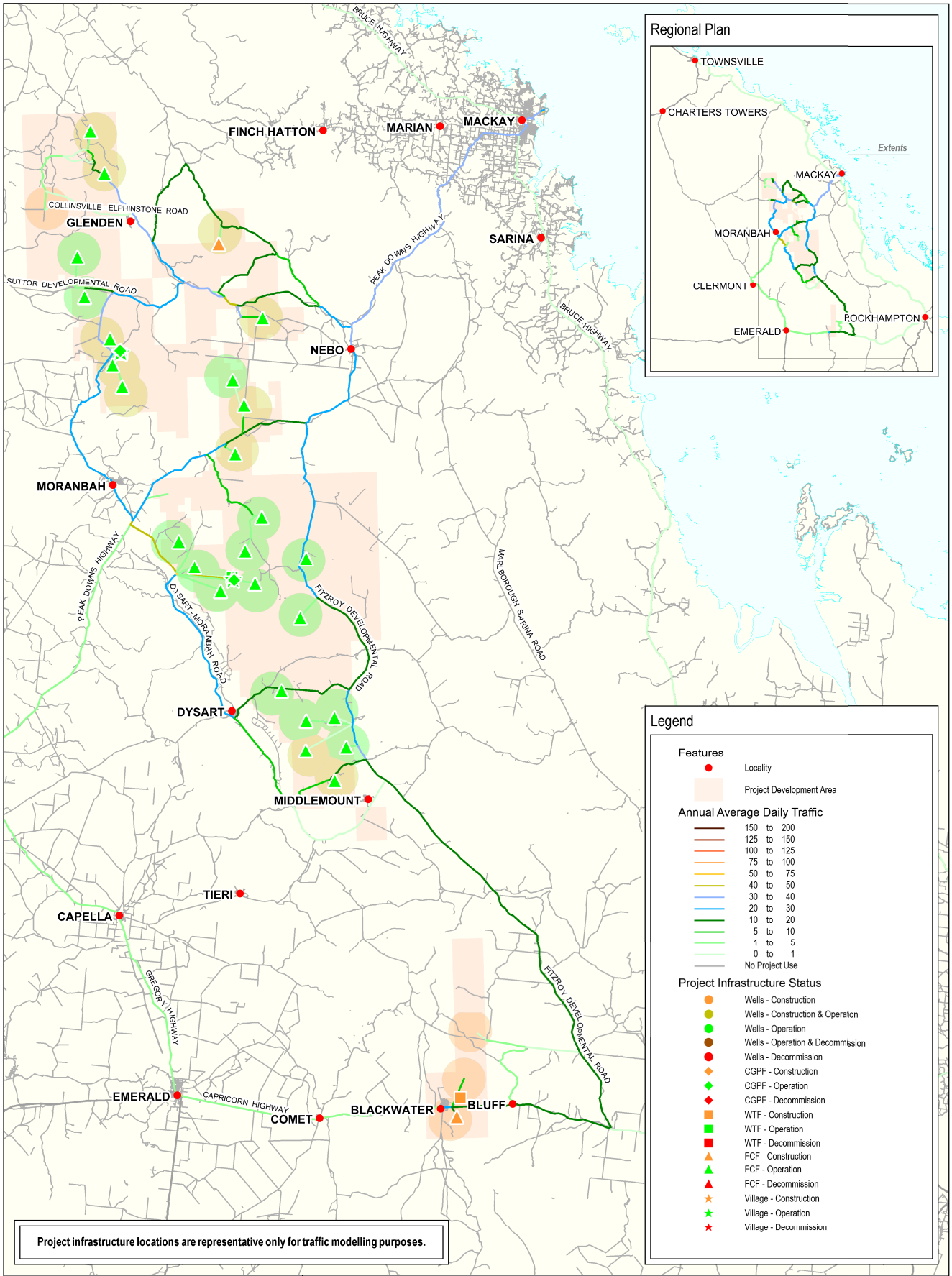
D-11



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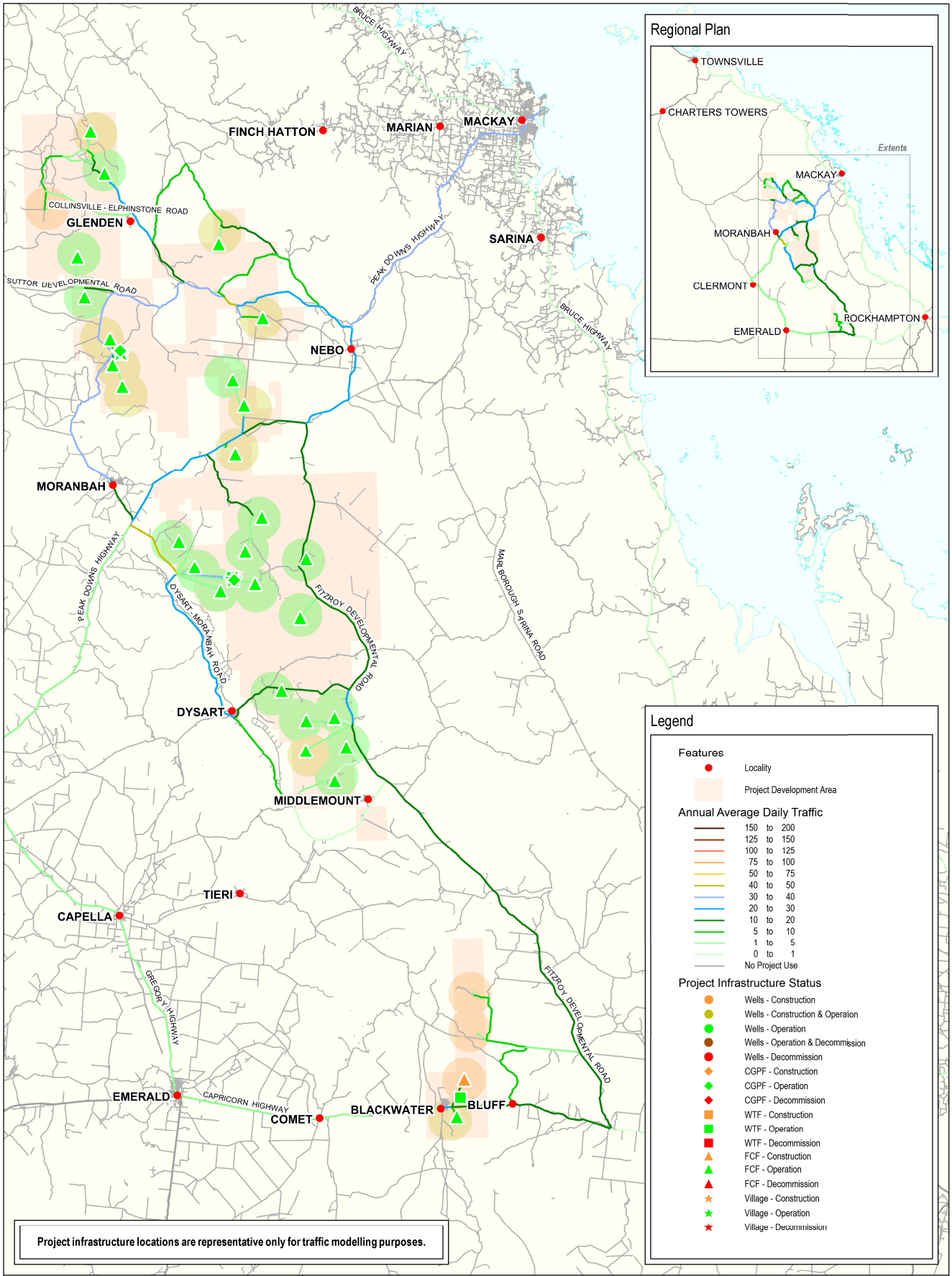
Project Traffic Volumes for 2026

Figure No:

D-12



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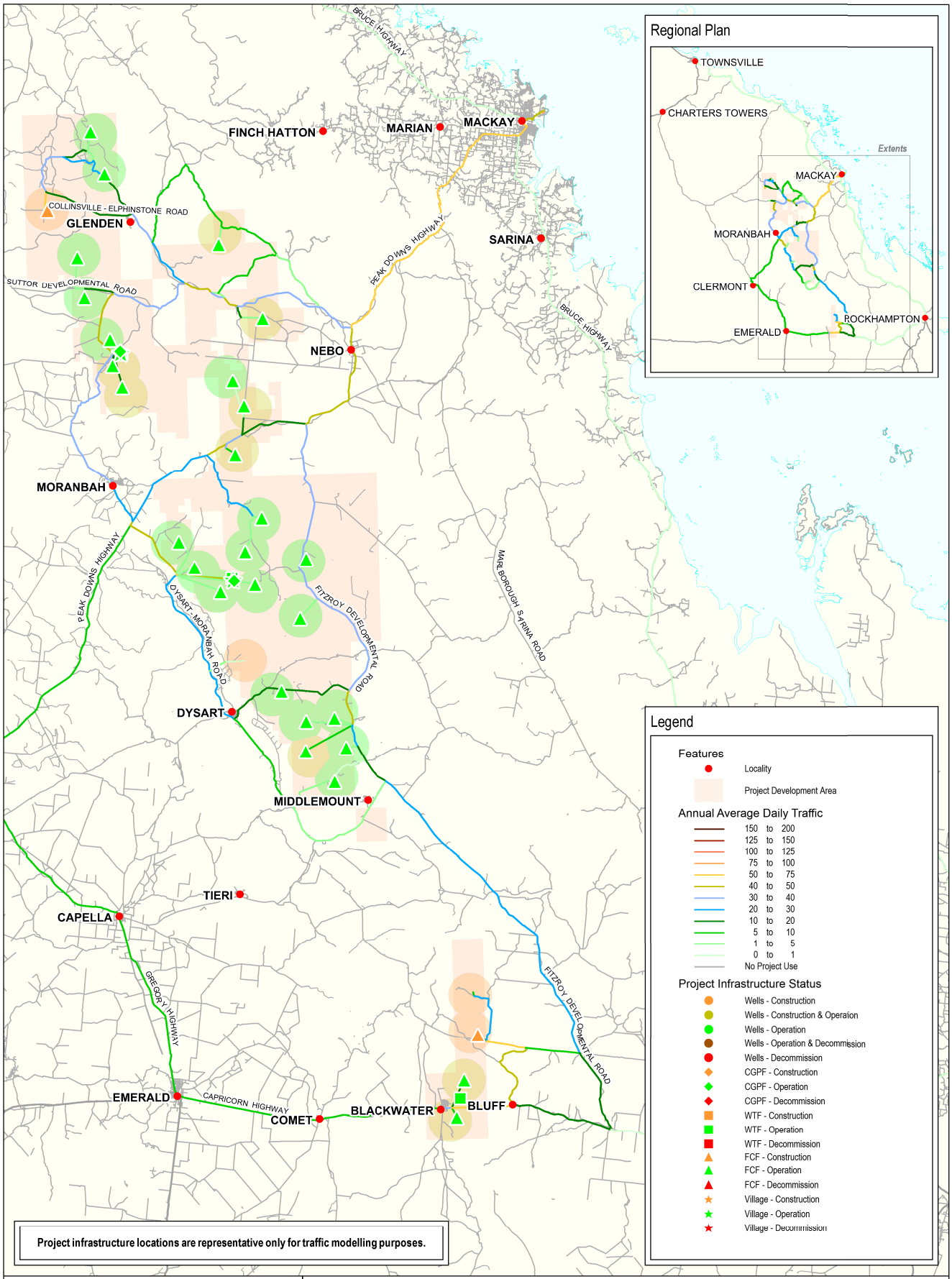
Project Traffic Volumes for 2027

Figure No:

D-13



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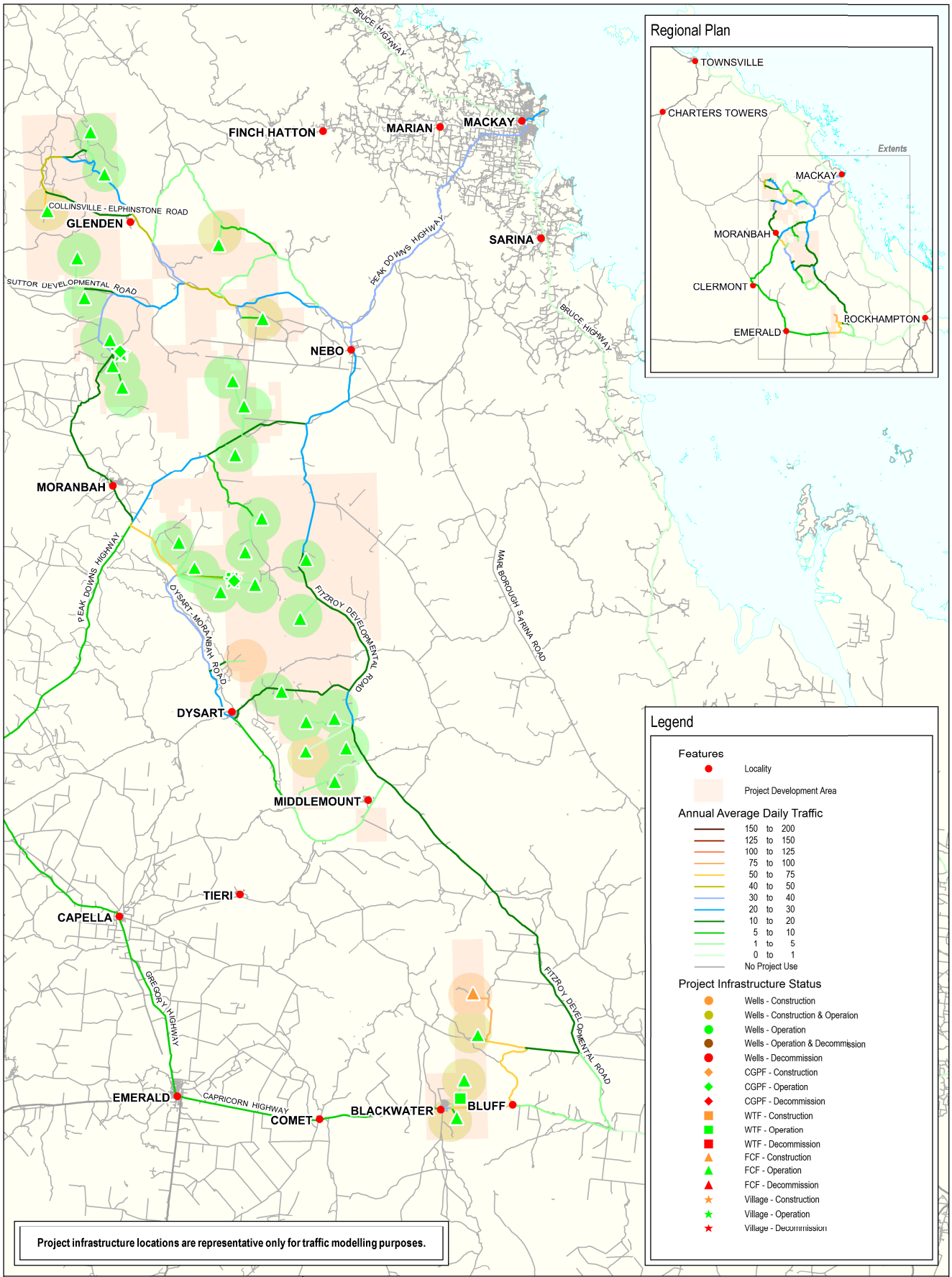
Project Traffic Volumes for 2028

Figure No:

D-14



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Project Traffic Volumes for 2029

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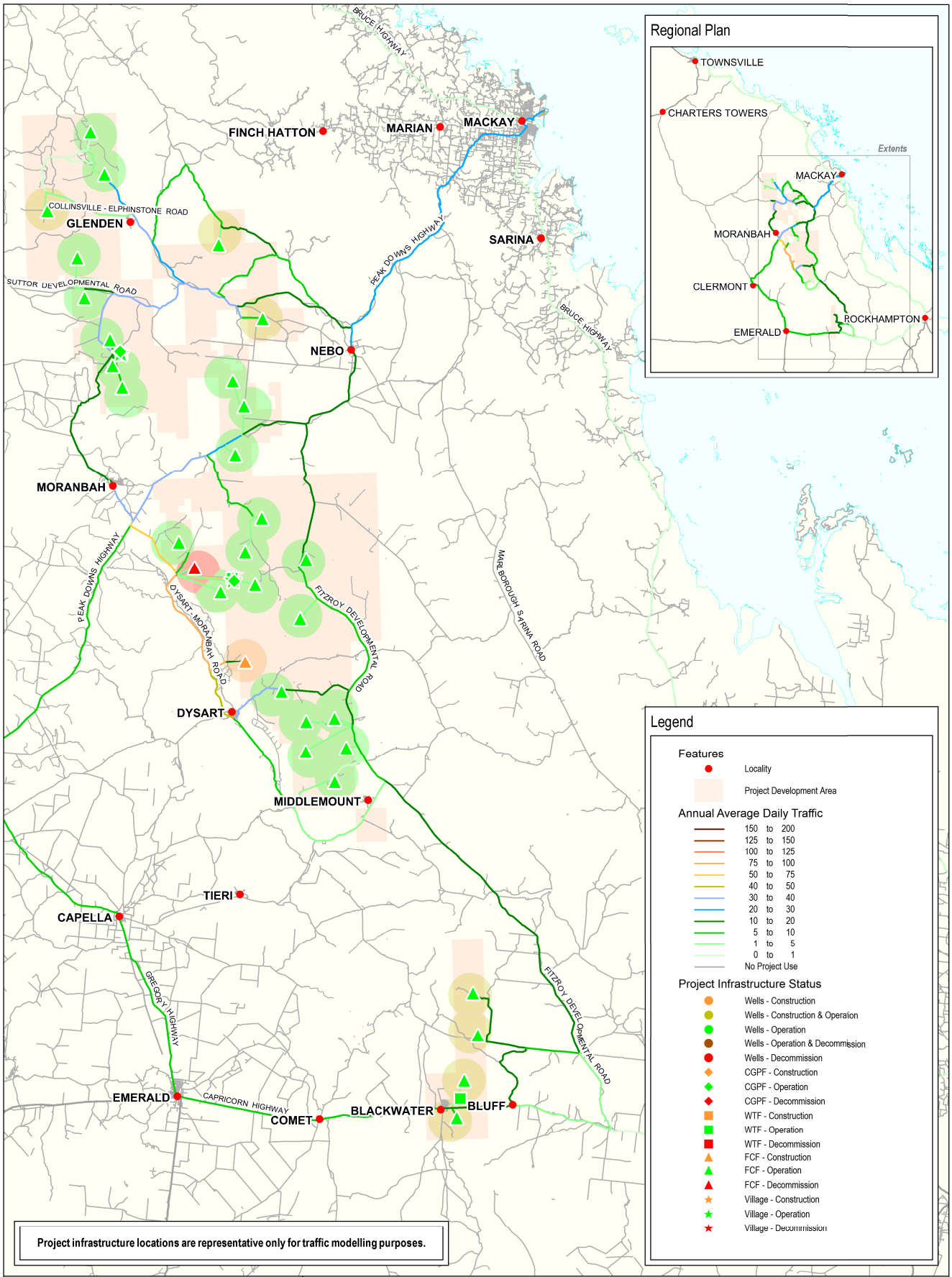
D-15



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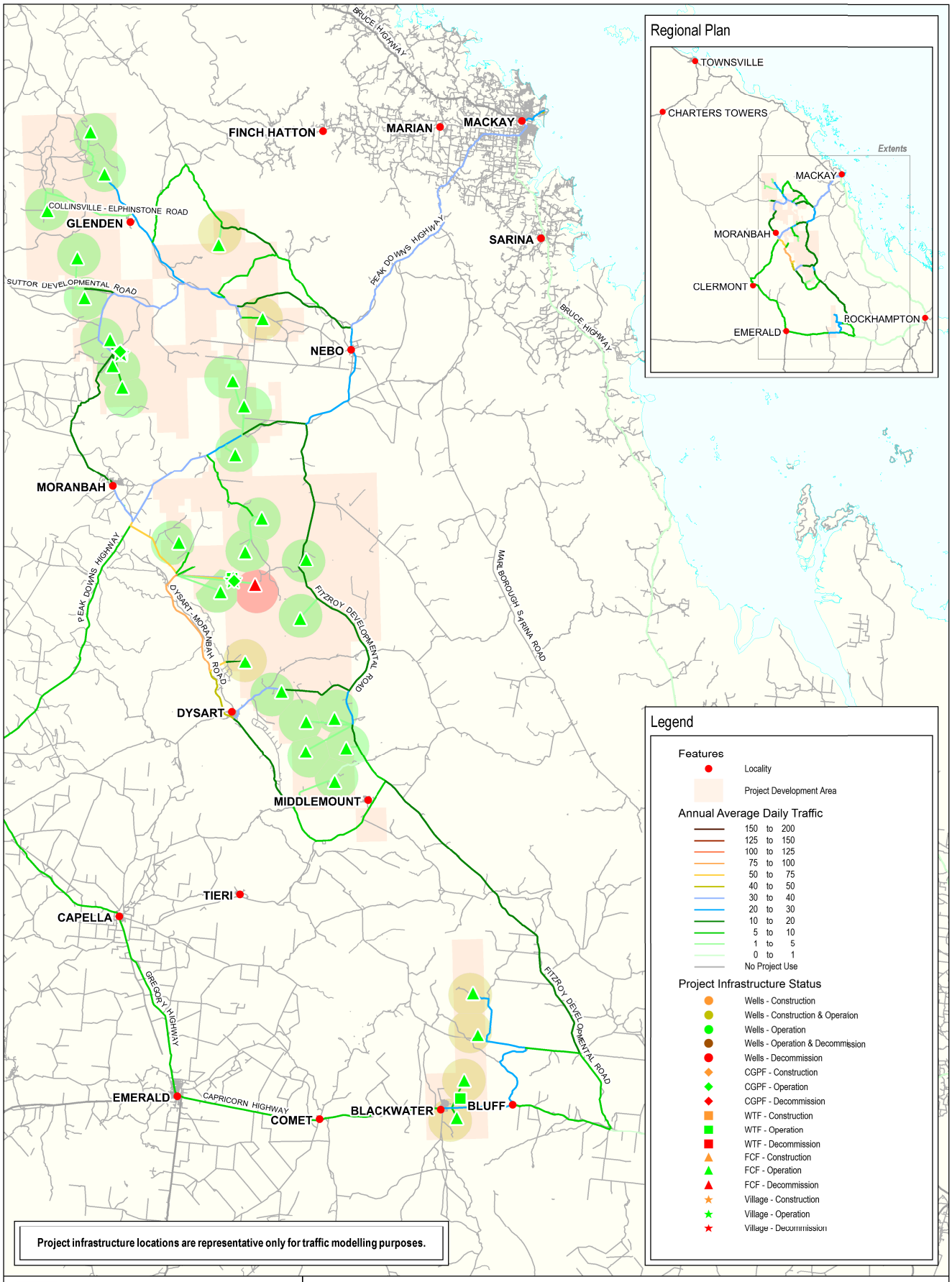
Project Traffic Volumes for 2030

Figure No:

D-16



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Bowen Gas Project

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Project Traffic Volumes for 2031

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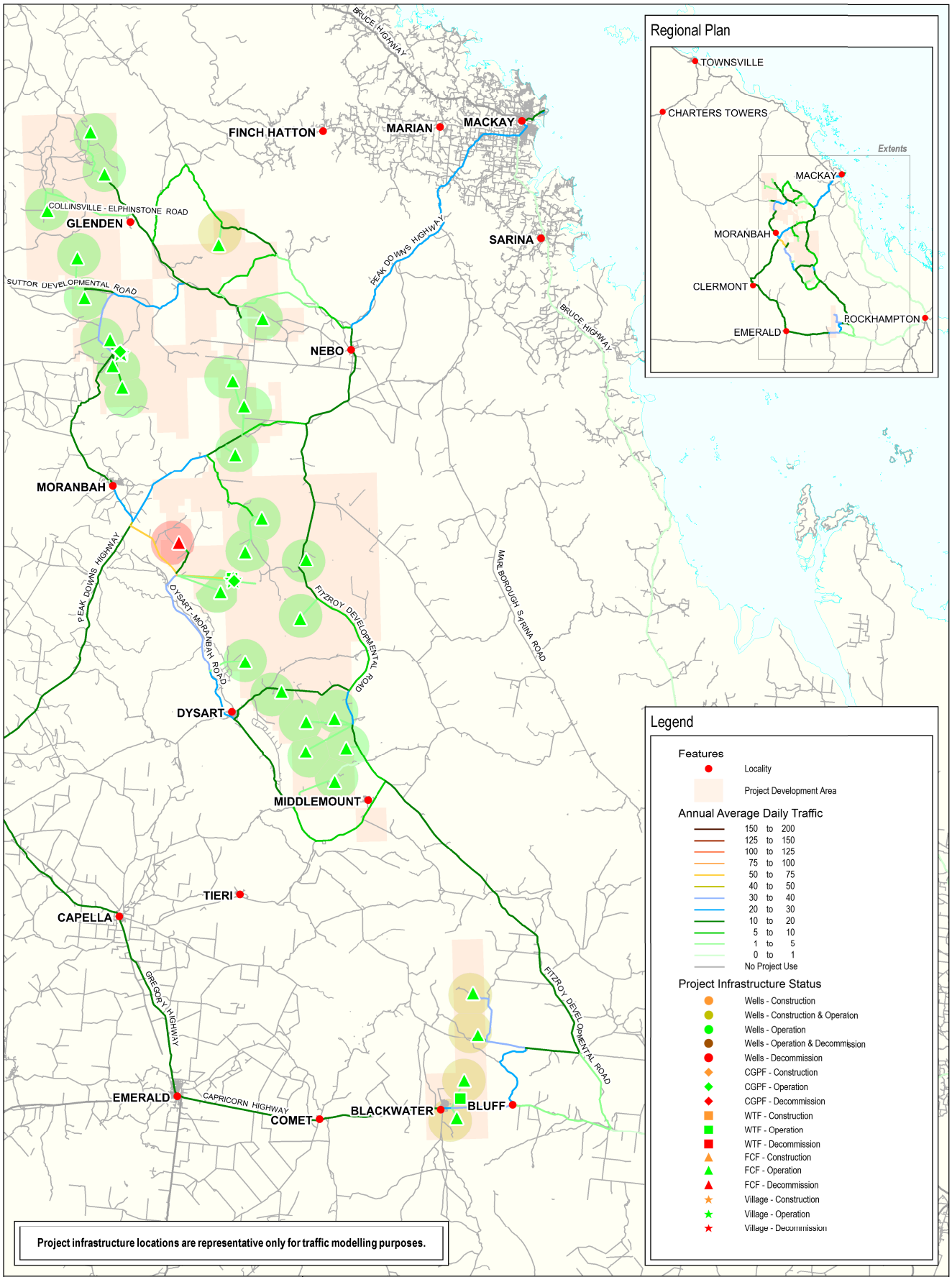
D-17



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Bowen Gas Project

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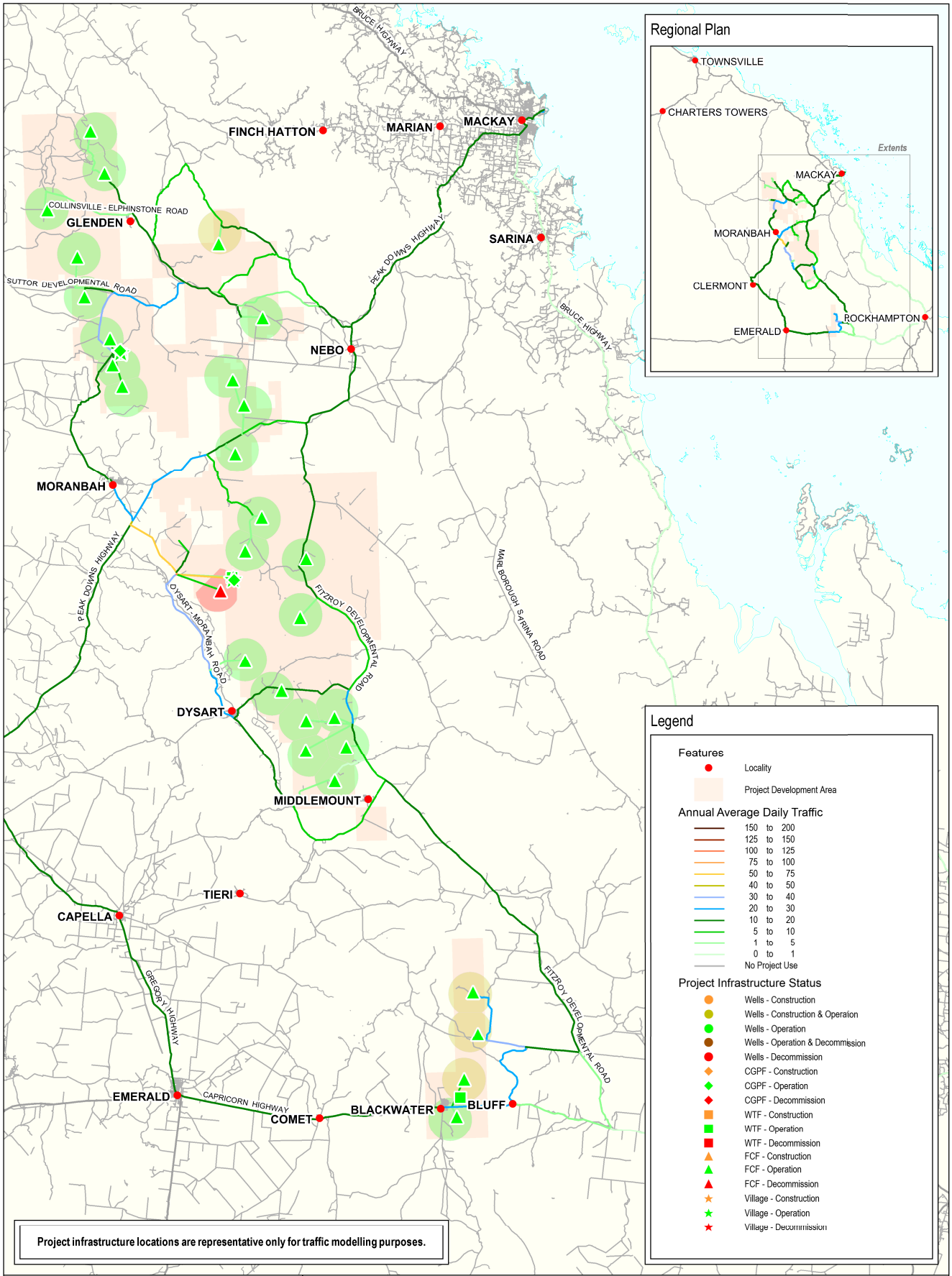
Project Traffic Volumes for 2032

Figure No:

D-18



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Bowen Gas Project

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Project Traffic Volumes for 2033

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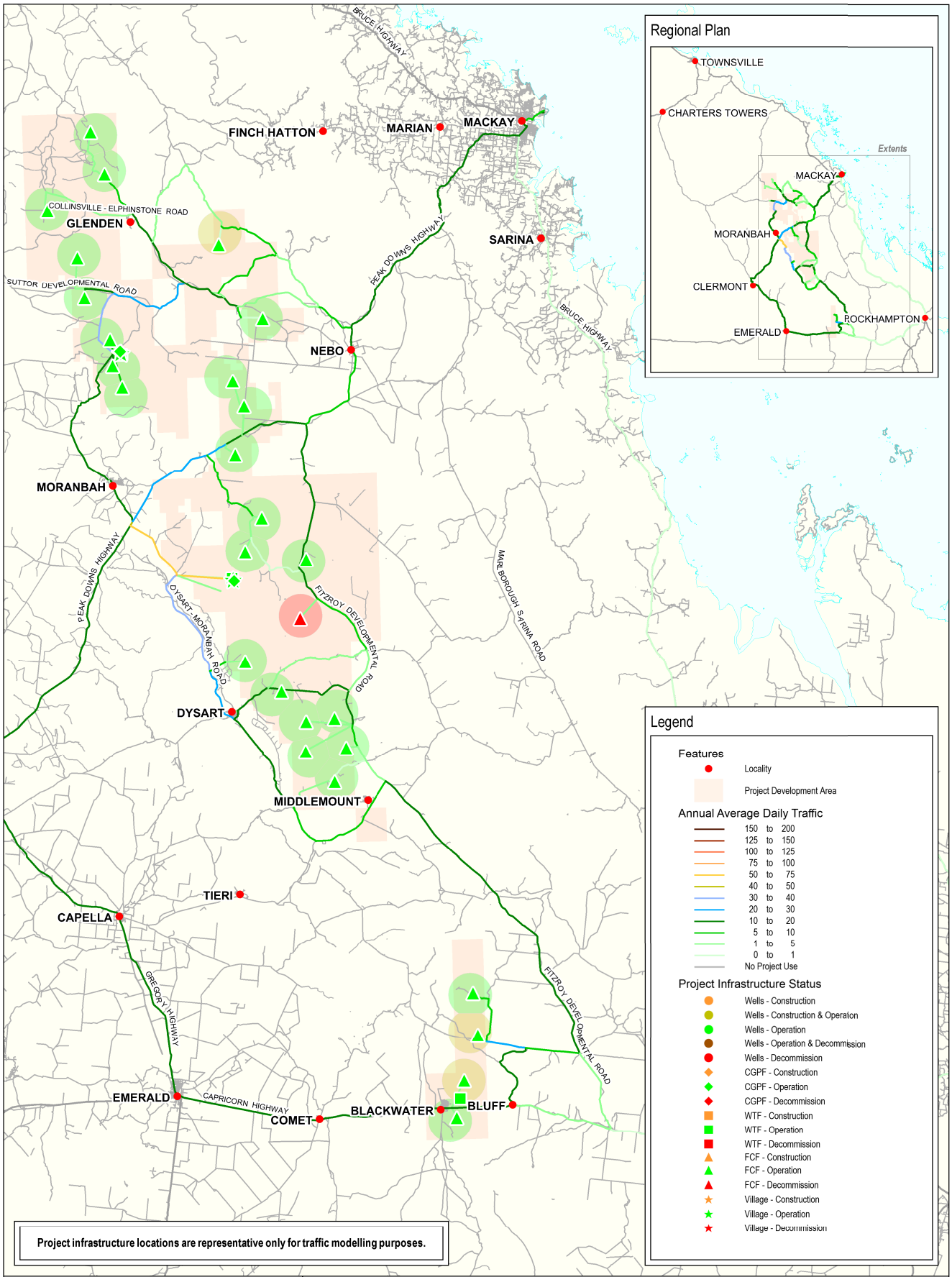
D-19



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Bowen Gas Project

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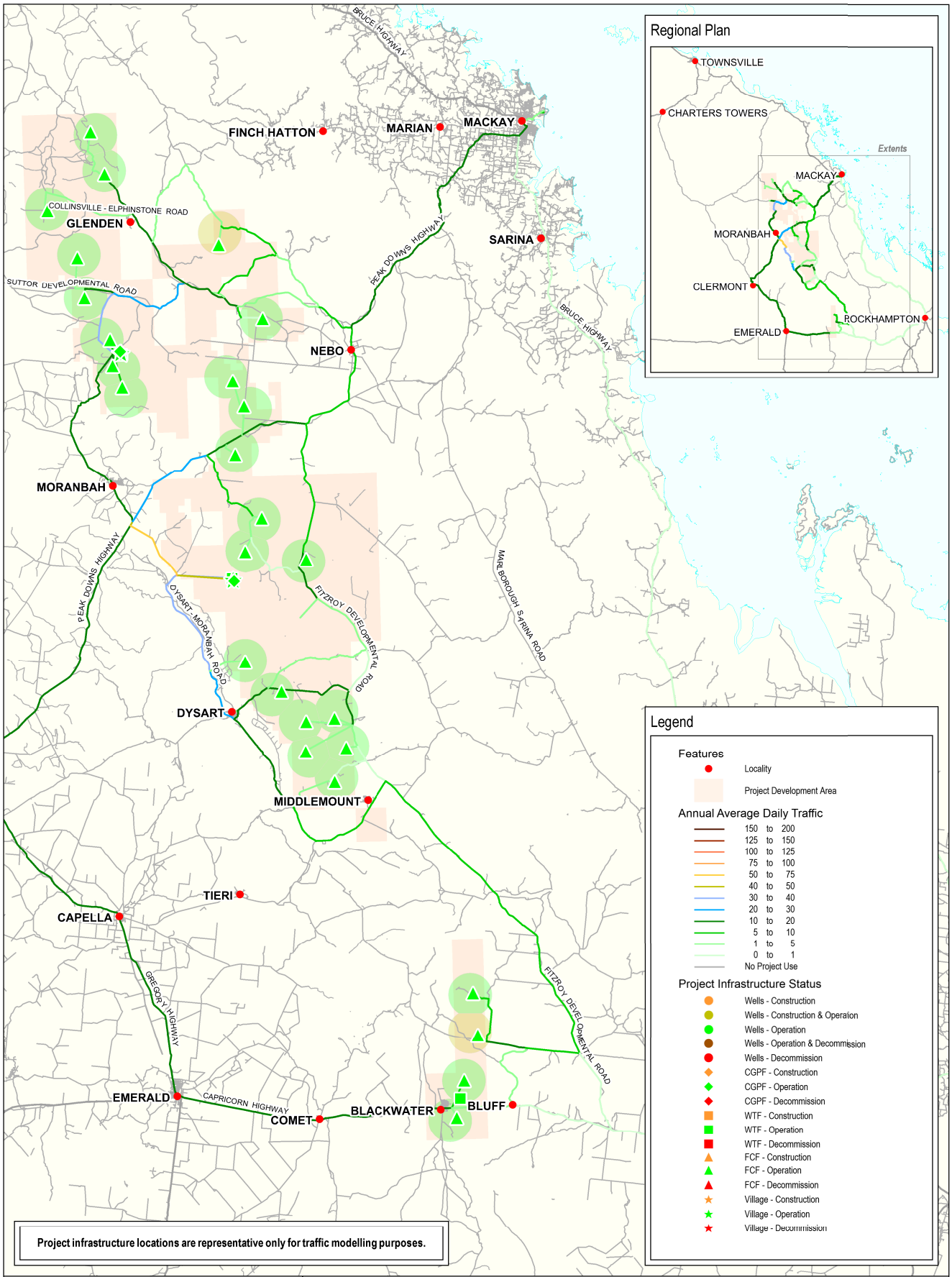
Project Traffic Volumes for 2034

Figure No:

D-20



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Bowen Gas Project

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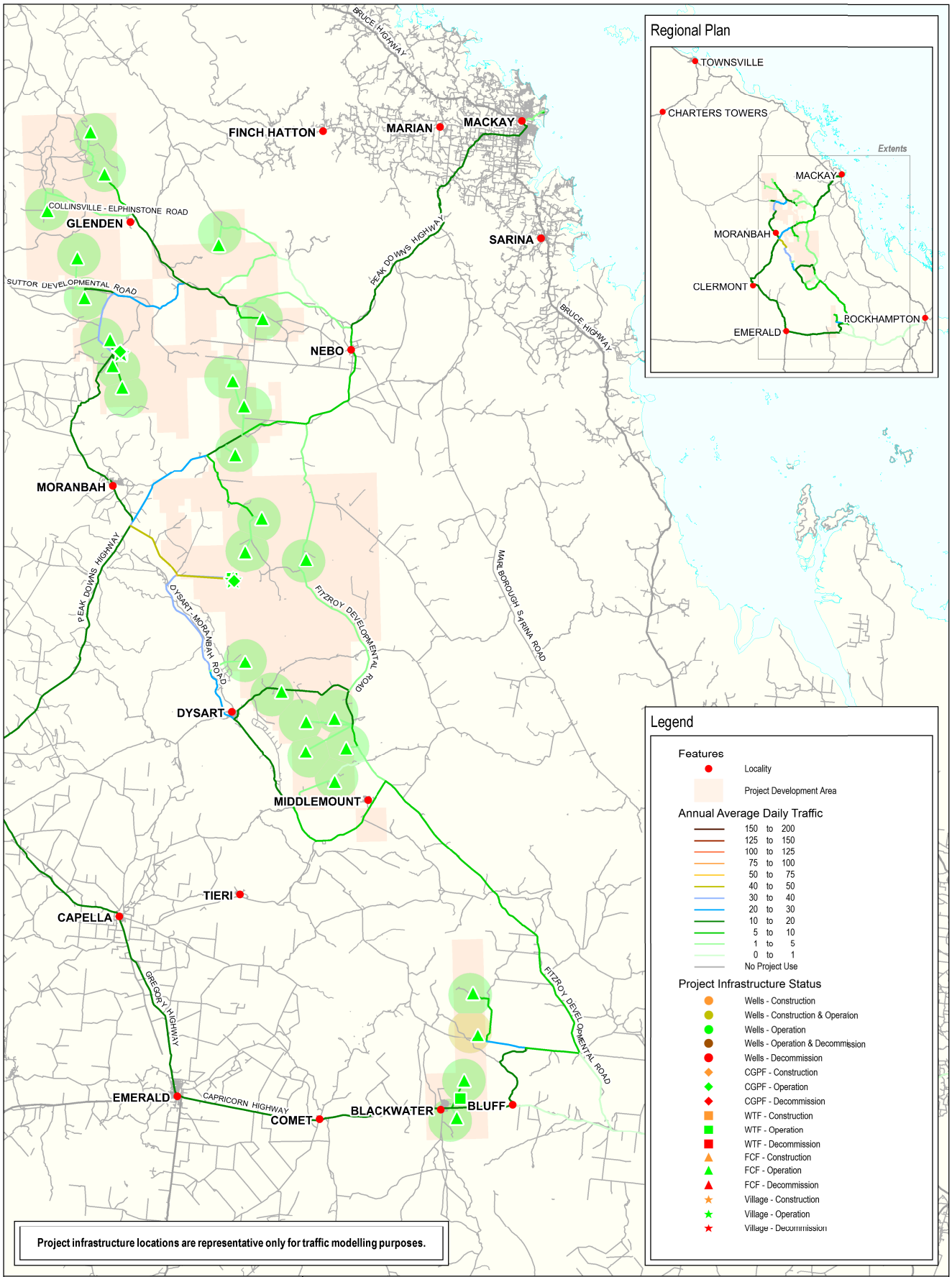
Project Traffic Volumes for 2035

Figure No: **D-21**



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Bowen Gas Project

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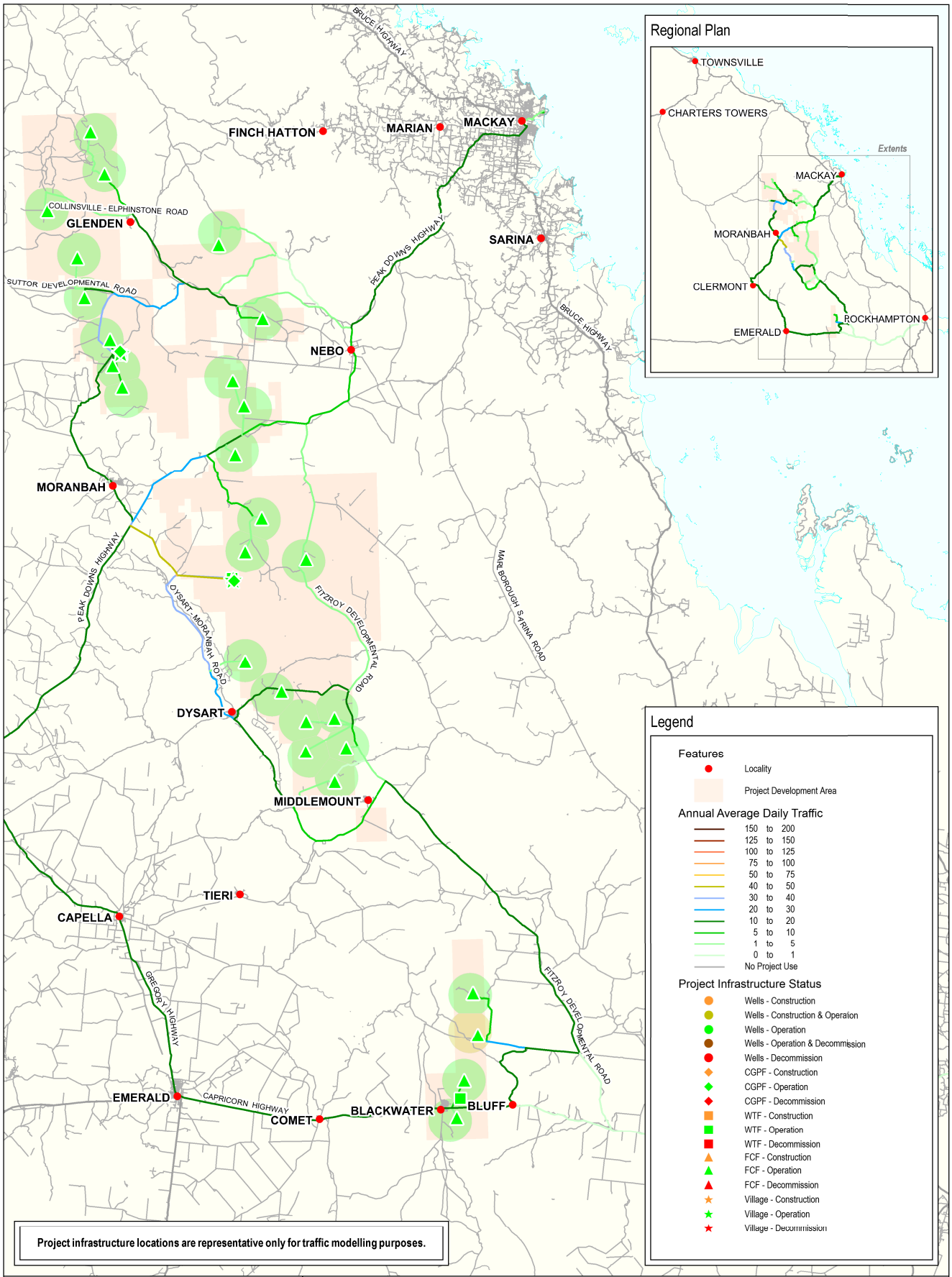
Project Traffic Volumes for 2036

Figure No:

D-22



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Bowen Gas Project

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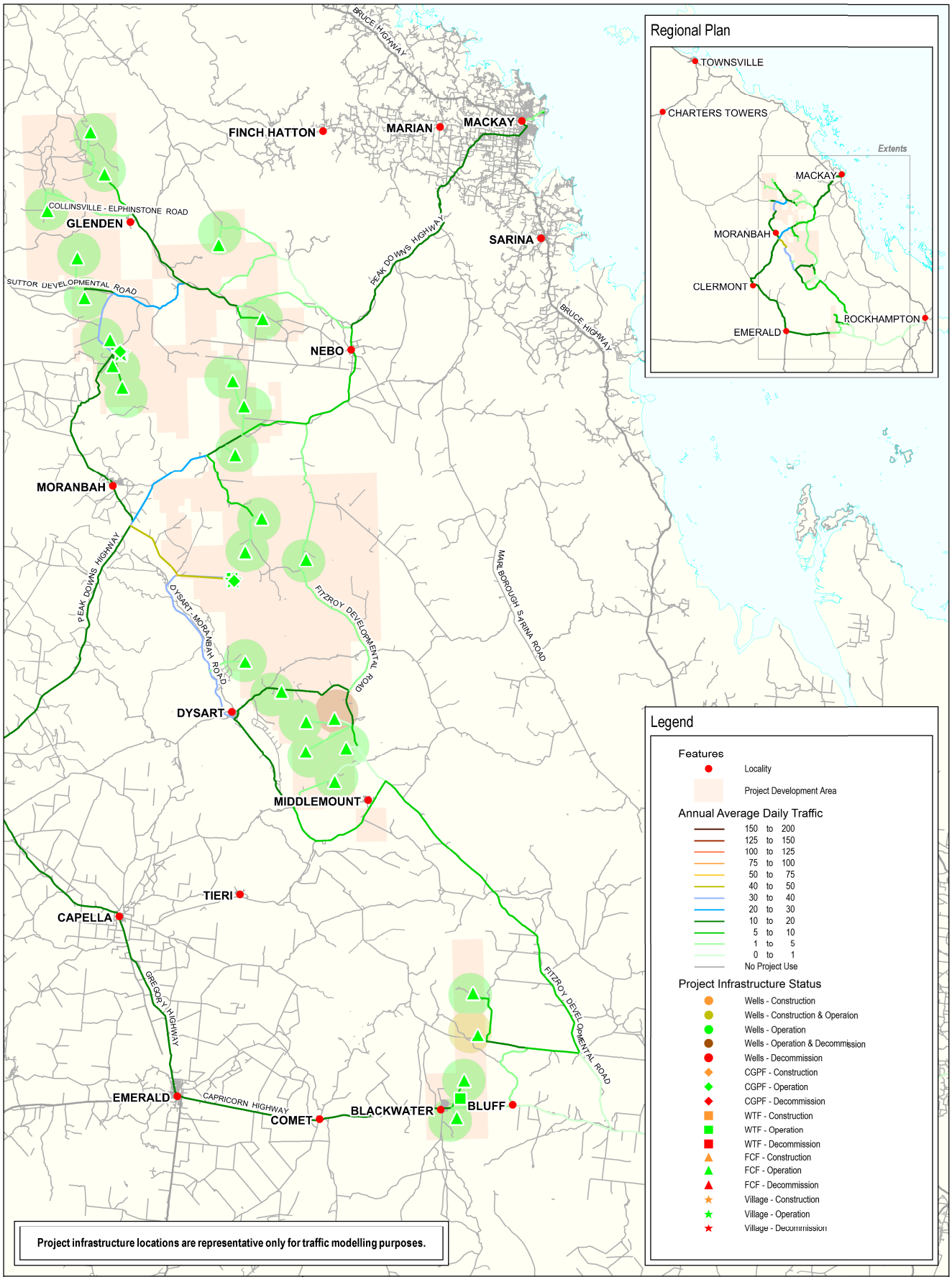
Project Traffic Volumes for 2037

Figure No:

D-23



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Bowen Gas Project

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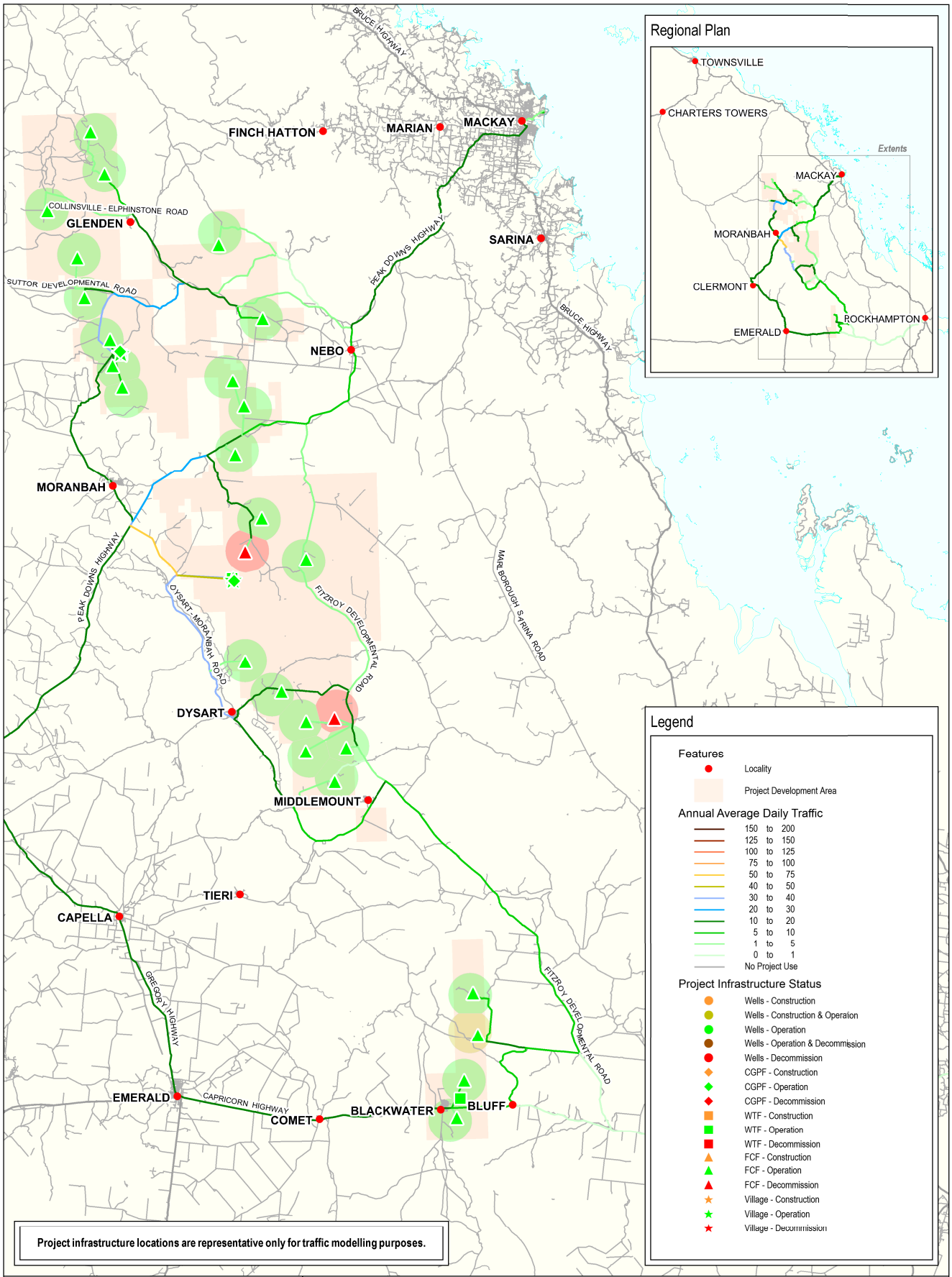
arrow energy go further

Project Traffic Volumes for 2038

Figure No:

D-24



Cardno Shaping the Future

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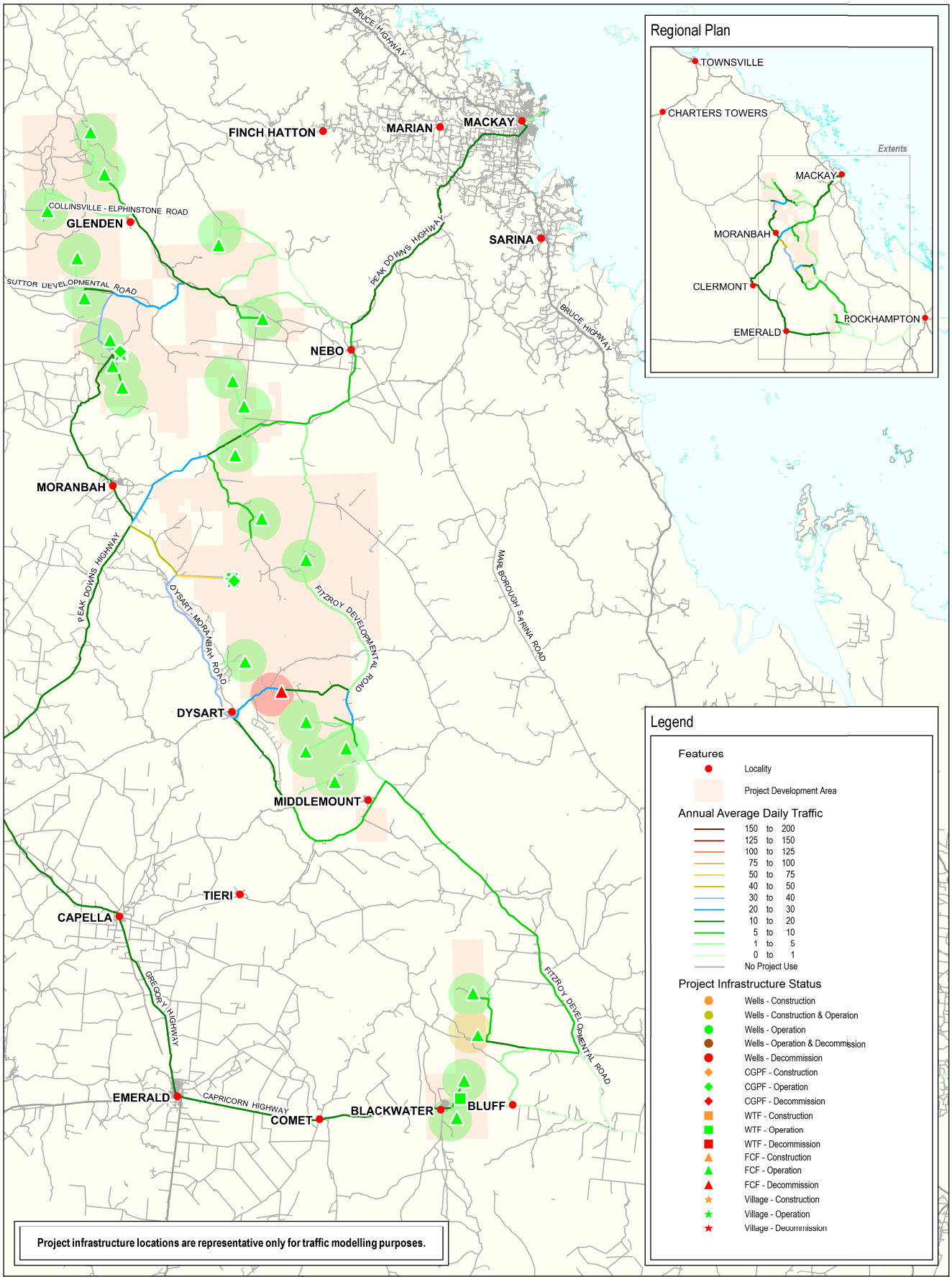
Project Traffic Volumes for 2039

Figure No:

D-25



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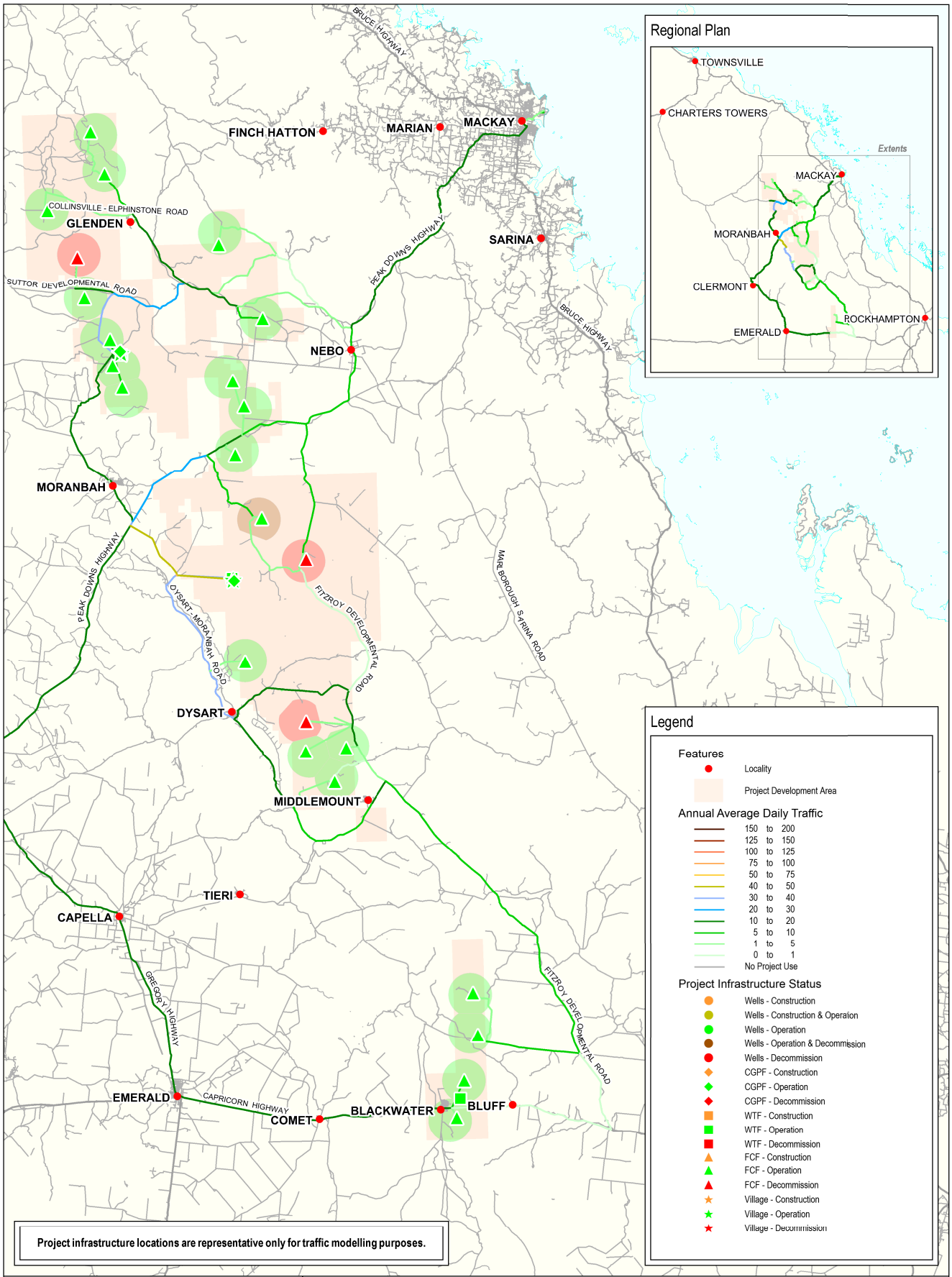
Project Traffic Volumes for 2040

Figure No:

D-26



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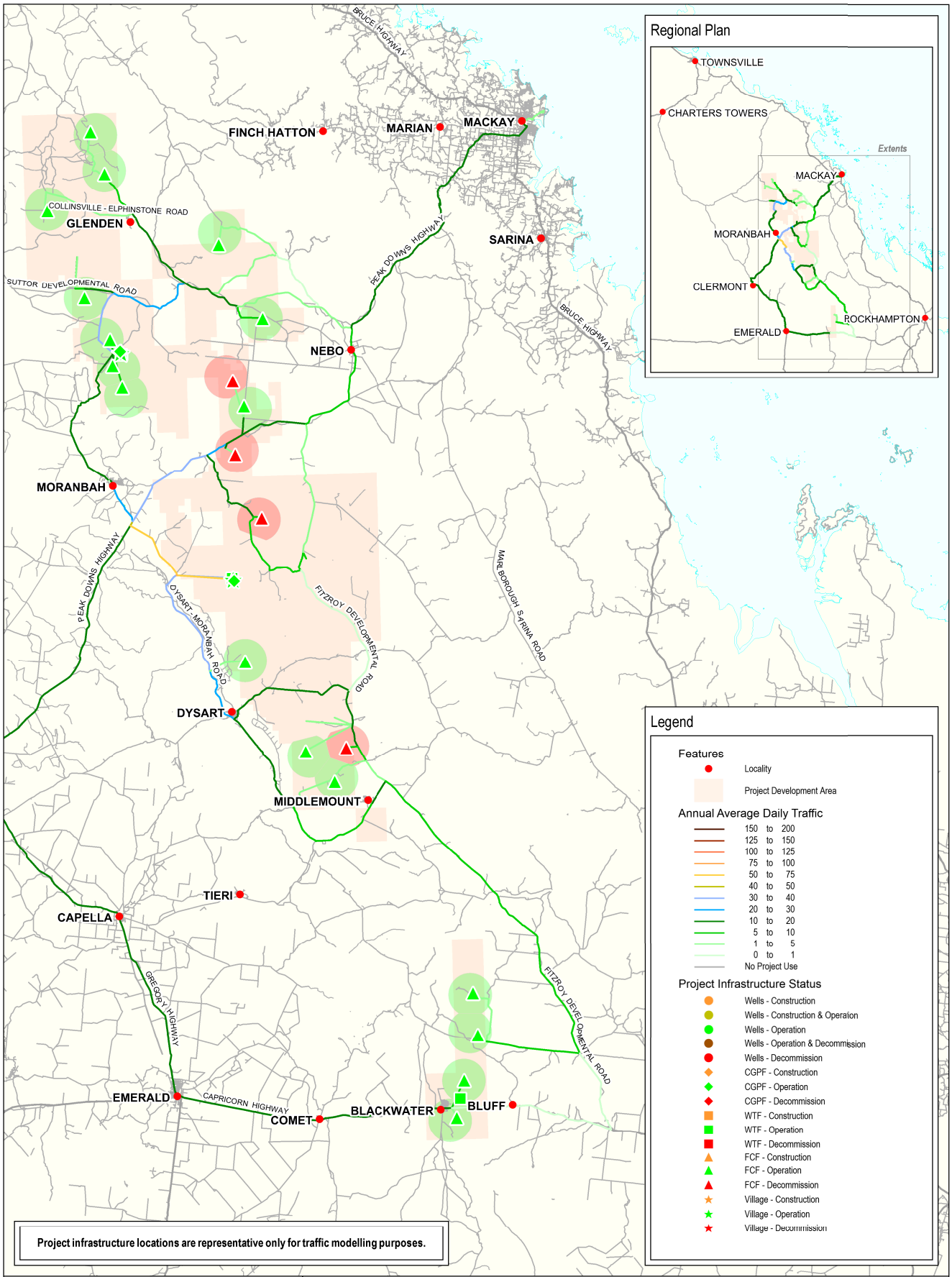
Project Traffic Volumes for 2041

Figure No:

D-27



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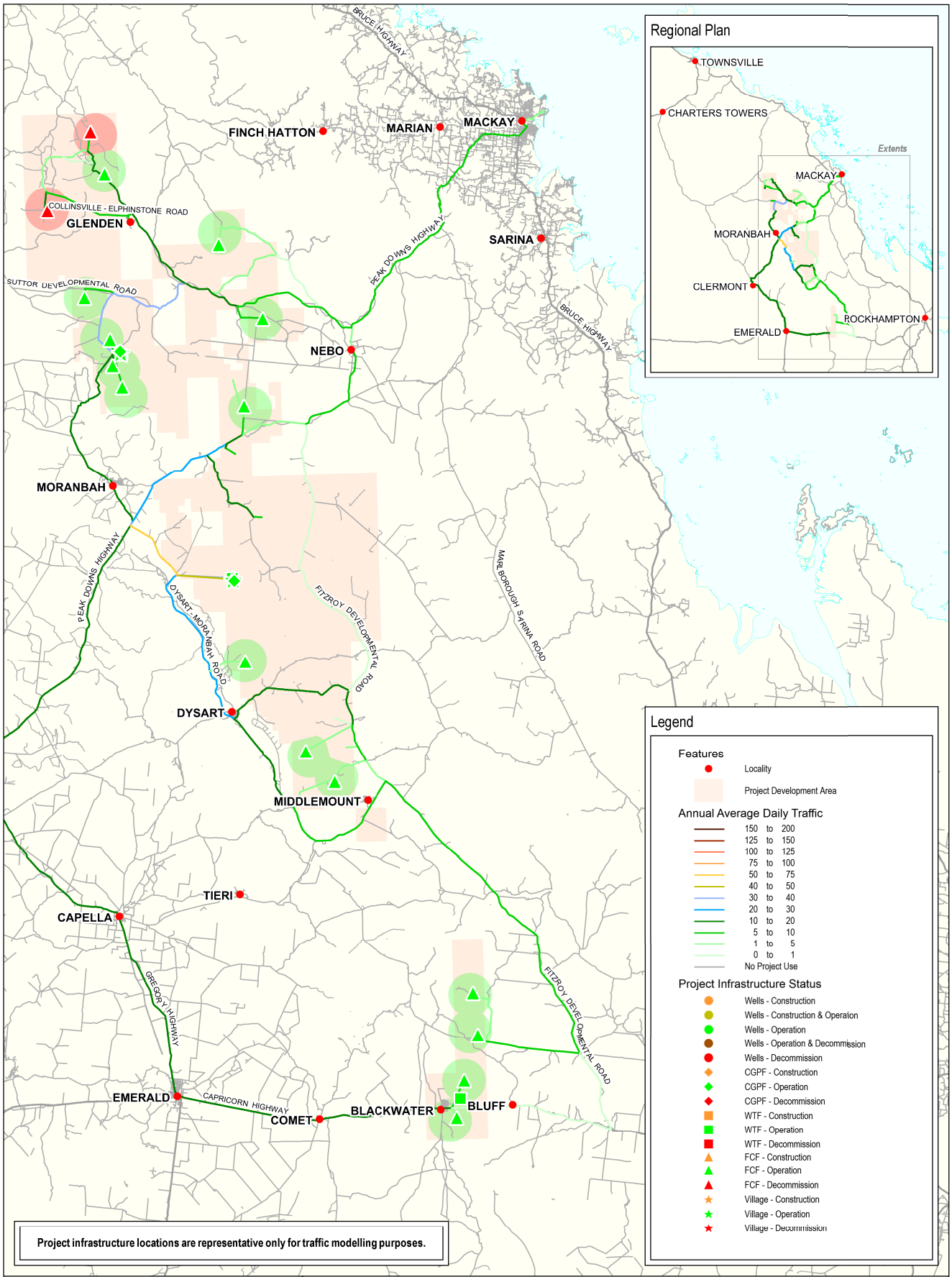
arrow energy go further

Project Traffic Volumes for 2042

Figure No:

D-28



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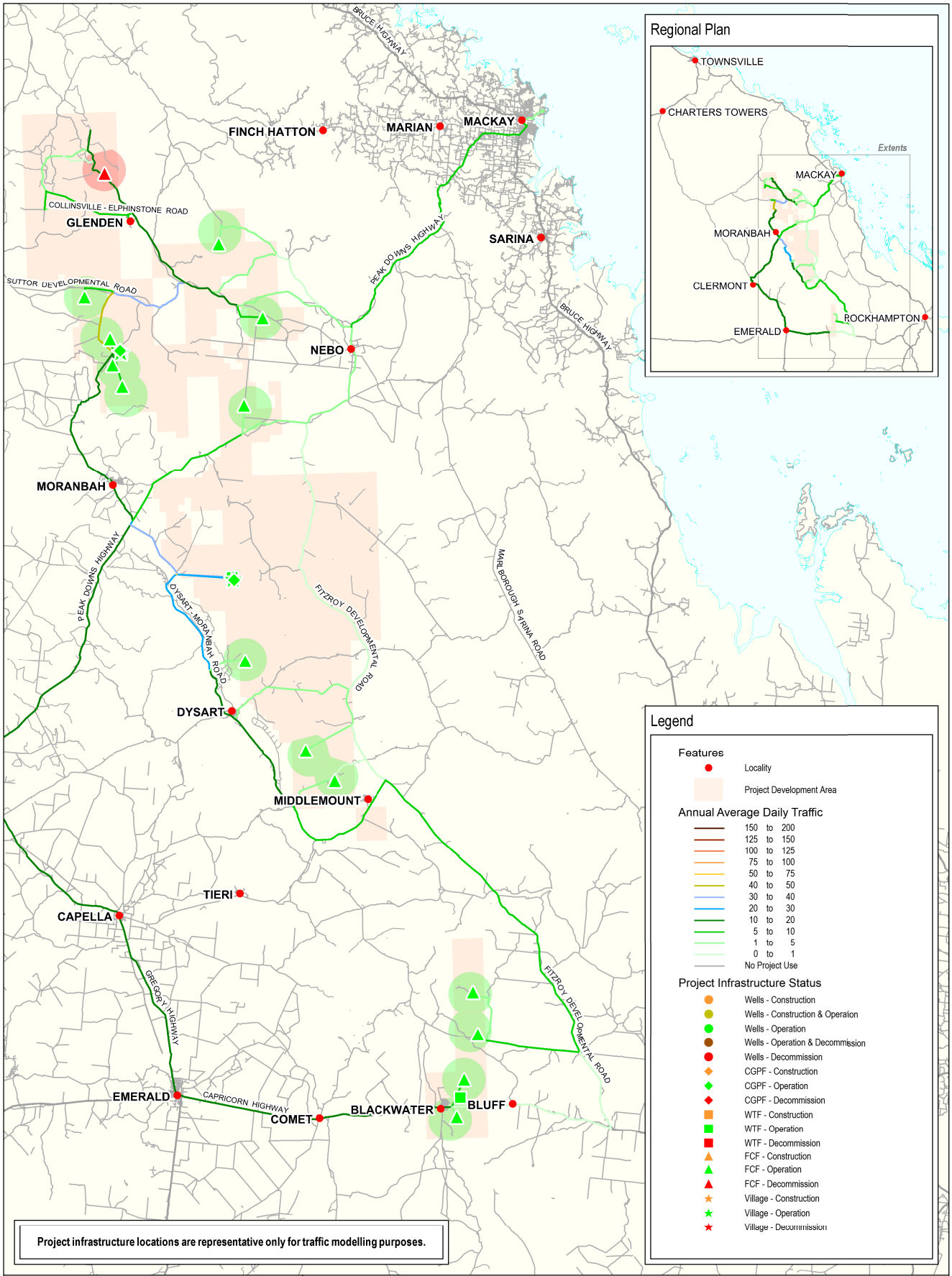
arrow energy go further

Project Traffic Volumes for 2043

Figure No: **D-29**



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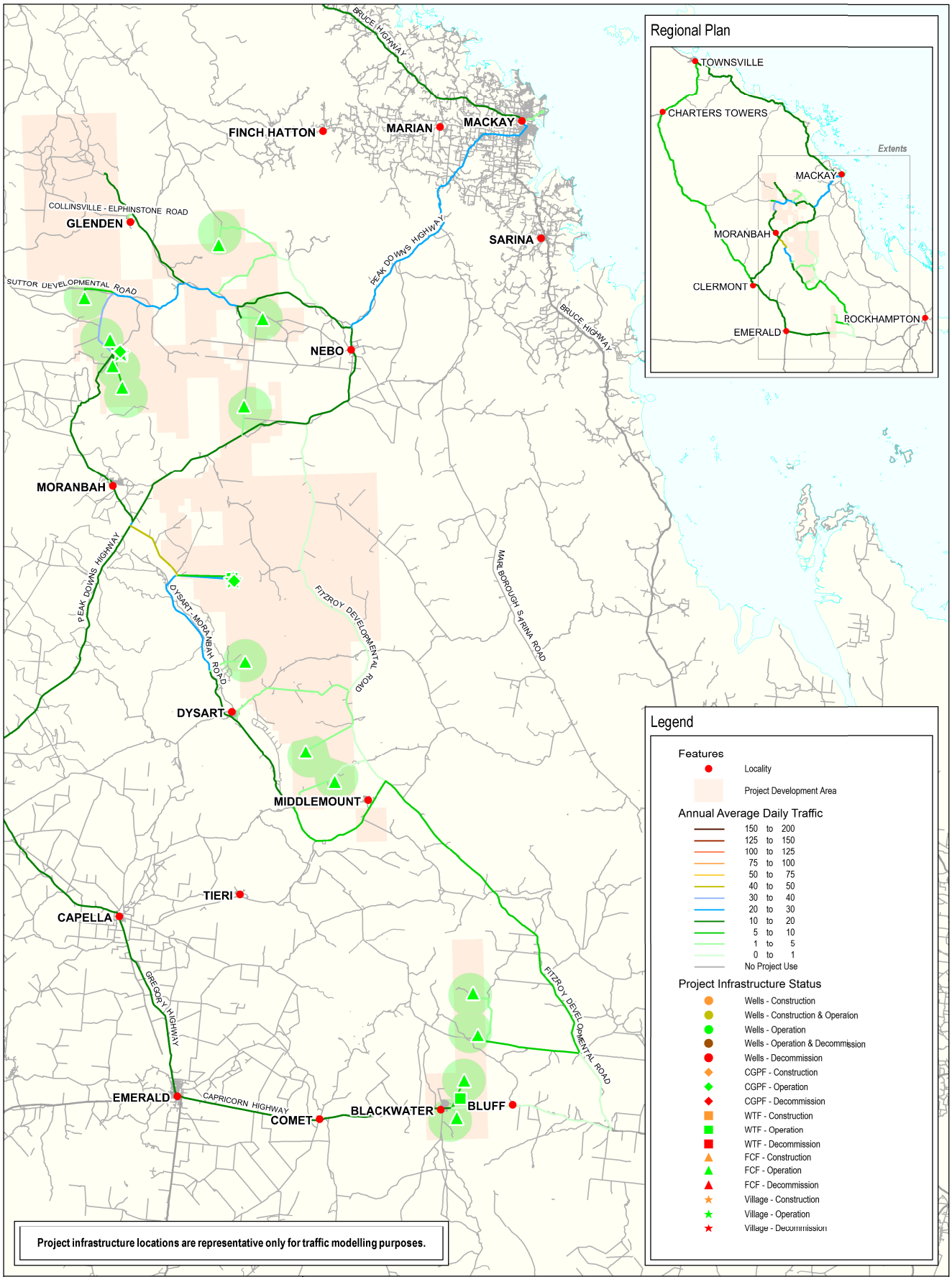
Project Traffic Volumes for 2044

Figure No:

D-30



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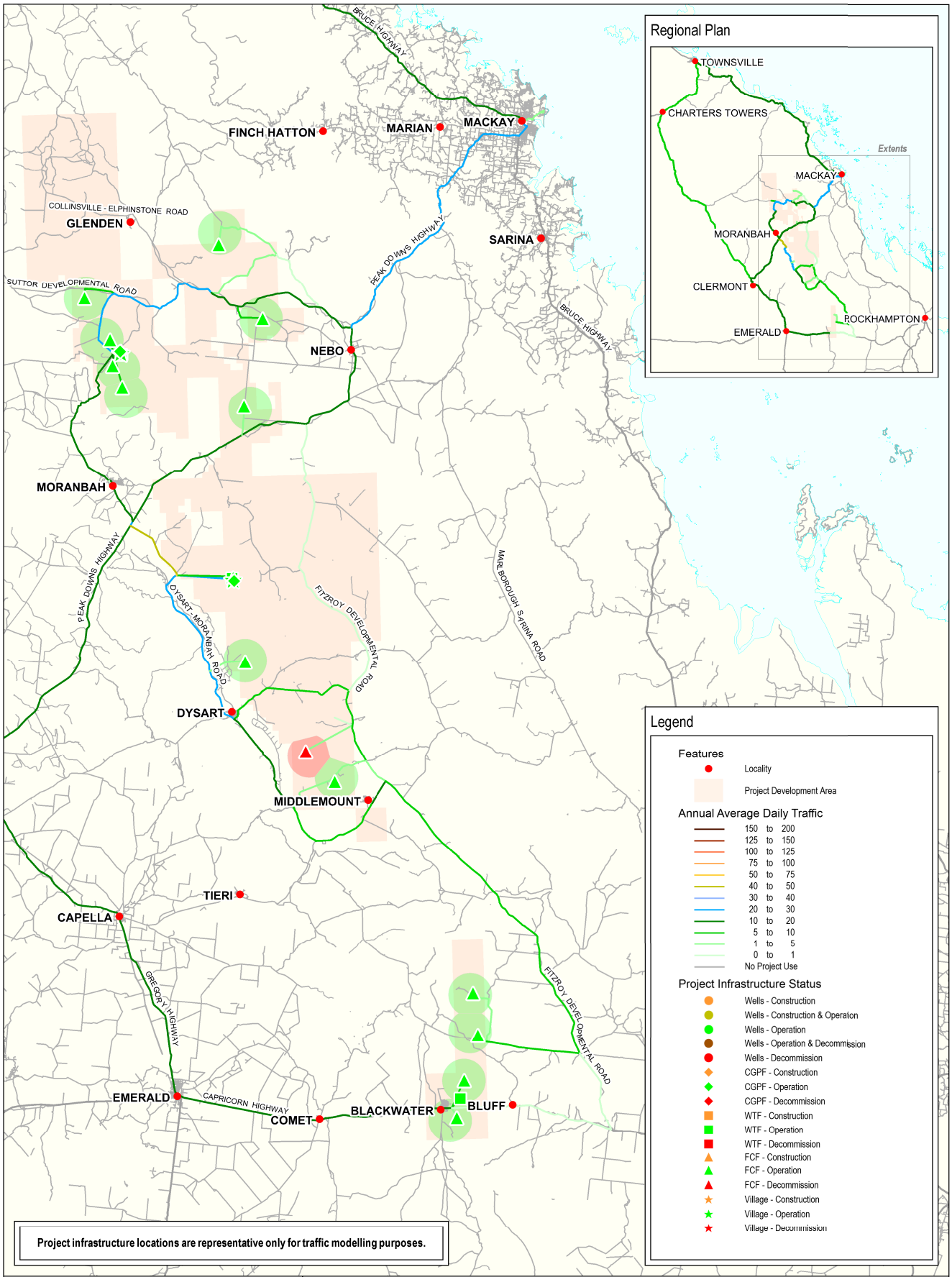
Project Traffic Volumes for 2045

Figure No:

D-31



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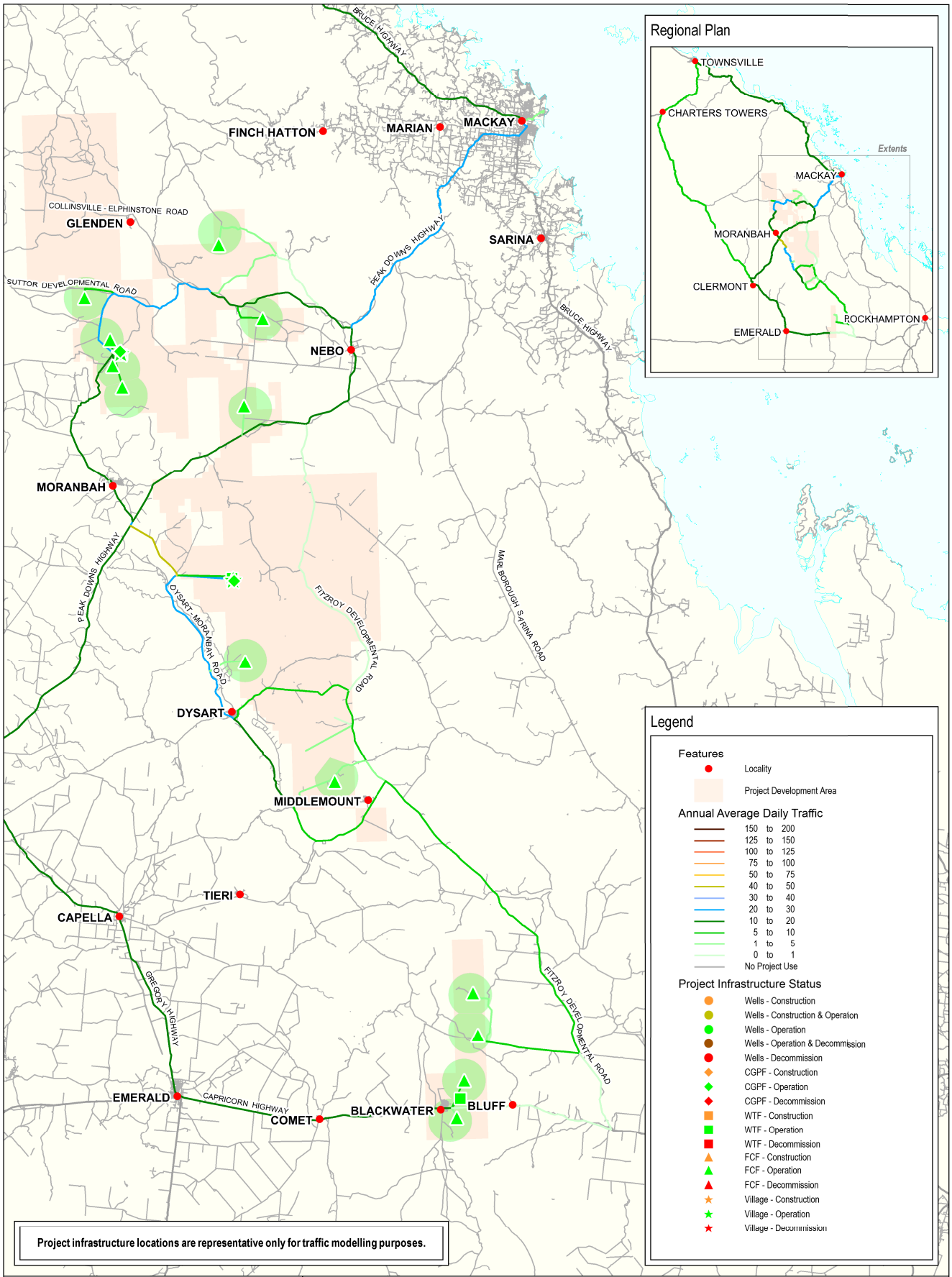
arrow energy go further

Project Traffic Volumes for 2046

Figure No:

D-32



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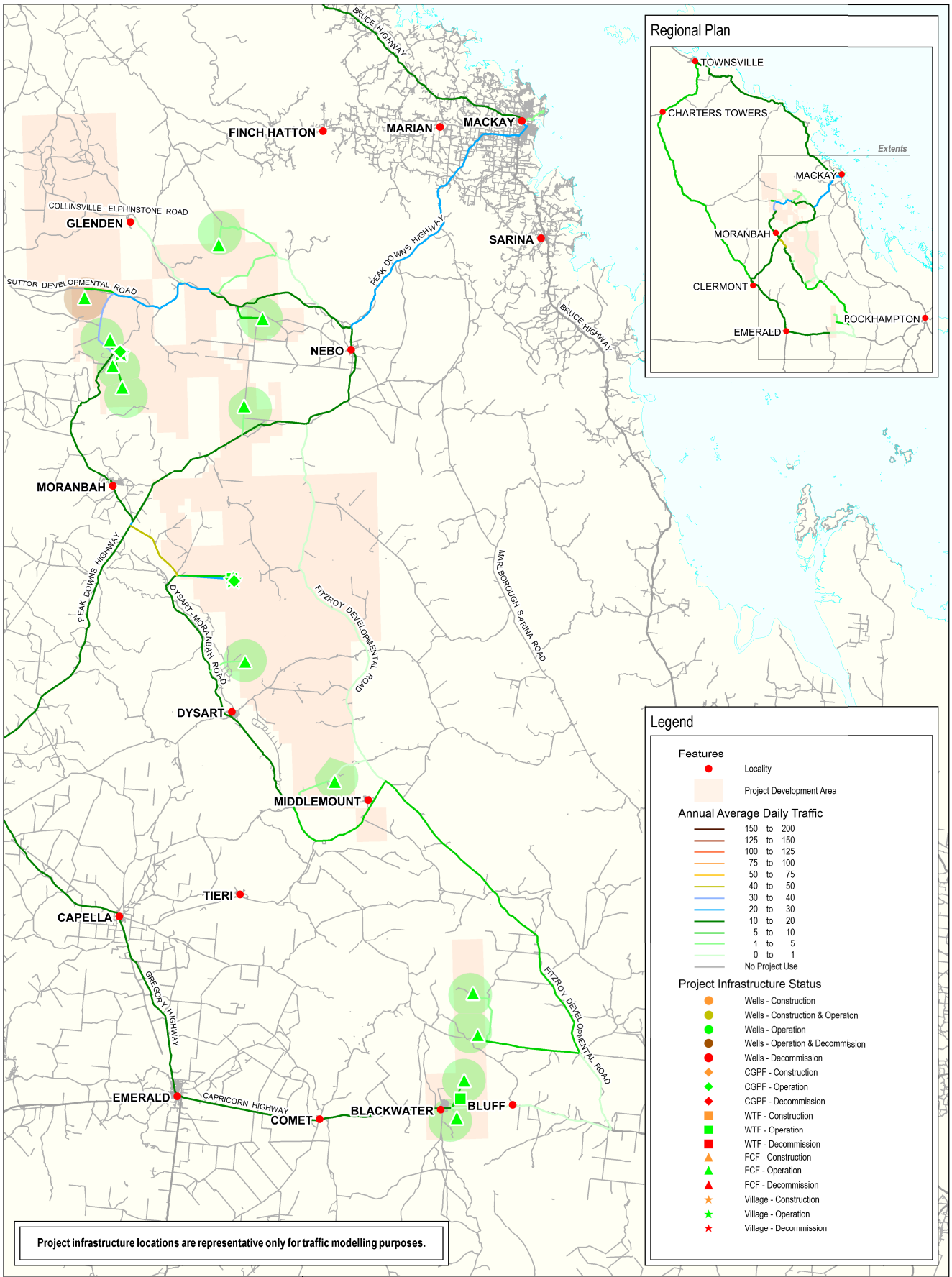
Project Traffic Volumes for 2047

Figure No:

D-33



Cardno Shaping the Future

Bowen Gas Project

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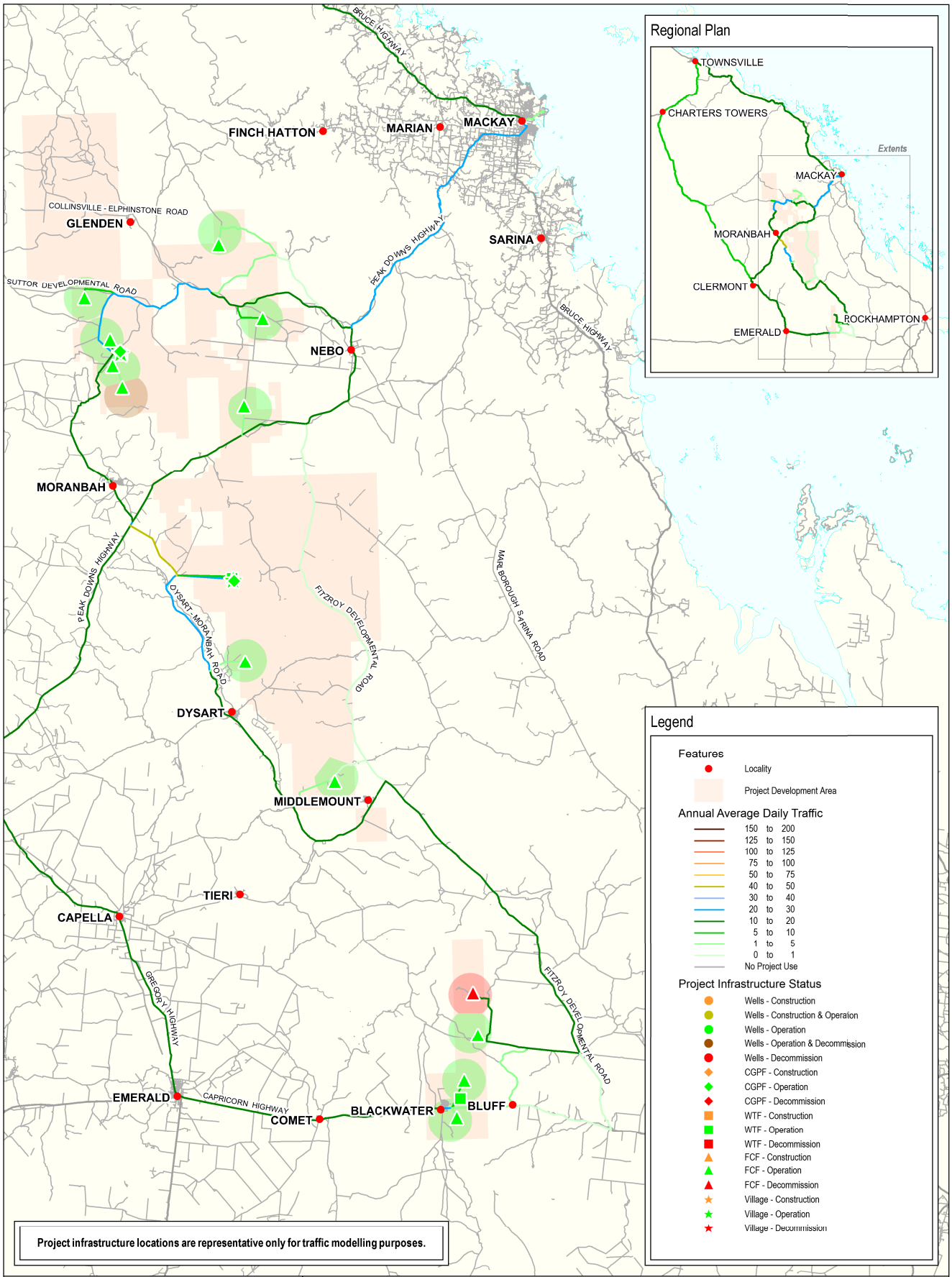
Project Traffic Volumes for 2048

Figure No:

D-34



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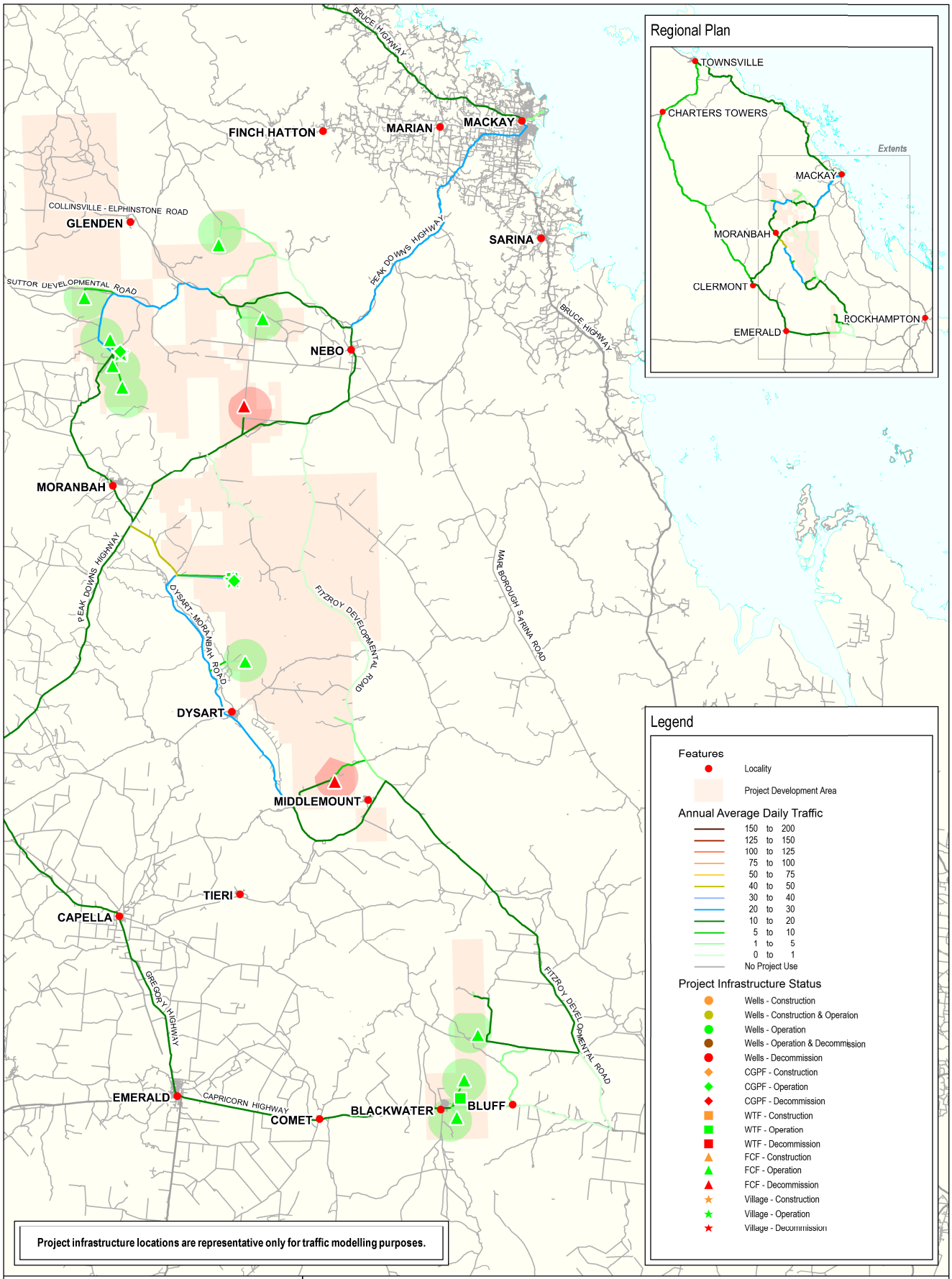
Project Traffic Volumes for 2049

Figure No:

D-35



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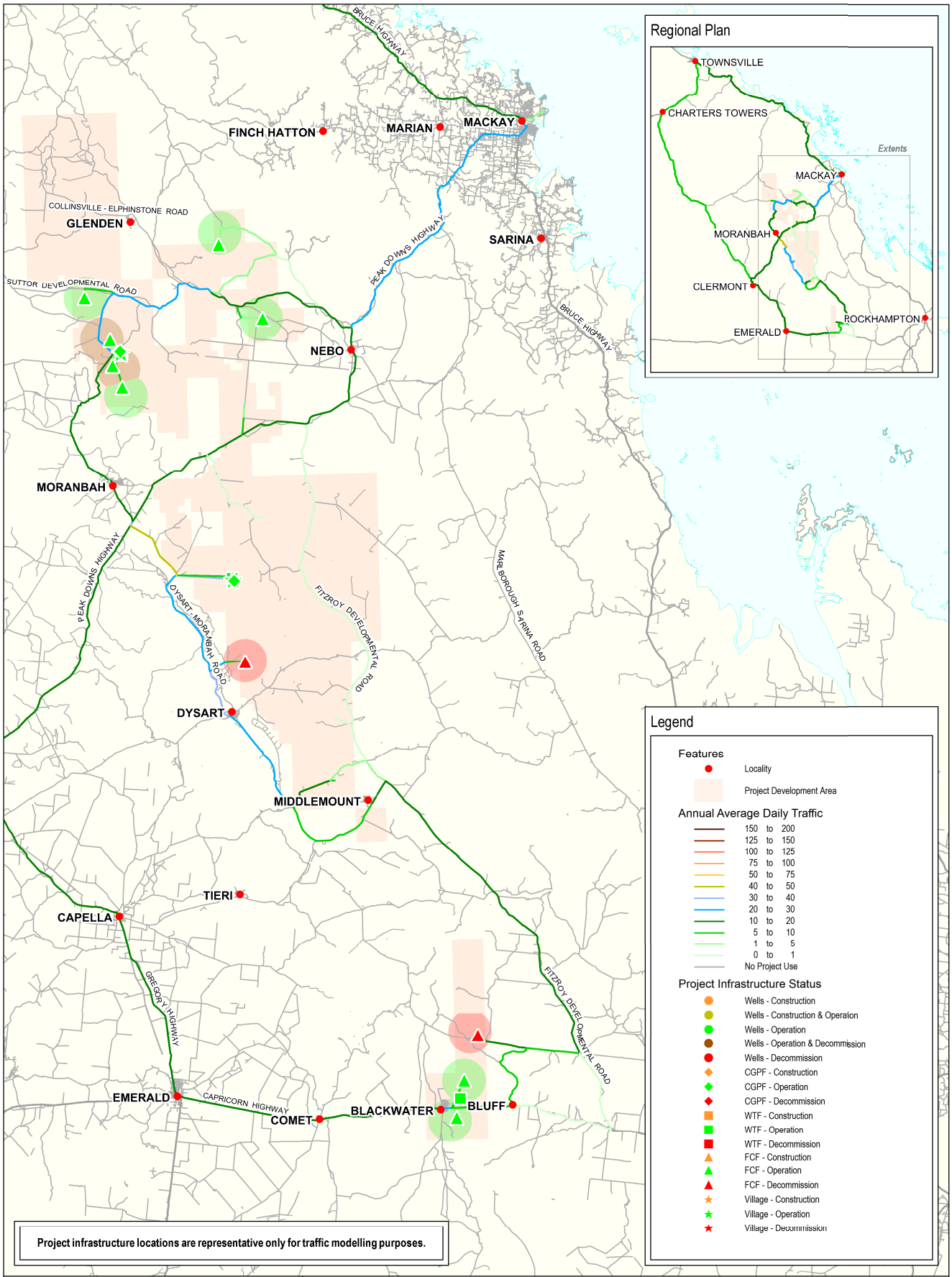
Project Traffic Volumes for 2050

Figure No:

D-36



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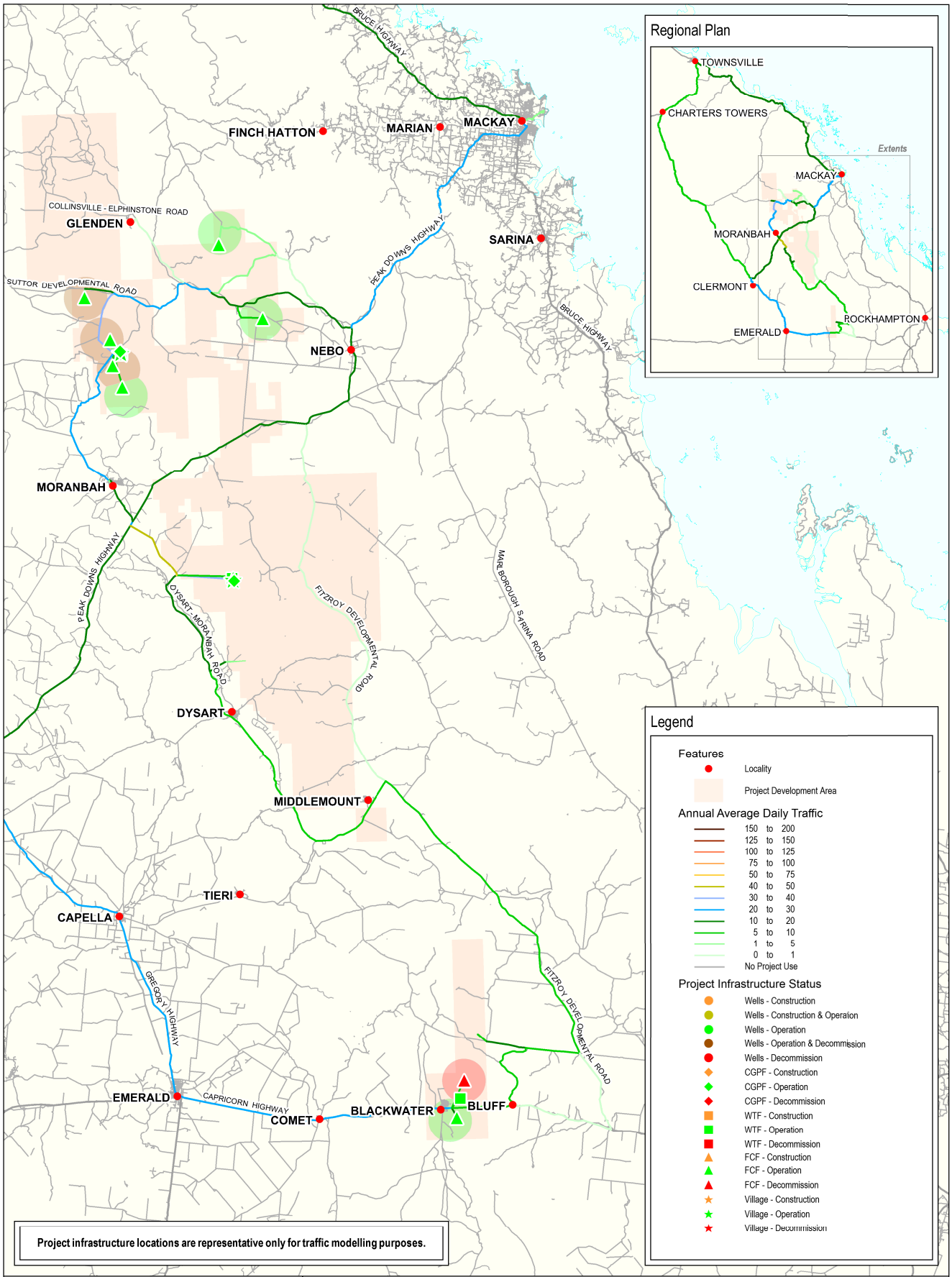
arrow energy go further

Project Traffic Volumes for 2051

Figure No:

D-37



Cardno Shaping the Future

Bowen Gas Project

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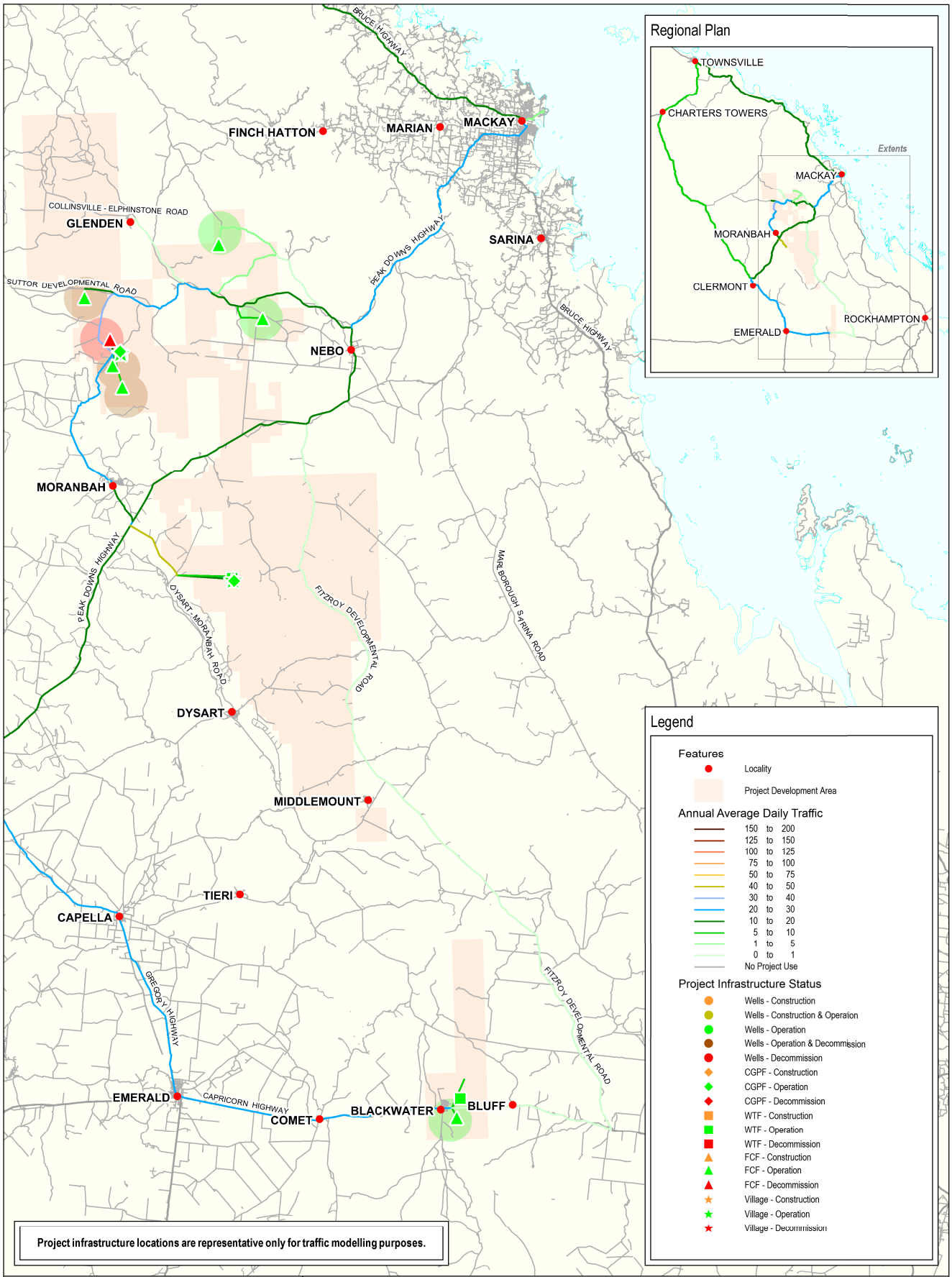
arrow energy go further

Project Traffic Volumes for 2052

Figure No:

D-38



Cardno Shaping the Future

Bowen Gas Project

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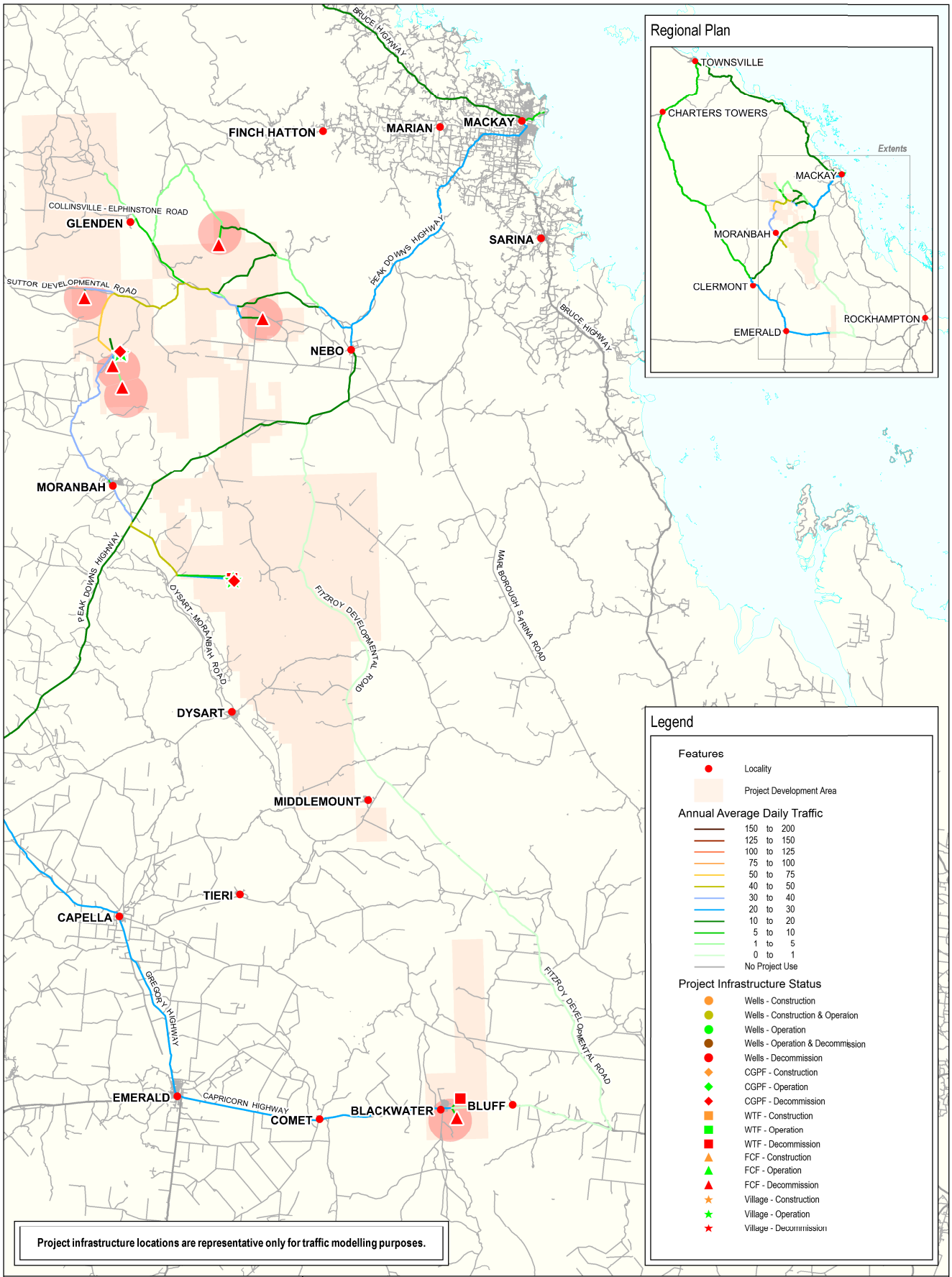
arrow energy go further

Project Traffic Volumes for 2053

Figure No:

D-39



Cardno Shaping the Future

Bowen Gas Project

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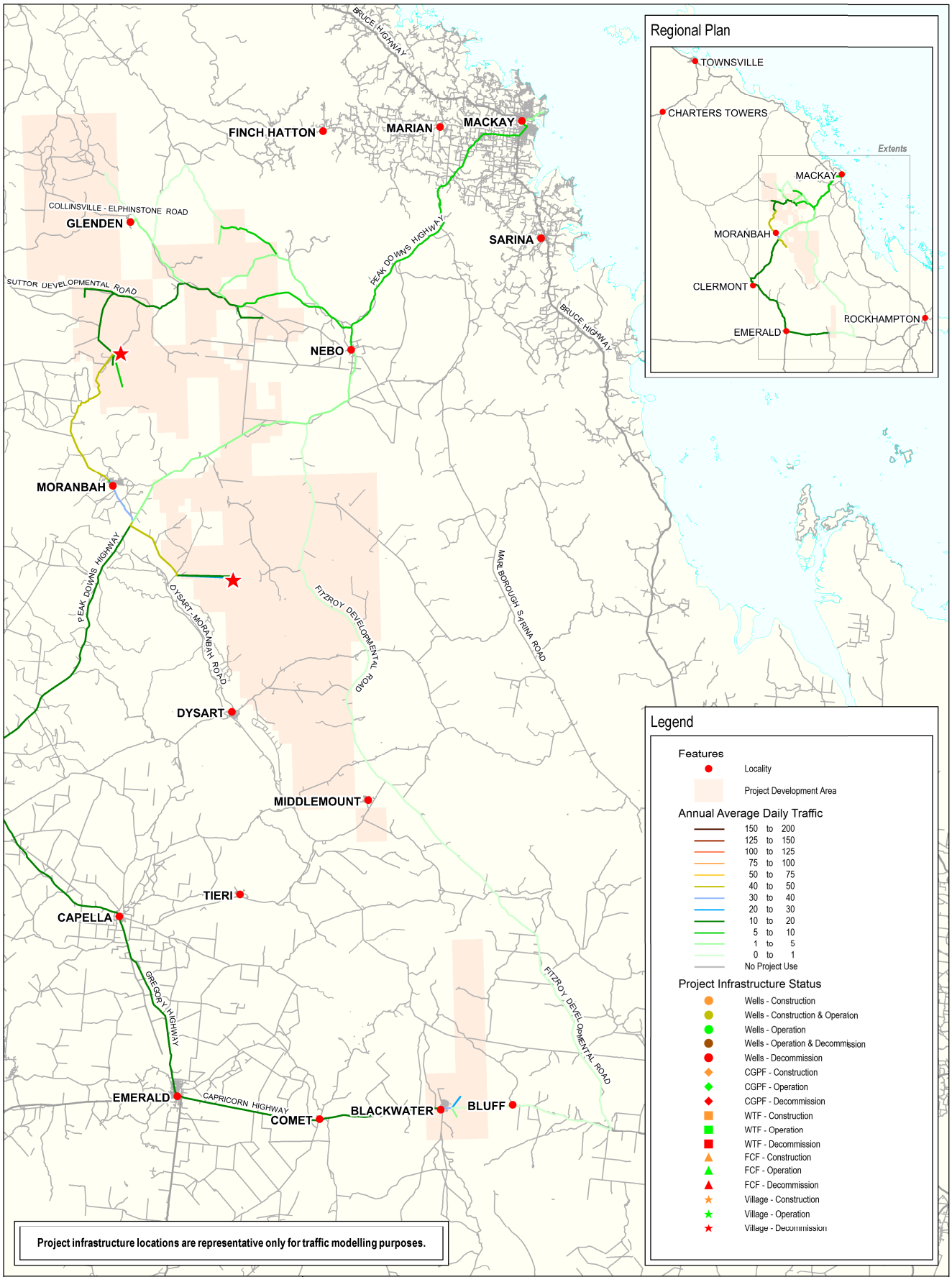
arrow energy go further

Project Traffic Volumes for 2054

Figure No:

D-40



Cardno Shaping the Future

Bowen Gas Project

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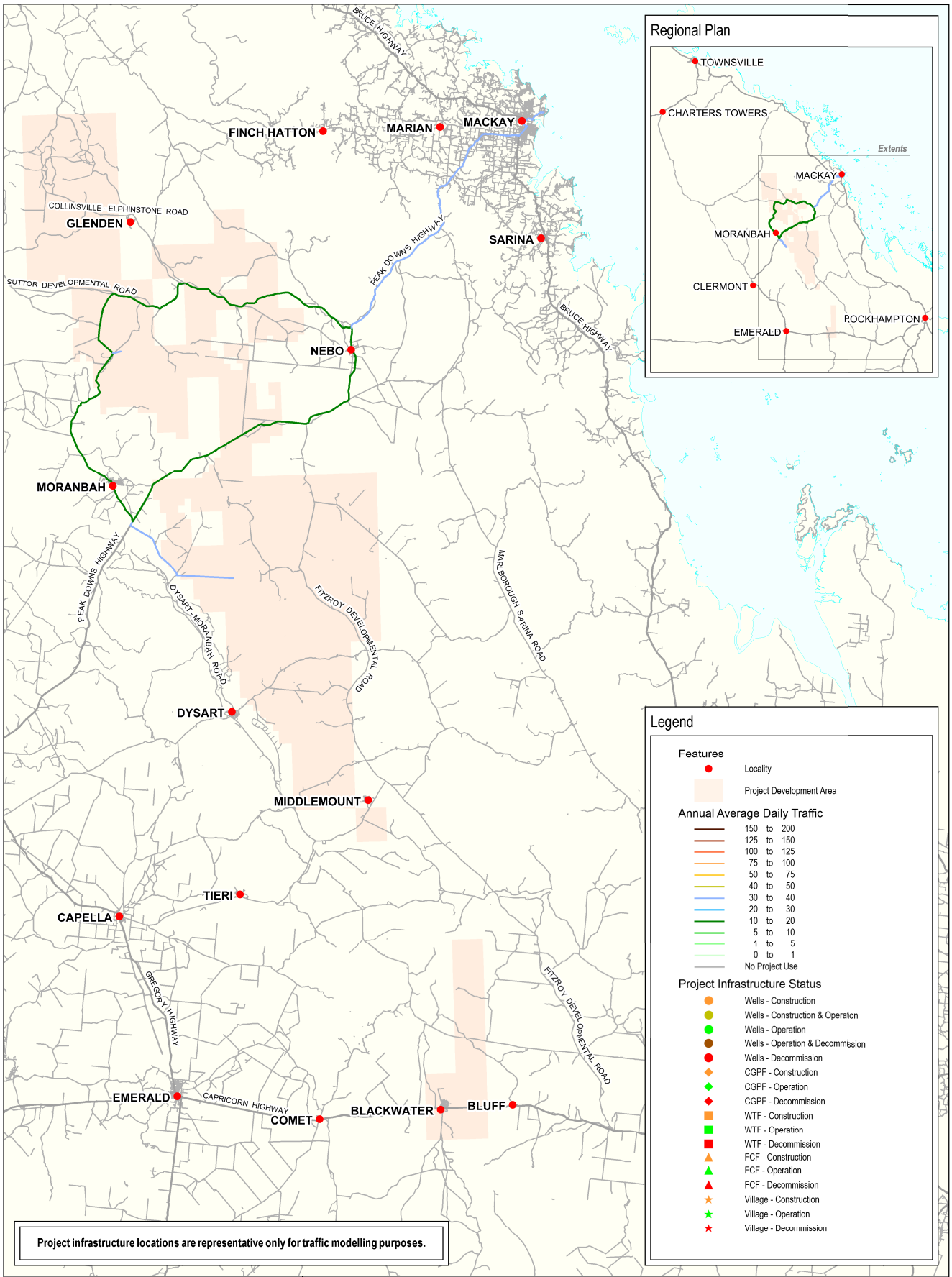
arrow energy go further

Project Traffic Volumes for 2055

Figure No:

D-41



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Project Traffic Volumes for 2056

Figure No:

D-42

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APPENDIX E
Literature Review

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E.1 Road Cross-section Thresholds

E.1.1 Sealed Road Design Guidance

Table E-1 summarises the road dimensions recommended by Austroads in the *Rural Road Design Manual* for undivided sealed roads based upon design Annual Average Daily Traffic (AADT) volumes.

Table E-1 Sealed Road Design Thresholds

Design AADT Volume (vpd)	No. of Lanes	Road Seal Width	Shoulder Seal Width	Total Shoulder Width
1 – 150	1	3.5m	0.5m	2.0m
150 – 500	2	6.0m	0.5m	1.5m
500 – 1,000	2	6.0m (minimum) 7.0m (desirable)	0.5m	1.5m
1,000 – 3,000	2	7.0m	1.0m	2.0m
3,000+	2	7.0m	1.5m	2.5m

Source: Austroads *Rural Road Design Manual*

E.1.2 Unsealed Road Design Guidance

TMR's *Road Planning and Design Manual* (elements of which are reproduced in the Austroads *Guide to Road Design* series) states that the theoretical capacity of an unsealed gravel surface road is approximately 50% of that of a comparative sealed road (similar carriageway cross-section, etc). Further, the TMR's manual states that the theoretical capacity of a natural earth surfaced road is approximately 40% of that of a comparative sealed road. These theoretical capacity reduction factors however, do not account for environmental considerations such as dust nuisance and safety. It is these amenity factors, as opposed to capacity constraints, which typically prompt a road authority to seal a road.

The *Unsealed Roads Manual Guidelines to Good Practice* prepared by ARRB Transport Research Ltd, which is referenced extensively in the Road Planning and Design Manual, is considered to provide best practise guidance for the design of Australian unsealed roads. The manual states that typically it is difficult to justify sealing a road carrying less than 100vpd and that sealing is usually justified when traffic volumes exceed 250vpd. The guide states that between these threshold vehicle volumes, an economic assessment of the benefit of sealing a road is usually warranted.

Table E-2 summarises the adopted threshold volumes for unsealed roads.

Table E-2 Unsealed Road Design Thresholds

AADT (vpd)		
<100	100-250	>250
Unsealed appropriate	Economic benefit assessment of sealing warranted	Sealing typically warranted

Source: ARRB *Unsealed Roads Manual Guidelines to Good Practice*

E.2 Intersection Thresholds

E.2.1 Intersection Performance Guidance

The performance of an intersection is typically analysed using SIDRA Intersection 6 (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 E-3 provides the TMR defined DOS thresholds for intersections.

Table E-3 TMR Intersection Performance Thresholds

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 E-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 E-4. 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 E-4 RMS Intersections Performance Thresholds

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*

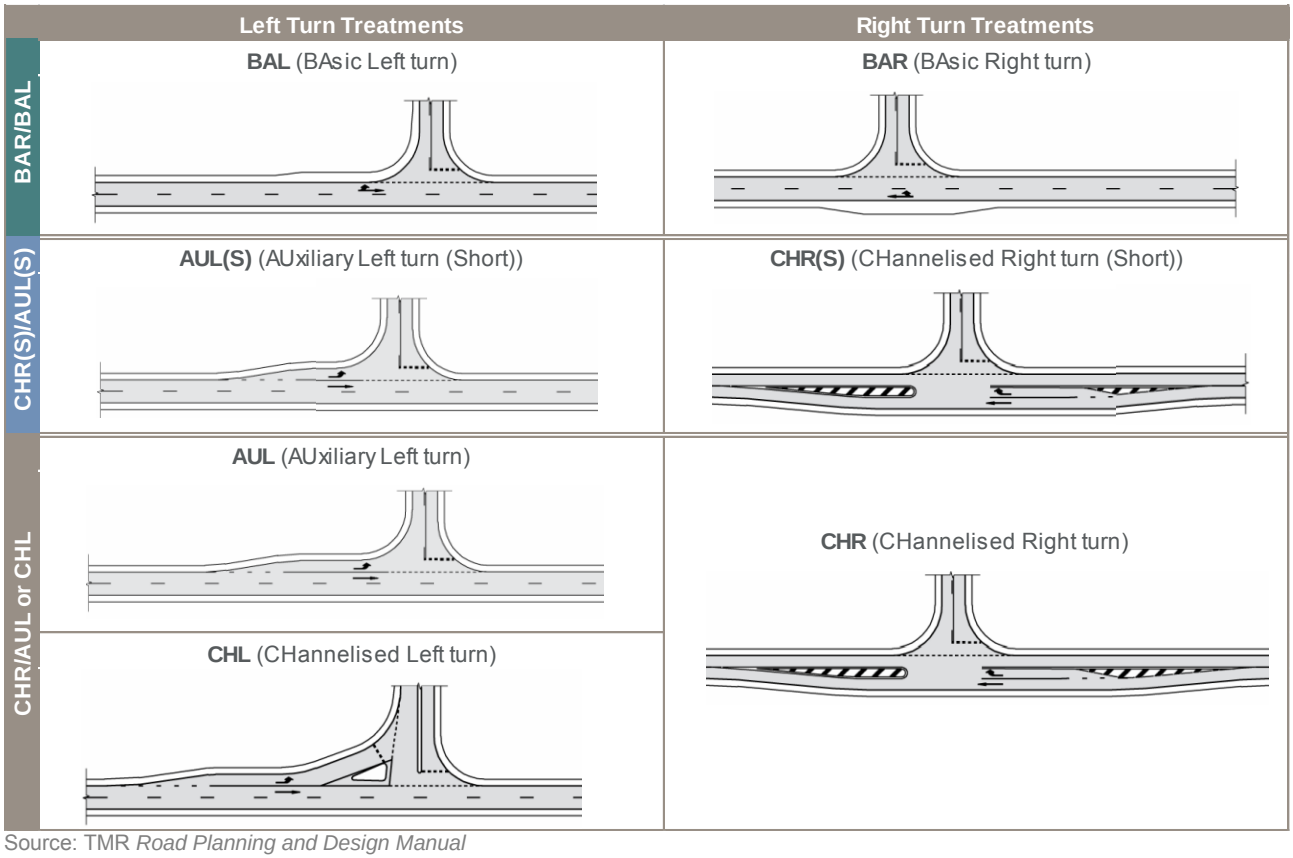
E.2.2 Intersection Turn Treatment Guidance

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 E-1.

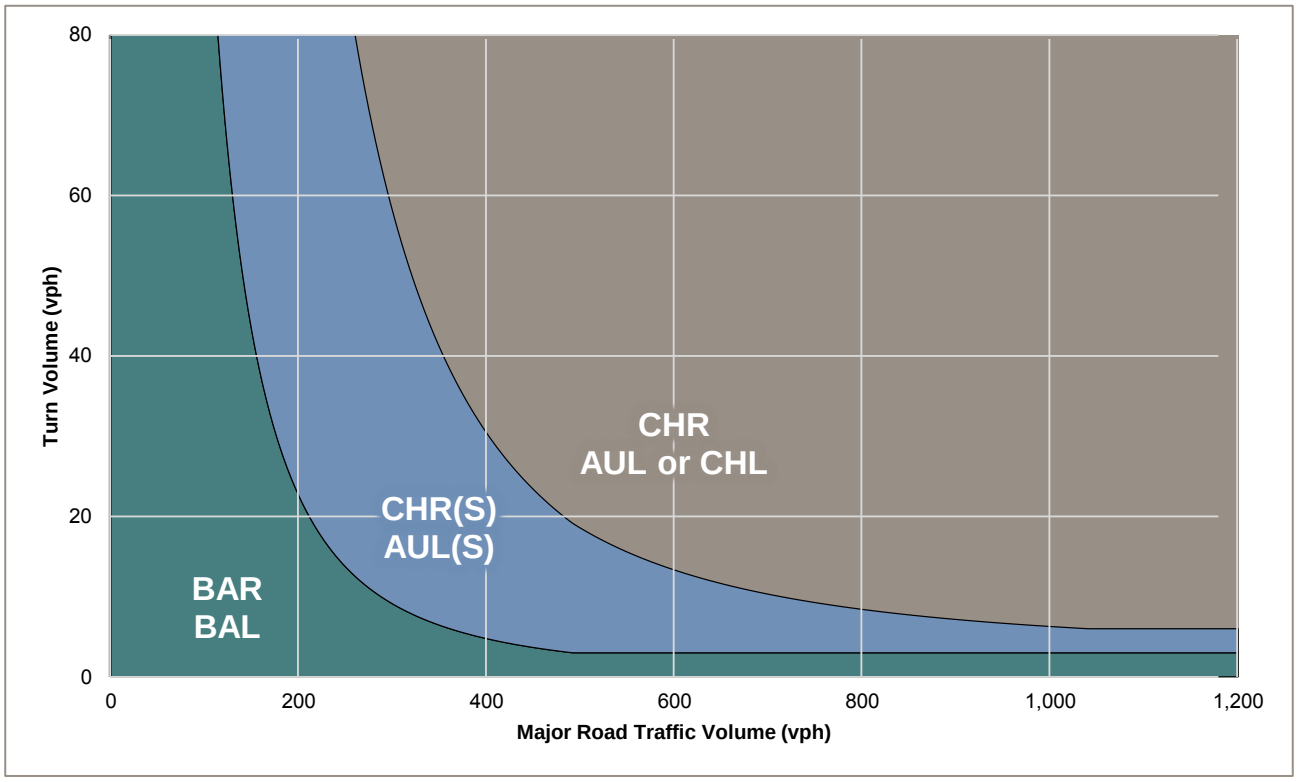
Figure E-1 Intersection Turn Treatments



Source: TMR *Road Planning and Design Manual*

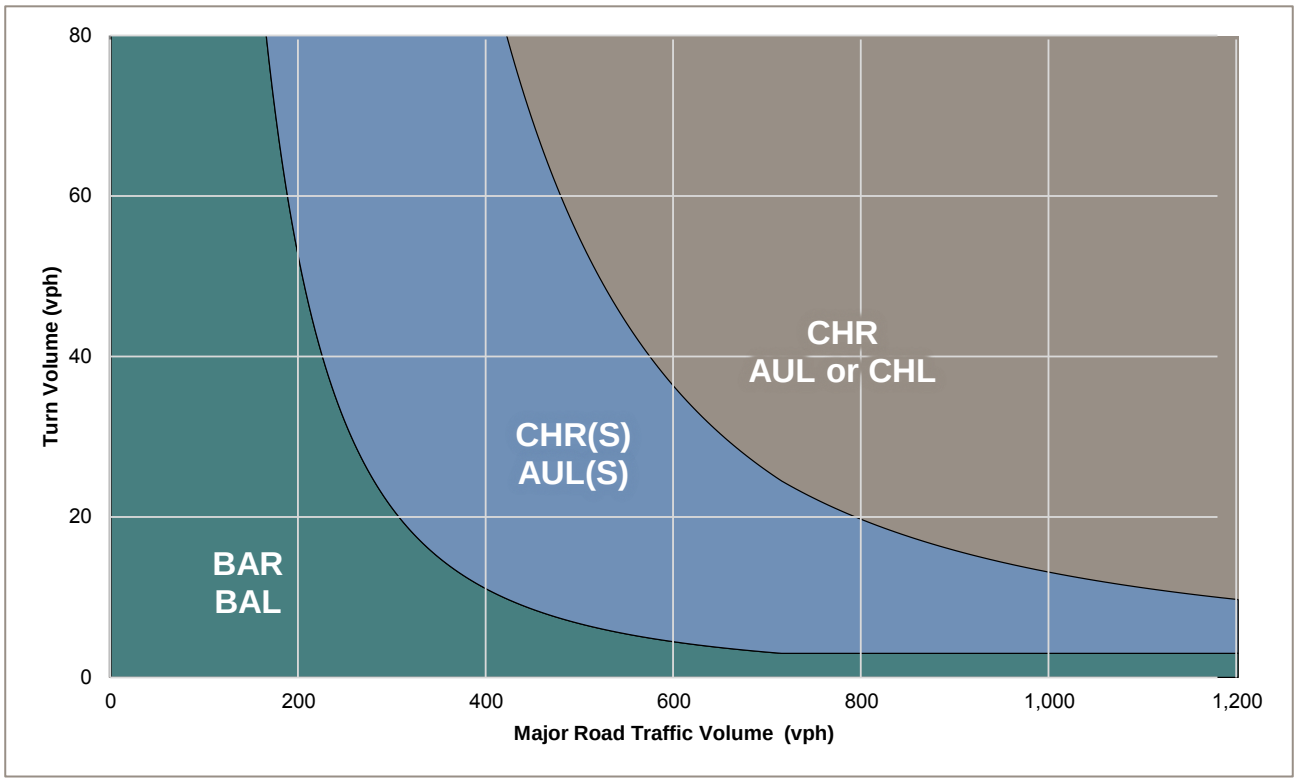
The Austroads turn warrants provide guidance on where deceleration lanes and turning lanes should be used based on traffic volumes. The warrants were developed by Arndt, Troutbeck, Handley & Slattery (2006) and were produced by identifying the location at which the benefits of providing a higher-level 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 E-2 and E-3. The turn treatment acronyms (i.e. BAL, BAR etc.) and colours in the Figures E-2 and E-3 directly relate to the turn treatments illustrated on Figure E-1 above.

Figure E-2 Turn Warrants for Higher Speed Rural Roads (≥ 100km/h)



Source: *TMR Road Planning and Design Manual*

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



Source: *TMR Road Planning and Design Manual*

E.2.3 Intersection 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.

E.3 School Bus Routes

The TMR *Guide for the Road Safety Management of Rural School Bus Routes and Bus Stops* identifies that it is difficult to define specific quantitative thresholds for the provision of bus facilities and that discretion and engineering judgement should be exercised. It recognises that many factors influence the choice of treatment in a given situation. Further, the guideline recognises that due to the transient nature of school bus stops in rural areas, the provision of formalised school bus stops is typically not warranted.

The following strategic planning guidance is provided by the guideline to assist in reducing the potential for conflict between project traffic, school bus vehicles and students:

- School bus routes should be suitable for bus performance under all weather conditions.
- School bus routes should only be signed where, for safety reasons, it is necessary to warn motorists of the possible presence of the school bus or students on the road.
- School bus stops and their activities should be adequately visible in all relevant lighting and weather conditions.

E.4 Rail Crossings

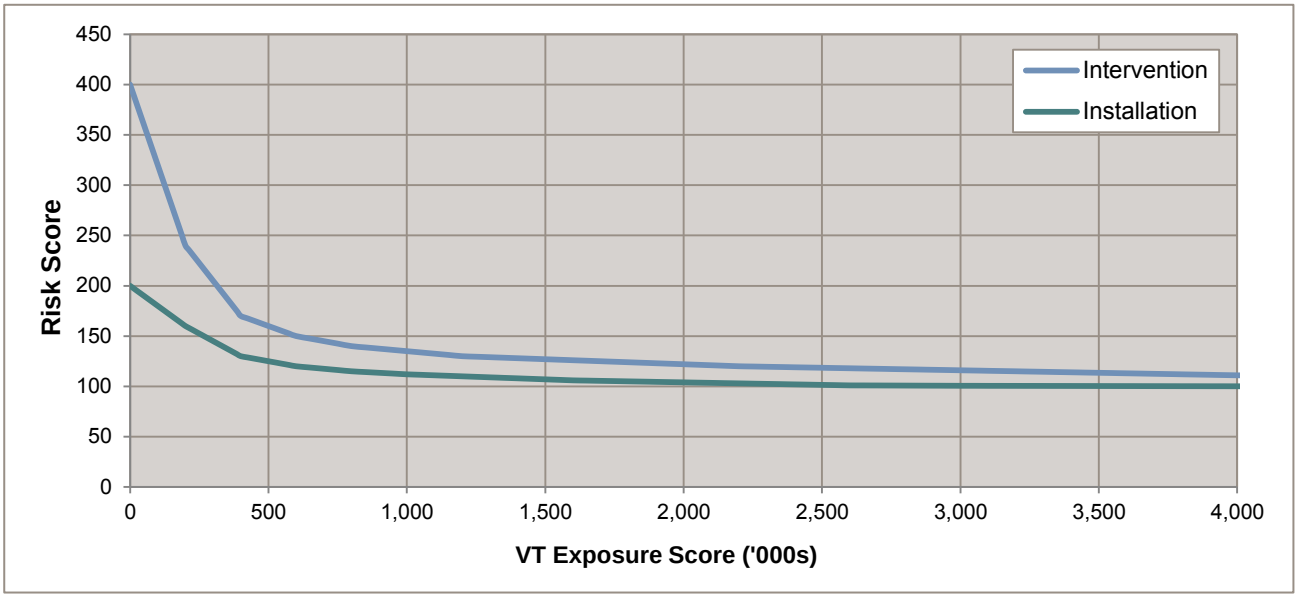
The Australian Level Crossing Assessment Model (ALCAM) is used to produce a Risk Score for level crossings based on the physical characteristics of a level crossing and the existing warning and control devices. It is primarily a tool for rating level crossing safety in a comparative manner.

To compare the Risk Scores for a range of crossings, a reference score is used that can provide an indicative assessment of the risk relative to the consequence of a collision. Two reference scores are used: Installation Limit Score and the Intervention Limit Score. It is noted that these scores are not used to determine whether or not a crossing is ‘safe’ but rather how the Risk Score compares with the level of risk that may be acceptable at other crossings with a similar traffic and road environment profile.

The Installation Limit Score indicates a level below which the level crossing risk is likely to be within acceptable limits. The Intervention Limit Score indicates a level above which there is likely to be safety hazards that require priority attention to mitigate the level of risk.

The Installation and Intervention Limit Score Thresholds have been reproduced from the *Australian Level Crossing Assessment: Model Assessment Handbook* (2007) on Figure E-4.

Figure E-4 Installation and Intervention Limit Score Thresholds



Source: *Australian Level Crossing Assessment Model: Crossing Assessment Handbook*

The VT Exposure Score identified on Figure E-4 is calculated based on the traffic level (average road and rail vehicles per day) and is then modified by an Environmental Factor (or Consequence Multiplier) which is related to the severity of the consequence if an incident was to occur. The VT exposure score is therefore calculated by multiplying the road vehicles per day by the rail vehicles per day and then multiplying by the Environmental Factor.

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APPENDIX F
Pavement Impact Assessment

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ASSESSMENT INPUTS

Roughness Increase	3	counts/year
Terminal Roughness	120	counts
Inflation Rate	4.39%	p.a. (compound)
Discount Rate	6.00%	p.a. (compound)
Heavy Vehicle Growth Rate	3.00%	p.a. (linear)

AVERAGE ESAs

2C: 2-Axle Trucks and Buses	0.8	ESAs
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

Establishment of a New Pavement Maintenance Database - Stage 1 and 2 Analysis (AP-R394-11)

Project Loadings

Equivalent Standard Axles (ESAs) per Year

Cardno ID#	Section Details				2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039
	TMR ROAD	Chainage Start	Chainage End	Direction																									
1	196	0	0.53	1	3	22	70	333	98	130	143	175	98	127	137	76	73	146	83	70	89	44	35	22	3	10	10	3	6
2	196	0	0.53	3	18	126	396	1,889	558	738	810	990	558	720	774	432	414	828	468	396	504	252	198	126	18	54	54	18	36
3	196	0.53	0.875	1	3	22	70	333	98	130	143	175	98	127	137	76	73	146	83	70	89	44	35	22	3	10	10	3	6
4	196	0.53	0.875	3	18	126	396	1,889	558	738	810	990	558	720	774	432	414	828	468	396	504	252	198	126	18	54	54	18	36
5	196	0.875	0.95	1	36	162	846	1,458	900	576	648	648	612	576	342	288	450	522	288	144	144	54	72	18	36	0	0	0	0
6	196	0.875	0.95	3	6	29	149	257	159	102	114	114	108	102	60	51	79	92	51	25	25	10	13	3	6	0	0	0	0
7	196	0.95	1.329	1	36	162	846	1,458	900	576	648	648	612	576	342	288	450	522	288	144	144	54	72	18	36	0	0	0	0
8	196	0.95	1.329	3	6	29	149	257	159	102	114	114	108	102	60	51	79	92	51	25	25	10	13	3	6	0	0	0	0
9	196	1.329	1.58	1	36	162	846	1,458	900	576	648	648	612	576	342	288	450	522	288	144	144	54	72	18	36	0	0	0	0
10	196	1.329	1.58	3	6	29	149	257	159	102	114	114	108	102	60	51	79	92	51	25	25	10	13	3	6	0	0	0	0
11	196	1.58	3.226	1	36	162	846	1,458	900	576	648	648	612	576	342	288	450	522	288	144	144	54	72	18	36	0	0	0	0
12	196	1.58	3.226	3	6	29	149	257	159	102	114	114	108	102	60	51	79	92	51	25	25	10	13	3	6	0	0	0	0
13	196	3.226	4.03	1	36	162	846	1,458	900	576	648	648	612	576	342	288	450	522	288	144	144	54	72	18	36	0	0	0	0
14	196	3.226	4.03	3	6	29	149	257	159	102	114	114	108	102	60	51	79	92	51	25	25	10	13	3	6	0	0	0	0
15	196	4.031	12.67	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
16	196	4.031	12.67	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	196	12.67	13.86	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
18	196	12.67	13.86	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	196	13.86	20.71	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
20	196	13.86	20.71	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	196	20.71	24.89	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
22	196	20.71	24.89	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	196	24.89	28.77	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
24	196	24.89	28.77	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	196	28.77	30.357	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
26	196	28.77	30.357	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	196	30.357	33.944	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
28	196	30.357	33.944	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	196	33.944	35.56	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
30	196	33.944	35.56	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	469	0	0.065	1	0	0	0	0	0	0	0	0	0	156	446	3,777	3,021	4,940	3,906	1,507	2,617	2,274	1,829	1,113	121	522	491	124	332
32	469	0	0.065	3	0	0	0	0	0	0	0	0	0	1,211	3,470	29,391	23,470	38,425	30,369	11,744	20,385	17,717	14,248	8,668	939	4,069	3,824	966	2,586
33	469	0.065	1.119	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
34	469	0.065	1.119	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	469	1.119	6.724	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
36	469	1.119	6.724	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	469	6.724	9.089	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
38	469	6.724	9.089	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	469	9.089	10.984	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
40	469	9.089	10.984	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	469	10.984	15.17	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
42	469	10.984	15.17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	469	15.17	17.175	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
44	469	15.17	17.175	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	469	17.175	20.465	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
46	469	17.175	20.465	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	469	20.465	21.34	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
48	469	20.465	21.34	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	469	21.34	27.18	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
50	469	21.34	27.18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	469	27.18	40.68	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
52	469	27.18	40.68	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	469	40.68	48.39	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
54	469	40.68	48.39	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	469	48.39	49.59	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
56	469	48.39	49.59	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	469	49.59	59.16	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
58	469	49.59	59.16	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	469	59.16	77.17	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
60	469	59.16	77.17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	469	77.17	89.03	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
62	469	77.17	89.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	469	89.03	89.57	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
64	469	89.03	89.57	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Equivalent Standard Axles (ESAs) per Ye

Cardno ID#	Section Details				2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056
	TMR ROAD	Chainage Start	Chainage End	Direction																	
1	196	0	0.53	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	196	0	0.53	3	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	196	0.53	0.875	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	196	0.53	0.875	3	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	196	0.875	0.95	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	196	0.875	0.95	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	196	0.95	1.329	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	196	0.95	1.329	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	196	1.329	1.58	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	196	1.329	1.58	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	196	1.58	3.226	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	196	1.58	3.226	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	196	3.226	4.03	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	196	3.226	4.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	196	4.031	12.67	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	196	4.031	12.67	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	196	12.67	13.86	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	196	12.67	13.86	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	196	13.86	20.71	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	196	13.86	20.71	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	196	20.71	24.89	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	196	20.71	24.89	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	196	24.89	28.77	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	196	24.89	28.77	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	196	28.77	30.357	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	196	28.77	30.357	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	196	30.357	33.944	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	196	30.357	33.944	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	196	33.944	35.56	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	196	33.944	35.56	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	469	0	0.065	1	194	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	469	0	0.065	3	1,511	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	469	0.065	1.119	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	469	0.065	1.119	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	469	1.119	6.724	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	469	1.119	6.724	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	469	6.724	9.089	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	469	6.724	9.089	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	469	9.089	10.984	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	469	9.089	10.984	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	469	10.984	15.17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	469	10.984	15.17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	469	15.17	17.175	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	469	15.17	17.175	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	469	17.175	20.465	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	469	17.175	20.465	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	469	20.465	21.34	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	469	20.465	21.34	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	469	21.34	27.18	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	469	21.34	27.18	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	469	27.18	40.68	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	469	27.18	40.68	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	469	40.68	48.39	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	469	40.68	48.39	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	469	48.39	49.59	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	469	48.39	49.59	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	469	49.59	59.16	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	469	49.59	59.16	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	469	59.16	77.17	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	469	59.16	77.17	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	469	77.17	89.03	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	469	77.17	89.03	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	469	89.03	89.57	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	469	89.03	89.57	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Section Properties of Assessed Road Network

Constructed and Expenditure Properties

Cardno ID#	Section Details				Physical Attributes					
	TMR ROAD	Chainage Start	Chainage End	Direction	Lanes	Length	Total Pavement Width	Section Width	Roughness Survey Year	Average Roughness
1	196	0.000 km	0.530 km	1		0.530 km	11.11 m	5.55 m	2013	106.81
2	196	0.000 km	0.530 km	3		0.530 km	11.11 m	5.55 m	2013	106.81
3	196	0.530 km	0.875 km	1		0.345 km	9.27 m	4.63 m	2013	138.67
4	196	0.530 km	0.875 km	3		0.345 km	9.27 m	4.63 m	2013	138.67
5	196	0.875 km	0.950 km	1		0.075 km	8.38 m	4.19 m	2013	126.67
6	196	0.875 km	0.950 km	3		0.075 km	8.38 m	4.19 m	2013	126.67
7	196	0.950 km	1.329 km	1		0.379 km	12.91 m	6.46 m	2013	78.02
8	196	0.950 km	1.329 km	3		0.379 km	12.91 m	6.46 m	2013	78.02
9	196	1.329 km	1.580 km	1		0.251 km	13.19 m	6.60 m	2013	105.26
10	196	1.329 km	1.580 km	3		0.251 km	13.19 m	6.60 m	2013	105.26
11	196	1.580 km	3.226 km	1		1.646 km	17.06 m	8.53 m	2013	94.64
12	196	1.580 km	3.226 km	3		1.646 km	17.06 m	8.53 m	2013	94.64
13	196	3.226 km	4.030 km	1		0.804 km	11.52 m	5.76 m	2013	85.11
14	196	3.226 km	4.030 km	3		0.804 km	11.52 m	5.76 m	2013	85.11
15	196	4.031 km	12.670 km	1		8.639 km	9.49 m	4.75 m	2013	67.43
16	196	4.031 km	12.670 km	3		8.639 km	9.49 m	4.75 m	2013	67.43
17	196	12.670 km	13.860 km	1		1.190 km	9.87 m	4.94 m	2013	78.21
18	196	12.670 km	13.860 km	3		1.190 km	9.87 m	4.94 m	2013	78.21
19	196	13.860 km	20.710 km	1		6.850 km	11.34 m	5.67 m	2013	72.19
20	196	13.860 km	20.710 km	3		6.850 km	11.34 m	5.67 m	2013	72.19
21	196	20.710 km	24.890 km	1		4.180 km	12.39 m	6.19 m	2013	68.09
22	196	20.710 km	24.890 km	3		4.180 km	12.39 m	6.19 m	2013	68.09
23	196	24.890 km	28.770 km	1		3.880 km	13.84 m	6.92 m	2013	63.97
24	196	24.890 km	28.770 km	3		3.880 km	13.84 m	6.92 m	2013	63.97
25	196	28.770 km	30.357 km	1		1.587 km	12.27 m	6.13 m	2013	68.71
26	196	28.770 km	30.357 km	3		1.587 km	12.27 m	6.13 m	2013	68.71
27	196	30.357 km	33.944 km	1		3.587 km	15.09 m	7.55 m	2013	62.56
28	196	30.357 km	33.944 km	3		3.587 km	15.09 m	7.55 m	2013	62.56
29	196	33.944 km	35.560 km	1		1.616 km	12.47 m	6.24 m	2013	81.41
30	196	33.944 km	35.560 km	3		1.616 km	12.47 m	6.24 m	2013	81.41
31	469	0.000 km	0.065 km	1		0.065 km	10.00 m	5.00 m	2012	166.00
32	469	0.000 km	0.065 km	3		0.065 km	10.00 m	5.00 m	2012	166.00
33	469	0.065 km	1.119 km	1		1.054 km	9.08 m	4.54 m	2012	110.85
34	469	0.065 km	1.119 km	3		1.054 km	9.08 m	4.54 m	2012	110.85
35	469	1.119 km	6.724 km	1		5.605 km	6.74 m	3.37 m	2012	88.51
36	469	1.119 km	6.724 km	3		5.605 km	6.74 m	3.37 m	2012	88.51
37	469	6.724	9.089	1		2.365 km	8.49 m	4.24 m	2012	49.61
38	469	6.724	9.089	3		2.365 km	8.49 m	4.24 m	2012	49.61
39	469	9.089	10.984	1		1.895 km	8.32 m	4.16 m	2012	53.16
40	469	9.089	10.984	3		1.895 km	8.32 m	4.16 m	2012	53.16
41	469	10.984	15.170	1		4.186 km	8.10 m	4.05 m	2012	72.33
42	469	10.984	15.170	3		4.186 km	8.10 m	4.05 m	2012	72.33
43	469	15.170	17.175	1		2.005 km	8.60 m	4.30 m	2012	84.51
44	469	15.170	17.175	3		2.005 km	8.60 m	4.30 m	2012	84.51
45	469	17.175	20.465	1		3.290 km	8.43 m	4.22 m	2012	82.01
46	469	17.175	20.465	3		3.290 km	8.43 m	4.22 m	2012	82.01
47	469	20.465	21.340	1		0.875 km	6.70 m	3.35 m	2012	118.99
48	469	20.465	21.340	3		0.875 km	6.70 m	3.35 m	2012	118.99
49	469	21.340	27.180	1		5.840 km	8.60 m	4.30 m	2012	73.65
50	469	21.340	27.180	3		5.840 km	8.60 m	4.30 m	2012	73.65
51	469	27.180	40.680	1		13.500 km	7.21 m	3.61 m	2012	76.84
52	469	27.180	40.680	3		13.500 km	7.21 m	3.61 m	2012	76.84
53	469	40.680	48.390	1		7.710 km	6.71 m	3.35 m	2012	76.13
54	469	40.680	48.390	3		7.710 km	6.71 m	3.35 m	2012	76.13
55	469	48.390	49.590	1		1.200 km	6.61 m	3.31 m	2012	96.65
56	469	48.390	49.590	3		1.200 km	6.61 m	3.31 m	2012	96.65
57	469	49.590	59.160	1		9.570 km	6.61 m	3.31 m	2012	79.44
58	469	49.590	59.160	3		9.570 km	6.61 m	3.31 m	2012	79.44
59	469	59.160	77.170	1		18.010 km	6.61 m	3.30 m	2012	68.90
60	469	59.160	77.170	3		18.010 km	6.61 m	3.30 m	2012	68.90
61	469	77.170	89.030	1		11.860 km	6.63 m	3.32 m	2012	77.94
62	469	77.170	89.030	3		11.860 km	6.63 m	3.32 m	2012	77.94
63	469	89.030	89.570	1		0.540 km	7.64 m	3.82 m	2012	71.94
64	469	89.030	89.570	3		0.540 km	7.64 m	3.82 m	2012	71.94

Section Properties of Assessed Road Network

Traffic Volumes and Scoping

Cardno ID#	Section Details				Traffic Volumes							Scoping Tests	
	TMR ROAD	Chainage Start	Chainage End	Direction	AADT Survey Year	AADT	HV %	HV AADT	ESA/HV	Survey Year ESAs	HV Growth	Peak Annual ESAs	Peak % Impact on Baseline ESAs
1	196	0.000 km	0.530 km	1	2012	8,113 vpd	11.33%	919 vpd	1.7	565,349	3%	333	0%
2	196	0.000 km	0.530 km	3	2012	11,552 vpd	11.35%	1,311 vpd	1.7	805,263	3%	1,889	0%
3	196	0.530 km	0.875 km	1	2012	18,284 vpd	5.38%	984 vpd	1.3	467,748	3%	333	0%
4	196	0.530 km	0.875 km	3	2012	19,933 vpd	5.54%	1,104 vpd	1.3	533,740	3%	1,889	0%
5	196	0.875 km	0.950 km	1	2012	18,284 vpd	5.38%	984 vpd	1.3	467,748	3%	1,458	0%
6	196	0.875 km	0.950 km	3	2012	19,933 vpd	5.54%	1,104 vpd	1.3	533,740	3%	257	0%
7	196	0.950 km	1.329 km	1	2012	18,284 vpd	5.38%	984 vpd	1.3	467,748	3%	1,458	0%
8	196	0.950 km	1.329 km	3	2012	19,933 vpd	5.54%	1,104 vpd	1.3	533,740	3%	257	0%
9	196	1.329 km	1.580 km	1	2012	18,284 vpd	5.38%	984 vpd	1.3	467,748	3%	1,458	0%
10	196	1.329 km	1.580 km	3	2012	19,933 vpd	5.54%	1,104 vpd	1.3	533,740	3%	257	0%
11	196	1.580 km	3.226 km	1	2012	10,832 vpd	3.58%	388 vpd	1.1	153,738	3%	1,458	1%
12	196	1.580 km	3.226 km	3	2012	11,166 vpd	3.45%	385 vpd	1.1	155,892	3%	257	0%
13	196	3.226 km	4.030 km	1	2012	9,292 vpd	4.41%	410 vpd	1.0	154,067	3%	1,458	1%
14	196	3.226 km	4.030 km	3	2012	8,141 vpd	3.82%	311 vpd	1.1	120,706	3%	257	0%
15	196	4.031 km	12.670 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
16	196	4.031 km	12.670 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
17	196	12.670 km	13.860 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
18	196	12.670 km	13.860 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
19	196	13.860 km	20.710 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
20	196	13.860 km	20.710 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
21	196	20.710 km	24.890 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
22	196	20.710 km	24.890 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
23	196	24.890 km	28.770 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
24	196	24.890 km	28.770 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
25	196	28.770 km	30.357 km	1	2012	5,462 vpd	7.04%	385 vpd	1.2	168,083	3%	0	0%
26	196	28.770 km	30.357 km	3	2012	5,491 vpd	6.73%	370 vpd	1.2	162,462	3%	0	0%
27	196	30.357 km	33.944 km	1	2012	5,357 vpd	7.59%	407 vpd	1.2	171,477	3%	0	0%
28	196	30.357 km	33.944 km	3	2012	5,298 vpd	7.20%	381 vpd	1.2	162,498	3%	0	0%
29	196	33.944 km	35.560 km	1	2012	5,205 vpd	6.52%	339 vpd	1.1	140,306	3%	0	0%
30	196	33.944 km	35.560 km	3	2012	5,729 vpd	6.03%	345 vpd	1.1	143,664	3%	0	0%
31	469	0.000 km	0.065 km	1	2012	2,523 vpd	16.38%	413 vpd	1.3	198,086	3%	4,940	2%
32	469	0.000 km	0.065 km	3	2012	2,412 vpd	12.64%	305 vpd	1.5	170,857	3%	38,425	22%
33	469	0.065 km	1.119 km	1	2012	2,523 vpd	16.38%	413 vpd	1.3	198,086	3%	0	0%
34	469	0.065 km	1.119 km	3	2012	2,412 vpd	12.64%	305 vpd	1.5	170,857	3%	0	0%
35	469	1.119 km	6.724 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
36	469	1.119 km	6.724 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
37	469	6.724 km	9.089 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
38	469	6.724 km	9.089 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
39	469	9.089 km	10.984 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
40	469	9.089 km	10.984 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
41	469	10.984 km	15.170 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
42	469	10.984 km	15.170 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
43	469	15.170 km	17.175 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
44	469	15.170 km	17.175 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
45	469	17.175 km	20.465 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
46	469	17.175 km	20.465 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
47	469	20.465 km	21.340 km	1	2012	1,511 vpd	12.36%	187 vpd	1.9	131,254	3%	0	0%
48	469	20.465 km	21.340 km	3	2012	1,436 vpd	14.31%	205 vpd	1.8	134,758	3%	0	0%
49	469	21.340 km	27.180 km	1	2012	219 vpd	11.53%	25 vpd	2.0	18,579	3%	0	0%
50	469	21.340 km	27.180 km	3	2012	217 vpd	21.52%	47 vpd	1.4	23,543	3%	0	0%
51	469	27.180 km	40.680 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
52	469	27.180 km	40.680 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
53	469	40.680 km	48.390 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
54	469	40.680 km	48.390 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
55	469	48.390 km	49.590 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
56	469	48.390 km	49.590 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
57	469	49.590 km	59.160 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
58	469	49.590 km	59.160 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
59	469	59.160 km	77.170 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
60	469	59.160 km	77.170 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
61	469	77.170 km	89.030 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
62	469	77.170 km	89.030 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%
63	469	89.030 km	89.570 km	1	2012	35 vpd	21.92%	8 vpd	1.6	4,745	3%	0	0%
64	469	89.030 km	89.570 km	3	2012	40 vpd	26.65%	11 vpd	2.0	8,067	3%	0	0%

Rehabilitation Impacts

Cardno ID#	Section Details				Roughness Characteristics					Baseline ESAs		With Project ESAs			litation Scopin
	TMR ROAD	Chainage Start	Chainage End	Direction	Surveyed Roughness	Roughness Year	Deterioration Rate	Base Year Roughness	Adopted Terminal Roughness	Rehab Date	Predicted Breakpoint	Break Year	Rehab Date	Bring Forward Period	Bring Forward?
1	196	0.000 km	0.530 km	1	106.81	2013	3.0	112.8	120.0	**2017.40**	2,170,292	2017	**2017.40**	0.00	No
2	196	0.000 km	0.530 km	3	106.81	2013	3.0	112.8	120.0	**2017.40**	3,091,289	2017	**2017.39**	0.00	No
3	196	0.530 km	0.875 km	1	138.67	2013	3.0	144.7	150.0	**2016.78**	1,455,324	2016	**2016.78**	0.00	No
4	196	0.530 km	0.875 km	3	138.67	2013	3.0	144.7	150.0	**2016.78**	1,660,647	2016	**2016.78**	0.00	No
5	196	0.875 km	0.950 km	1	126.67	2013	3.0	132.7	140.0	**2017.44**	1,822,412	2017	**2017.44**	0.00	No
6	196	0.875 km	0.950 km	3	126.67	2013	3.0	132.7	140.0	**2017.44**	2,079,526	2017	**2017.44**	0.00	No
7	196	0.950 km	1.329 km	1	78.02	2013	3.0	84.0	120.0	**2026.99**	7,816,750	2026	**2026.98**	0.01	No
8	196	0.950 km	1.329 km	3	78.02	2013	3.0	84.0	120.0	**2026.99**	8,919,574	2026	**2026.99**	0.00	No
9	196	1.329 km	1.580 km	1	105.26	2013	3.0	111.3	120.0	**2017.91**	2,082,442	2017	**2017.91**	0.00	No
10	196	1.329 km	1.580 km	3	105.26	2013	3.0	111.3	120.0	**2017.91**	2,376,242	2017	**2017.91**	0.00	No
11	196	1.580 km	3.226 km	1	94.64	2013	3.0	100.6	120.0	**2021.45**	1,370,818	2021	**2021.43**	0.02	No
12	196	1.580 km	3.226 km	3	94.64	2013	3.0	100.6	120.0	**2021.45**	1,390,020	2021	**2021.45**	0.00	No
13	196	3.226 km	4.030 km	1	85.11	2013	3.0	91.1	120.0	**2024.63**	2,043,429	2024	**2024.60**	0.03	No
14	196	3.226 km	4.030 km	3	85.11	2013	3.0	91.1	120.0	**2024.63**	1,600,952	2024	**2024.62**	0.01	No
15	196	4.031 km	12.670 km	1	67.43	2013	3.0	73.4	120.0	**2030.52**	3,732,459	2030	**2030.52**	0.00	No
16	196	4.031 km	12.670 km	3	67.43	2013	3.0	73.4	120.0	**2030.52**	3,607,638	2030	**2030.52**	0.00	No
17	196	12.670 km	13.860 km	1	78.21	2013	3.0	84.2	120.0	**2026.93**	2,792,992	2026	**2026.93**	0.00	No
18	196	12.670 km	13.860 km	3	78.21	2013	3.0	84.2	120.0	**2026.93**	2,699,589	2026	**2026.93**	0.00	No
19	196	13.860 km	20.710 km	1	72.19	2013	3.0	78.2	120.0	**2028.94**	3,308,929	2028	**2028.94**	0.00	No
20	196	13.860 km	20.710 km	3	72.19	2013	3.0	78.2	120.0	**2028.94**	3,198,272	2028	**2028.94**	0.00	No
21	196	20.710 km	24.890 km	1	68.09	2013	3.0	74.1	120.0	**2030.30**	3,673,514	2030	**2030.30**	0.00	No
22	196	20.710 km	24.890 km	3	68.09	2013	3.0	74.1	120.0	**2030.30**	3,550,665	2030	**2030.30**	0.00	No
23	196	24.890 km	28.770 km	1	63.97	2013	3.0	70.0	120.0	**2031.68**	4,049,349	2031	**2031.68**	0.00	No
24	196	24.890 km	28.770 km	3	63.97	2013	3.0	70.0	120.0	**2031.68**	3,913,931	2031	**2031.68**	0.00	No
25	196	28.770 km	30.357 km	1	68.71	2013	3.0	74.7	120.0	**2030.10**	3,617,568	2030	**2030.10**	0.00	No
26	196	28.770 km	30.357 km	3	68.71	2013	3.0	74.7	120.0	**2030.10**	3,496,590	2030	**2030.10**	0.00	No
27	196	30.357 km	33.944 km	1	62.56	2013	3.0	68.6	120.0	**2032.15**	4,264,505	2032	**2032.15**	0.00	No
28	196	30.357 km	33.944 km	3	62.56	2013	3.0	68.6	120.0	**2032.15**	4,041,204	2032	**2032.15**	0.00	No
29	196	33.944 km	35.560 km	1	81.41	2013	3.0	87.4	120.0	**2025.86**	2,110,488	2025	**2025.86**	0.00	No
30	196	33.944 km	35.560 km	3	81.41	2013	3.0	87.4	120.0	**2025.86**	2,160,999	2025	**2025.86**	0.00	No
31	469	0.000 km	0.065 km	1	166.00	2012	3.0	175.0	180.0	**2016.67**	590,882	2016	**2016.67**	0.00	No
32	469	0.000 km	0.065 km	3	166.00	2012	3.0	175.0	180.0	**2016.67**	509,659	2016	**2016.67**	0.00	No
33	469	0.065 km	1.119 km	1	110.85	2012	3.0	119.8	120.0	**2015.05**	227,166	2015	**2015.05**	0.00	No
34	469	0.065 km	1.119 km	3	110.85	2012	3.0	119.8	120.0	**2015.05**	195,940	2015	**2015.05**	0.00	No
35	469	1.119 km	6.724 km	1	88.51	2012	3.0	97.5	120.0	**2022.50**	1,352,806	2022	**2022.50**	0.00	No
36	469	1.119 km	6.724 km	3	88.51	2012	3.0	97.5	120.0	**2022.50**	1,388,921	2022	**2022.50**	0.00	No
37	469	6.724 km	9.089 km	1	49.61	2012	3.0	58.6	120.0	**2035.46**	4,013,861	2035	**2035.46**	0.00	No
38	469	6.724 km	9.089 km	3	49.61	2012	3.0	58.6	120.0	**2035.46**	4,121,017	2035	**2035.46**	0.00	No
39	469	9.089 km	10.984 km	1	53.16	2012	3.0	62.2	120.0	**2034.28**	3,741,202	2034	**2034.28**	0.00	No
40	469	9.089 km	10.984 km	3	53.16	2012	3.0	62.2	120.0	**2034.28**	3,841,079	2034	**2034.28**	0.00	No
41	469	10.984 km	15.170 km	1	72.33	2012	3.0	81.3	120.0	**2027.89**	2,371,846	2027	**2027.89**	0.00	No
42	469	10.984 km	15.170 km	3	72.33	2012	3.0	81.3	120.0	**2027.89**	2,435,165	2027	**2027.89**	0.00	No
43	469	15.170 km	17.175 km	1	84.51	2012	3.0	93.5	120.0	**2023.83**	1,593,149	2023	**2023.83**	0.00	No
44	469	15.170 km	17.175 km	3	84.51	2012	3.0	93.5	120.0	**2023.83**	1,635,680	2023	**2023.83**	0.00	No
45	469	17.175 km	20.465 km	1	82.01	2012	3.0	91.0	120.0	**2024.66**	1,747,329	2024	**2024.66**	0.00	No
46	469	17.175 km	20.465 km	3	82.01	2012	3.0	91.0	120.0	**2024.66**	1,793,976	2024	**2024.66**	0.00	No
47	469	20.465 km	21.340 km	1	118.99	2012	3.0	128.0	130.0	**2015.67**	241,587	2015	**2015.67**	0.00	No
48	469	20.465 km	21.340 km	3	118.99	2012	3.0	128.0	130.0	**2015.67**	248,036	2015	**2015.67**	0.00	No
49	469	21.340 km	27.180 km	1	73.65	2012	3.0	82.7	120.0	**2027.45**	323,304	2027	**2027.45**	0.00	No
50	469	21.340 km	27.180 km	3	73.65	2012	3.0	82.7	120.0	**2027.45**	409,688	2027	**2027.45**	0.00	No
51	469	27.180 km	40.680 km	1	76.84	2012	3.0	85.8	120.0	**2026.39**	75,022	2026	**2026.39**	0.00	No
52	469	27.180 km	40.680 km	3	76.84	2012	3.0	85.8	120.0	**2026.39**	127,537	2026	**2026.39**	0.00	No
53	469	40.680 km	48.390 km	1	76.13	2012	3.0	85.1	120.0	**2026.62**	76,684	2026	**2026.62**	0.00	No
54	469	40.680 km	48.390 km	3	76.13	2012	3.0	85.1	120.0	**2026.62**	130,363	2026	**2026.62**	0.00	No
55	469	48.390 km	49.590 km	1	96.65	2012	3.0	105.7	120.0	**2019.78**	32,071	2019	**2019.78**	0.00	No
56	469	48.390 km	49.590 km	3	96.65	2012	3.0	105.7	120.0	**2019.78**	54,521	2019	**2019.78**	0.00	No
57	469	49.590 km	59.160 km	1	79.44	2012	3.0	88.4	120.0	**2025.52**	69,008	2025	**2025.52**	0.00	No
58	469	49.590 km	59.160 km	3	79.44	2012	3.0	88.4	120.0	**2025.52**	117,314	2025	**2025.52**	0.00	No
59	469	59.160 km	77.170 km	1	68.90	2012	3.0	77.9	120.0	**2029.03**	94,129	2029	**2029.03**	0.00	No
60	469	59.160 km	77.170 km	3	68.90	2012	3.0	77.9	120.0	**2029.03**	160,020	2029	**2029.03**	0.00	No
61	469	77.170 km	89.030 km	1	77.94	2012	3.0	86.9	120.0	**2026.02**	72,436	2026	**2026.02**	0.00	No
62	469	77.170 km	89.030 km	3	77.94	2012	3.0	86.9	120.0	**2026.02**	123,141	2026	**2026.02**	0.00	No
63	469	89.030 km	89.570 km	1	71.94	2012	3.0	80.9	120.0	**2028.02**	86,664	2028	**2028.02**	0.00	No
64	469	89.030 km	89.570 km	3	71.94	2012	3.0	80.9	120.0	**2028.02**	147,329	2028	**2028.02**	0.00	No

Maintenance Impacts

Cardno ID#	Section Details				Potential Impact On Maintenance
	TMR ROAD	Chainage Start	Chainage End	Direction	
1	196	0.000 km	0.530 km	1	0.05%
2	196	0.000 km	0.530 km	3	0.21%
3	196	0.530 km	0.875 km	1	0.06%
4	196	0.530 km	0.875 km	3	0.30%
5	196	0.875 km	0.950 km	1	0.25%
6	196	0.875 km	0.950 km	3	0.04%
7	196	0.950 km	1.329 km	1	0.25%
8	196	0.950 km	1.329 km	3	0.04%
9	196	1.329 km	1.580 km	1	0.25%
10	196	1.329 km	1.580 km	3	0.04%
11	196	1.580 km	3.226 km	1	0.56%
12	196	1.580 km	3.226 km	3	0.10%
13	196	3.226 km	4.030 km	1	0.56%
14	196	3.226 km	4.030 km	3	0.11%
15	196	4.031 km	12.670 km	1	0.00%
16	196	4.031 km	12.670 km	3	0.00%
17	196	12.670 km	13.860 km	1	0.00%
18	196	12.670 km	13.860 km	3	0.00%
19	196	13.860 km	20.710 km	1	0.00%
20	196	13.860 km	20.710 km	3	0.00%
21	196	20.710 km	24.890 km	1	0.00%
22	196	20.710 km	24.890 km	3	0.00%
23	196	24.890 km	28.770 km	1	0.00%
24	196	24.890 km	28.770 km	3	0.00%
25	196	28.770 km	30.357 km	1	0.00%
26	196	28.770 km	30.357 km	3	0.00%
27	196	30.357 km	33.944 km	1	0.00%
28	196	30.357 km	33.944 km	3	0.00%
29	196	33.944 km	35.560 km	1	0.00%
30	196	33.944 km	35.560 km	3	0.00%
31	469	0.000 km	0.065 km	1	1.63%
32	469	0.000 km	0.065 km	3	13.91%
33	469	0.065 km	1.119 km	1	0.00%
34	469	0.065 km	1.119 km	3	0.00%
35	469	1.119 km	6.724 km	1	0.00%
36	469	1.119 km	6.724 km	3	0.00%
37	469	6.724 km	9.089 km	1	0.00%
38	469	6.724 km	9.089 km	3	0.00%
39	469	9.089 km	10.984 km	1	0.00%
40	469	9.089 km	10.984 km	3	0.00%
41	469	10.984 km	15.170 km	1	0.00%
42	469	10.984 km	15.170 km	3	0.00%
43	469	15.170 km	17.175 km	1	0.00%
44	469	15.170 km	17.175 km	3	0.00%
45	469	17.175 km	20.465 km	1	0.00%
46	469	17.175 km	20.465 km	3	0.00%
47	469	20.465 km	21.340 km	1	0.00%
48	469	20.465 km	21.340 km	3	0.00%
49	469	21.340 km	27.180 km	1	0.00%
50	469	21.340 km	27.180 km	3	0.00%
51	469	27.180 km	40.680 km	1	0.00%
52	469	27.180 km	40.680 km	3	0.00%
53	469	40.680 km	48.390 km	1	0.00%
54	469	40.680 km	48.390 km	3	0.00%
55	469	48.390 km	49.590 km	1	0.00%
56	469	48.390 km	49.590 km	3	0.00%
57	469	49.590 km	59.160 km	1	0.00%
58	469	49.590 km	59.160 km	3	0.00%
59	469	59.160 km	77.170 km	1	0.00%
60	469	59.160 km	77.170 km	3	0.00%
61	469	77.170 km	89.030 km	1	0.00%
62	469	77.170 km	89.030 km	3	0.00%
63	469	89.030 km	89.570 km	1	0.00%
64	469	89.030 km	89.570 km	3	0.00%

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	3	25	95	429	527	657	800	975	1,073	1,200	1,337	1,413	1,486	1,632	1,715	1,785	1,874	1,918
2	196	0.000 km	0.530 km	3	18	144	540	2,429	2,987	3,725	4,535	5,524	6,082	6,802	7,576	8,008	8,421	9,249	9,717	10,113	10,617	10,869
3	196	0.530 km	0.875 km	1	3	25	95	429	527	657	800	975	1,073	1,200	1,337	1,413	1,486	1,632	1,715	1,785	1,874	1,918
4	196	0.530 km	0.875 km	3	18	144	540	2,429	2,987	3,725	4,535	5,524	6,082	6,802	7,576	8,008	8,421	9,249	9,717	10,113	10,617	10,869
5	196	0.875 km	0.950 km	1	36	198	1,044	2,501	3,401	3,977	4,625	5,272	5,884	6,460	6,802	7,090	7,540	8,062	8,349	8,493	8,637	8,691
6	196	0.875 km	0.950 km	3	6	35	184	441	600	702	816	930	1,038	1,140	1,200	1,251	1,331	1,423	1,473	1,499	1,524	1,534
7	196	0.950 km	1.329 km	1	36	198	1,044	2,501	3,401	3,977	4,625	5,272	5,884	6,460	6,802	7,090	7,540	8,062	8,349	8,493	8,637	8,691
8	196	0.950 km	1.329 km	3	6	35	184	441	600	702	816	930	1,038	1,140	1,200	1,251	1,331	1,423	1,473	1,499	1,524	1,534
9	196	1.329 km	1.580 km	1	36	198	1,044	2,501	3,401	3,977	4,625	5,272	5,884	6,460	6,802	7,090	7,540	8,062	8,349	8,493	8,637	8,691
10	196	1.329 km	1.580 km	3	6	35	184	441	600	702	816	930	1,038	1,140	1,200	1,251	1,331	1,423	1,473	1,499	1,524	1,534
11	196	1.580 km	3.226 km	1	36	198	1,044	2,501	3,401	3,977	4,625	5,272	5,884	6,460	6,802	7,090	7,540	8,062	8,349	8,493	8,637	8,691
12	196	1.580 km	3.226 km	3	6	35	184	441	600	702	816	930	1,038	1,140	1,200	1,251	1,331	1,423	1,473	1,499	1,524	1,534
13	196	3.226 km	4.030 km	1	36	198	1,044	2,501	3,401	3,977	4,625	5,272	5,884	6,460	6,802	7,090	7,540	8,062	8,349	8,493	8,637	8,691
14	196	3.226 km	4.030 km	3	6	35	184	441	600	702	816	930	1,038	1,140	1,200	1,251	1,331	1,423	1,473	1,499	1,524	1,534
15	196	4.031 km	12.670 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	196	4.031 km	12.670 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	196	12.670 km	13.860 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	196	12.670 km	13.860 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	196	13.860 km	20.710 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	196	13.860 km	20.710 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	196	20.710 km	24.890 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	196	20.710 km	24.890 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	196	24.890 km	28.770 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	196	24.890 km	28.770 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	196	28.770 km	30.357 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	196	28.770 km	30.357 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	196	30.357 km	33.944 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	196	30.357 km	33.944 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	196	33.944 km	35.560 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	196	33.944 km	35.560 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	469	0.000 km	0.065 km	1	0	0	0	0	0	0	0	0	0	156	601	4,378	7,399	12,339	16,246	17,753	20,370	22,644
32	469	0.000 km	0.065 km	3	0	0	0	0	0	0	0	0	0	1,211	4,681	34,072	57,542	95,967	126,336	138,079	158,464	176,181
33	469	0.065 km	1.119 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	469	0.065 km	1.119 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	469	1.119 km	6.724 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	469	1.119 km	6.724 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	469	6.724 km	9.089 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	469	6.724 km	9.089 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	469	9.089 km	10.984 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	469	9.089 km	10.984 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	469	10.984 km	15.170 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	469	10.984 km	15.170 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	469	15.170 km	17.175 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	469	15.170 km	17.175 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	469	17.175 km	20.465 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	469	17.175 km	20.465 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	469	20.465 km	21.340 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	469	20.465 km	21.340 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	469	21.340 km	27.180 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	469	21.340 km	27.180 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	469	27.180 km	40.680 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	469	27.180 km	40.680 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	469	40.680 km	48.390 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	469	40.680 km	48.390 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	469	48.390 km	49.590 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	469	48.390 km	49.590 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	469	49.590 km	59.160 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	469	49.590 km	59.160 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	469	59.160 km	77.170 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	469	59.160 km	77.170 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	469	77.170 km	89.030 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	469	77.170 km	89.030 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	469	89.030 km	89.570 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	469	89.030 km	89.570 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	1	1,953	1,975	1,978	1,988	1,997	2,001	2,007	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010
2	196	0.000 km	0.530 km	3	11,067	11,193	11,211	11,265	11,319	11,337	11,373	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391
3	196	0.530 km	0.875 km	1	1,953	1,975	1,978	1,988	1,997	2,001	2,007	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010	2,010
4	196	0.530 km	0.875 km	3	11,067	11,193	11,211	11,265	11,319	11,337	11,373	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391	11,391
5	196	0.875 km	0.950 km	1	8,763	8,781	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817
6	196	0.875 km	0.950 km	3	1,546	1,550	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
7	196	0.950 km	1.329 km	1	8,763	8,781	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817
8	196	0.950 km	1.329 km	3	1,546	1,550	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
9	196	1.329 km	1.580 km	1	8,763	8,781	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817
10	196	1.329 km	1.580 km	3	1,546	1,550	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
11	196	1.580 km	3.226 km	1	8,763	8,781	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817
12	196	1.580 km	3.226 km	3	1,546	1,550	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
13	196	3.226 km	4.030 km	1	8,763	8,781	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817	8,817
14	196	3.226 km	4.030 km	3	1,546	1,550	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556	1,556
15	196	4.031 km	12.670 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	196	4.031 km	12.670 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	196	12.670 km	13.860 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	196	12.670 km	13.860 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	196	13.860 km	20.710 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	196	13.860 km	20.710 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21	196	20.710 km	24.890 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
22	196	20.710 km	24.890 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23	196	24.890 km	28.770 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	196	24.890 km	28.770 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	196	28.770 km	30.357 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	196	28.770 km	30.357 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	196	30.357 km	33.944 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	196	30.357 km	33.944 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29	196	33.944 km	35.560 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	196	33.944 km	35.560 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	469	0.000 km	0.065 km	1	24,473	25,586	25,707	26,229	26,720	26,844	27,176	27,369	27,369	27,369	27,369	27,369	27,369	27,369	27,369	27,369	27,369	27,369
32	469	0.000 km	0.065 km	3	190,429	199,097	200,036	204,105	207,928	208,894	211,480	212,990	212,990	212,990	212,990	212,990	212,990	212,990	212,990	212,990	212,990	212,990
33	469	0.065 km	1.119 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
34	469	0.065 km	1.119 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	469	1.119 km	6.724 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	469	1.119 km	6.724 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	469	6.724 km	9.089 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	469	6.724 km	9.089 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
39	469	9.089 km	10.984 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	469	9.089 km	10.984 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	469	10.984 km	15.170 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	469	10.984 km	15.170 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	469	15.170 km	17.175 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	469	15.170 km	17.175 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	469	17.175 km	20.465 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	469	17.175 km	20.465 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	469	20.465 km	21.340 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	469	20.465 km	21.340 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
49	469	21.340 km	27.180 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	469	21.340 km	27.180 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
51	469	27.180 km	40.680 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	469	27.180 km	40.680 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	469	40.680 km	48.390 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
54	469	40.680 km	48.390 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	469	48.390 km	49.590 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
56	469	48.390 km	49.590 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	469	49.590 km	59.160 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
58	469	49.590 km	59.160 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
59	469	59.160 km	77.170 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
60	469	59.160 km	77.170 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
61	469	77.170 km	89.030 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
62	469	77.170 km	89.030 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
63	469	89.030 km	89.570 km	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
64	469	89.030 km	89.570 km	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Cumulative Project ESAs

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	2,010	2,010	2,010	2,010	2,010	2,010
2	196	0.000 km	0.530 km	3	11,391	11,391	11,391	11,391	11,391	11,391
3	196	0.530 km	0.875 km	1	2,010	2,010	2,010	2,010	2,010	2,010
4	196	0.530 km	0.875 km	3	11,391	11,391	11,391	11,391	11,391	11,391
5	196	0.875 km	0.950 km	1	8,817	8,817	8,817	8,817	8,817	8,817
6	196	0.875 km	0.950 km	3	1,556	1,556	1,556	1,556	1,556	1,556
7	196	0.950 km	1.329 km	1	8,817	8,817	8,817	8,817	8,817	8,817
8	196	0.950 km	1.329 km	3	1,556	1,556	1,556	1,556	1,556	1,556
9	196	1.329 km	1.580 km	1	8,817	8,817	8,817	8,817	8,817	8,817
10	196	1.329 km	1.580 km	3	1,556	1,556	1,556	1,556	1,556	1,556
11	196	1.580 km	3.226 km	1	8,817	8,817	8,817	8,817	8,817	8,817
12	196	1.580 km	3.226 km	3	1,556	1,556	1,556	1,556	1,556	1,556
13	196	3.226 km	4.030 km	1	8,817	8,817	8,817	8,817	8,817	8,817
14	196	3.226 km	4.030 km	3	1,556	1,556	1,556	1,556	1,556	1,556
15	196	4.031 km	12.670 km	1	0	0	0	0	0	0
16	196	4.031 km	12.670 km	3	0	0	0	0	0	0
17	196	12.670 km	13.860 km	1	0	0	0	0	0	0
18	196	12.670 km	13.860 km	3	0	0	0	0	0	0
19	196	13.860 km	20.710 km	1	0	0	0	0	0	0
20	196	13.860 km	20.710 km	3	0	0	0	0	0	0
21	196	20.710 km	24.890 km	1	0	0	0	0	0	0
22	196	20.710 km	24.890 km	3	0	0	0	0	0	0
23	196	24.890 km	28.770 km	1	0	0	0	0	0	0
24	196	24.890 km	28.770 km	3	0	0	0	0	0	0
25	196	28.770 km	30.357 km	1	0	0	0	0	0	0
26	196	28.770 km	30.357 km	3	0	0	0	0	0	0
27	196	30.357 km	33.944 km	1	0	0	0	0	0	0
28	196	30.357 km	33.944 km	3	0	0	0	0	0	0
29	196	33.944 km	35.560 km	1	0	0	0	0	0	0
30	196	33.944 km	35.560 km	3	0	0	0	0	0	0
31	469	0.000 km	0.065 km	1	27,369	27,369	27,369	27,369	27,369	27,369
32	469	0.000 km	0.065 km	3	212,990	212,990	212,990	212,990	212,990	212,990
33	469	0.065 km	1.119 km	1	0	0	0	0	0	0
34	469	0.065 km	1.119 km	3	0	0	0	0	0	0
35	469	1.119 km	6.724 km	1	0	0	0	0	0	0
36	469	1.119 km	6.724 km	3	0	0	0	0	0	0
37	469	6.724 km	9.089 km	1	0	0	0	0	0	0
38	469	6.724 km	9.089 km	3	0	0	0	0	0	0
39	469	9.089 km	10.984 km	1	0	0	0	0	0	0
40	469	9.089 km	10.984 km	3	0	0	0	0	0	0
41	469	10.984 km	15.170 km	1	0	0	0	0	0	0
42	469	10.984 km	15.170 km	3	0	0	0	0	0	0
43	469	15.170 km	17.175 km	1	0	0	0	0	0	0
44	469	15.170 km	17.175 km	3	0	0	0	0	0	0
45	469	17.175 km	20.465 km	1	0	0	0	0	0	0
46	469	17.175 km	20.465 km	3	0	0	0	0	0	0
47	469	20.465 km	21.340 km	1	0	0	0	0	0	0
48	469	20.465 km	21.340 km	3	0	0	0	0	0	0
49	469	21.340 km	27.180 km	1	0	0	0	0	0	0
50	469	21.340 km	27.180 km	3	0	0	0	0	0	0
51	469	27.180 km	40.680 km	1	0	0	0	0	0	0
52	469	27.180 km	40.680 km	3	0	0	0	0	0	0
53	469	40.680 km	48.390 km	1	0	0	0	0	0	0
54	469	40.680 km	48.390 km	3	0	0	0	0	0	0
55	469	48.390 km	49.590 km	1	0	0	0	0	0	0
56	469	48.390 km	49.590 km	3	0	0	0	0	0	0
57	469	49.590 km	59.160 km	1	0	0	0	0	0	0
58	469	49.590 km	59.160 km	3	0	0	0	0	0	0
59	469	59.160 km	77.170 km	1	0	0	0	0	0	0
60	469	59.160 km	77.170 km	3	0	0	0	0	0	0
61	469	77.170 km	89.030 km	1	0	0	0	0	0	0
62	469	77.170 km	89.030 km	3	0	0	0	0	0	0
63	469	89.030 km	89.570 km	1	0	0	0	0	0	0
64	469	89.030 km	89.570 km	3	0	0	0	0	0	0

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	616,230	634,717	653,204	671,691	690,177	708,664	727,151	745,638	764,125	782,612	801,099	819,586	838,073	856,560	875,046	893,533	912,020	930,507
2	196	0.000 km	0.530 km	3	877,737	904,069	930,401	956,733	983,065	1,009,397	1,035,729	1,062,061	1,088,393	1,114,726	1,141,058	1,167,390	1,193,722	1,220,054	1,246,386	1,272,718	1,299,050	1,325,382
3	196	0.530 km	0.875 km	1	509,845	525,140	540,435	555,731	571,026	586,321	601,617	616,912	632,208	647,503	662,798	678,094	693,389	708,684	723,980	739,275	754,570	769,866
4	196	0.530 km	0.875 km	3	581,776	599,229	616,683	634,136	651,589	669,042	686,496	703,949	721,402	738,856	756,309	773,762	791,215	808,669	826,122	843,575	861,029	878,482
5	196	0.875 km	0.950 km	1	509,845	525,140	540,435	555,731	571,026	586,321	601,617	616,912	632,208	647,503	662,798	678,094	693,389	708,684	723,980	739,275	754,570	769,866
6	196	0.875 km	0.950 km	3	581,776	599,229	616,683	634,136	651,589	669,042	686,496	703,949	721,402	738,856	756,309	773,762	791,215	808,669	826,122	843,575	861,029	878,482
7	196	0.950 km	1.329 km	1	509,845	525,140	540,435	555,731	571,026	586,321	601,617	616,912	632,208	647,503	662,798	678,094	693,389	708,684	723,980	739,275	754,570	769,866
8	196	0.950 km	1.329 km	3	581,776	599,229	616,683	634,136	651,589	669,042	686,496	703,949	721,402	738,856	756,309	773,762	791,215	808,669	826,122	843,575	861,029	878,482
9	196	1.329 km	1.580 km	1	509,845	525,140	540,435	555,731	571,026	586,321	601,617	616,912	632,208	647,503	662,798	678,094	693,389	708,684	723,980	739,275	754,570	769,866
10	196	1.329 km	1.580 km	3	581,776	599,229	616,683	634,136	651,589	669,042	686,496	703,949	721,402	738,856	756,309	773,762	791,215	808,669	826,122	843,575	861,029	878,482
11	196	1.580 km	3.226 km	1	167,574	172,602	177,629	182,656	187,683	192,711	197,738	202,765	207,792	212,820	217,847	222,874	227,901	232,928	237,956	242,983	248,010	253,037
12	196	1.580 km	3.226 km	3	169,922	175,019	180,117	185,215	190,312	195,410	200,508	205,605	210,703	215,801	220,898	225,996	231,094	236,191	241,289	246,387	251,484	256,582
13	196	3.226 km	4.030 km	1	167,932	172,970	178,008	183,046	188,084	193,122	198,160	203,198	208,236	213,274	218,312	223,350	228,388	233,426	238,464	243,502	248,540	253,578
14	196	3.226 km	4.030 km	3	131,569	135,516	139,463	143,410	147,357	151,304	155,251	159,198	163,146	167,093	171,040	174,987	178,934	182,881	186,828	190,775	194,722	198,669
15	196	4.031 km	12.670 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
16	196	4.031 km	12.670 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
17	196	12.670 km	13.860 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
18	196	12.670 km	13.860 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
19	196	13.860 km	20.710 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
20	196	13.860 km	20.710 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
21	196	20.710 km	24.890 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
22	196	20.710 km	24.890 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
23	196	24.890 km	28.770 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
24	196	24.890 km	28.770 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
25	196	28.770 km	30.357 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
26	196	28.770 km	30.357 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
27	196	30.357 km	33.944 km	1	186,910	192,517	198,125	203,732	209,339	214,946	220,554	226,161	231,768	237,376	242,983	248,590	254,198	259,805	265,412	271,019	276,627	282,234
28	196	30.357 km	33.944 km	3	177,123	182,437	187,750	193,064	198,378	203,691	209,005	214,319	219,632	224,946	230,260	235,573	240,887	246,201	251,514	256,828	262,142	267,455
29	196	33.944 km	35.560 km	1	152,934	157,522	162,110	166,698	171,286	175,874	180,462	185,050	189,638	194,226	198,814	203,402	207,990	212,578	217,166	221,754	226,342	230,930
30	196	33.944 km	35.560 km	3	156,594	161,292	165,989	170,687	175,385	180,083	184,781	189,478	194,176	198,874	203,572	208,270	212,968	217,665	222,363	227,061	231,759	236,457
31	469	0.000 km	0.065 km	1	215,913	222,391	228,868	235,345	241,823	248,300	254,778	261,255	267,732	274,210	280,687	287,165	293,642	300,119	306,597	313,074	319,552	326,029
32	469	0.000 km	0.065 km	3	186,234	191,821	197,408	202,995	208,582	214,169	219,756	225,343	230,930	236,517	242,104	247,691	253,278	258,865	264,452	270,039	275,626	281,213
33	469	0.065 km	1.119 km	1	215,913	222,391	228,868	235,345	241,823	248,300	254,778	261,255	267,732	274,210	280,687	287,165	293,642	300,119	306,597	313,074	319,552	326,029
34	469	0.065 km	1.119 km	3	186,234	191,821	197,408	202,995	208,582	214,169	219,756	225,343	230,930	236,517	242,104	247,691	253,278	258,865	264,452	270,039	275,626	281,213
35	469	1.119 km	6.724 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
36	469	1.119 km	6.724 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
37	469	6.724 km	9.089 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
38	469	6.724 km	9.089 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
39	469	9.089 km	10.984 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
40	469	9.089 km	10.984 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
41	469	10.984 km	15.170 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
42	469	10.984 km	15.170 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
43	469	15.170 km	17.175 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
44	469	15.170 km	17.175 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
45	469	17.175 km	20.465 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
46	469	17.175 km	20.465 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
47	469	20.465 km	21.340 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
48	469	20.465 km	21.340 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
49	469	21.340 km	27.180 km	1	20,251	20,858	21,466	22,073	22,681	23,288	23,896	24,503	25,111	25,718	26,326	26,933	27,541	28,148	28,756	29,363	29,971	30,578
50	469	21.340 km	27.180 km	3	25,661	26,431	27,201	27,971	28,741	29,511	30,280	31,050	31,820	32,590	33,360	34,130	34,899	35,669	36,439	37,209	37,979	38,749
51	469	27.180 km	40.680 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
52	469	27.180 km	40.680 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
53	469	40.680 km	48.390 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
54	469	40.680 km	48.390 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
55	469	48.390 km	49.590 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
56	469	48.390 km	49.590 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
57	469	49.590 km	59.160 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
58	469	49.590 km	59.160 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
59	469	59.160 km	77.170 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
60	469	59.160 km	77.170 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
61	469	77.170 km	89.030 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
62	469	77.170 km	89.030 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
63	469	89.030 km	89.570 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
64	469	89.030 km	89.570 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	1	948,994	967,481	985,968	1,004,455	1,022,942	1,041,428	1,059,915	1,078,402	1,096,889	1,115,376	1,133,863	1,152,350	1,170,837	1,189,324	1,207,811	1,226,297	1,244,784	1,263,271
2	196	0.000 km	0.530 km	3	1,351,714	1,378,047	1,404,379	1,430,711	1,457,043	1,483,375	1,509,707	1,536,039	1,562,371	1,588,703	1,615,035	1,641,368	1,667,700	1,694,032	1,720,364	1,746,696	1,773,028	1,799,360
3	196	0.530 km	0.875 km	1	785,161	800,456	815,752	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
4	196	0.530 km	0.875 km	3	895,935	913,388	930,842	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
5	196	0.875 km	0.950 km	1	785,161	800,456	815,752	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
6	196	0.875 km	0.950 km	3	895,935	913,388	930,842	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
7	196	0.950 km	1.329 km	1	785,161	800,456	815,752	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
8	196	0.950 km	1.329 km	3	895,935	913,388	930,842	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
9	196	1.329 km	1.580 km	1	785,161	800,456	815,752	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
10	196	1.329 km	1.580 km	3	895,935	913,388	930,842	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
11	196	1.580 km	3.226 km	1	258,065	263,092	268,119	273,146	278,174	283,201	288,228	293,255	298,282	303,310	308,337	313,364	318,391	323,419	328,446	333,473	338,500	343,528
12	196	1.580 km	3.226 km	3	261,679	266,777	271,875	276,972	282,070	287,168	292,265	297,363	302,461	307,558	312,656	317,754	322,851	327,949	333,047	338,144	343,242	348,340
13	196	3.226 km	4.030 km	1	258,616	263,654	268,692	273,730	278,768	283,806	288,844	293,882	298,920	303,958	308,996	314,034	319,072	324,110	329,148	334,186	339,224	344,262
14	196	3.226 km	4.030 km	3	202,616	206,563	210,510	214,457	218,405	222,352	226,299	230,246	234,193	238,140	242,087	246,034	249,981	253,928	257,875	261,822	265,769	269,716
15	196	4.031 km	12.670 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
16	196	4.031 km	12.670 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
17	196	12.670 km	13.860 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
18	196	12.670 km	13.860 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
19	196	13.860 km	20.710 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
20	196	13.860 km	20.710 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
21	196	20.710 km	24.890 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
22	196	20.710 km	24.890 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
23	196	24.890 km	28.770 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
24	196	24.890 km	28.770 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
25	196	28.770 km	30.357 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
26	196	28.770 km	30.357 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
27	196	30.357 km	33.944 km	1	287,841	293,449	299,056	304,663	310,270	315,878	321,485	327,092	332,700	338,307	343,914	349,522	355,129	360,736	366,343	371,951	377,558	383,165
28	196	30.357 km	33.944 km	3	272,769	278,083	283,397	288,710	294,024	299,338	304,651	309,965	315,279	320,592	325,906	331,220	336,533	341,847	347,161	352,474	357,788	363,102
29	196	33.944 km	35.560 km	1	235,518	240,106	244,694	249,282	253,870	258,458	263,046	267,634	272,222	276,810	281,398	285,986	290,574	295,162	299,750	304,338	308,926	313,514
30	196	33.944 km	35.560 km	3	241,154	245,852	250,550	255,248	259,946	264,643	269,341	274,039	278,737	283,435	288,133	292,830	297,528	302,226	306,924	311,622	316,319	321,017
31	469	0.000 km	0.065 km	1	332,506	338,984	345,461	351,939	358,416	364,893	371,371	377,848	384,325	390,803	397,280	403,758	410,235	416,712	423,190	429,667	436,145	442,622
32	469	0.000 km	0.065 km	3	286,800	292,387	297,974	303,561	309,148	314,735	320,322	325,909	331,496	337,083	342,670	348,257	353,844	359,431	365,018	370,605	376,192	381,779
33	469	0.065 km	1.119 km	1	332,506	338,984	345,461	351,939	358,416	364,893	371,371	377,848	384,325	390,803	397,280	403,758	410,235	416,712	423,190	429,667	436,145	442,622
34	469	0.065 km	1.119 km	3	286,800	292,387	297,974	303,561	309,148	314,735	320,322	325,909	331,496	337,083	342,670	348,257	353,844	359,431	365,018	370,605	376,192	381,779
35	469	1.119 km	6.724 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
36	469	1.119 km	6.724 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
37	469	6.724 km	9.089 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
38	469	6.724 km	9.089 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
39	469	9.089 km	10.984 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
40	469	9.089 km	10.984 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
41	469	10.984 km	15.170 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
42	469	10.984 km	15.170 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
43	469	15.170 km	17.175 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
44	469	15.170 km	17.175 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
45	469	17.175 km	20.465 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
46	469	17.175 km	20.465 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
47	469	20.465 km	21.340 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
48	469	20.465 km	21.340 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
49	469	21.340 km	27.180 km	1	31,186	31,793	32,401	33,008	33,616	34,223	34,831	35,438	36,046	36,654	37,261	37,869	38,476	39,084	39,691	40,299	40,906	41,514
50	469	21.340 km	27.180 km	3	39,518	40,288	41,058	41,828	42,598	43,368	44,137	44,907	45,677	46,447	47,217	47,987	48,757	49,526	50,296	51,066	51,836	52,606
51	469	27.180 km	40.680 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
52	469	27.180 km	40.680 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
53	469	40.680 km	48.390 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
54	469	40.680 km	48.390 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
55	469	48.390 km	49.590 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
56	469	48.390 km	49.590 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
57	469	49.590 km	59.160 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
58	469	49.590 km	59.160 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
59	469	59.160 km	77.170 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
60	469	59.160 km	77.170 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
61	469	77.170 km	89.030 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
62	469	77.170 km	89.030 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
63	469	89.030 km	89.570 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
64	469	89.030 km	89.570 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025

Annual Basline ESAs

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	1,281,758	1,300,245	1,318,732	1,337,219	1,355,706	1,374,193
2	196	0.000 km	0.530 km	3	1,825,692	1,852,024	1,878,356	1,904,689	1,931,021	1,957,353
3	196	0.530 km	0.875 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
4	196	0.530 km	0.875 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
5	196	0.875 km	0.950 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
6	196	0.875 km	0.950 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
7	196	0.950 km	1.329 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
8	196	0.950 km	1.329 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
9	196	1.329 km	1.580 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
10	196	1.329 km	1.580 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
11	196	1.580 km	3.226 km	1	348,555	353,582	358,609	363,636	368,664	373,691
12	196	1.580 km	3.226 km	3	353,437	358,535	363,633	368,730	373,828	378,925
13	196	3.226 km	4.030 km	1	349,300	354,338	359,376	364,413	369,451	374,489
14	196	3.226 km	4.030 km	3	273,664	277,611	281,558	285,505	289,452	293,399
15	196	4.031 km	12.670 km	1	381,077	386,573	392,069	397,566	403,062	408,558
16	196	4.031 km	12.670 km	3	368,333	373,645	378,958	384,270	389,583	394,895
17	196	12.670 km	13.860 km	1	381,077	386,573	392,069	397,566	403,062	408,558
18	196	12.670 km	13.860 km	3	368,333	373,645	378,958	384,270	389,583	394,895
19	196	13.860 km	20.710 km	1	381,077	386,573	392,069	397,566	403,062	408,558
20	196	13.860 km	20.710 km	3	368,333	373,645	378,958	384,270	389,583	394,895
21	196	20.710 km	24.890 km	1	381,077	386,573	392,069	397,566	403,062	408,558
22	196	20.710 km	24.890 km	3	368,333	373,645	378,958	384,270	389,583	394,895
23	196	24.890 km	28.770 km	1	381,077	386,573	392,069	397,566	403,062	408,558
24	196	24.890 km	28.770 km	3	368,333	373,645	378,958	384,270	389,583	394,895
25	196	28.770 km	30.357 km	1	381,077	386,573	392,069	397,566	403,062	408,558
26	196	28.770 km	30.357 km	3	368,333	373,645	378,958	384,270	389,583	394,895
27	196	30.357 km	33.944 km	1	388,773	394,380	399,987	405,595	411,202	416,809
28	196	30.357 km	33.944 km	3	368,415	373,729	379,043	384,357	389,670	394,984
29	196	33.944 km	35.560 km	1	318,102	322,690	327,278	331,866	336,454	341,042
30	196	33.944 km	35.560 km	3	325,715	330,413	335,111	339,808	344,506	349,204
31	469	0.000 km	0.065 km	1	449,099	455,577	462,054	468,532	475,009	481,486
32	469	0.000 km	0.065 km	3	387,366	392,953	398,540	404,127	409,714	415,301
33	469	0.065 km	1.119 km	1	449,099	455,577	462,054	468,532	475,009	481,486
34	469	0.065 km	1.119 km	3	387,366	392,953	398,540	404,127	409,714	415,301
35	469	1.119 km	6.724 km	1	297,579	301,871	306,163	310,455	314,747	319,039
36	469	1.119 km	6.724 km	3	305,523	309,930	314,337	318,743	323,150	327,556
37	469	6.724 km	9.089 km	1	297,579	301,871	306,163	310,455	314,747	319,039
38	469	6.724 km	9.089 km	3	305,523	309,930	314,337	318,743	323,150	327,556
39	469	9.089 km	10.984 km	1	297,579	301,871	306,163	310,455	314,747	319,039
40	469	9.089 km	10.984 km	3	305,523	309,930	314,337	318,743	323,150	327,556
41	469	10.984 km	15.170 km	1	297,579	301,871	306,163	310,455	314,747	319,039
42	469	10.984 km	15.170 km	3	305,523	309,930	314,337	318,743	323,150	327,556
43	469	15.170 km	17.175 km	1	297,579	301,871	306,163	310,455	314,747	319,039
44	469	15.170 km	17.175 km	3	305,523	309,930	314,337	318,743	323,150	327,556
45	469	17.175 km	20.465 km	1	297,579	301,871	306,163	310,455	314,747	319,039
46	469	17.175 km	20.465 km	3	305,523	309,930	314,337	318,743	323,150	327,556
47	469	20.465 km	21.340 km	1	297,579	301,871	306,163	310,455	314,747	319,039
48	469	20.465 km	21.340 km	3	305,523	309,930	314,337	318,743	323,150	327,556
49	469	21.340 km	27.180 km	1	42,121	42,729	43,336	43,944	44,551	45,159
50	469	21.340 km	27.180 km	3	53,376	54,145	54,915	55,685	56,455	57,225
51	469	27.180 km	40.680 km	1	10,758	10,913	11,068	11,223	11,379	11,534
52	469	27.180 km	40.680 km	3	18,288	18,552	18,816	19,080	19,343	19,607
53	469	40.680 km	48.390 km	1	10,758	10,913	11,068	11,223	11,379	11,534
54	469	40.680 km	48.390 km	3	18,288	18,552	18,816	19,080	19,343	19,607
55	469	48.390 km	49.590 km	1	10,758	10,913	11,068	11,223	11,379	11,534
56	469	48.390 km	49.590 km	3	18,288	18,552	18,816	19,080	19,343	19,607
57	469	49.590 km	59.160 km	1	10,758	10,913	11,068	11,223	11,379	11,534
58	469	49.590 km	59.160 km	3	18,288	18,552	18,816	19,080	19,343	19,607
59	469	59.160 km	77.170 km	1	10,758	10,913	11,068	11,223	11,379	11,534
60	469	59.160 km	77.170 km	3	18,288	18,552	18,816	19,080	19,343	19,607
61	469	77.170 km	89.030 km	1	10,758	10,913	11,068	11,223	11,379	11,534
62	469	77.170 km	89.030 km	3	18,288	18,552	18,816	19,080	19,343	19,607
63	469	89.030 km	89.570 km	1	10,758	10,913	11,068	11,223	11,379	11,534
64	469	89.030 km	89.570 km	3	18,288	18,552	18,816	19,080	19,343	19,607

Calculation Sheet

Cumulative Basline ESAs

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	616,230	1,250,947	1,904,150	2,575,841	3,266,018	3,974,683	4,701,834	5,447,472	6,211,597	6,994,209	7,795,308	8,614,894	9,452,966	10,309,526	11,184,572	12,078,105	12,990,126	13,920,633
2	196	0.000 km	0.530 km	3	877,737	1,781,805	2,712,206	3,668,939	4,652,004	5,661,402	6,697,131	7,759,192	8,847,586	9,962,311	11,103,369	12,270,759	13,464,481	14,684,534	15,930,921	17,203,639	18,502,689	19,828,071
3	196	0.530 km	0.875 km	1	509,845	1,034,985	1,575,420	2,131,151	2,702,177	3,288,499	3,890,116	4,507,028	5,139,235	5,786,738	6,449,536	7,127,630	7,821,019	8,529,703	9,253,683	9,992,958	10,747,528	11,517,393
4	196	0.530 km	0.875 km	3	581,776	1,181,005	1,797,688	2,431,824	3,083,413	3,752,456	4,438,951	5,142,900	5,864,303	6,603,158	7,359,467	8,133,229	8,924,445	9,733,113	10,559,235	11,402,811	12,263,839	13,142,321
5	196	0.875 km	0.950 km	1	509,845	1,034,985	1,575,420	2,131,151	2,702,177	3,288,499	3,890,116	4,507,028	5,139,235	5,786,738	6,449,536	7,127,630	7,821,019	8,529,703	9,253,683	9,992,958	10,747,528	11,517,393
6	196	0.875 km	0.950 km	3	581,776	1,181,005	1,797,688	2,431,824	3,083,413	3,752,456	4,438,951	5,142,900	5,864,303	6,603,158	7,359,467	8,133,229	8,924,445	9,733,113	10,559,235	11,402,811	12,263,839	13,142,321
7	196	0.950 km	1.329 km	1	509,845	1,034,985	1,575,420	2,131,151	2,702,177	3,288,499	3,890,116	4,507,028	5,139,235	5,786,738	6,449,536	7,127,630	7,821,019	8,529,703	9,253,683	9,992,958	10,747,528	11,517,393
8	196	0.950 km	1.329 km	3	581,776	1,181,005	1,797,688	2,431,824	3,083,413	3,752,456	4,438,951	5,142,900	5,864,303	6,603,158	7,359,467	8,133,229	8,924,445	9,733,113	10,559,235	11,402,811	12,263,839	13,142,321
9	196	1.329 km	1.580 km	1	509,845	1,034,985	1,575,420	2,131,151	2,702,177	3,288,499	3,890,116	4,507,028	5,139,235	5,786,738	6,449,536	7,127,630	7,821,019	8,529,703	9,253,683	9,992,958	10,747,528	11,517,393
10	196	1.329 km	1.580 km	3	581,776	1,181,005	1,797,688	2,431,824	3,083,413	3,752,456	4,438,951	5,142,900	5,864,303	6,603,158	7,359,467	8,133,229	8,924,445	9,733,113	10,559,235	11,402,811	12,263,839	13,142,321
11	196	1.580 km	3.226 km	1	167,574	340,176	517,805	700,461	888,144	1,080,855	1,278,593	1,481,358	1,689,150	1,901,970	2,119,816	2,342,690	2,570,592	2,803,520	3,041,476	3,284,459	3,532,469	3,785,506
12	196	1.580 km	3.226 km	3	169,922	344,941	525,058	710,273	900,585	1,095,995	1,296,503	1,502,108	1,712,811	1,928,612	2,149,510	2,375,506	2,606,599	2,842,791	3,084,079	3,330,466	3,581,950	3,838,532
13	196	3.226 km	4.030 km	1	167,932	340,903	518,911	701,958	890,042	1,083,165	1,281,325	1,484,523	1,692,759	1,906,034	2,124,346	2,347,696	2,576,084	2,809,510	3,047,975	3,291,477	3,540,017	3,793,595
14	196	3.226 km	4.030 km	3	131,569	267,085	406,548	549,958	697,316	848,620	1,003,871	1,163,070	1,326,215	1,493,308	1,664,348	1,839,335	2,018,268	2,201,149	2,387,977	2,578,752	2,773,474	2,972,144
15	196	4.031 km	12.670 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
16	196	4.031 km	12.670 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
17	196	12.670 km	13.860 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
18	196	12.670 km	13.860 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
19	196	13.860 km	20.710 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
20	196	13.860 km	20.710 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
21	196	20.710 km	24.890 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
22	196	20.710 km	24.890 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
23	196	24.890 km	28.770 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
24	196	24.890 km	28.770 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
25	196	28.770 km	30.357 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
26	196	28.770 km	30.357 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
27	196	30.357 km	33.944 km	1	186,910	379,427	577,552	781,284	990,623	1,205,569	1,426,123	1,652,284	1,884,052	2,121,428	2,364,411	2,613,001	2,867,198	3,127,003	3,392,415	3,663,435	3,940,061	4,222,295
28	196	30.357 km	33.944 km	3	177,123	359,559	547,310	740,373	938,751	1,142,442	1,351,447	1,565,766	1,785,398	2,010,344	2,240,604	2,476,177	2,717,064	2,963,265	3,214,779	3,471,607	3,733,749	4,001,205
29	196	33.944 km	35.560 km	1	152,934	310,455	472,565	639,262	810,548	986,421	1,166,883	1,351,932	1,541,570	1,735,796	1,934,609	2,138,011	2,346,001	2,558,578	2,775,744	2,997,497	3,223,839	3,454,769
30	196	33.944 km	35.560 km	3	156,594	317,885	483,875	654,562	829,947	1,010,030	1,194,810	1,384,289	1,578,465	1,777,339	1,980,911	2,189,181	2,402,148	2,619,814	2,842,177	3,069,238	3,300,996	3,537,453
31	469	0.000 km	0.065 km	1	215,913	438,304	667,172	902,517	1,144,340	1,392,640	1,647,418	1,908,673	2,176,405	2,450,615	2,731,302	3,018,466	3,312,108	3,612,228	3,918,824	4,231,899	4,551,450	4,877,479
32	469	0.000 km	0.065 km	3	186,234	378,054	575,462	778,456	987,038	1,201,207	1,420,962	1,646,305	1,877,235	2,113,751	2,355,855	2,603,546	2,856,823	3,115,688	3,380,140	3,650,178	3,925,804	4,207,017
33	469	0.065 km	1.119 km	1	215,913	438,304	667,172	902,517	1,144,340	1,392,640	1,647,418	1,908,673	2,176,405	2,450,615	2,731,302	3,018,466	3,312,108	3,612,228	3,918,824	4,231,899	4,551,450	4,877,479
34	469	0.065 km	1.119 km	3	186,234	378,054	575,462	778,456	987,038	1,201,207	1,420,962	1,646,305	1,877,235	2,113,751	2,355,855	2,603,546	2,856,823	3,115,688	3,380,140	3,650,178	3,925,804	4,207,017
35	469	1.119 km	6.724 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
36	469	1.119 km	6.724 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
37	469	6.724 km	9.089 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
38	469	6.724 km	9.089 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
39	469	9.089 km	10.984 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
40	469	9.089 km	10.984 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
41	469	10.984 km	15.170 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
42	469	10.984 km	15.170 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
43	469	15.170 km	17.175 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
44	469	15.170 km	17.175 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
45	469	17.175 km	20.465 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
46	469	17.175 km	20.465 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
47	469	20.465 km	21.340 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
48	469	20.465 km	21.340 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
49	469	21.340 km	27.180 km	1	20,251	41,109	62,574	84,647	107,328	130,616	154,512	179,015	204,126	229,844	256,170	283,103	310,644	338,792	367,548	396,911	426,882	457,460
50	469	21.340 km	27.180 km	3	25,661	52,092	79,293	107,264	136,005	165,516	195,796	226,846	258,666	291,256	324,616	358,745	393,645	429,314	465,753	502,962	540,941	579,689
51	469	27.180 km	40.680 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
52	469	27.180 km	40.680 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
53	469	40.680 km	48.390 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
54	469	40.680 km	48.390 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
55	469	48.390 km	49.590 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
56	469	48.390 km	49.590 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
57	469	49.590 km	59.160 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
58	469	49.590 km	59.160 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
59	469	59.160 km	77.170 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
60	469	59.160 km	77.170 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
61	469	77.170 km	89.030 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
62	469	77.170 km	89.030 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
63	469	89.030 km	89.570 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
64	469	89.030 km	89.570 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	1	14,869,627	15,837,108	16,823,075	17,827,530	18,850,472	19,891,900	20,951,815	22,030,218	23,127,107	24,242,483	25,376,346	26,528,696	27,699,532	28,888,856	30,096,667	31,322,964	32,567,748	33,831,020
2	196	0.000 km	0.530 km	3	21,179,786	22,557,832	23,962,211	25,392,922	26,849,965	28,333,340	29,843,047	31,379,086	32,941,457	34,530,161	36,145,196	37,786,564	39,454,263	41,148,295	42,868,659	44,615,355	46,388,383	48,187,743
3	196	0.530 km	0.875 km	1	12,302,554	13,103,011	13,918,762	14,749,809	15,596,152	16,457,789	17,334,722	18,226,951	19,134,474	20,057,293	20,995,408	21,948,818	22,917,523	23,901,523	24,900,819	25,915,410	26,945,296	27,990,478
4	196	0.530 km	0.875 km	3	14,038,256	14,951,645	15,882,486	16,830,781	17,796,530	18,779,731	19,780,386	20,798,494	21,834,055	22,887,070	23,957,538	25,045,459	26,150,834	27,273,661	28,413,943	29,571,677	30,746,865	31,939,505
5	196	0.875 km	0.950 km	1	12,302,554	13,103,011	13,918,762	14,749,809	15,596,152	16,457,789	17,334,722	18,226,951	19,134,474	20,057,293	20,995,408	21,948,818	22,917,523	23,901,523	24,900,819	25,915,410	26,945,296	27,990,478
6	196	0.875 km	0.950 km	3	14,038,256	14,951,645	15,882,486	16,830,781	17,796,530	18,779,731	19,780,386	20,798,494	21,834,055	22,887,070	23,957,538	25,045,459	26,150,834	27,273,661	28,413,943	29,571,677	30,746,865	31,939,505
7	196	0.950 km	1.329 km	1	12,302,554	13,103,011	13,918,762	14,749,809	15,596,152	16,457,789	17,334,722	18,226,951	19,134,474	20,057,293	20,995,408	21,948,818	22,917,523	23,901,523	24,900,819	25,915,410	26,945,296	27,990,478
8	196	0.950 km	1.329 km	3	14,038,256	14,951,645	15,882,486	16,830,781	17,796,530	18,779,731	19,780,386	20,798,494	21,834,055	22,887,070	23,957,538	25,045,459	26,150,834	27,273,661	28,413,943	29,571,677	30,746,865	31,939,505
9	196	1.329 km	1.580 km	1	12,302,554	13,103,011	13,918,762	14,749,809	15,596,152	16,457,789	17,334,722	18,226,951	19,134,474	20,057,293	20,995,408	21,948,818	22,917,523	23,901,523	24,900,819	25,915,410	26,945,296	27,990,478
10	196	1.329 km	1.580 km	3	14,038,256	14,951,645	15,882,486	16,830,781	17,796,530	18,779,731	19,780,386	20,798,494	21,834,055	22,887,070	23,957,538	25,045,459	26,150,834	27,273,661	28,413,943	29,571,677	30,746,865	31,939,505
11	196	1.580 km	3.226 km	1	4,043,571	4,306,663	4,574,782	4,847,928	5,126,102	5,409,302	5,697,530	5,990,786	6,289,068	6,592,378	6,900,715	7,214,079	7,532,470	7,855,889	8,184,335	8,517,808	8,856,308	9,199,836
12	196	1.580 km	3.226 km	3	4,100,211	4,366,989	4,638,863	4,915,836	5,197,906	5,485,074	5,777,339	6,074,702	6,377,163	6,684,721	6,997,377	7,315,131	7,637,982	7,965,931	8,298,978	8,637,122	8,980,364	9,328,703
13	196	3.226 km	4.030 km	1	4,052,211	4,315,865	4,584,557	4,858,287	5,137,055	5,420,861	5,709,704	6,003,586	6,302,506	6,606,464	6,915,460	7,229,493	7,548,565	7,872,675	8,201,823	8,536,008	8,875,232	9,219,493
14	196	3.226 km	4.030 km	3	3,174,760	3,381,323	3,591,834	3,806,291	4,024,696	4,247,047	4,473,346	4,703,592	4,937,784	5,175,924	5,418,011	5,664,045	5,914,026	6,167,954	6,425,830	6,687,652	6,953,421	7,223,138
15	196	4.031 km	12.670 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
16	196	4.031 km	12.670 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
17	196	12.670 km	13.860 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
18	196	12.670 km	13.860 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
19	196	13.860 km	20.710 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
20	196	13.860 km	20.710 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
21	196	20.710 km	24.890 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
22	196	20.710 km	24.890 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
23	196	24.890 km	28.770 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
24	196	24.890 km	28.770 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
25	196	28.770 km	30.357 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
26	196	28.770 km	30.357 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
27	196	30.357 km	33.944 km	1	4,510,137	4,803,585	5,102,641	5,407,304	5,717,575	6,033,453	6,354,938	6,682,030	7,014,730	7,353,037	7,696,951	8,046,472	8,401,601	8,762,338	9,128,681	9,500,632	9,878,190	10,261,355
28	196	30.357 km	33.944 km	3	4,273,974	4,552,056	4,835,453	5,124,163	5,418,187	5,717,525	6,022,176	6,332,141	6,647,419	6,968,012	7,293,918	7,625,137	7,961,671	8,303,518	8,650,679	9,003,153	9,360,941	9,724,043
29	196	33.944 km	35.560 km	1	3,690,286	3,930,392	4,175,086	4,424,367	4,678,237	4,936,695	5,199,740	5,467,374	5,739,596	6,016,405	6,297,803	6,583,789	6,874,363	7,169,524	7,469,274	7,773,612	8,082,538	8,396,051
30	196	33.944 km	35.560 km	3	3,778,607	4,024,460	4,275,010	4,530,257	4,790,203	5,054,847	5,324,188	5,598,227	5,876,964	6,160,399	6,448,531	6,741,361	7,038,890	7,341,115	7,648,039	7,959,661	8,275,980	8,596,997
31	469	0.000 km	0.065 km	1	5,209,985	5,548,969	5,894,430	6,246,369	6,604,785	6,969,678	7,341,049	7,718,897	8,103,222	8,494,025	8,891,305	9,295,063	9,705,298	10,122,011	10,545,200	10,974,868	11,411,012	11,853,634
32	469	0.000 km	0.065 km	3	4,493,816	4,786,203	5,084,177	5,387,738	5,696,885	6,011,620	6,331,942	6,657,851	6,989,346	7,326,429	7,669,099	8,017,356	8,371,200	8,730,630	9,095,648	9,466,253	9,842,445	10,224,224
33	469	0.065 km	1.119 km	1	5,209,985	5,548,969	5,894,430	6,246,369	6,604,785	6,969,678	7,341,049	7,718,897	8,103,222	8,494,025	8,891,305	9,295,063	9,705,298	10,122,011	10,545,200	10,974,868	11,411,012	11,853,634
34	469	0.065 km	1.119 km	3	4,493,816	4,786,203	5,084,177	5,387,738	5,696,885	6,011,620	6,331,942	6,657,851	6,989,346	7,326,429	7,669,099	8,017,356	8,371,200	8,730,630	9,095,648	9,466,253	9,842,445	10,224,224
35	469	1.119 km	6.724 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
36	469	1.119 km	6.724 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
37	469	6.724 km	9.089 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
38	469	6.724 km	9.089 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
39	469	9.089 km	10.984 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
40	469	9.089 km	10.984 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
41	469	10.984 km	15.170 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
42	469	10.984 km	15.170 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
43	469	15.170 km	17.175 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
44	469	15.170 km	17.175 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
45	469	17.175 km	20.465 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
46	469	17.175 km	20.465 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
47	469	20.465 km	21.340 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
48	469	20.465 km	21.340 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
49	469	21.340 km	27.180 km	1	488,646	520,440	552,840	585,849	619,465	653,688	688,519	723,958	760,004	796,657	833,918	871,787	910,263	949,346	989,038	1,029,336	1,070,242	1,111,756
50	469	21.340 km	27.180 km	3	619,208	659,496	700,554	742,382	784,980	828,348	872,485	917,392	963,070	1,009,517	1,056,733	1,104,720	1,153,477	1,203,003	1,253,299	1,304,365	1,356,201	1,408,807
51	469	27.180 km	40.680 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
52	469	27.180 km	40.680 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
53	469	40.680 km	48.390 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
54	469	40.680 km	48.390 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
55	469	48.390 km	49.590 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
56	469	48.390 km	49.590 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
57	469	49.590 km	59.160 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
58	469	49.590 km	59.160 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
59	469	59.160 km	77.170 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
60	469	59.160 km	77.170 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
61	469	77.170 km	89.030 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
62	469	77.170 km	89.030 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
63	469	89.030 km	89.570 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
64	469	89.030 km	89.570 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707

Calculation Sheet

Cumulative Basline ESAs

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	35,112,778	36,413,023	37,731,755	39,068,973	40,424,679	41,798,872
2	196	0.000 km	0.530 km	3	50,013,435	51,865,460	53,743,816	55,648,505	57,579,526	59,536,878
3	196	0.530 km	0.875 km	1	29,050,955	30,126,728	31,217,796	32,324,159	33,445,817	34,582,771
4	196	0.530 km	0.875 km	3	33,149,600	34,377,147	35,622,148	36,884,602	38,164,509	39,461,870
5	196	0.875 km	0.950 km	1	29,050,955	30,126,728	31,217,796	32,324,159	33,445,817	34,582,771
6	196	0.875 km	0.950 km	3	33,149,600	34,377,147	35,622,148	36,884,602	38,164,509	39,461,870
7	196	0.950 km	1.329 km	1	29,050,955	30,126,728	31,217,796	32,324,159	33,445,817	34,582,771
8	196	0.950 km	1.329 km	3	33,149,600	34,377,147	35,622,148	36,884,602	38,164,509	39,461,870
9	196	1.329 km	1.580 km	1	29,050,955	30,126,728	31,217,796	32,324,159	33,445,817	34,582,771
10	196	1.329 km	1.580 km	3	33,149,600	34,377,147	35,622,148	36,884,602	38,164,509	39,461,870
11	196	1.580 km	3.226 km	1	9,548,390	9,901,972	10,260,582	10,624,218	10,992,882	11,366,573
12	196	1.580 km	3.226 km	3	9,682,140	10,040,675	10,404,308	10,773,038	11,146,866	11,525,791
13	196	3.226 km	4.030 km	1	9,568,793	9,923,131	10,282,506	10,646,920	11,016,371	11,390,860
14	196	3.226 km	4.030 km	3	7,496,801	7,774,412	8,055,970	8,341,474	8,630,926	8,924,325
15	196	4.031 km	12.670 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
16	196	4.031 km	12.670 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
17	196	12.670 km	13.860 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
18	196	12.670 km	13.860 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
19	196	13.860 km	20.710 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
20	196	13.860 km	20.710 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
21	196	20.710 km	24.890 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
22	196	20.710 km	24.890 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
23	196	24.890 km	28.770 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
24	196	24.890 km	28.770 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
25	196	28.770 km	30.357 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
26	196	28.770 km	30.357 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
27	196	30.357 km	33.944 km	1	10,650,128	11,044,508	11,444,495	11,850,090	12,261,291	12,678,101
28	196	30.357 km	33.944 km	3	10,092,458	10,466,187	10,845,230	11,229,587	11,619,257	12,014,241
29	196	33.944 km	35.560 km	1	8,714,153	9,036,843	9,364,121	9,695,986	10,032,440	10,373,482
30	196	33.944 km	35.560 km	3	8,922,712	9,253,125	9,588,236	9,928,044	10,272,551	10,621,755
31	469	0.000 km	0.065 km	1	12,302,734	12,758,311	13,220,365	13,688,897	14,163,906	14,645,392
32	469	0.000 km	0.065 km	3	10,611,590	11,004,543	11,403,082	11,807,209	12,216,923	12,632,224
33	469	0.065 km	1.119 km	1	12,302,734	12,758,311	13,220,365	13,688,897	14,163,906	14,645,392
34	469	0.065 km	1.119 km	3	10,611,590	11,004,543	11,403,082	11,807,209	12,216,923	12,632,224
35	469	1.119 km	6.724 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
36	469	1.119 km	6.724 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
37	469	6.724 km	9.089 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
38	469	6.724 km	9.089 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
39	469	9.089 km	10.984 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
40	469	9.089 km	10.984 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
41	469	10.984 km	15.170 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
42	469	10.984 km	15.170 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
43	469	15.170 km	17.175 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
44	469	15.170 km	17.175 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
45	469	17.175 km	20.465 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
46	469	17.175 km	20.465 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
47	469	20.465 km	21.340 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
48	469	20.465 km	21.340 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
49	469	21.340 km	27.180 km	1	1,153,877	1,196,606	1,239,942	1,283,886	1,328,437	1,373,596
50	469	21.340 km	27.180 km	3	1,462,182	1,516,328	1,571,243	1,626,928	1,683,383	1,740,608
51	469	27.180 km	40.680 km	1	294,703	305,616	316,685	327,908	339,286	350,820
52	469	27.180 km	40.680 km	3	500,996	519,548	538,364	557,444	576,787	596,394
53	469	40.680 km	48.390 km	1	294,703	305,616	316,685	327,908	339,286	350,820
54	469	40.680 km	48.390 km	3	500,996	519,548	538,364	557,444	576,787	596,394
55	469	48.390 km	49.590 km	1	294,703	305,616	316,685	327,908	339,286	350,820
56	469	48.390 km	49.590 km	3	500,996	519,548	538,364	557,444	576,787	596,394
57	469	49.590 km	59.160 km	1	294,703	305,616	316,685	327,908	339,286	350,820
58	469	49.590 km	59.160 km	3	500,996	519,548	538,364	557,444	576,787	596,394
59	469	59.160 km	77.170 km	1	294,703	305,616	316,685	327,908	339,286	350,820
60	469	59.160 km	77.170 km	3	500,996	519,548	538,364	557,444	576,787	596,394
61	469	77.170 km	89.030 km	1	294,703	305,616	316,685	327,908	339,286	350,820
62	469	77.170 km	89.030 km	3	500,996	519,548	538,364	557,444	576,787	596,394
63	469	89.030 km	89.570 km	1	294,703	305,616	316,685	327,908	339,286	350,820
64	469	89.030 km	89.570 km	3	500,996	519,548	538,364	557,444	576,787	596,394

Calculation Sheet

Annual (Baseline + Project)

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	616,233	634,739	653,274	672,024	690,276	708,795	727,294	745,813	764,223	782,739	801,235	819,662	838,146	856,706	875,129	893,603	912,109	930,552
2	196	0.000 km	0.530 km	3	877,755	904,195	930,797	958,622	983,623	1,010,135	1,036,539	1,063,051	1,088,951	1,115,445	1,141,831	1,167,822	1,194,136	1,220,882	1,246,854	1,273,114	1,299,554	1,325,634
3	196	0.530 km	0.875 km	1	509,848	525,162	540,505	556,064	571,125	586,452	601,760	617,087	632,306	647,630	662,935	678,170	693,462	708,830	724,062	739,345	754,659	769,910
4	196	0.530 km	0.875 km	3	581,794	599,355	617,078	636,025	652,147	669,780	687,305	704,939	721,960	739,575	757,083	774,194	791,629	809,496	826,590	843,971	861,532	878,734
5	196	0.875 km	0.950 km	1	509,881	525,302	541,281	557,188	571,926	586,897	602,265	617,560	632,819	648,079	663,140	678,381	693,839	709,206	724,267	739,419	754,714	769,920
6	196	0.875 km	0.950 km	3	581,782	599,258	616,832	634,393	651,748	669,144	686,610	704,063	721,510	738,957	756,369	773,813	791,295	808,761	826,173	843,601	861,054	878,491
7	196	0.950 km	1.329 km	1	509,881	525,302	541,281	557,188	571,926	586,897	602,265	617,560	632,819	648,079	663,140	678,381	693,839	709,206	724,267	739,419	754,714	769,920
8	196	0.950 km	1.329 km	3	581,782	599,258	616,832	634,393	651,748	669,144	686,610	704,063	721,510	738,957	756,369	773,813	791,295	808,761	826,173	843,601	861,054	878,491
9	196	1.329 km	1.580 km	1	509,881	525,302	541,281	557,188	571,926	586,897	602,265	617,560	632,819	648,079	663,140	678,381	693,839	709,206	724,267	739,419	754,714	769,920
10	196	1.329 km	1.580 km	3	581,782	599,258	616,832	634,393	651,748	669,144	686,610	704,063	721,510	738,957	756,369	773,813	791,295	808,761	826,173	843,601	861,054	878,491
11	196	1.580 km	3.226 km	1	167,610	172,764	178,475	184,114	188,583	193,286	198,386	203,413	208,404	213,395	218,189	223,162	228,351	233,450	238,244	243,127	248,154	253,091
12	196	1.580 km	3.226 km	3	169,928	175,048	180,266	185,472	190,471	195,512	200,622	205,720	210,811	215,902	220,959	226,047	231,173	236,283	241,340	246,412	251,510	256,591
13	196	3.226 km	4.030 km	1	167,968	173,132	178,854	184,504	188,984	193,698	198,808	203,846	208,848	213,850	218,654	223,638	228,838	233,948	238,752	243,646	248,684	253,632
14	196	3.226 km	4.030 km	3	131,575	135,545	139,612	143,667	147,516	151,406	155,366	159,313	163,254	167,194	171,100	175,038	179,013	182,973	186,879	190,800	194,748	198,679
15	196	4.031 km	12.670 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
16	196	4.031 km	12.670 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
17	196	12.670 km	13.860 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
18	196	12.670 km	13.860 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
19	196	13.860 km	20.710 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
20	196	13.860 km	20.710 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
21	196	20.710 km	24.890 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
22	196	20.710 km	24.890 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
23	196	24.890 km	28.770 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
24	196	24.890 km	28.770 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
25	196	28.770 km	30.357 km	1	183,210	188,706	194,203	199,699	205,195	210,691	216,188	221,684	227,180	232,677	238,173	243,669	249,165	254,662	260,158	265,654	271,151	276,647
26	196	28.770 km	30.357 km	3	177,083	182,396	187,708	193,021	198,333	203,645	208,958	214,270	219,583	224,895	230,208	235,520	240,833	246,145	251,458	256,770	262,083	267,395
27	196	30.357 km	33.944 km	1	186,910	192,517	198,125	203,732	209,339	214,946	220,554	226,161	231,768	237,376	242,983	248,590	254,198	259,805	265,412	271,019	276,627	282,234
28	196	30.357 km	33.944 km	3	177,123	182,437	187,750	193,064	198,378	203,691	209,005	214,319	219,632	224,946	230,260	235,573	240,887	246,201	251,514	256,828	262,142	267,455
29	196	33.944 km	35.560 km	1	152,934	157,522	162,110	166,698	171,286	175,874	180,462	185,050	189,638	194,226	198,814	203,402	207,990	212,578	217,166	221,754	226,342	230,930
30	196	33.944 km	35.560 km	3	156,594	161,292	165,989	170,687	175,385	180,083	184,781	189,478	194,176	198,874	203,572	208,270	212,968	217,665	222,363	227,061	231,759	236,457
31	469	0.000 km	0.065 km	1	215,913	222,391	228,868	235,345	241,823	248,300	254,778	261,255	267,732	274,365	281,133	290,941	296,663	305,059	310,503	314,581	322,168	328,303
32	469	0.000 km	0.065 km	3	186,234	191,821	197,408	202,995	208,582	214,169	219,756	225,343	230,930	237,728	245,573	277,082	276,747	297,290	294,821	281,782	296,010	298,930
33	469	0.065 km	1.119 km	1	215,913	222,391	228,868	235,345	241,823	248,300	254,778	261,255	267,732	274,210	280,687	287,165	293,642	300,119	306,597	313,074	319,552	326,029
34	469	0.065 km	1.119 km	3	186,234	191,821	197,408	202,995	208,582	214,169	219,756	225,343	230,930	236,517	242,104	247,691	253,278	258,865	264,452	270,039	275,626	281,213
35	469	1.119 km	6.724 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
36	469	1.119 km	6.724 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
37	469	6.724 km	9.089 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
38	469	6.724 km	9.089 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
39	469	9.089 km	10.984 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
40	469	9.089 km	10.984 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
41	469	10.984 km	15.170 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
42	469	10.984 km	15.170 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
43	469	15.170 km	17.175 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
44	469	15.170 km	17.175 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
45	469	17.175 km	20.465 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
46	469	17.175 km	20.465 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
47	469	20.465 km	21.340 km	1	143,067	147,359	151,651	155,943	160,235	164,527	168,819	173,111	177,403	181,695	185,987	190,279	194,571	198,863	203,155	207,447	211,739	216,031
48	469	20.465 km	21.340 km	3	146,886	151,293	155,699	160,106	164,513	168,919	173,326	177,732	182,139	186,545	190,952	195,359	199,765	204,172	208,578	212,985	217,392	221,798
49	469	21.340 km	27.180 km	1	20,251	20,858	21,466	22,073	22,681	23,288	23,896	24,503	25,111	25,718	26,326	26,933	27,541	28,148	28,756	29,363	29,971	30,578
50	469	21.340 km	27.180 km	3	25,661	26,431	27,201	27,971	28,741	29,511	30,280	31,050	31,820	32,590	33,360	34,130	34,899	35,669	36,439	37,209	37,979	38,749
51	469	27.180 km	40.680 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
52	469	27.180 km	40.680 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
53	469	40.680 km	48.390 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
54	469	40.680 km	48.390 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
55	469	48.390 km	49.590 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
56	469	48.390 km	49.590 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
57	469	49.590 km	59.160 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
58	469	49.590 km	59.160 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
59	469	59.160 km	77.170 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
60	469	59.160 km	77.170 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
61	469	77.170 km	89.030 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
62	469	77.170 km	89.030 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277
63	469	89.030 km	89.570 km	1	5,172	5,327	5,482	5,638	5,793	5,948	6,103	6,258	6,413	6,569	6,724	6,879	7,034	7,189	7,344	7,499	7,655	7,810
64	469	89.030 km	89.570 km	3	8,792	9,056	9,320	9,584	9,848	10,111	10,375	10,639	10,903	11,166	11,430	11,694	11,958	12,222	12,485	12,749	13,013	13,277

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	1	949,029	967,503	985,971	1,004,464	1,022,951	1,041,432	1,059,922	1,078,405	1,096,889	1,115,376	1,133,863	1,152,350	1,170,837	1,189,324	1,207,811	1,226,297	1,244,784	1,263,271
2	196	0.000 km	0.530 km	3	1,351,912	1,378,173	1,404,397	1,430,765	1,457,097	1,483,393	1,509,743	1,536,057	1,562,371	1,588,703	1,615,035	1,641,368	1,667,700	1,694,032	1,720,364	1,746,696	1,773,028	1,799,360
3	196	0.530 km	0.875 km	1	785,196	800,479	815,755	831,057	846,352	861,641	876,939	892,232	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
4	196	0.530 km	0.875 km	3	896,133	913,514	930,860	948,349	965,802	983,220	1,000,691	1,018,126	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
5	196	0.875 km	0.950 km	1	785,233	800,474	815,788	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
6	196	0.875 km	0.950 km	3	895,948	913,392	930,848	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
7	196	0.950 km	1.329 km	1	785,233	800,474	815,788	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
8	196	0.950 km	1.329 km	3	895,948	913,392	930,848	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
9	196	1.329 km	1.580 km	1	785,233	800,474	815,788	831,047	846,342	861,638	876,933	892,228	907,524	922,819	938,114	953,410	968,705	984,000	999,296	1,014,591	1,029,886	1,045,182
10	196	1.329 km	1.580 km	3	895,948	913,392	930,848	948,295	965,748	983,202	1,000,655	1,018,108	1,035,561	1,053,015	1,070,468	1,087,921	1,105,375	1,122,828	1,140,281	1,157,734	1,175,188	1,192,641
11	196	1.580 km	3.226 km	1	258,137	263,110	268,155	273,146	278,174	283,201	288,228	293,255	298,282	303,310	308,337	313,364	318,391	323,419	328,446	333,473	338,500	343,528
12	196	1.580 km	3.226 km	3	261,692	266,780	271,881	276,972	282,070	287,168	292,265	297,363	302,461	307,558	312,656	317,754	322,851	327,949	333,047	338,144	343,242	348,340
13	196	3.226 km	4.030 km	1	258,688	263,672	268,728	273,730	278,768	283,806	288,844	293,882	298,920	303,958	308,996	314,034	319,072	324,110	329,148	334,186	339,224	344,262
14	196	3.226 km	4.030 km	3	202,629	206,566	210,517	214,457	218,405	222,352	226,299	230,246	234,193	238,140	242,087	246,034	249,981	253,928	257,875	261,822	265,769	269,716
15	196	4.031 km	12.670 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
16	196	4.031 km	12.670 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
17	196	12.670 km	13.860 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
18	196	12.670 km	13.860 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
19	196	13.860 km	20.710 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
20	196	13.860 km	20.710 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
21	196	20.710 km	24.890 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
22	196	20.710 km	24.890 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
23	196	24.890 km	28.770 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
24	196	24.890 km	28.770 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
25	196	28.770 km	30.357 km	1	282,143	287,640	293,136	298,632	304,128	309,625	315,121	320,617	326,114	331,610	337,106	342,603	348,099	353,595	359,091	364,588	370,084	375,580
26	196	28.770 km	30.357 km	3	272,708	278,020	283,333	288,645	293,958	299,270	304,583	309,895	315,208	320,520	325,833	331,145	336,458	341,770	347,083	352,395	357,708	363,020
27	196	30.357 km	33.944 km	1	287,841	293,449	299,056	304,663	310,270	315,878	321,485	327,092	332,700	338,307	343,914	349,522	355,129	360,736	366,343	371,951	377,558	383,165
28	196	30.357 km	33.944 km	3	272,769	278,083	283,397	288,710	294,024	299,338	304,651	309,965	315,279	320,592	325,906	331,220	336,533	341,847	347,161	352,474	357,788	363,102
29	196	33.944 km	35.560 km	1	235,518	240,106	244,694	249,282	253,870	258,458	263,046	267,634	272,222	276,810	281,398	285,986	290,574	295,162	299,750	304,338	308,926	313,514
30	196	33.944 km	35.560 km	3	241,154	245,852	250,550	255,248	259,946	264,643	269,341	274,039	278,737	283,435	288,133	292,830	297,528	302,226	306,924	311,622	316,319	321,017
31	469	0.000 km	0.065 km	1	334,335	340,097	345,582	352,461	358,907	365,018	371,703	378,042	384,325	390,803	397,280	403,758	410,235	416,712	423,190	429,667	436,145	442,622
32	469	0.000 km	0.065 km	3	301,047	301,055	298,913	307,630	312,972	315,701	322,907	327,419	331,496	337,083	342,670	348,257	353,844	359,431	365,018	370,605	376,192	381,779
33	469	0.065 km	1.119 km	1	332,506	338,984	345,461	351,939	358,416	364,893	371,371	377,848	384,325	390,803	397,280	403,758	410,235	416,712	423,190	429,667	436,145	442,622
34	469	0.065 km	1.119 km	3	286,800	292,387	297,974	303,561	309,148	314,735	320,322	325,909	331,496	337,083	342,670	348,257	353,844	359,431	365,018	370,605	376,192	381,779
35	469	1.119 km	6.724 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
36	469	1.119 km	6.724 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
37	469	6.724 km	9.089 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
38	469	6.724 km	9.089 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
39	469	9.089 km	10.984 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
40	469	9.089 km	10.984 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
41	469	10.984 km	15.170 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
42	469	10.984 km	15.170 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
43	469	15.170 km	17.175 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
44	469	15.170 km	17.175 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
45	469	17.175 km	20.465 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
46	469	17.175 km	20.465 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
47	469	20.465 km	21.340 km	1	220,323	224,615	228,907	233,199	237,491	241,783	246,075	250,367	254,659	258,951	263,243	267,535	271,827	276,119	280,411	284,703	288,995	293,287
48	469	20.465 km	21.340 km	3	226,205	230,611	235,018	239,425	243,831	248,238	252,644	257,051	261,457	265,864	270,271	274,677	279,084	283,490	287,897	292,304	296,710	301,117
49	469	21.340 km	27.180 km	1	31,186	31,793	32,401	33,008	33,616	34,223	34,831	35,438	36,046	36,654	37,261	37,869	38,476	39,084	39,691	40,299	40,906	41,514
50	469	21.340 km	27.180 km	3	39,518	40,288	41,058	41,828	42,598	43,368	44,137	44,907	45,677	46,447	47,217	47,987	48,757	49,526	50,296	51,066	51,836	52,606
51	469	27.180 km	40.680 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
52	469	27.180 km	40.680 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
53	469	40.680 km	48.390 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
54	469	40.680 km	48.390 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
55	469	48.390 km	49.590 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
56	469	48.390 km	49.590 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
57	469	49.590 km	59.160 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
58	469	49.590 km	59.160 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
59	469	59.160 km	77.170 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
60	469	59.160 km	77.170 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
61	469	77.170 km	89.030 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
62	469	77.170 km	89.030 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025
63	469	89.030 km	89.570 km	1	7,965	8,120	8,275	8,430	8,586	8,741	8,896	9,051	9,206	9,361	9,517	9,672	9,827	9,982	10,137	10,292	10,448	10,603
64	469	89.030 km	89.570 km	3	13,540	13,804	14,068	14,332	14,596	14,859	15,123	15,387	15,651	15,914	16,178	16,442	16,706	16,969	17,233	17,497	17,761	18,025

Calculation Sheet

Annual (Baseline + Project)

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	1,281,758	1,300,245	1,318,732	1,337,219	1,355,706	1,374,193
2	196	0.000 km	0.530 km	3	1,825,692	1,852,024	1,878,356	1,904,689	1,931,021	1,957,353
3	196	0.530 km	0.875 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
4	196	0.530 km	0.875 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
5	196	0.875 km	0.950 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
6	196	0.875 km	0.950 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
7	196	0.950 km	1.329 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
8	196	0.950 km	1.329 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
9	196	1.329 km	1.580 km	1	1,060,477	1,075,772	1,091,068	1,106,363	1,121,659	1,136,954
10	196	1.329 km	1.580 km	3	1,210,094	1,227,547	1,245,001	1,262,454	1,279,907	1,297,361
11	196	1.580 km	3.226 km	1	348,555	353,582	358,609	363,636	368,664	373,691
12	196	1.580 km	3.226 km	3	353,437	358,535	363,633	368,730	373,828	378,925
13	196	3.226 km	4.030 km	1	349,300	354,338	359,376	364,413	369,451	374,489
14	196	3.226 km	4.030 km	3	273,664	277,611	281,558	285,505	289,452	293,399
15	196	4.031 km	12.670 km	1	381,077	386,573	392,069	397,566	403,062	408,558
16	196	4.031 km	12.670 km	3	368,333	373,645	378,958	384,270	389,583	394,895
17	196	12.670 km	13.860 km	1	381,077	386,573	392,069	397,566	403,062	408,558
18	196	12.670 km	13.860 km	3	368,333	373,645	378,958	384,270	389,583	394,895
19	196	13.860 km	20.710 km	1	381,077	386,573	392,069	397,566	403,062	408,558
20	196	13.860 km	20.710 km	3	368,333	373,645	378,958	384,270	389,583	394,895
21	196	20.710 km	24.890 km	1	381,077	386,573	392,069	397,566	403,062	408,558
22	196	20.710 km	24.890 km	3	368,333	373,645	378,958	384,270	389,583	394,895
23	196	24.890 km	28.770 km	1	381,077	386,573	392,069	397,566	403,062	408,558
24	196	24.890 km	28.770 km	3	368,333	373,645	378,958	384,270	389,583	394,895
25	196	28.770 km	30.357 km	1	381,077	386,573	392,069	397,566	403,062	408,558
26	196	28.770 km	30.357 km	3	368,333	373,645	378,958	384,270	389,583	394,895
27	196	30.357 km	33.944 km	1	388,773	394,380	399,987	405,595	411,202	416,809
28	196	30.357 km	33.944 km	3	368,415	373,729	379,043	384,357	389,670	394,984
29	196	33.944 km	35.560 km	1	318,102	322,690	327,278	331,866	336,454	341,042
30	196	33.944 km	35.560 km	3	325,715	330,413	335,111	339,808	344,506	349,204
31	469	0.000 km	0.065 km	1	449,099	455,577	462,054	468,532	475,009	481,486
32	469	0.000 km	0.065 km	3	387,366	392,953	398,540	404,127	409,714	415,301
33	469	0.065 km	1.119 km	1	449,099	455,577	462,054	468,532	475,009	481,486
34	469	0.065 km	1.119 km	3	387,366	392,953	398,540	404,127	409,714	415,301
35	469	1.119 km	6.724 km	1	297,579	301,871	306,163	310,455	314,747	319,039
36	469	1.119 km	6.724 km	3	305,523	309,930	314,337	318,743	323,150	327,556
37	469	6.724 km	9.089 km	1	297,579	301,871	306,163	310,455	314,747	319,039
38	469	6.724 km	9.089 km	3	305,523	309,930	314,337	318,743	323,150	327,556
39	469	9.089 km	10.984 km	1	297,579	301,871	306,163	310,455	314,747	319,039
40	469	9.089 km	10.984 km	3	305,523	309,930	314,337	318,743	323,150	327,556
41	469	10.984 km	15.170 km	1	297,579	301,871	306,163	310,455	314,747	319,039
42	469	10.984 km	15.170 km	3	305,523	309,930	314,337	318,743	323,150	327,556
43	469	15.170 km	17.175 km	1	297,579	301,871	306,163	310,455	314,747	319,039
44	469	15.170 km	17.175 km	3	305,523	309,930	314,337	318,743	323,150	327,556
45	469	17.175 km	20.465 km	1	297,579	301,871	306,163	310,455	314,747	319,039
46	469	17.175 km	20.465 km	3	305,523	309,930	314,337	318,743	323,150	327,556
47	469	20.465 km	21.340 km	1	297,579	301,871	306,163	310,455	314,747	319,039
48	469	20.465 km	21.340 km	3	305,523	309,930	314,337	318,743	323,150	327,556
49	469	21.340 km	27.180 km	1	42,121	42,729	43,336	43,944	44,551	45,159
50	469	21.340 km	27.180 km	3	53,376	54,145	54,915	55,685	56,455	57,225
51	469	27.180 km	40.680 km	1	10,758	10,913	11,068	11,223	11,379	11,534
52	469	27.180 km	40.680 km	3	18,288	18,552	18,816	19,080	19,343	19,607
53	469	40.680 km	48.390 km	1	10,758	10,913	11,068	11,223	11,379	11,534
54	469	40.680 km	48.390 km	3	18,288	18,552	18,816	19,080	19,343	19,607
55	469	48.390 km	49.590 km	1	10,758	10,913	11,068	11,223	11,379	11,534
56	469	48.390 km	49.590 km	3	18,288	18,552	18,816	19,080	19,343	19,607
57	469	49.590 km	59.160 km	1	10,758	10,913	11,068	11,223	11,379	11,534
58	469	49.590 km	59.160 km	3	18,288	18,552	18,816	19,080	19,343	19,607
59	469	59.160 km	77.170 km	1	10,758	10,913	11,068	11,223	11,379	11,534
60	469	59.160 km	77.170 km	3	18,288	18,552	18,816	19,080	19,343	19,607
61	469	77.170 km	89.030 km	1	10,758	10,913	11,068	11,223	11,379	11,534
62	469	77.170 km	89.030 km	3	18,288	18,552	18,816	19,080	19,343	19,607
63	469	89.030 km	89.570 km	1	10,758	10,913	11,068	11,223	11,379	11,534
64	469	89.030 km	89.570 km	3	18,288	18,552	18,816	19,080	19,343	19,607

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	616,233	1,250,972	1,904,246	2,576,270	3,266,545	3,975,340	4,702,634	5,448,447	6,212,670	6,995,409	7,796,645	8,616,307	9,454,452	10,311,158	11,186,287	12,079,890	12,991,999	13,922,551
2	196	0.000 km	0.530 km	3	877,755	1,781,949	2,712,746	3,671,369	4,654,991	5,665,126	6,701,665	7,764,716	8,853,668	9,969,113	11,110,945	12,278,766	13,472,902	14,693,784	15,940,638	17,213,752	18,513,306	19,838,940
3	196	0.530 km	0.875 km	1	509,848	1,035,010	1,575,516	2,131,580	2,702,704	3,289,156	3,890,916	4,508,003	5,140,309	5,787,939	6,450,873	7,129,043	7,822,505	8,531,335	9,255,397	9,994,742	10,749,401	11,519,311
4	196	0.530 km	0.875 km	3	581,794	1,181,149	1,798,228	2,434,253	3,086,400	3,756,180	4,443,486	5,148,425	5,870,385	6,609,960	7,367,043	8,141,237	8,932,866	9,742,363	10,568,952	11,412,924	12,274,456	13,153,190
5	196	0.875 km	0.950 km	1	509,881	1,035,183	1,576,464	2,133,652	2,705,578	3,292,476	3,894,740	4,512,300	5,145,120	5,793,198	6,456,338	7,134,720	7,828,559	8,537,765	9,262,032	10,001,451	10,756,165	11,526,085
6	196	0.875 km	0.950 km	3	581,782	1,181,040	1,797,872	2,432,265	3,084,013	3,753,157	4,439,767	5,143,831	5,865,341	6,604,298	7,360,667	8,134,480	8,925,775	9,734,536	10,560,709	11,404,310	12,265,363	13,143,855
7	196	0.950 km	1.329 km	1	509,881	1,035,183	1,576,464	2,133,652	2,705,578	3,292,476	3,894,740	4,512,300	5,145,120	5,793,198	6,456,338	7,134,720	7,828,559	8,537,765	9,262,032	10,001,451	10,756,165	11,526,085
8	196	0.950 km	1.329 km	3	581,782	1,181,040	1,797,872	2,432,265	3,084,013	3,753,157	4,439,767	5,143,831	5,865,341	6,604,298	7,360,667	8,134,480	8,925,775	9,734,536	10,560,709	11,404,310	12,265,363	13,143,855
9	196	1.329 km	1.580 km	1	509,881	1,035,183	1,576,464	2,133,652	2,705,578	3,292,476	3,894,740	4,512,300	5,145,120	5,793,198	6,456,338	7,134,720	7,828,559	8,537,765	9,262,032	10,001,451	10,756,165	11,526,085
10	196	1.329 km	1.580 km	3	581,782	1,181,040	1,797,872	2,432,265	3,084,013	3,753,157	4,439,767	5,143,831	5,865,341	6,604,298	7,360,667	8,134,480	8,925,775	9,734,536	10,560,709	11,404,310	12,265,363	13,143,855
11	196	1.580 km	3.226 km	1	167,610	340,374	518,849	702,962	891,545	1,084,832	1,283,217	1,486,630	1,695,034	1,908,430	2,126,618	2,349,780	2,578,131	2,811,582	3,049,825	3,292,952	3,541,106	3,794,197
12	196	1.580 km	3.226 km	3	169,928	344,976	525,242	710,714	901,185	1,096,697	1,297,319	1,503,039	1,713,849	1,929,752	2,150,710	2,376,757	2,607,930	2,844,213	3,085,553	3,331,965	3,583,474	3,840,066
13	196	3.226 km	4.030 km	1	167,968	341,101	519,955	704,459	893,443	1,087,141	1,285,949	1,489,796	1,698,644	1,912,494	2,131,148	2,354,786	2,583,624	2,817,572	3,056,324	3,299,970	3,548,654	3,802,286
14	196	3.226 km	4.030 km	3	131,575	267,120	406,732	550,400	697,916	849,322	1,004,688	1,164,000	1,327,254	1,494,448	1,665,548	1,840,586	2,019,599	2,202,572	2,389,451	2,580,251	2,774,999	2,973,677
15	196	4.031 km	12.670 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
16	196	4.031 km	12.670 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
17	196	12.670 km	13.860 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
18	196	12.670 km	13.860 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
19	196	13.860 km	20.710 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
20	196	13.860 km	20.710 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
21	196	20.710 km	24.890 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
22	196	20.710 km	24.890 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
23	196	24.890 km	28.770 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
24	196	24.890 km	28.770 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
25	196	28.770 km	30.357 km	1	183,210	371,916	566,119	765,817	971,013	1,181,704	1,397,892	1,619,576	1,846,756	2,079,433	2,317,606	2,561,275	2,810,440	3,065,102	3,325,260	3,590,915	3,862,065	4,138,712
26	196	28.770 km	30.357 km	3	177,083	359,479	547,187	740,207	938,540	1,142,186	1,351,144	1,565,414	1,784,997	2,009,892	2,240,100	2,475,621	2,716,454	2,962,599	3,214,057	3,470,827	3,732,910	4,000,306
27	196	30.357 km	33.944 km	1	186,910	379,427	577,552	781,284	990,623	1,205,569	1,426,123	1,652,284	1,884,052	2,121,428	2,364,411	2,613,001	2,867,198	3,127,003	3,392,415	3,663,435	3,940,061	4,222,295
28	196	30.357 km	33.944 km	3	177,123	359,559	547,310	740,373	938,751	1,142,442	1,351,447	1,565,766	1,785,398	2,010,344	2,240,604	2,476,177	2,717,064	2,963,265	3,214,779	3,471,607	3,733,749	4,001,205
29	196	33.944 km	35.560 km	1	152,934	310,455	472,565	639,262	810,548	986,421	1,166,883	1,351,932	1,541,570	1,735,796	1,934,609	2,138,011	2,346,001	2,558,578	2,775,744	2,997,497	3,223,839	3,454,769
30	196	33.944 km	35.560 km	3	156,594	317,885	483,875	654,562	829,947	1,010,030	1,194,810	1,384,289	1,578,465	1,777,339	1,980,911	2,189,181	2,402,148	2,619,814	2,842,177	3,069,238	3,300,996	3,537,453
31	469	0.000 km	0.065 km	1	215,913	438,304	667,172	902,517	1,144,340	1,392,640	1,647,418	1,908,673	2,176,405	2,450,770	2,731,903	3,022,844	3,319,508	3,624,567	3,935,070	4,249,652	4,571,820	4,900,123
32	469	0.000 km	0.065 km	3	186,234	378,054	575,462	778,456	987,038	1,201,207	1,420,962	1,646,305	1,877,235	2,114,962	2,360,536	2,637,618	2,914,365	3,211,654	3,506,475	3,788,258	4,084,268	4,383,198
33	469	0.065 km	1.119 km	1	215,913	438,304	667,172	902,517	1,144,340	1,392,640	1,647,418	1,908,673	2,176,405	2,450,615	2,731,302	3,018,466	3,312,108	3,612,228	3,918,824	4,231,899	4,551,450	4,877,479
34	469	0.065 km	1.119 km	3	186,234	378,054	575,462	778,456	987,038	1,201,207	1,420,962	1,646,305	1,877,235	2,113,751	2,355,855	2,603,546	2,856,823	3,115,688	3,380,140	3,650,178	3,925,804	4,207,017
35	469	1.119 km	6.724 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
36	469	1.119 km	6.724 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
37	469	6.724 km	9.089 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
38	469	6.724 km	9.089 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
39	469	9.089 km	10.984 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
40	469	9.089 km	10.984 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
41	469	10.984 km	15.170 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
42	469	10.984 km	15.170 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
43	469	15.170 km	17.175 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
44	469	15.170 km	17.175 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
45	469	17.175 km	20.465 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
46	469	17.175 km	20.465 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
47	469	20.465 km	21.340 km	1	143,067	290,426	442,077	598,019	758,254	922,781	1,091,600	1,264,711	1,442,114	1,623,809	1,809,796	2,000,075	2,194,646	2,393,509	2,596,664	2,804,110	3,015,849	3,231,880
48	469	20.465 km	21.340 km	3	146,886	298,179	453,878	613,984	778,497	947,416	1,120,742	1,298,474	1,480,613	1,667,159	1,858,111	2,053,469	2,253,235	2,457,406	2,665,985	2,878,970	3,096,362	3,318,160
49	469	21.340 km	27.180 km	1	20,251	41,109	62,574	84,647	107,328	130,616	154,512	179,015	204,126	229,844	256,170	283,103	310,644	338,792	367,548	396,911	426,882	457,460
50	469	21.340 km	27.180 km	3	25,661	52,092	79,293	107,264	136,005	165,516	195,796	226,846	258,666	291,256	324,616	358,745	393,645	429,314	465,753	502,962	540,941	579,689
51	469	27.180 km	40.680 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
52	469	27.180 km	40.680 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
53	469	40.680 km	48.390 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
54	469	40.680 km	48.390 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
55	469	48.390 km	49.590 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
56	469	48.390 km	49.590 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
57	469	49.590 km	59.160 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
58	469	49.590 km	59.160 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
59	469	59.160 km	77.170 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
60	469	59.160 km	77.170 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
61	469	77.170 km	89.030 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
62	469	77.170 km	89.030 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622
63	469	89.030 km	89.570 km	1	5,172	10,499	15,982	21,619	27,412	33,360	39,463	45,721	52,134	58,703	65,426	72,305	79,339	86,528	93,873	101,372	109,027	116,837
64	469	89.030 km	89.570 km	3	8,792	17,849	27,169	36,753	46,600	56,712	67,087	77,726	88,628	99,795	111,225	122,919	134,877	147,098	159,584	172,333	185,346	198,622

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	1	14,871,580	15,839,083	16,825,054	17,829,518	18,852,469	19,893,901	20,953,822	22,032,228	23,129,117	24,244,493	25,378,356	26,530,706	27,701,543	28,890,866	30,098,677	31,324,974	32,569,758	33,833,030
2	196	0.000 km	0.530 km	3	21,190,852	22,569,025	23,973,422	25,404,186	26,861,283	28,344,676	29,854,419	31,390,476	32,952,848	34,541,551	36,156,587	37,797,954	39,465,654	41,159,686	42,880,049	44,626,745	46,399,774	48,199,134
3	196	0.530 km	0.875 km	1	12,304,507	13,104,986	13,920,741	14,751,797	15,598,149	16,459,790	17,336,729	18,228,961	19,136,484	20,059,304	20,997,418	21,950,828	22,919,533	23,903,533	24,902,829	25,917,420	26,947,306	27,992,488
4	196	0.530 km	0.875 km	3	14,049,323	14,962,837	15,893,697	16,842,046	17,807,848	18,791,068	19,791,758	20,809,884	21,845,446	22,898,461	23,968,928	25,056,850	26,162,224	27,285,052	28,425,333	29,583,067	30,758,255	31,950,896
5	196	0.875 km	0.950 km	1	12,311,318	13,111,792	13,927,580	14,758,627	15,604,969	16,466,607	17,343,540	18,235,768	19,143,292	20,066,111	21,004,225	21,957,635	22,926,340	23,910,340	24,909,636	25,924,227	26,954,114	27,999,295
6	196	0.875 km	0.950 km	3	14,039,803	14,953,194	15,884,042	16,832,337	17,798,086	18,781,287	19,781,942	20,800,050	21,835,611	22,888,626	23,959,094	25,047,015	26,152,390	27,275,217	28,415,499	29,573,233	30,748,421	31,941,061
7	196	0.950 km	1.329 km	1	12,311,318	13,111,792	13,927,580	14,758,627	15,604,969	16,466,607	17,343,540	18,235,768	19,143,292	20,066,111	21,004,225	21,957,635	22,926,340	23,910,340	24,909,636	25,924,227	26,954,114	27,999,295
8	196	0.950 km	1.329 km	3	14,039,803	14,953,194	15,884,042	16,832,337	17,798,086	18,781,287	19,781,942	20,800,050	21,835,611	22,888,626	23,959,094	25,047,015	26,152,390	27,275,217	28,415,499	29,573,233	30,748,421	31,941,061
9	196	1.329 km	1.580 km	1	12,311,318	13,111,792	13,927,580	14,758,627	15,604,969	16,466,607	17,343,540	18,235,768	19,143,292	20,066,111	21,004,225	21,957,635	22,926,340	23,910,340	24,909,636	25,924,227	26,954,114	27,999,295
10	196	1.329 km	1.580 km	3	14,039,803	14,953,194	15,884,042	16,832,337	17,798,086	18,781,287	19,781,942	20,800,050	21,835,611	22,888,626	23,959,094	25,047,015	26,152,390	27,275,217	28,415,499	29,573,233	30,748,421	31,941,061
11	196	1.580 km	3.226 km	1	4,052,334	4,315,444	4,583,599	4,856,745	5,134,919	5,418,120	5,706,348	5,999,603	6,297,885	6,601,195	6,909,532	7,222,896	7,541,287	7,864,706	8,193,152	8,526,625	8,865,125	9,208,653
12	196	1.580 km	3.226 km	3	4,101,758	4,368,538	4,640,419	4,917,392	5,199,462	5,486,630	5,778,895	6,076,258	6,378,719	6,686,277	6,998,933	7,316,687	7,639,538	7,967,487	8,300,534	8,638,678	8,981,920	9,330,259
13	196	3.226 km	4.030 km	1	4,060,974	4,324,646	4,593,374	4,867,104	5,145,872	5,429,678	5,718,522	6,012,404	6,311,323	6,615,281	6,924,277	7,238,311	7,557,383	7,881,492	8,210,640	8,544,826	8,884,049	9,228,311
14	196	3.226 km	4.030 km	3	3,176,306	3,382,873	3,593,390	3,807,847	4,026,252	4,248,603	4,474,902	4,705,148	4,939,340	5,177,480	5,419,567	5,665,601	5,915,582	6,169,510	6,427,386	6,689,208	6,954,977	7,224,694
15	196	4.031 km	12.670 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
16	196	4.031 km	12.670 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
17	196	12.670 km	13.860 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
18	196	12.670 km	13.860 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
19	196	13.860 km	20.710 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
20	196	13.860 km	20.710 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
21	196	20.710 km	24.890 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
22	196	20.710 km	24.890 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
23	196	24.890 km	28.770 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
24	196	24.890 km	28.770 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
25	196	28.770 km	30.357 km	1	4,420,855	4,708,495	5,001,631	5,300,263	5,604,392	5,914,016	6,229,137	6,549,755	6,875,868	7,207,478	7,544,585	7,887,187	8,235,286	8,588,881	8,947,973	9,312,560	9,682,645	10,058,225
26	196	28.770 km	30.357 km	3	4,273,014	4,551,034	4,834,367	5,123,012	5,416,970	5,716,240	6,020,823	6,330,719	6,645,926	6,966,447	7,292,279	7,623,425	7,959,882	8,301,653	8,648,735	9,001,131	9,358,838	9,721,859
27	196	30.357 km	33.944 km	1	4,510,137	4,803,585	5,102,641	5,407,304	5,717,575	6,033,453	6,354,938	6,682,030	7,014,730	7,353,037	7,696,951	8,046,472	8,401,601	8,762,338	9,128,681	9,500,632	9,878,190	10,261,355
28	196	30.357 km	33.944 km	3	4,273,974	4,552,056	4,835,453	5,124,163	5,418,187	5,717,525	6,022,176	6,332,141	6,647,419	6,968,012	7,293,918	7,625,137	7,961,671	8,303,518	8,650,679	9,003,153	9,360,941	9,724,043
29	196	33.944 km	35.560 km	1	3,690,286	3,930,392	4,175,086	4,424,367	4,678,237	4,936,695	5,199,740	5,467,374	5,739,596	6,016,405	6,297,803	6,583,789	6,874,363	7,169,524	7,469,274	7,773,612	8,082,538	8,396,051
30	196	33.944 km	35.560 km	3	3,778,607	4,024,460	4,275,010	4,530,257	4,790,203	5,054,847	5,324,188	5,598,227	5,876,964	6,160,399	6,448,531	6,741,361	7,038,890	7,341,115	7,648,039	7,959,661	8,275,980	8,596,997
31	469	0.000 km	0.065 km	1	5,234,458	5,574,555	5,920,137	6,272,598	6,631,504	6,996,522	7,368,224	7,746,266	8,130,592	8,521,395	8,918,675	9,322,433	9,732,668	10,149,380	10,572,570	11,002,237	11,438,382	11,881,004
32	469	0.000 km	0.065 km	3	4,684,245	4,985,300	5,284,213	5,591,842	5,904,814	6,220,515	6,543,422	6,870,841	7,202,337	7,539,420	7,882,090	8,230,346	8,584,190	8,943,621	9,308,639	9,679,244	10,055,435	10,437,214
33	469	0.065 km	1.119 km	1	5,209,985	5,548,969	5,894,430	6,246,369	6,604,785	6,969,678	7,341,049	7,718,897	8,103,222	8,494,025	8,891,305	9,295,063	9,705,298	10,122,011	10,545,200	10,974,868	11,411,012	11,853,634
34	469	0.065 km	1.119 km	3	4,493,816	4,786,203	5,084,177	5,387,738	5,696,885	6,011,620	6,331,942	6,657,851	6,989,346	7,326,429	7,669,099	8,017,356	8,371,200	8,730,630	9,095,648	9,466,253	9,842,445	10,224,224
35	469	1.119 km	6.724 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
36	469	1.119 km	6.724 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
37	469	6.724 km	9.089 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
38	469	6.724 km	9.089 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
39	469	9.089 km	10.984 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
40	469	9.089 km	10.984 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
41	469	10.984 km	15.170 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
42	469	10.984 km	15.170 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
43	469	15.170 km	17.175 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
44	469	15.170 km	17.175 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
45	469	17.175 km	20.465 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
46	469	17.175 km	20.465 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
47	469	20.465 km	21.340 km	1	3,452,203	3,676,818	3,905,725	4,138,924	4,376,415	4,618,198	4,864,273	5,114,640	5,369,299	5,628,250	5,891,493	6,159,028	6,430,855	6,706,974	6,987,385	7,272,088	7,561,084	7,854,371
48	469	20.465 km	21.340 km	3	3,544,364	3,774,976	4,009,994	4,249,418	4,493,249	4,741,487	4,994,131	5,251,182	5,512,640	5,778,504	6,048,775	6,323,452	6,602,536	6,886,026	7,173,923	7,466,227	7,762,937	8,064,053
49	469	21.340 km	27.180 km	1	488,646	520,440	552,840	585,849	619,465	653,688	688,519	723,958	760,004	796,657	833,918	871,787	910,263	949,346	989,038	1,029,336	1,070,242	1,111,756
50	469	21.340 km	27.180 km	3	619,208	659,496	700,554	742,382	784,980	828,348	872,485	917,392	963,070	1,009,517	1,056,733	1,104,720	1,153,477	1,203,003	1,253,299	1,304,365	1,356,201	1,408,807
51	469	27.180 km	40.680 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
52	469	27.180 km	40.680 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
53	469	40.680 km	48.390 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
54	469	40.680 km	48.390 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
55	469	48.390 km	49.590 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
56	469	48.390 km	49.590 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
57	469	49.590 km	59.160 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
58	469	49.590 km	59.160 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
59	469	59.160 km	77.170 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
60	469	59.160 km	77.170 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
61	469	77.170 km	89.030 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
62	469	77.170 km	89.030 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707
63	469	89.030 km	89.570 km	1	124,802	132,922	141,197	149,627	158,213	166,954	175,850	184,901	194,107	203,468	212,985	222,657	232,484	242,466	252,603	262,895	273,343	283,946
64	469	89.030 km	89.570 km	3	212,163	225,967	240,035	254,367	268,962	283,821	298,944	314,331	329,982	345,896	362,075	378,516	395,222	412,192	429,425	446,922	464,683	482,707

Calculation Sheet

Cumulative (Baseline + Project)

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	35,114,788	36,415,033	37,733,765	39,070,984	40,426,689	41,800,882
2	196	0.000 km	0.530 km	3	50,024,826	51,876,850	53,755,207	55,659,895	57,590,916	59,548,269
3	196	0.530 km	0.875 km	1	29,052,965	30,128,738	31,219,806	32,326,169	33,447,827	34,584,781
4	196	0.530 km	0.875 km	3	33,160,990	34,388,538	35,633,538	36,895,992	38,175,900	39,473,260
5	196	0.875 km	0.950 km	1	29,059,773	30,135,545	31,226,613	32,332,976	33,454,635	34,591,588
6	196	0.875 km	0.950 km	3	33,151,156	34,378,703	35,623,704	36,886,158	38,166,065	39,463,426
7	196	0.950 km	1.329 km	1	29,059,773	30,135,545	31,226,613	32,332,976	33,454,635	34,591,588
8	196	0.950 km	1.329 km	3	33,151,156	34,378,703	35,623,704	36,886,158	38,166,065	39,463,426
9	196	1.329 km	1.580 km	1	29,059,773	30,135,545	31,226,613	32,332,976	33,454,635	34,591,588
10	196	1.329 km	1.580 km	3	33,151,156	34,378,703	35,623,704	36,886,158	38,166,065	39,463,426
11	196	1.580 km	3.226 km	1	9,557,208	9,910,790	10,269,399	10,633,036	11,001,699	11,375,390
12	196	1.580 km	3.226 km	3	9,683,696	10,042,231	10,405,864	10,774,594	11,148,422	11,527,347
13	196	3.226 km	4.030 km	1	9,577,610	9,931,948	10,291,323	10,655,737	11,025,188	11,399,678
14	196	3.226 km	4.030 km	3	7,498,357	7,775,968	8,057,526	8,343,030	8,632,482	8,925,881
15	196	4.031 km	12.670 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
16	196	4.031 km	12.670 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
17	196	12.670 km	13.860 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
18	196	12.670 km	13.860 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
19	196	13.860 km	20.710 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
20	196	13.860 km	20.710 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
21	196	20.710 km	24.890 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
22	196	20.710 km	24.890 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
23	196	24.890 km	28.770 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
24	196	24.890 km	28.770 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
25	196	28.770 km	30.357 km	1	10,439,302	10,825,874	11,217,944	11,615,509	12,018,571	12,427,129
26	196	28.770 km	30.357 km	3	10,090,191	10,463,837	10,842,794	11,227,064	11,616,647	12,011,542
27	196	30.357 km	33.944 km	1	10,650,128	11,044,508	11,444,495	11,850,090	12,261,291	12,678,101
28	196	30.357 km	33.944 km	3	10,092,458	10,466,187	10,845,230	11,229,587	11,619,257	12,014,241
29	196	33.944 km	35.560 km	1	8,714,153	9,036,843	9,364,121	9,695,986	10,032,440	10,373,482
30	196	33.944 km	35.560 km	3	8,922,712	9,253,125	9,588,236	9,928,044	10,272,551	10,621,755
31	469	0.000 km	0.065 km	1	12,330,103	12,785,680	13,247,734	13,716,266	14,191,275	14,672,762
32	469	0.000 km	0.065 km	3	10,824,580	11,217,533	11,616,073	12,020,200	12,429,914	12,845,215
33	469	0.065 km	1.119 km	1	12,302,734	12,758,311	13,220,365	13,688,897	14,163,906	14,645,392
34	469	0.065 km	1.119 km	3	10,611,590	11,004,543	11,403,082	11,807,209	12,216,923	12,632,224
35	469	1.119 km	6.724 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
36	469	1.119 km	6.724 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
37	469	6.724 km	9.089 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
38	469	6.724 km	9.089 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
39	469	9.089 km	10.984 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
40	469	9.089 km	10.984 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
41	469	10.984 km	15.170 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
42	469	10.984 km	15.170 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
43	469	15.170 km	17.175 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
44	469	15.170 km	17.175 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
45	469	17.175 km	20.465 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
46	469	17.175 km	20.465 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
47	469	20.465 km	21.340 km	1	8,151,950	8,453,821	8,759,984	9,070,439	9,385,186	9,704,225
48	469	20.465 km	21.340 km	3	8,369,577	8,679,507	8,993,843	9,312,586	9,635,736	9,963,292
49	469	21.340 km	27.180 km	1	1,153,877	1,196,606	1,239,942	1,283,886	1,328,437	1,373,596
50	469	21.340 km	27.180 km	3	1,462,182	1,516,328	1,571,243	1,626,928	1,683,383	1,740,608
51	469	27.180 km	40.680 km	1	294,703	305,616	316,685	327,908	339,286	350,820
52	469	27.180 km	40.680 km	3	500,996	519,548	538,364	557,444	576,787	596,394
53	469	40.680 km	48.390 km	1	294,703	305,616	316,685	327,908	339,286	350,820
54	469	40.680 km	48.390 km	3	500,996	519,548	538,364	557,444	576,787	596,394
55	469	48.390 km	49.590 km	1	294,703	305,616	316,685	327,908	339,286	350,820
56	469	48.390 km	49.590 km	3	500,996	519,548	538,364	557,444	576,787	596,394
57	469	49.590 km	59.160 km	1	294,703	305,616	316,685	327,908	339,286	350,820
58	469	49.590 km	59.160 km	3	500,996	519,548	538,364	557,444	576,787	596,394
59	469	59.160 km	77.170 km	1	294,703	305,616	316,685	327,908	339,286	350,820
60	469	59.160 km	77.170 km	3	500,996	519,548	538,364	557,444	576,787	596,394
61	469	77.170 km	89.030 km	1	294,703	305,616	316,685	327,908	339,286	350,820
62	469	77.170 km	89.030 km	3	500,996	519,548	538,364	557,444	576,787	596,394
63	469	89.030 km	89.570 km	1	294,703	305,616	316,685	327,908	339,286	350,820
64	469	89.030 km	89.570 km	3	500,996	519,548	538,364	557,444	576,787	596,394

Annual Project ESA Loadings as a Percentage of the Annual Baseline ESA

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	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%	0.0%	0.0%	0.0%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
3	196	0.530 km	0.875 km	1	0.0%	0.0%	0.0%	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%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.1%	0.3%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.0%
5	196	0.875 km	0.950 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	1	0.0%	0.1%	0.5%	0.8%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	1	0.0%	0.1%	0.5%	0.8%	0.5%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	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%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	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%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	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%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	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%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	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%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	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%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	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%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	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%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	1.3%	1.0%	1.6%	1.3%	0.5%	0.8%	0.7%
32	469	0.000 km	0.065 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	1.4%	11.9%	9.3%	14.8%	11.5%	4.3%	7.4%	6.3%
33	469	0.065 km	1.119 km	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%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	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%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	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%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	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%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	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%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	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%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	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%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	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%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	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%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	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%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	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%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	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%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	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%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	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%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	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%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	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%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Calculation Sheet

Annual Project ESA Loadings as a Percentage of the Annual Baseline ESA

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	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%	0.0%	0.0%	0.0%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	196	0.530 km	0.875 km	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%	0.0%	0.0%	0.0%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	196	0.875 km	0.950 km	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%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	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%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	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%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	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%	0.0%	0.0%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	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%	0.0%	0.0%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	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%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	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%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	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%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	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%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	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%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	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%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	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%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	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%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.5%	0.3%	0.0%	0.1%	0.1%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	469	0.000 km	0.065 km	3	5.0%	3.0%	0.3%	1.3%	1.2%	0.3%	0.8%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33	469	0.065 km	1.119 km	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%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	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%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	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%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	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%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	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%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	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%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	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%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	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%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	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%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	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%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	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%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	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%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	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%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	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%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	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%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	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%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Annual Project ESA Loadings as a Percentage of the Annual Baseline ESA

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	196	0.530 km	0.875 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	196	0.875 km	0.950 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	469	0.000 km	0.065 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33	469	0.065 km	1.119 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Annual Project ESA Loadings as a Percentage of the Base Year

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1	196	0.000 km	0.530 km	1	0.0%	0.0%	0.0%	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%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.1%	0.0%
3	196	0.530 km	0.875 km	1	0.0%	0.0%	0.0%	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%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.1%	0.3%	0.1%	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%
5	196	0.875 km	0.950 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	1	0.0%	0.0%	0.2%	0.3%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	1	0.0%	0.1%	0.5%	0.9%	0.5%	0.3%	0.4%	0.4%	0.4%	0.3%	0.2%	0.2%	0.3%	0.3%	0.2%	0.1%	0.1%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	1	0.0%	0.1%	0.5%	0.9%	0.5%	0.3%	0.4%	0.4%	0.4%	0.3%	0.2%	0.2%	0.3%	0.3%	0.2%	0.1%	0.1%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	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%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	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%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	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%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	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%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	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%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	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%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	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%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	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%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.2%	1.7%	1.4%	2.3%	1.8%	0.7%	1.2%	1.1%
32	469	0.000 km	0.065 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	1.9%	15.8%	12.6%	20.6%	16.3%	6.3%	10.9%	9.5%
33	469	0.065 km	1.119 km	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%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	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%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	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%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	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%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	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%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	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%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	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%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	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%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	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%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	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%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	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%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	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%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	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%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	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%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	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%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	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%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Calculation Sheet

Annual Project ESA Loadings as a Percentage of the Base Year

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
1	196	0.000 km	0.530 km	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%	0.0%	0.0%	0.0%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	196	0.530 km	0.875 km	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%	0.0%	0.0%	0.0%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	196	0.875 km	0.950 km	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%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	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%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	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%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	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%	0.0%	0.0%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	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%	0.0%	0.0%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	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%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	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%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	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%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	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%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	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%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	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%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	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%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	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%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.8%	0.5%	0.1%	0.2%	0.2%	0.1%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	469	0.000 km	0.065 km	3	7.7%	4.7%	0.5%	2.2%	2.1%	0.5%	1.4%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33	469	0.065 km	1.119 km	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%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	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%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	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%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	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%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	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%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	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%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	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%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	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%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	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%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	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%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	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%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	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%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	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%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	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%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	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%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	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%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Annual Project ESA Loadings as a Percentage of the Base Year

Cardno ID#	TMR ROAD	Chainage Start	Chainage End	Direction	2051	2052	2053	2054	2055	2056
1	196	0.000 km	0.530 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	196	0.000 km	0.530 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	196	0.530 km	0.875 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4	196	0.530 km	0.875 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
5	196	0.875 km	0.950 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
6	196	0.875 km	0.950 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
7	196	0.950 km	1.329 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
8	196	0.950 km	1.329 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
9	196	1.329 km	1.580 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
10	196	1.329 km	1.580 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
11	196	1.580 km	3.226 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
12	196	1.580 km	3.226 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	196	3.226 km	4.030 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	196	3.226 km	4.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	196	4.031 km	12.670 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	196	4.031 km	12.670 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	196	12.670 km	13.860 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18	196	12.670 km	13.860 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	196	13.860 km	20.710 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
20	196	13.860 km	20.710 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
21	196	20.710 km	24.890 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
22	196	20.710 km	24.890 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
23	196	24.890 km	28.770 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
24	196	24.890 km	28.770 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
25	196	28.770 km	30.357 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
26	196	28.770 km	30.357 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
27	196	30.357 km	33.944 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
28	196	30.357 km	33.944 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
29	196	33.944 km	35.560 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
30	196	33.944 km	35.560 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
31	469	0.000 km	0.065 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
32	469	0.000 km	0.065 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33	469	0.065 km	1.119 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
34	469	0.065 km	1.119 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
35	469	1.119 km	6.724 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
36	469	1.119 km	6.724 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
37	469	6.724 km	9.089 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
38	469	6.724 km	9.089 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
39	469	9.089 km	10.984 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
40	469	9.089 km	10.984 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
41	469	10.984 km	15.170 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
42	469	10.984 km	15.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
43	469	15.170 km	17.175 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
44	469	15.170 km	17.175 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
45	469	17.175 km	20.465 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
46	469	17.175 km	20.465 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
47	469	20.465 km	21.340 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
48	469	20.465 km	21.340 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
49	469	21.340 km	27.180 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
50	469	21.340 km	27.180 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
51	469	27.180 km	40.680 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
52	469	27.180 km	40.680 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
53	469	40.680 km	48.390 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
54	469	40.680 km	48.390 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
55	469	48.390 km	49.590 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
56	469	48.390 km	49.590 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
57	469	49.590 km	59.160 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
58	469	49.590 km	59.160 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
59	469	59.160 km	77.170 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
60	469	59.160 km	77.170 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
61	469	77.170 km	89.030 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
62	469	77.170 km	89.030 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
63	469	89.030 km	89.570 km	1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
64	469	89.030 km	89.570 km	3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

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Bowen Gas Project SREIS

APPENDIX G

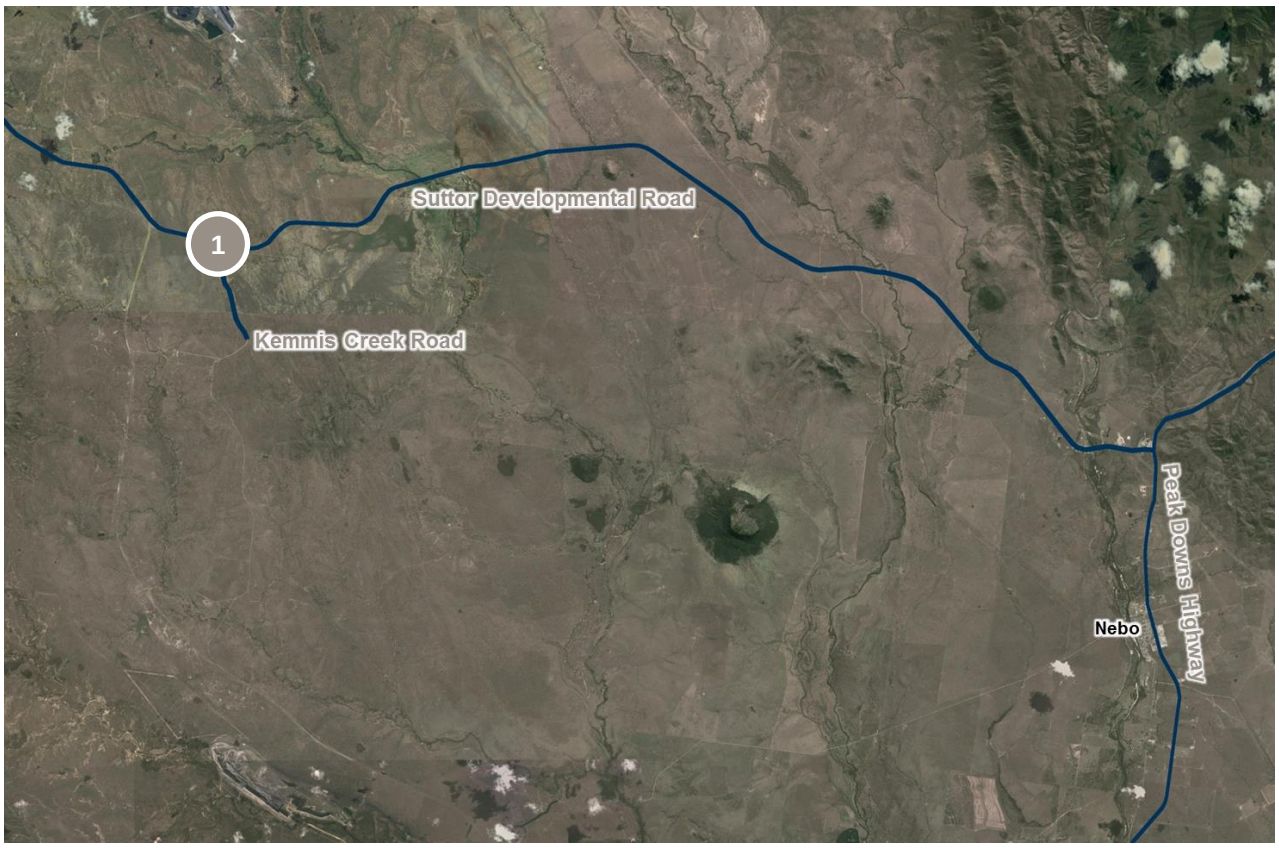
Traffic Engineering Case Study Assessments

Cardno
Shaping the Future

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Locality Plan



Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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Aerial Photo

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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Intersection Photos

Eastern Approach: Suttor Developmental Road	
Looking West towards Intersection (150m away)	**Looking East from Intersection**
	

Southern Approach: Kemmis Creek Road	
Looking North towards Intersection (150m away)	**Looking South from Intersection**
	

Western Approach: Suttor Developmental Road	
Looking East towards Intersection (150m away)	**Looking West from Intersection**
	

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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Eastern Approach: Suttor Developmental Road		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	none	
Right Turn Treatment	n/a	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Southern Approach: Kemmis Creek Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	n/a	
Pavement Condition	Unsealed, loose gravel	

Western Approach: Suttor Developmental Road		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	none	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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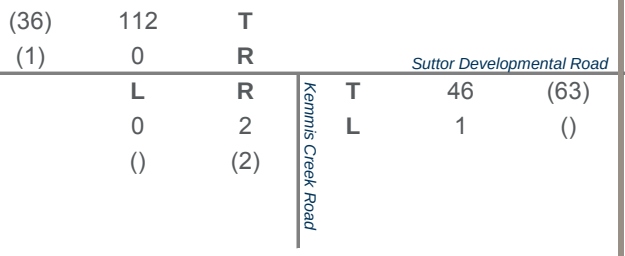
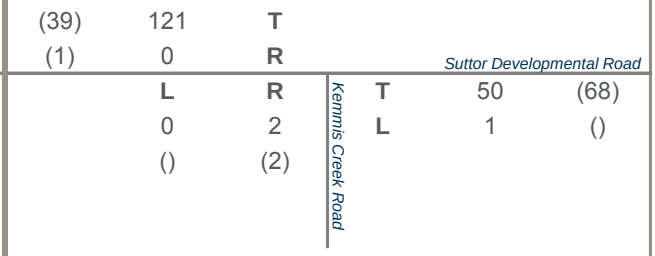
Baseline Traffic (Peak Hour Intersection Volumes)

Surveyed Traffic Volumes — **2013**

AM Peak	7:00am to 8:00am
PM Peak	4:30pm to 5:30pm



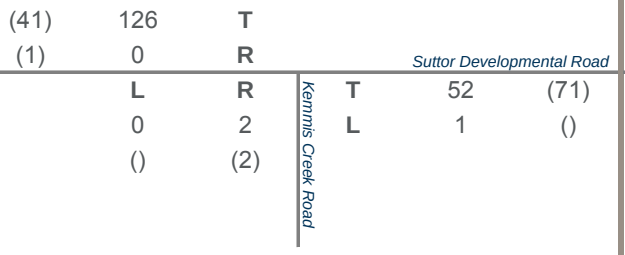
2015



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2015	4.23%	1.08

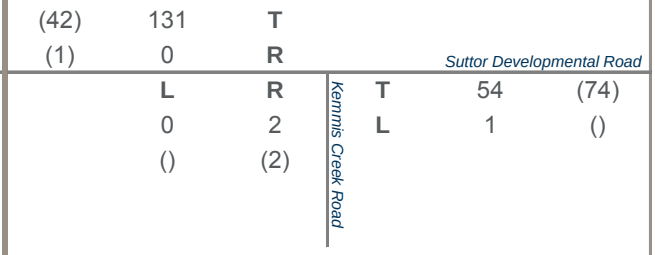
2016



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2016	4.23%	1.13

2017



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2017	4.23%	1.17

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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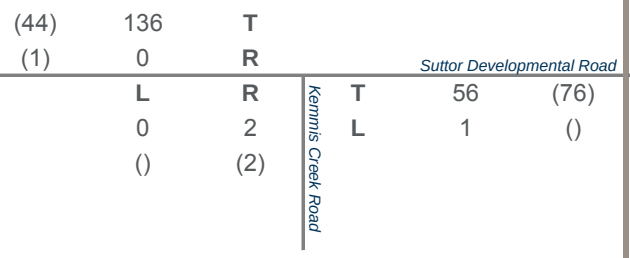
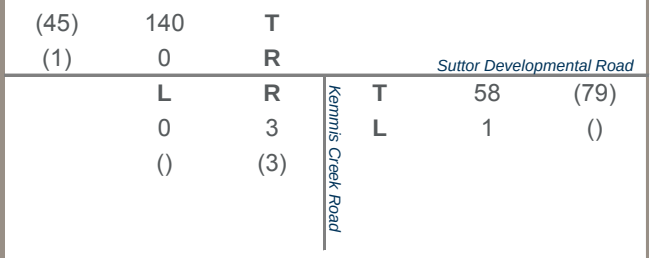
Baseline Traffic (Peak Hour Intersection Volumes)

2018



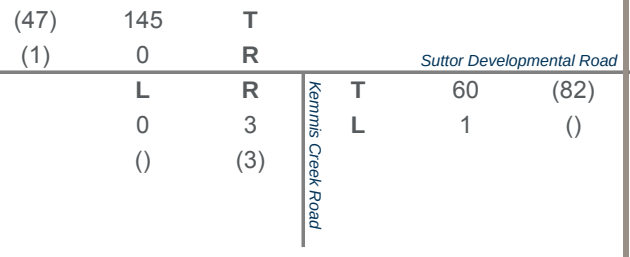
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2018	4.23%	1.21

2019



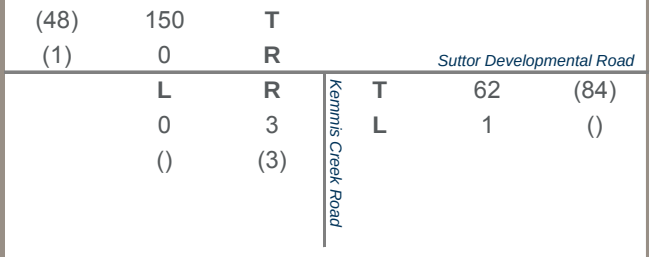
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2019	4.23%	1.25

2020



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2020	4.23%	1.30

2021



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2021	4.23%	1.34

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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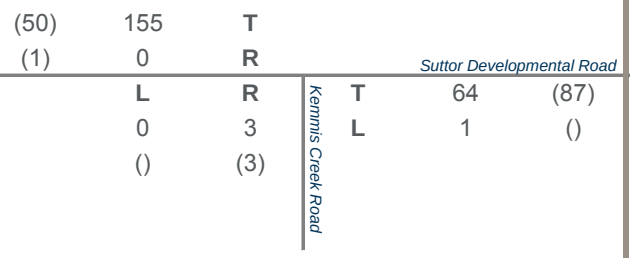
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

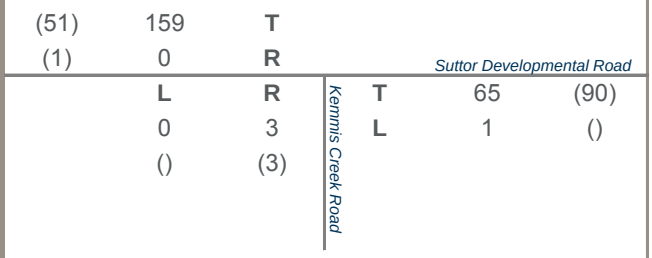
Baseline Traffic (Peak Hour Intersection Volumes)

2022



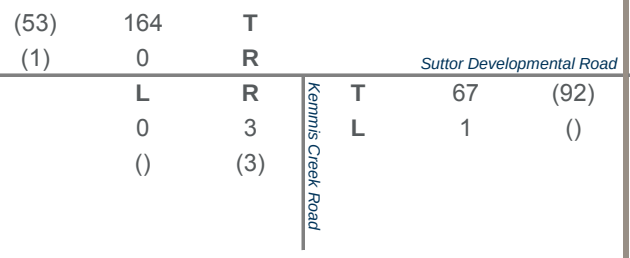
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2022	4.23%	1.38

2023



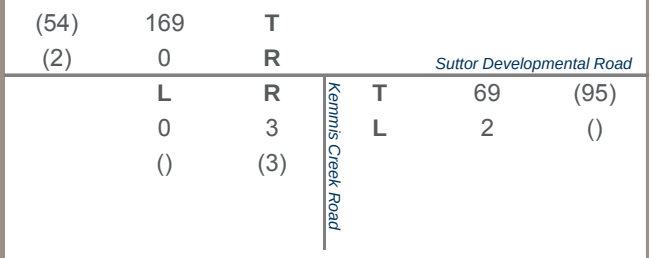
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2023	4.23%	1.42

2024



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2024	4.23%	1.47

2025



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2025	4.23%	1.51

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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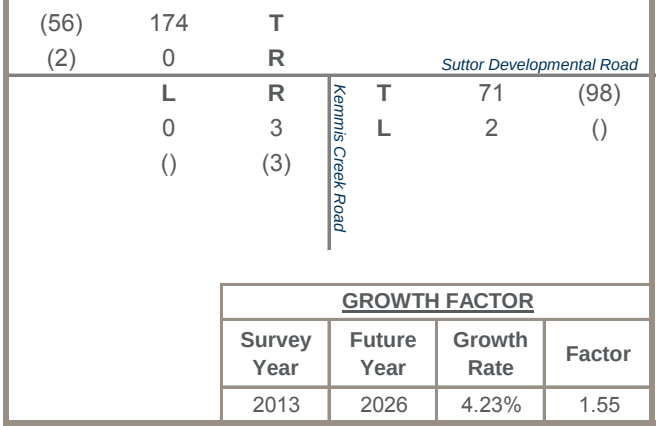
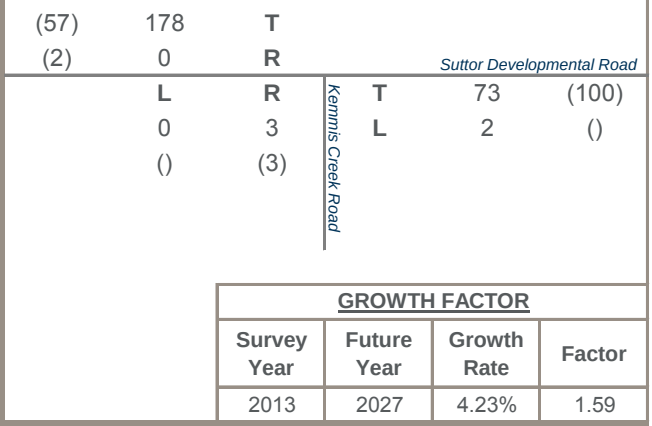
Baseline Traffic (Peak Hour Intersection Volumes)

2026



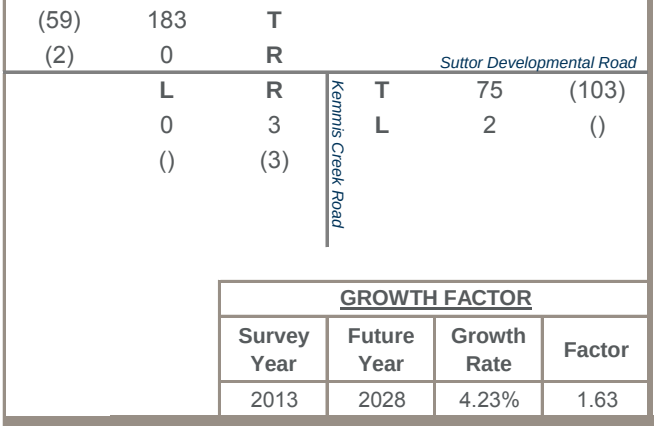
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2026	4.23%	1.55

2027



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2027	4.23%	1.59

2028



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2028	4.23%	1.63

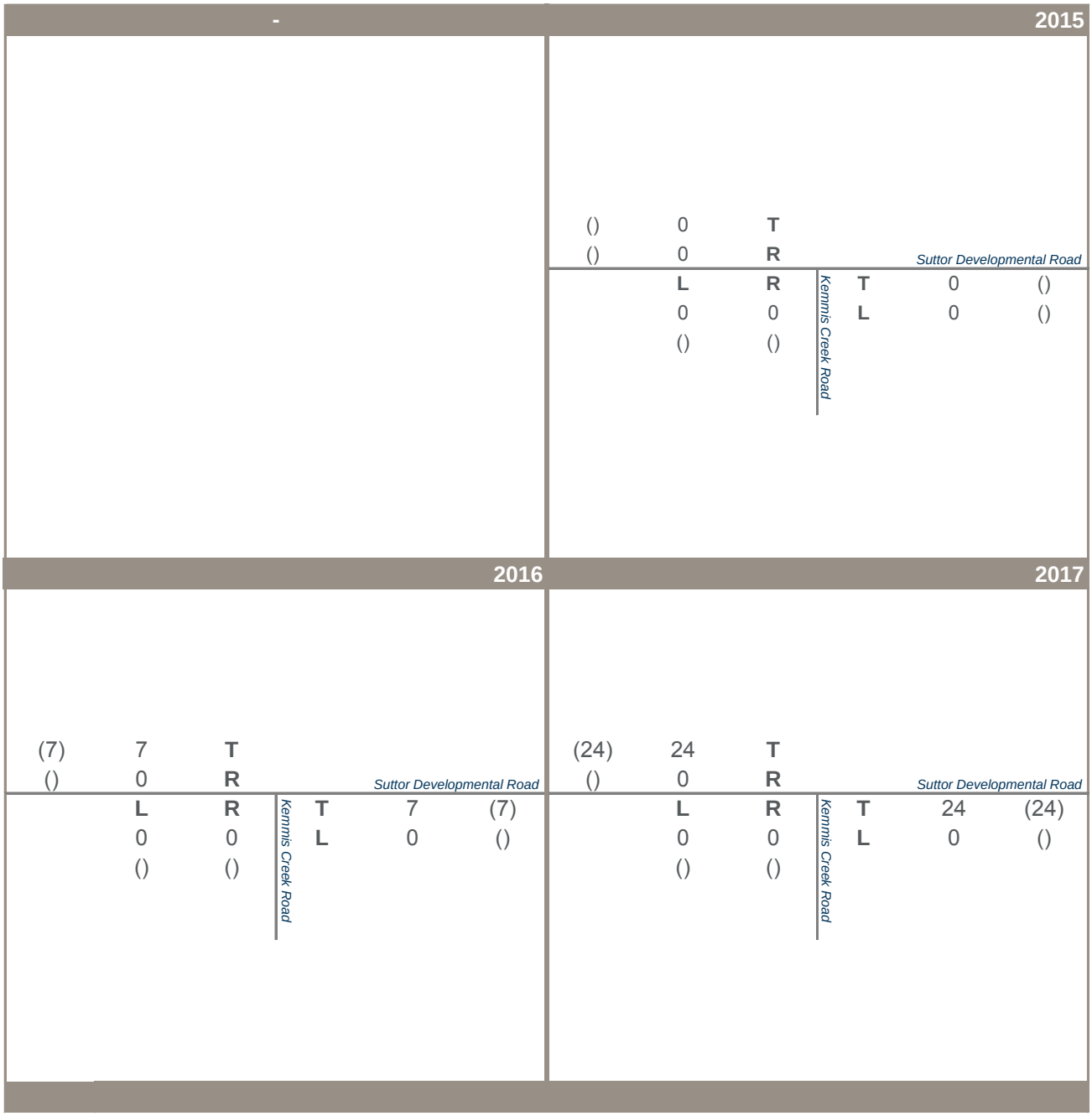
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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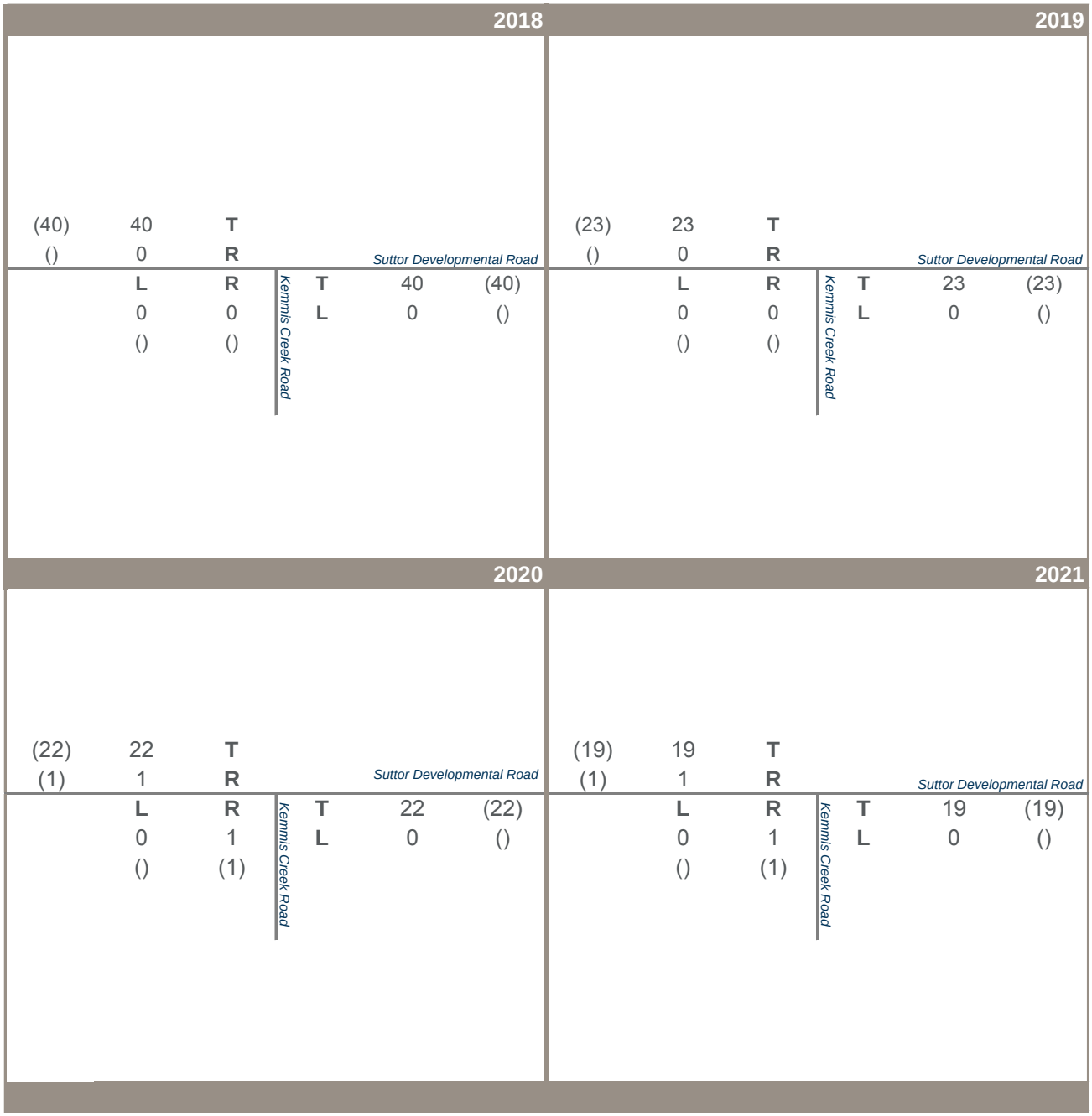
Project Traffic (Peak Hour Intersection Volumes)



Legend

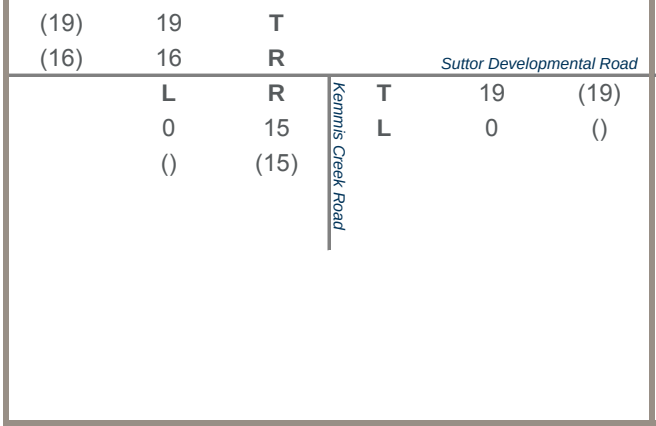
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

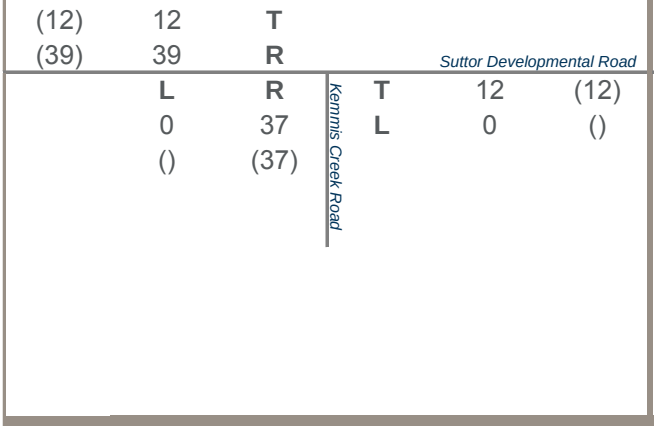
Project Traffic (Peak Hour Intersection Volumes)

2022



2023

2024



2025

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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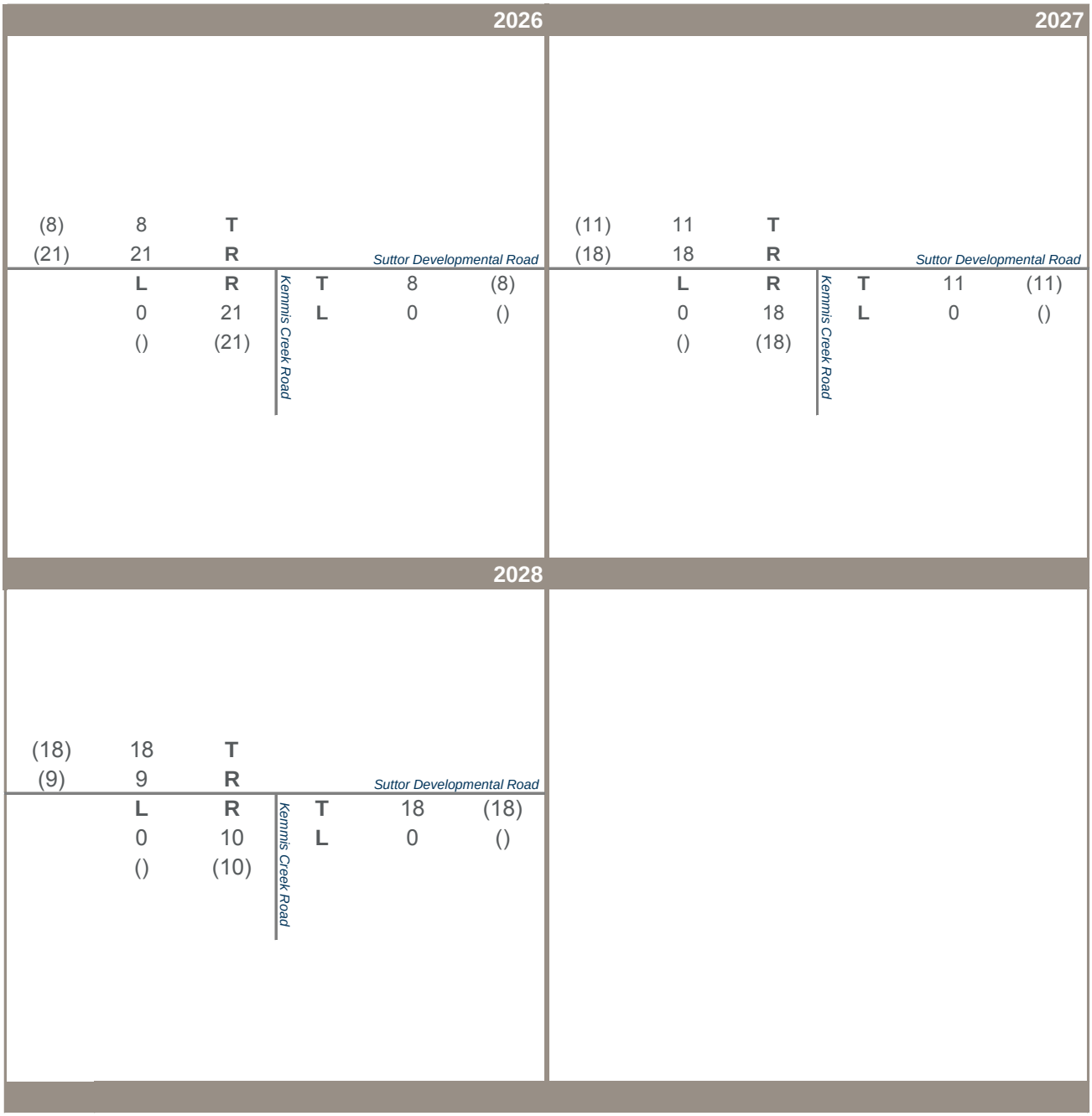
Project Traffic (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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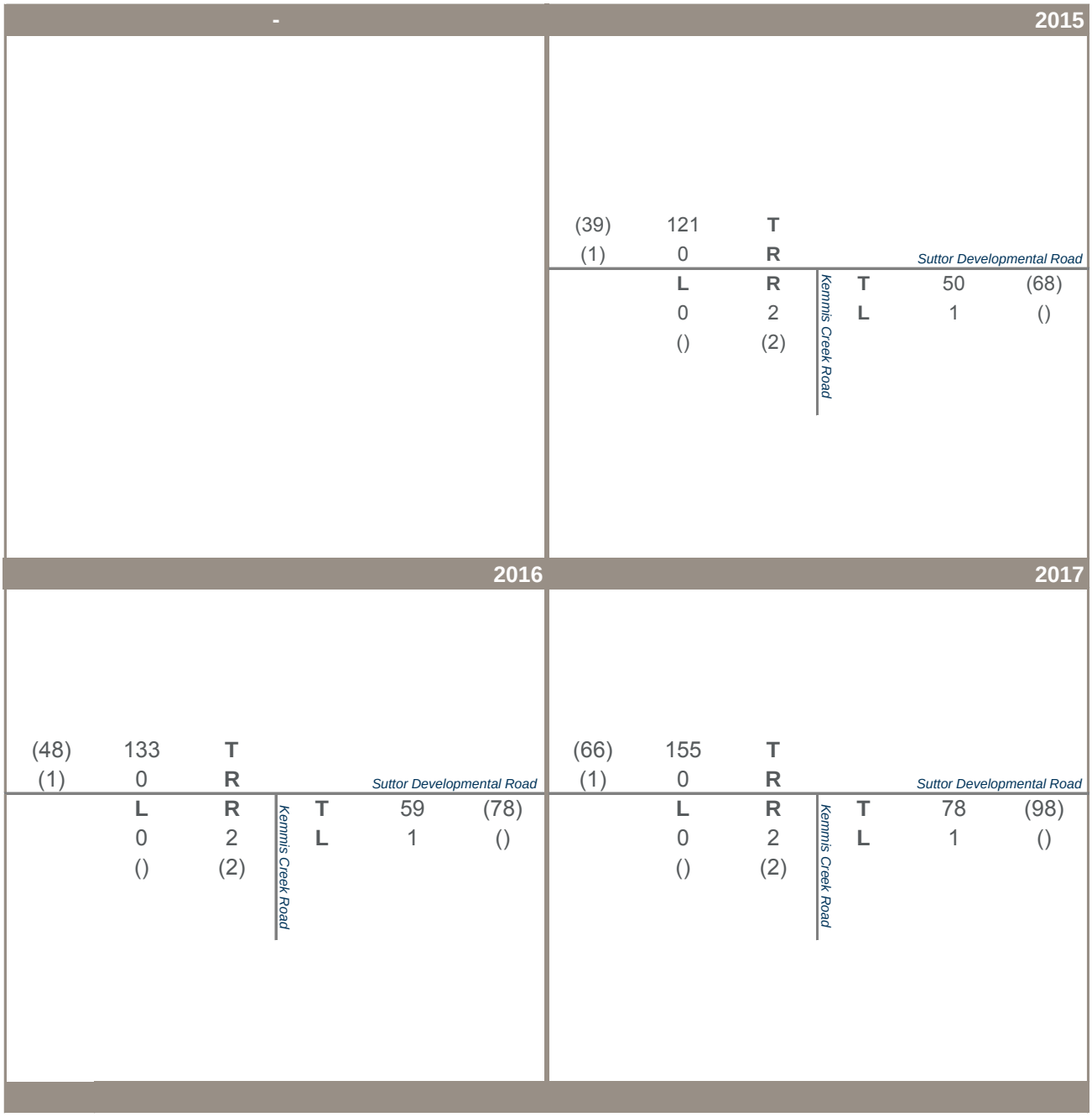
Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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Design Traffic Volumes (Peak Hour Intersection Volumes)

2018

(84)	176	T										
(1)	0	R										
						Suttor Developmental Road						
	L	R		T	96	(116)		T	81	(102)		
	0	2	Kemmis Creek Road	L	1	()	Kemmis Creek Road	L	1	()		
	()	(2)										

2019

(68)	164	T										
(1)	0	R										
						Suttor Developmental Road						
	L	R		T	81	(102)		T	80	(103)		
	0	3	Kemmis Creek Road	L	1	()	Kemmis Creek Road	L	1	()		
	()	(3)										

2020

(69)	167	T										
(2)	1	R										
						Suttor Developmental Road						
	L	R		T	82	(104)		T	82	(104)		
	0	3	Kemmis Creek Road	L	1	()	Kemmis Creek Road	L	1	()		
	()	(3)										

2021

(67)	169	T										
(3)	1	R										
						Suttor Developmental Road						
	L	R		T	80	(103)		T	79	(102)		
	0	4	Kemmis Creek Road	L	1	()	Kemmis Creek Road	L	1	()		
	()	(4)										

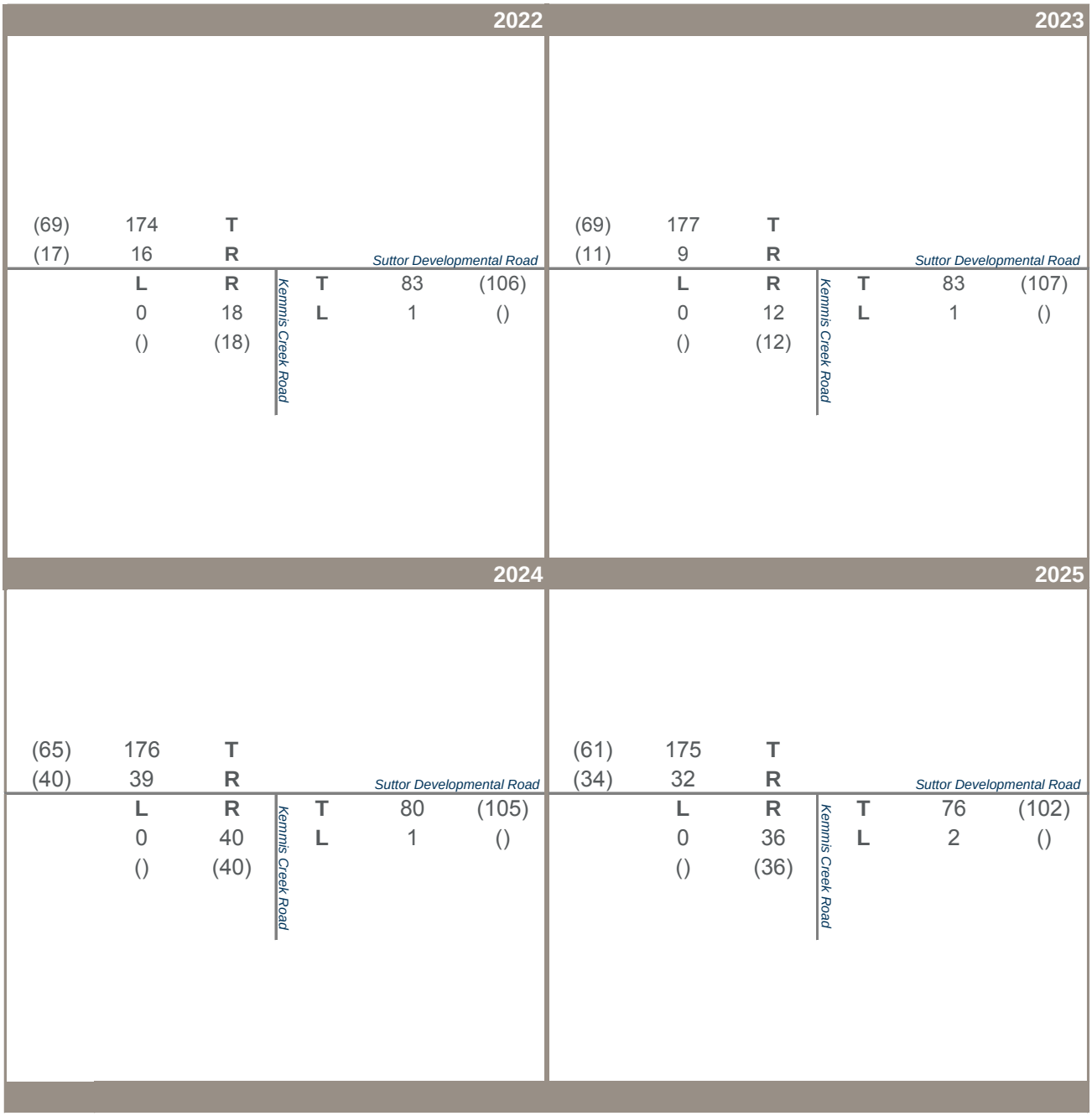
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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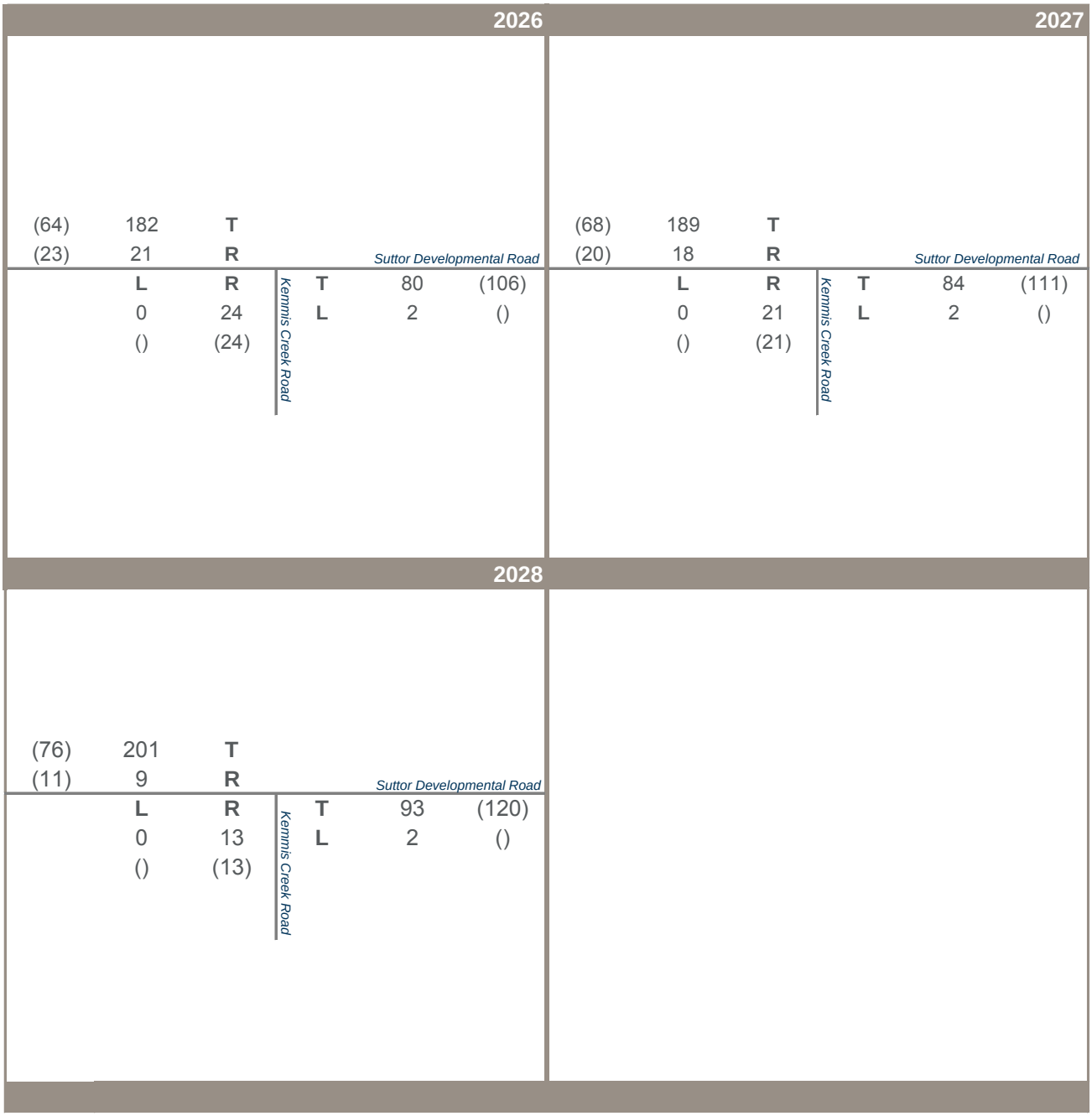
Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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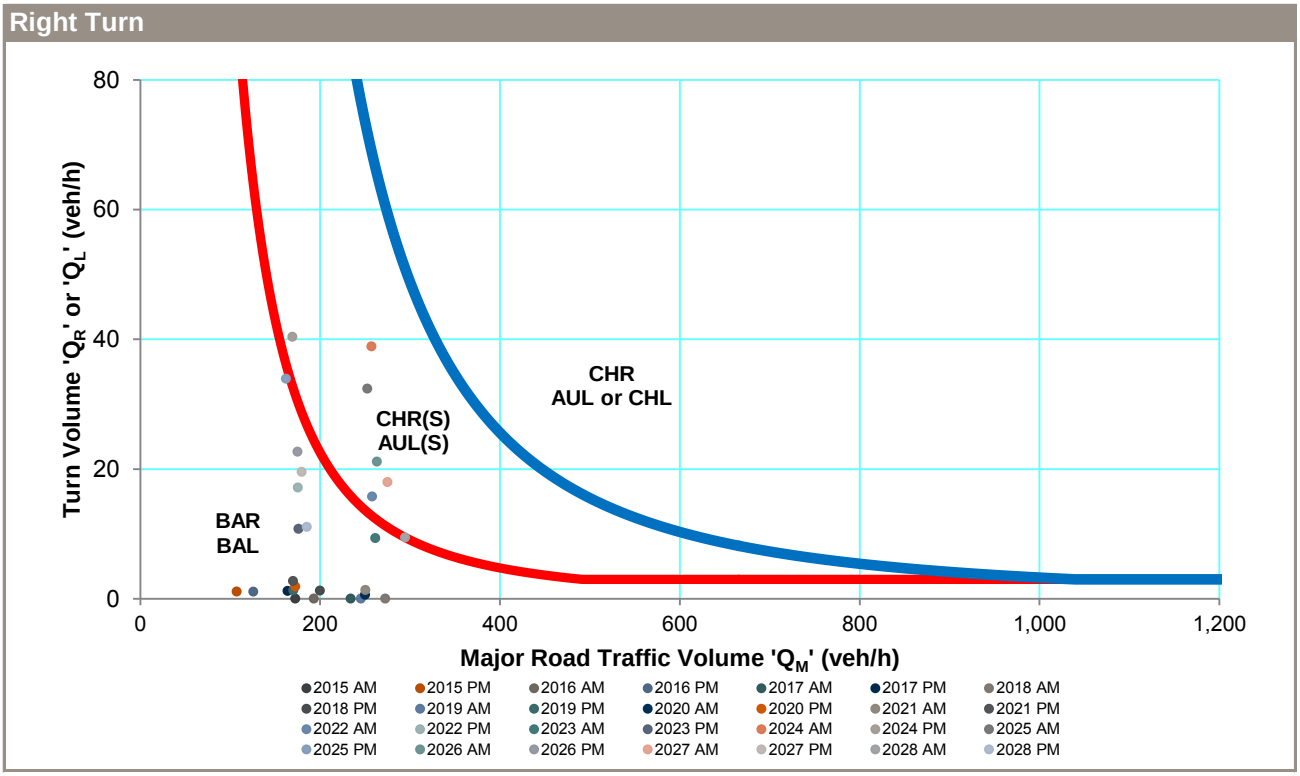
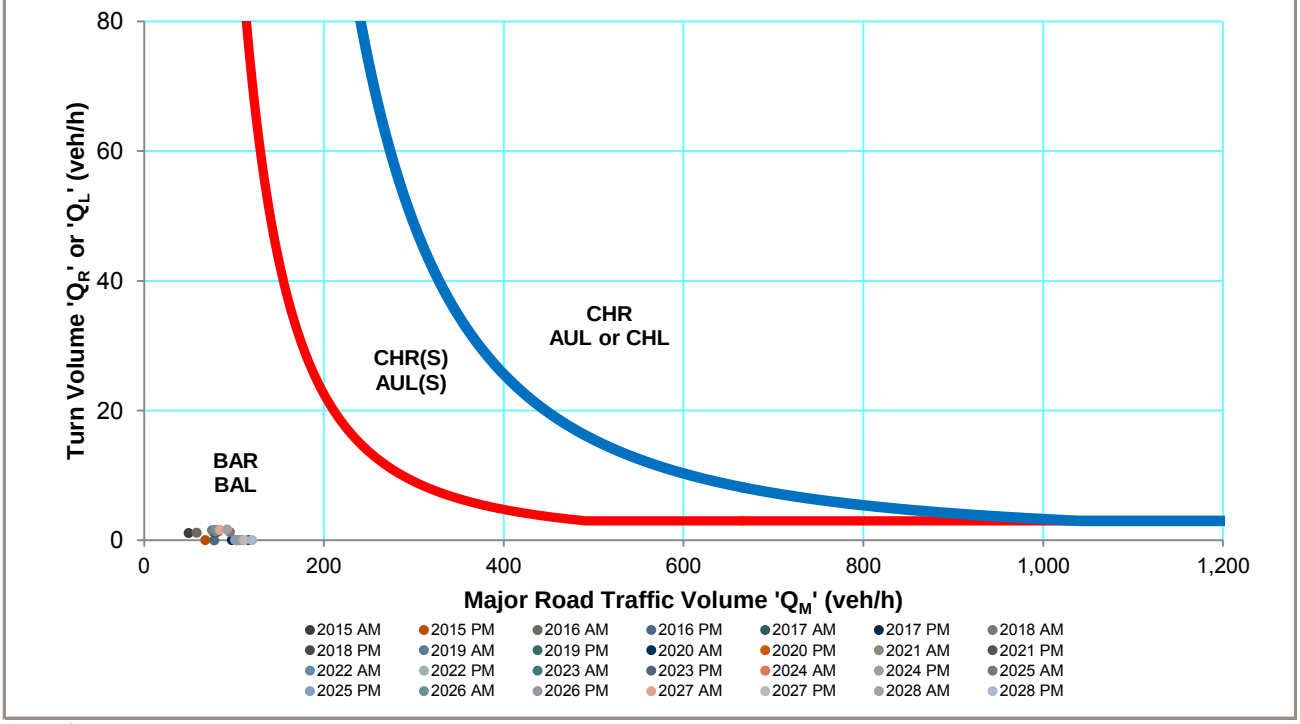
Turn Warrant Assessment

Right Turn



Left Turn



Legend

BAR	Basic Right Turn	**BAL**	Basic Left Turn
CHR	Channelised Right Turn	**CHL**	Channelised Left Turn
CHR(S)	Channelised Right Turn (short)	**CHL(S)**	Channelised Left Turn (short)

Intersection 1 - Suttor Developmental Road/Kemmis Creek Road

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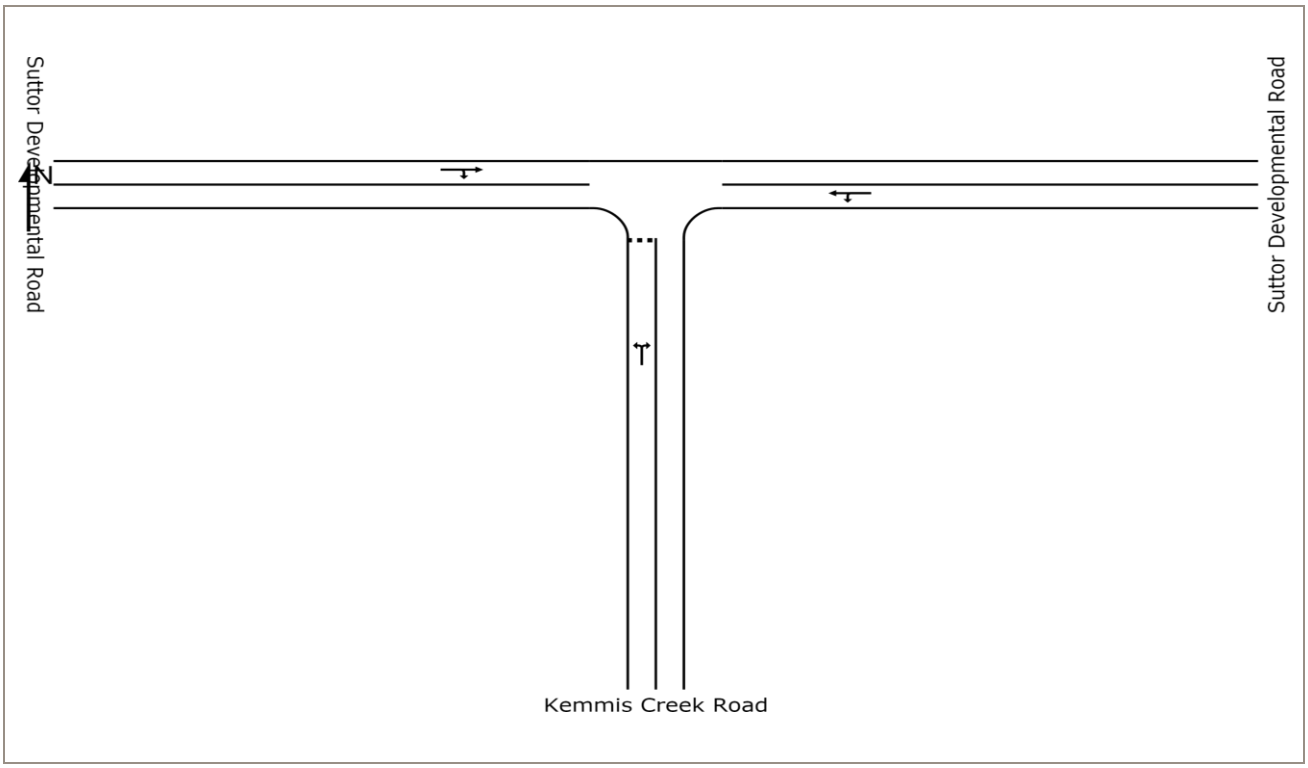
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Operational Analysis: Intersection Configuration



Operational Analysis: Summary of Results

Scenario	AM Peak			PM Peak			Accept -able
	DOS	Critical Delay	95th%ile Queue	DOS	Critical Delay	95th%ile Queue	
2013 Survey	0.08	20 sec	3m	0.04	20 sec	1m	✓
2018 Baseline and Project	0.12	20 sec	5m	0.08	20 sec	2m	✓
2028 Baseline and Project	0.14	21 sec	6m	0.08	20 sec	2m	✓

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Locality Plan

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Aerial Photo

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Intersection Photos

Eastern Approach: Suttor Developmental Road	
Looking West towards Intersection (150m away)	**Looking East from Intersection**
	

Southern Approach: Red Hill Road	
Looking North towards Intersection (150m away)	**Looking South from Intersection**
	

Western Approach: Suttor Developmental Road	
Looking East towards Intersection (150m away)	**Looking West from Intersection**
	

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Eastern Approach: Suttor Developmental Road		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	none	
Right Turn Treatment	n/a	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Unsealed, loose gravel	

Southern Approach: Red Hill Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	n/a	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Unsealed, loose gravel	

Western Approach: Suttor Developmental Road		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	none	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Unsealed, loose gravel	

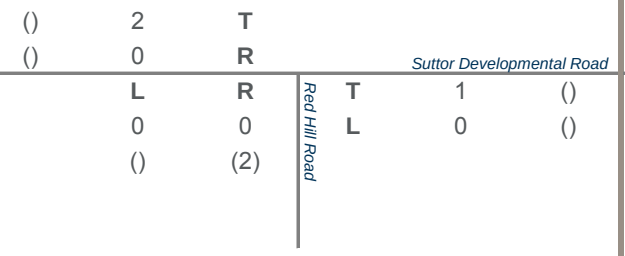
Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

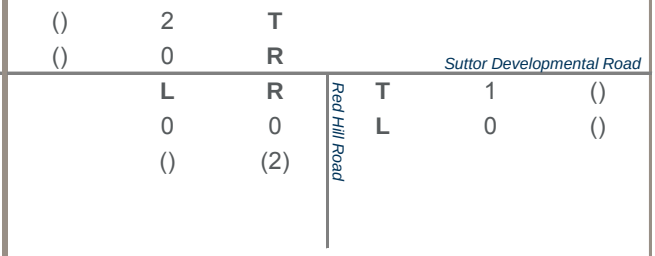
Baseline Traffic (Peak Hour Intersection Volumes)

Surveyed Traffic Volumes — **2013**

AM Peak	6:45am to 7:45am
PM Peak	4:30pm to 5:30pm

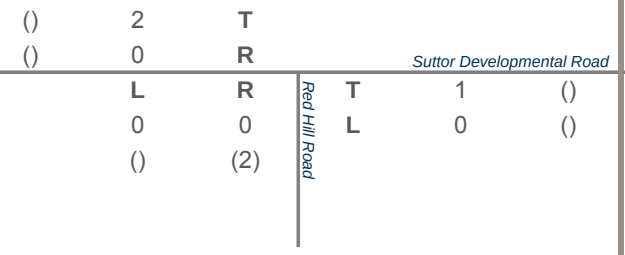


2015



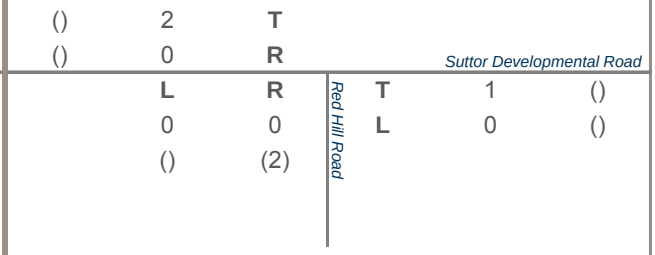
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2015	4.23%	1.08

2016



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2016	4.23%	1.13

2017



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2017	4.23%	1.17

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Baseline Traffic (Peak Hour Intersection Volumes)

2018

()	2	T										
()	0	R										
	L	R		T	1	()						
	0	0		L	0	()						
	()	(2)										

Suttor Developmental Road

Red Hill Road

GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2018	4.23%	1.21

2019

()	3	T										
()	0	R										
	L	R		T	1	()						
	0	0		L	0	()						
	()	(3)										

Suttor Developmental Road

Red Hill Road

GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2019	4.23%	1.25

2020

()	3	T										
()	0	R										
	L	R		T	1	()						
	0	0		L	0	()						
	()	(3)										

Suttor Developmental Road

Red Hill Road

GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2020	4.23%	1.30

2021

()	3	T										
()	0	R										
	L	R		T	1	()						
	0	0		L	0	()						
	()	(3)										

Suttor Developmental Road

Red Hill Road

GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2021	4.23%	1.34

Legend

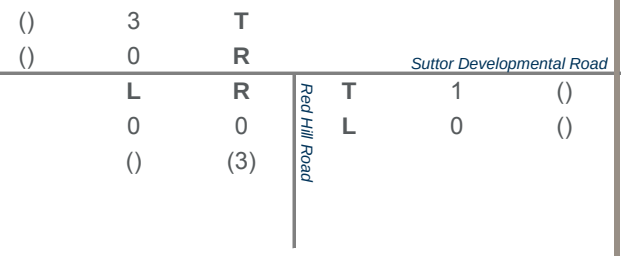
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

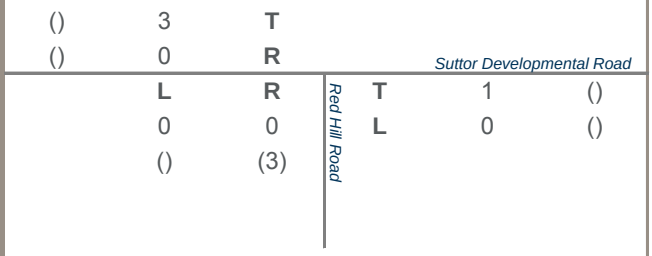
Baseline Traffic (Peak Hour Intersection Volumes)

2022



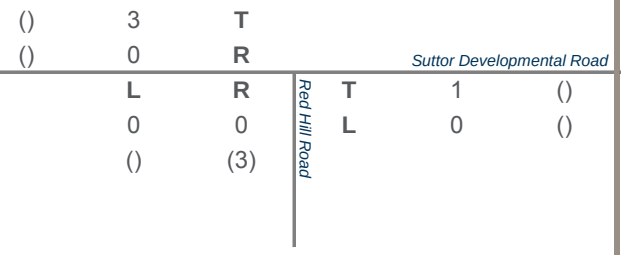
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2022	4.23%	1.38

2023



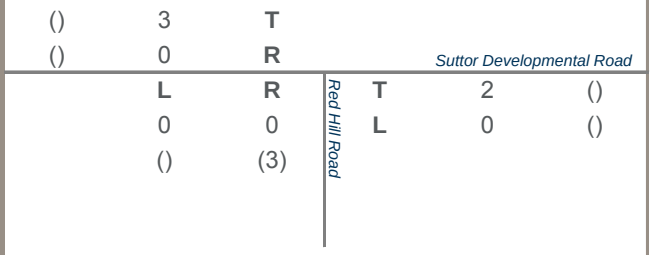
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2023	4.23%	1.42

2024



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2024	4.23%	1.47

2025



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2025	4.23%	1.51

Legend

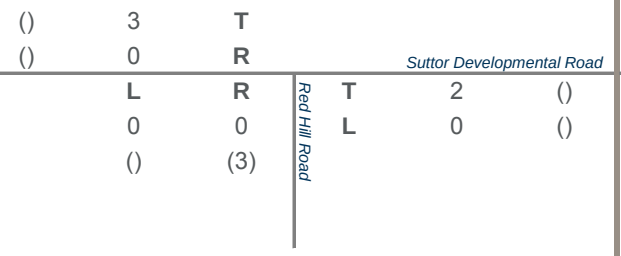
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

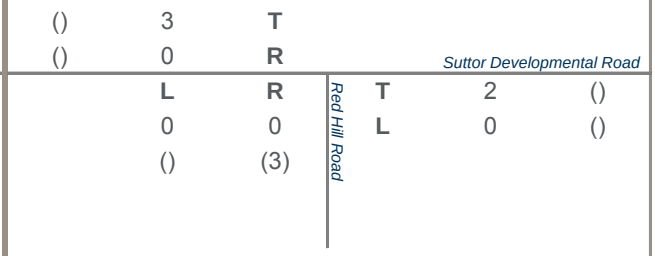
Baseline Traffic (Peak Hour Intersection Volumes)

2026



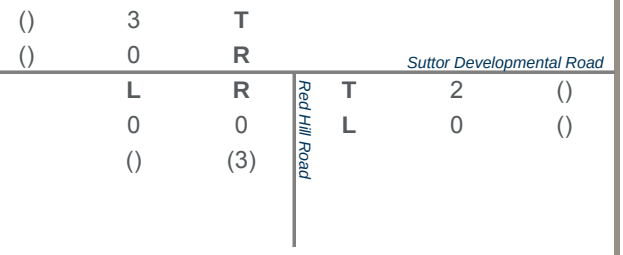
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2026	4.23%	1.55

2027



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2027	4.23%	1.59

2028



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2028	4.23%	1.63

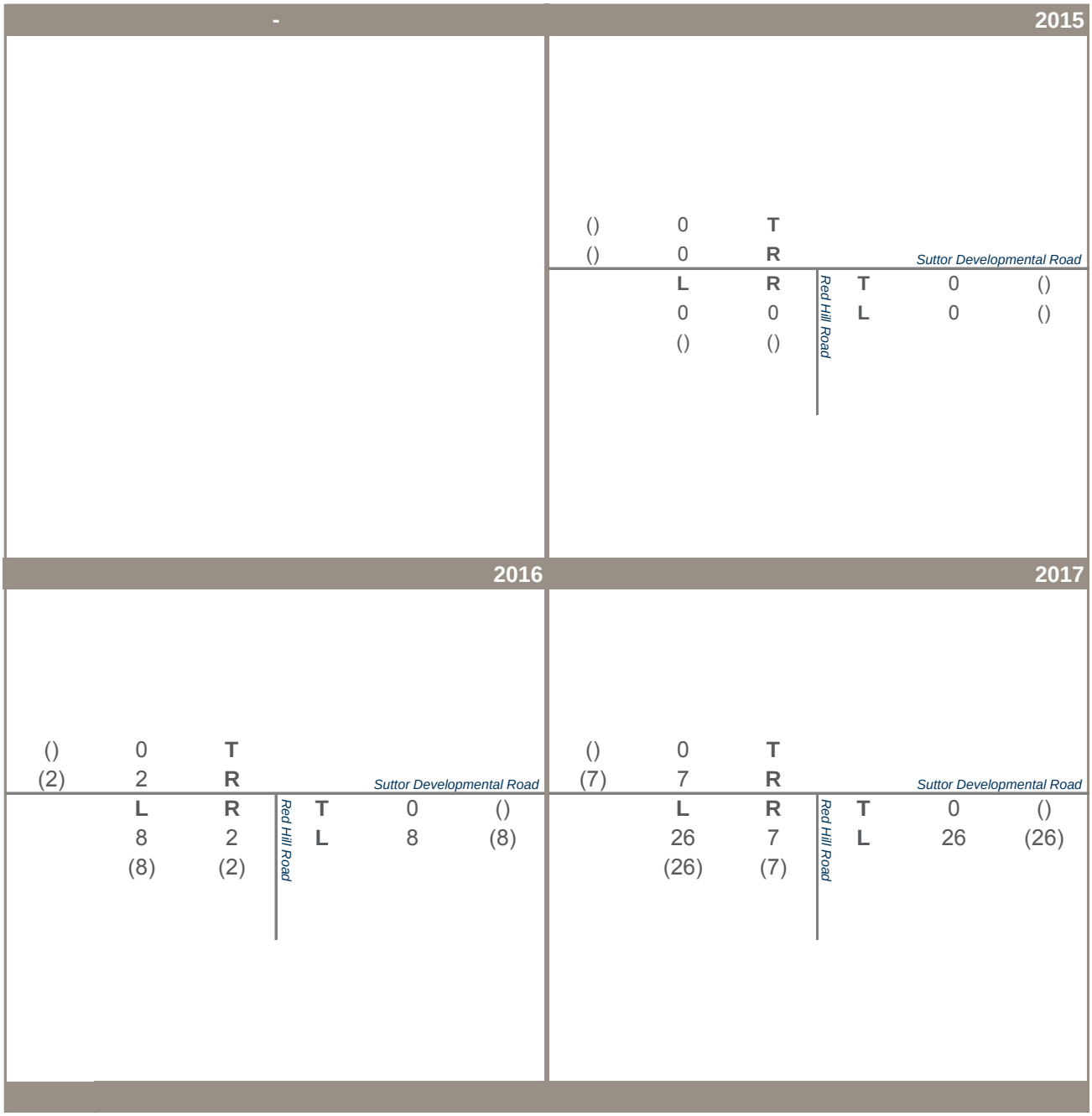
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)



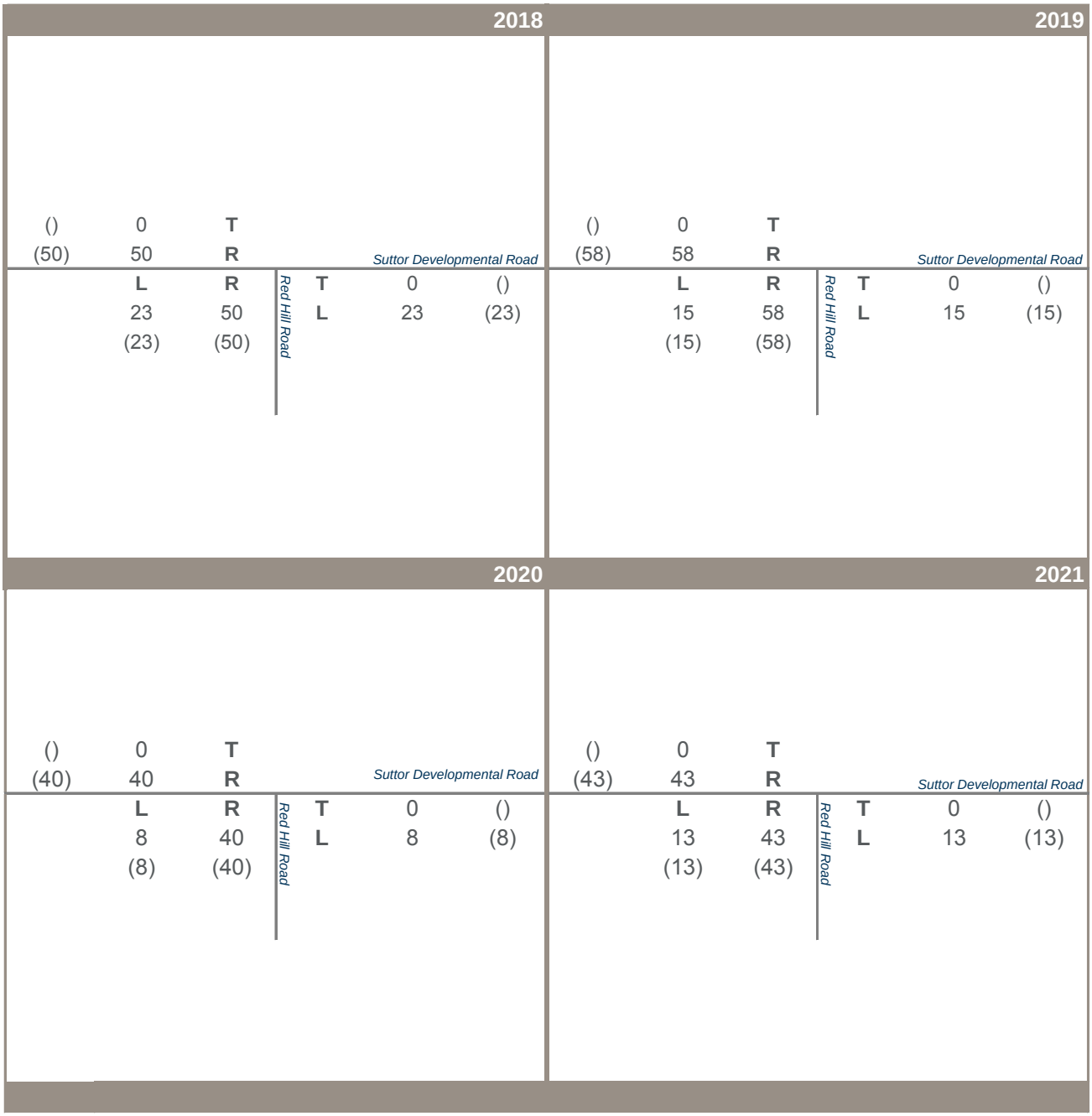
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)



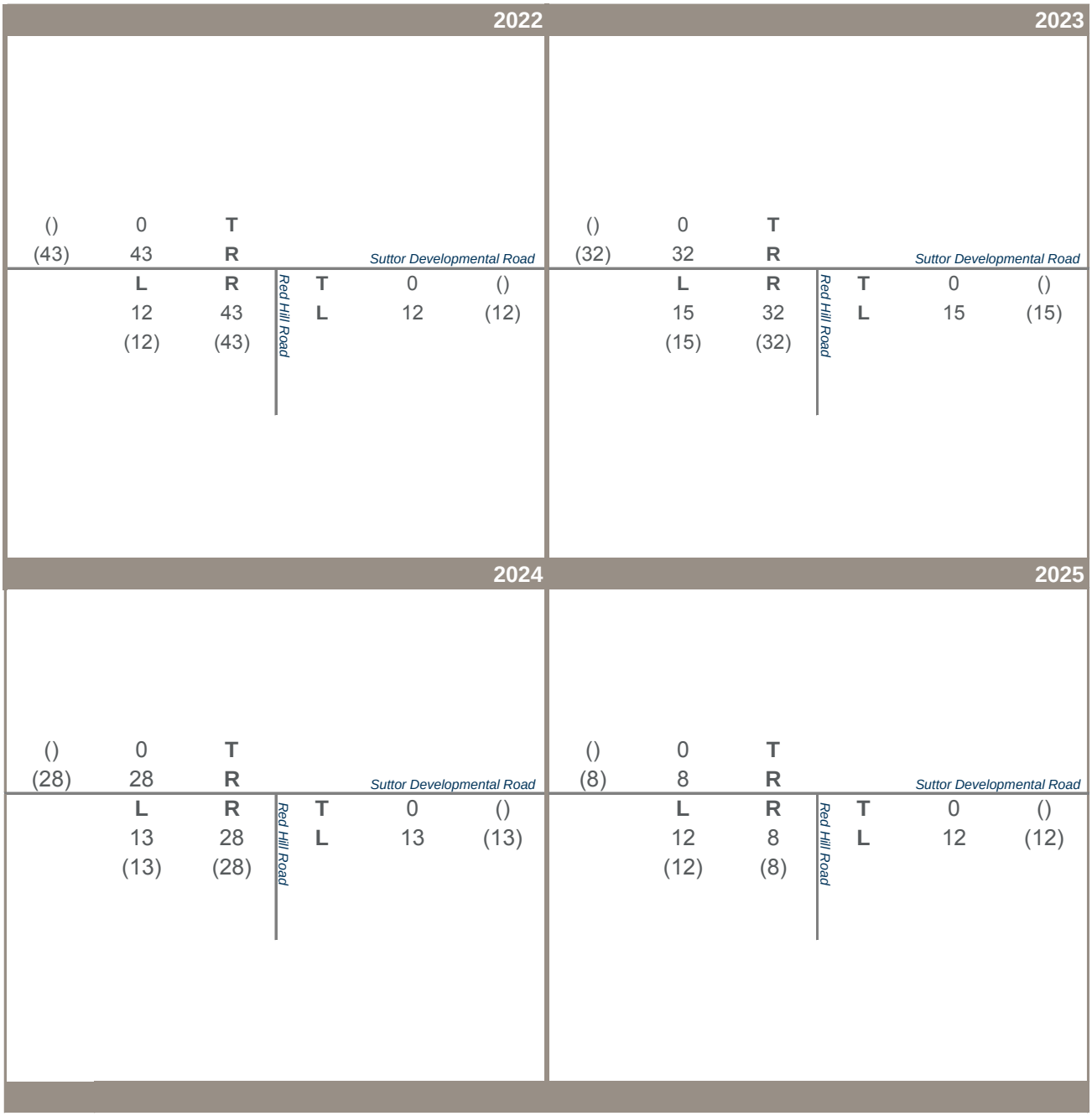
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)



Legend

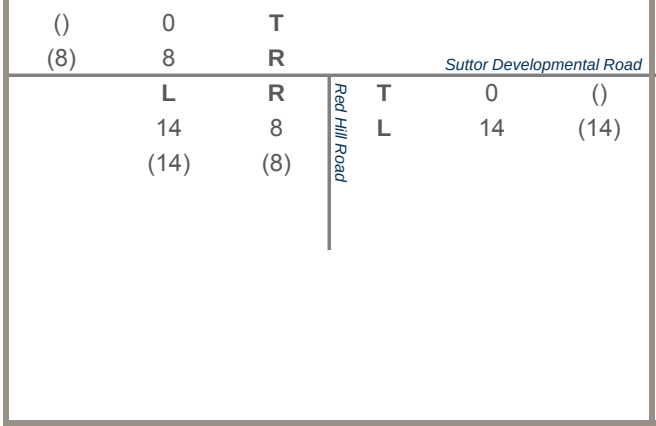
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

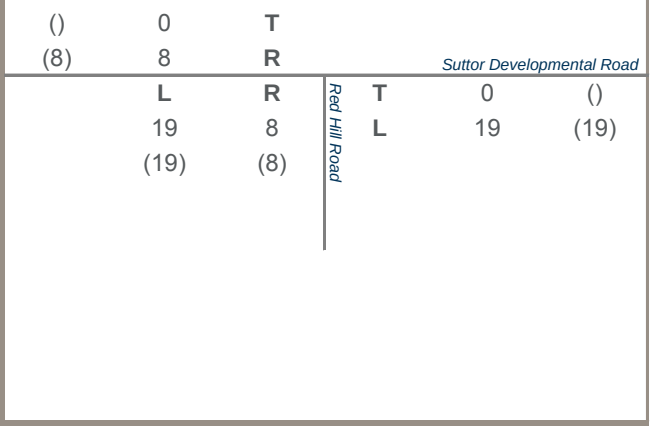
Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)

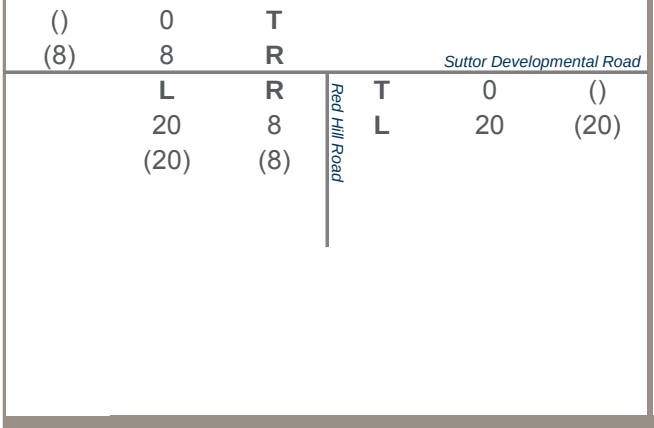
2026



2027



2028



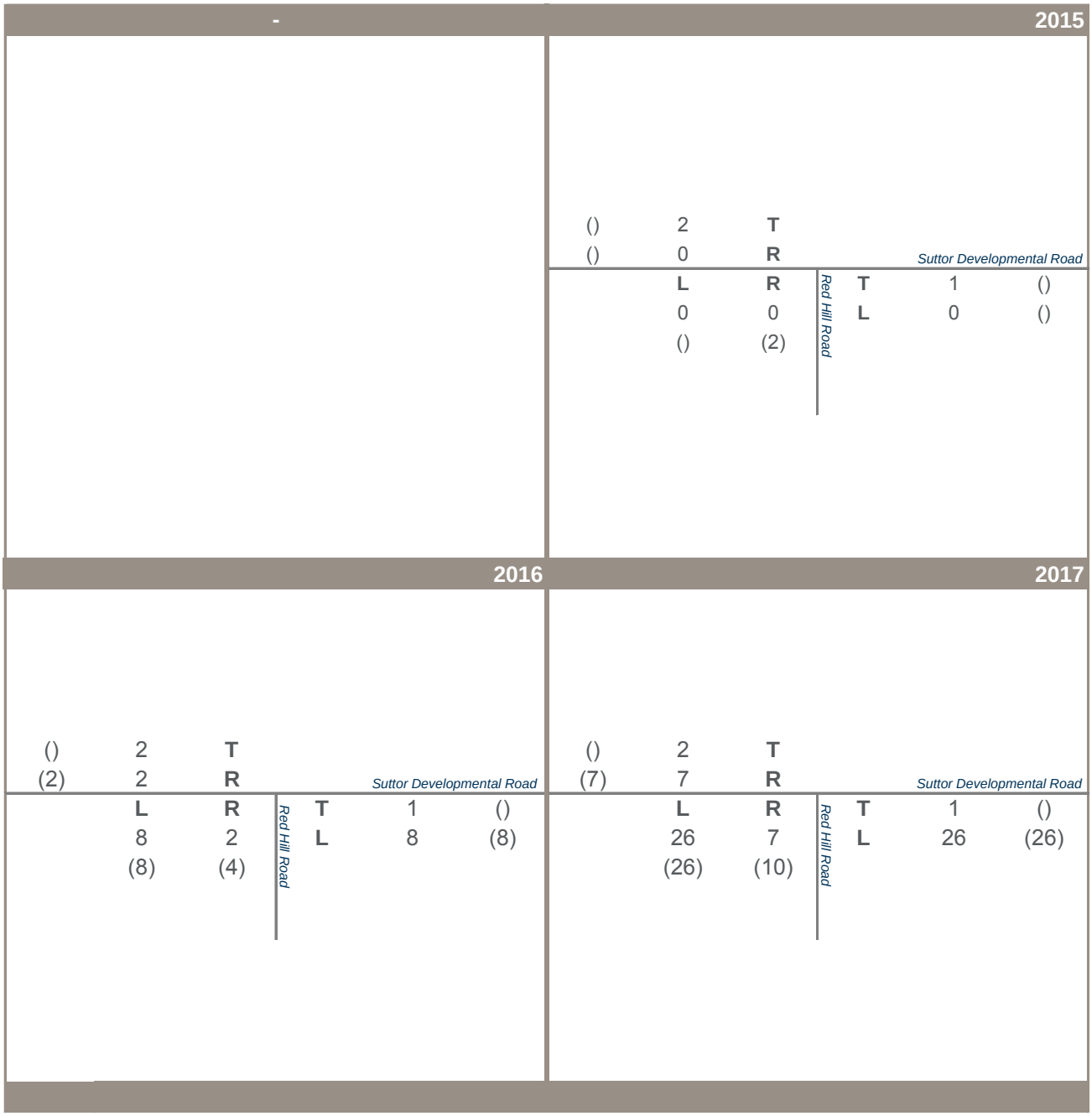
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



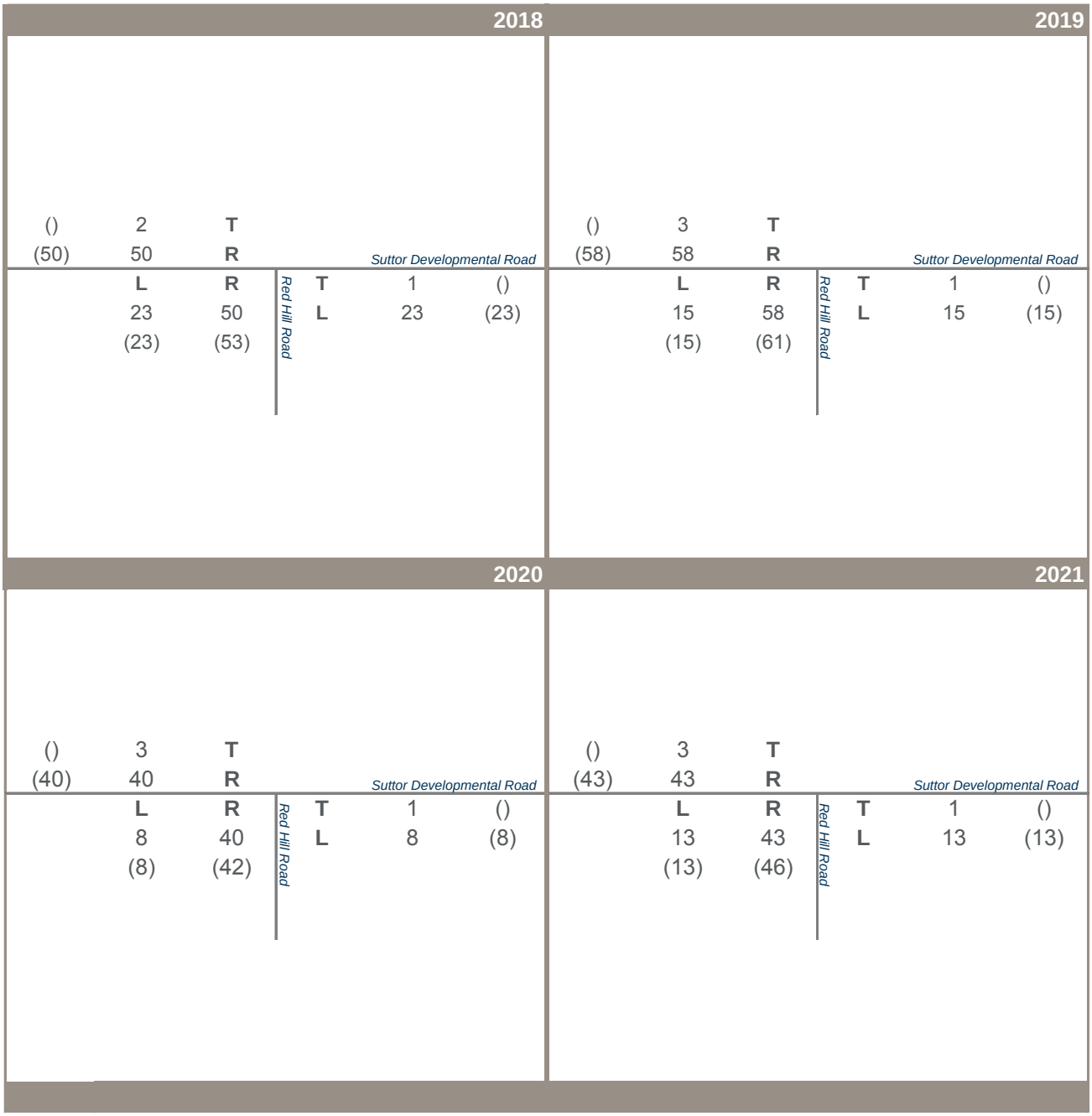
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



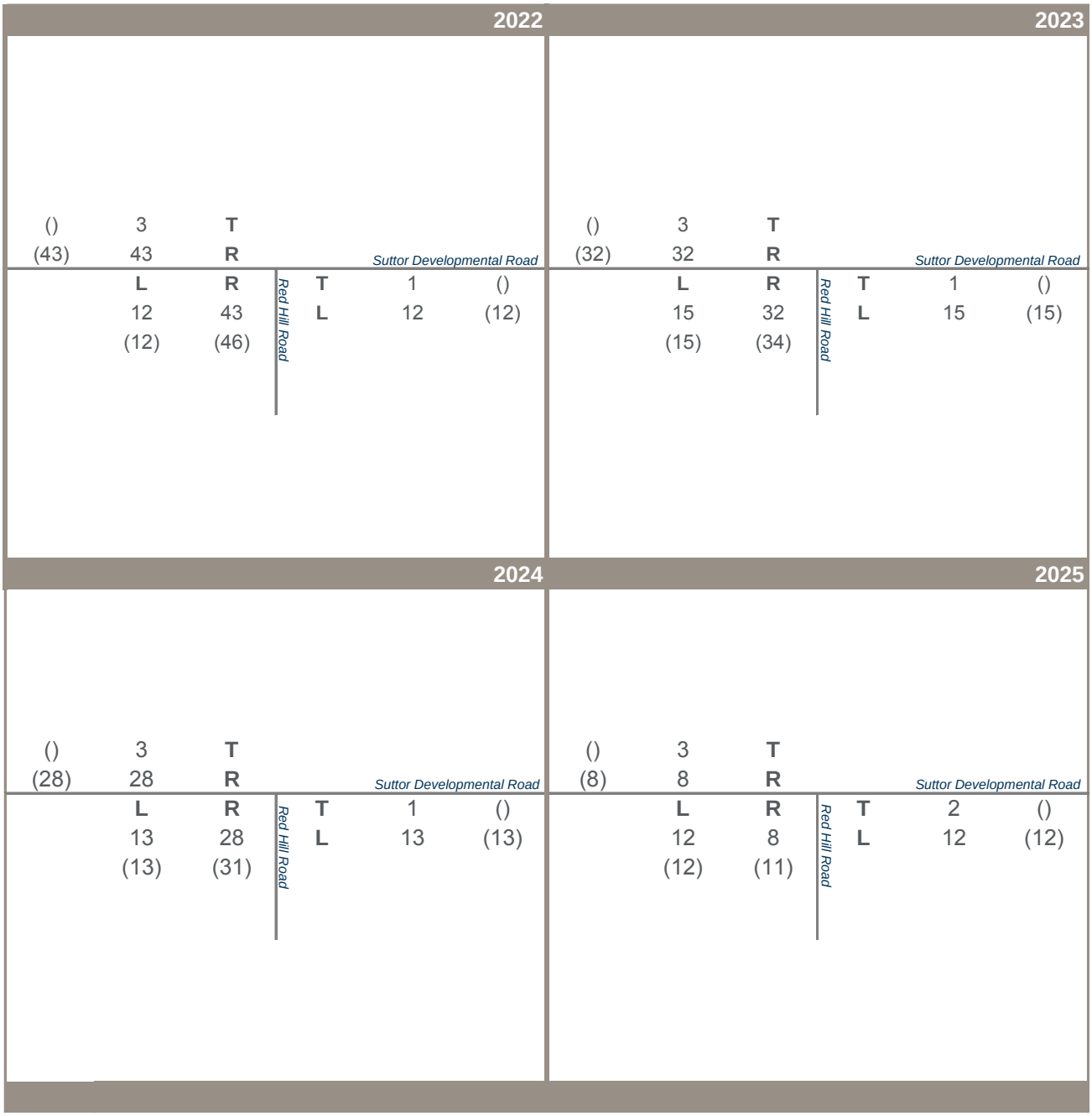
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



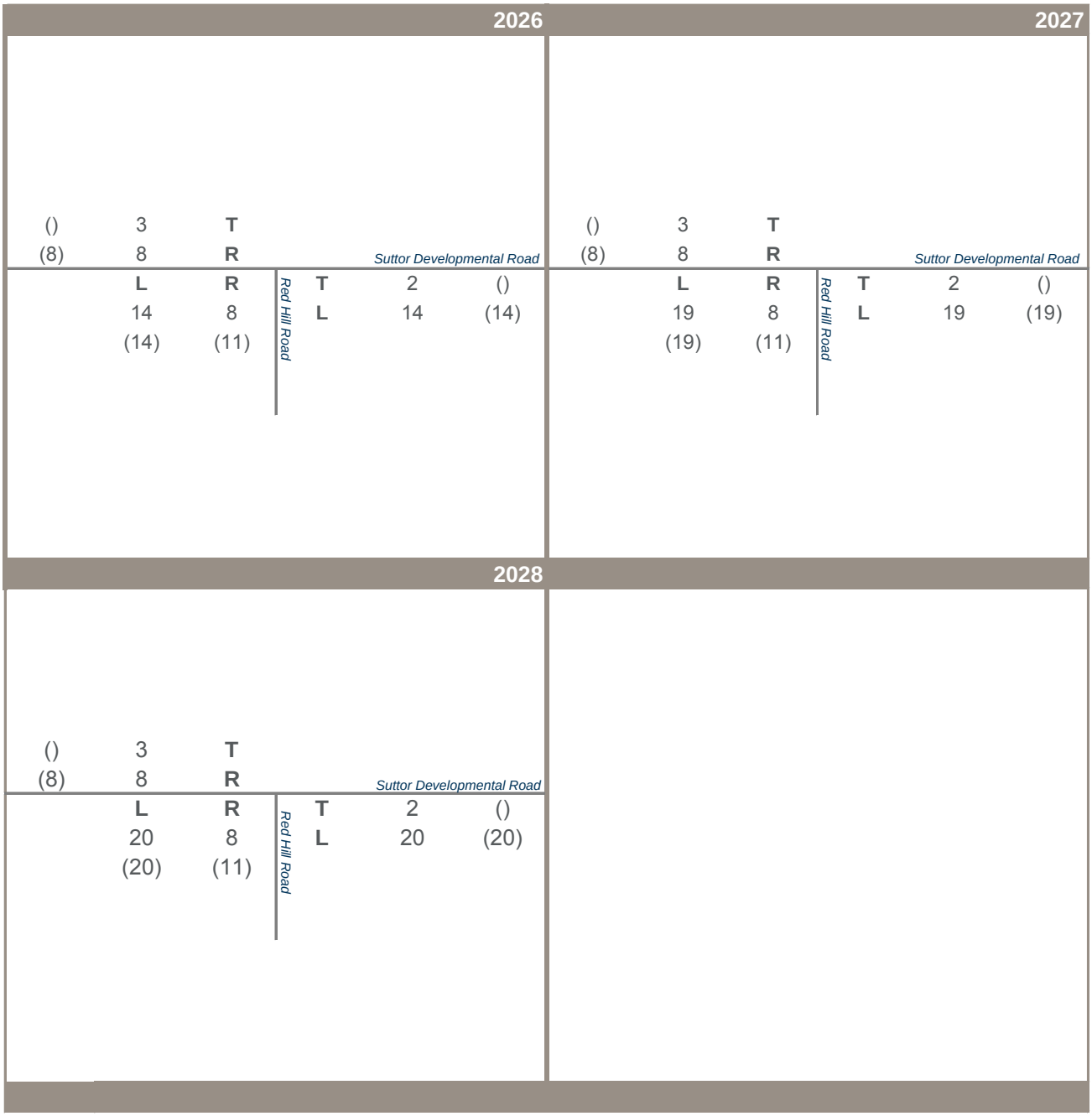
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

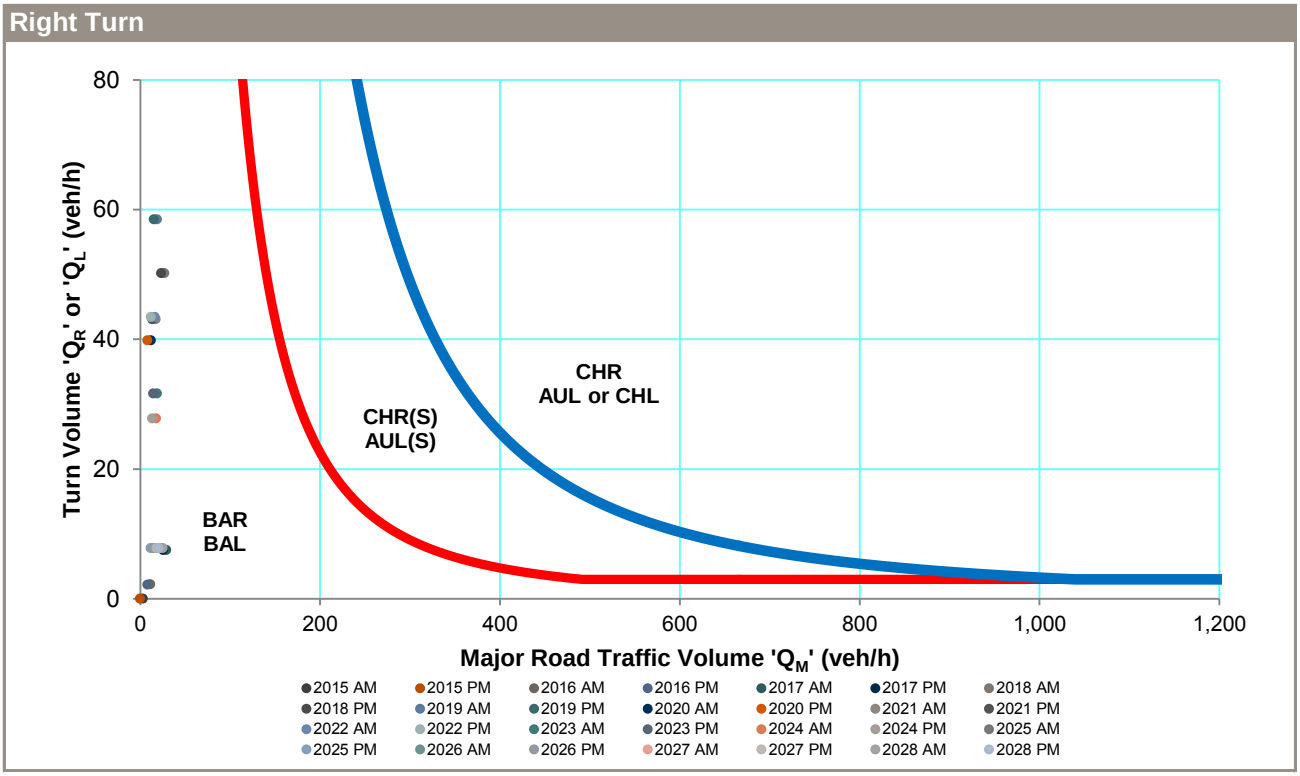
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 2 - Suttor Developmental Road/Red Hill Road

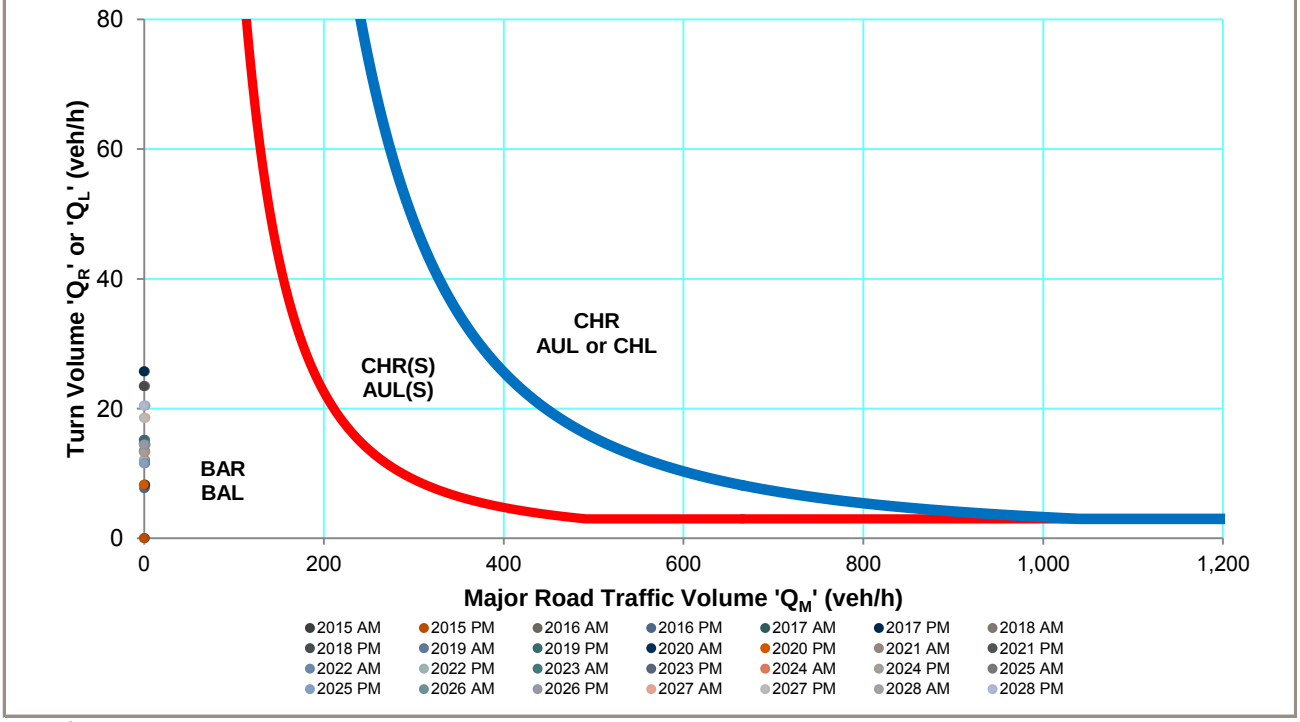
Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Turn Warrant Assessment

Right Turn



Left Turn



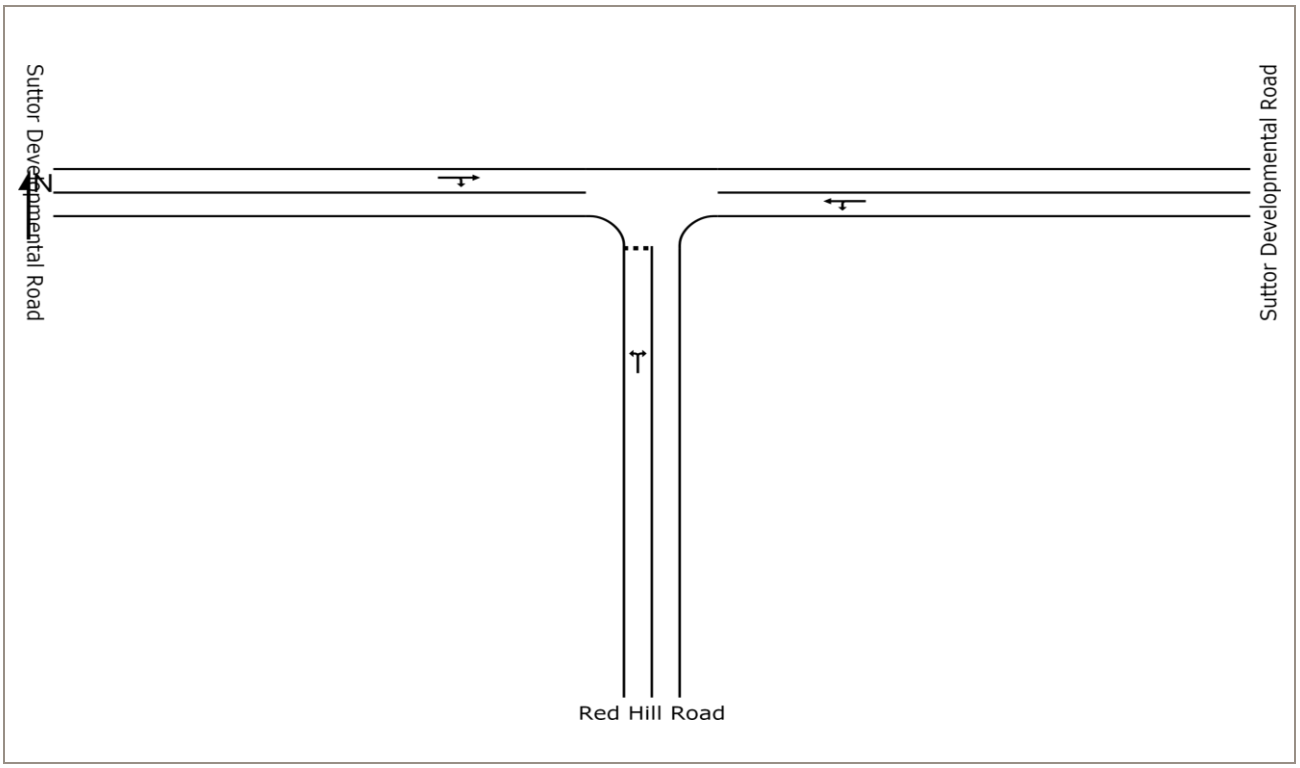
Legend

BAR	Basic Right Turn	**BAL**	Basic Left Turn
CHR	Channelised Right Turn	**CHL**	Channelised Left Turn
CHR(S)	Channelised Right Turn (short)	**CHL(S)**	Channelised Left Turn (short)

Intersection 2 - Suttor Developmental Road/Red Hill Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Operational Analysis: Intersection Configuration



Operational Analysis: Summary of Results

Scenario	AM Peak			PM Peak			Accept -able
	DOS	Critical Delay	95th%ile Queue	DOS	Critical Delay	95th%ile Queue	
2013 Survey	0.002	20 sec	1m	0.003	20 sec	1m	✓
2018 Baseline and Project	0.07	20 sec	2m	0.07	20 sec	2m	✓
2028 Baseline and Project	0.02	20 sec	1m	0.03	20 sec	1m	✓

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Locality Plan

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Aerial Photo

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Intersection Photos

Northern Approach: Red Hill Road	
Looking South towards Intersection (150m away)	**Looking North from Intersection**
	

Southern Approach: Red Hill Road	
Looking North towards Intersection (150m away)	**Looking South from Intersection**
	

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Northern Approach: Red Hill Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	none	
Right Turn Treatment	n/a	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Eastern Approach: Potential CGPF Access		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	n/a	
Pavement Condition	Loose Gravel	

Southern Approach: Red Hill Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	none	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

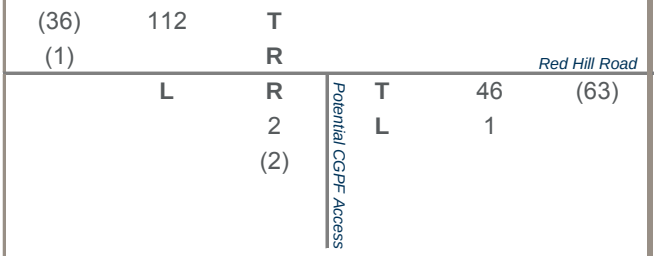
Intersection 3 - Red Hill Road/Potential CGPF Access

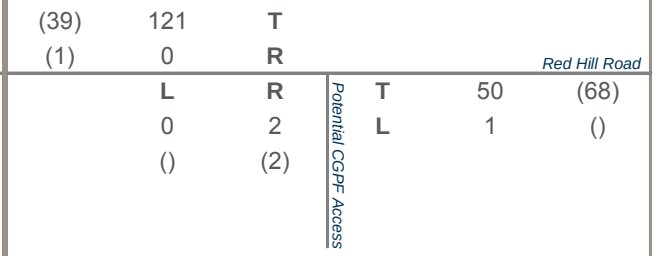
Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Baseline Traffic (Peak Hour Intersection Volumes)

Surveyed Traffic Volumes — **2013**

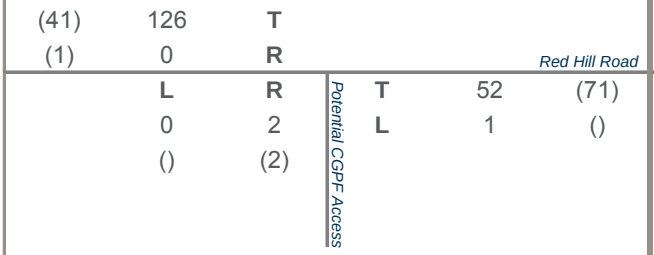
AM Peak	6:30am to 7:30am
PM Peak	5:15pm to 6:15pm





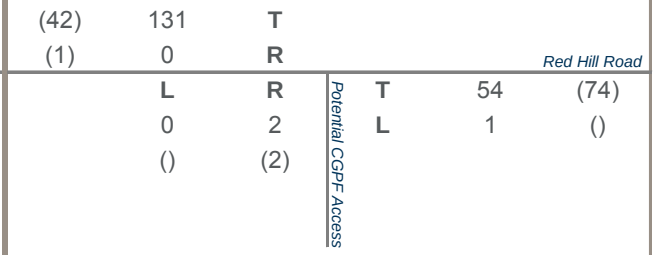
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2015	4.23%	1.08

2016



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2016	4.23%	1.13

2017



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2017	4.23%	1.17

Legend

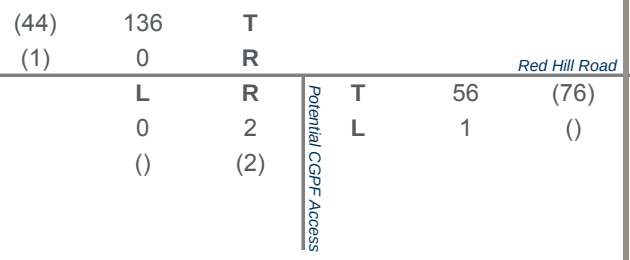
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

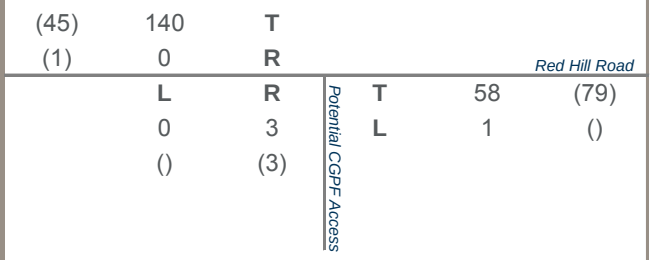
Baseline Traffic (Peak Hour Intersection Volumes)

2018



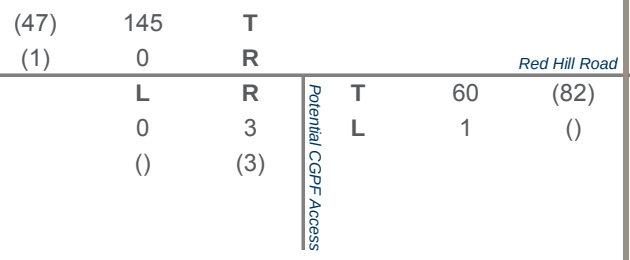
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2018	4.23%	1.21

2019



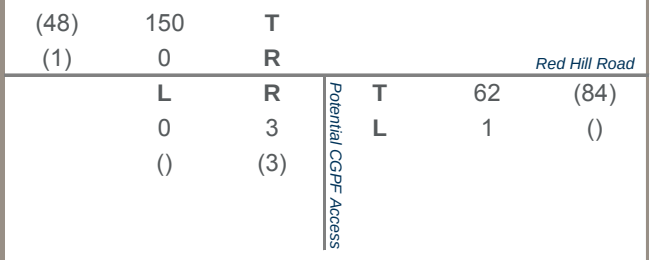
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2019	4.23%	1.25

2020



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2020	4.23%	1.30

2021



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2021	4.23%	1.34

Legend

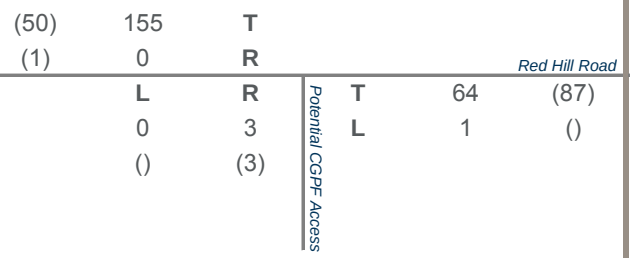
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

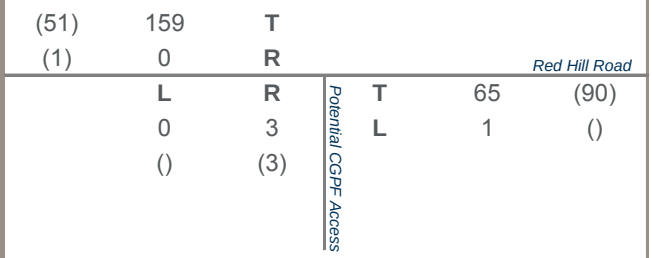
Baseline Traffic (Peak Hour Intersection Volumes)

2022



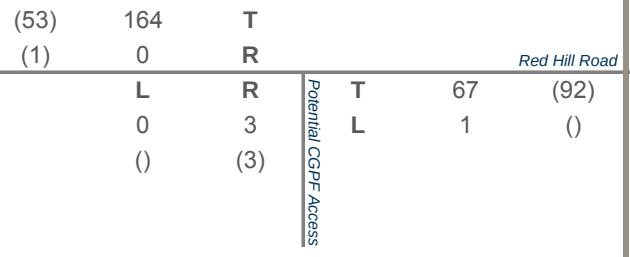
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2022	4.23%	1.38

2023



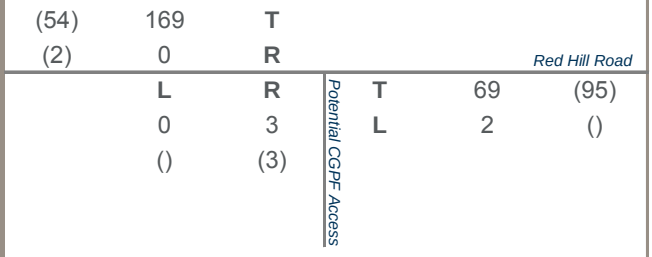
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2023	4.23%	1.42

2024



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2024	4.23%	1.47

2025



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2025	4.23%	1.51

Legend

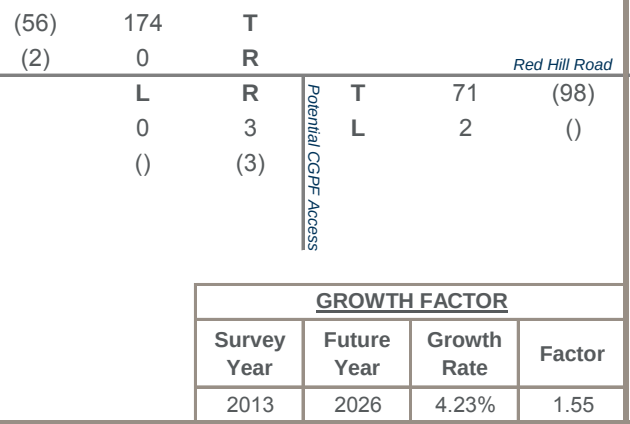
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

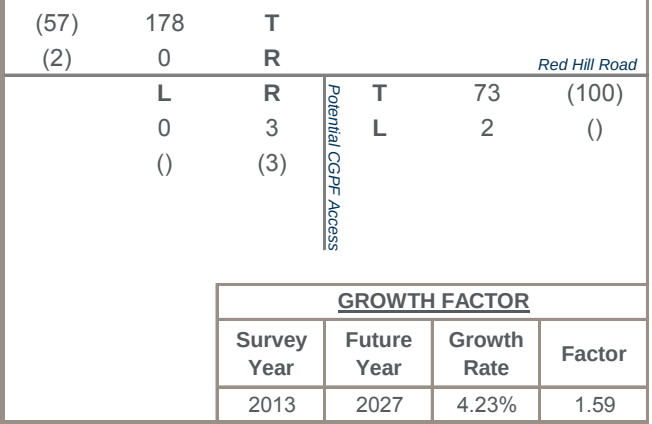
Baseline Traffic (Peak Hour Intersection Volumes)

2026



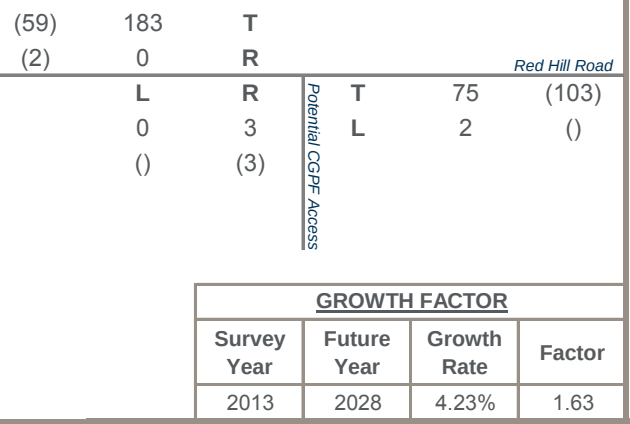
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2026	4.23%	1.55

2027



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2027	4.23%	1.59

2028



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2028	4.23%	1.63

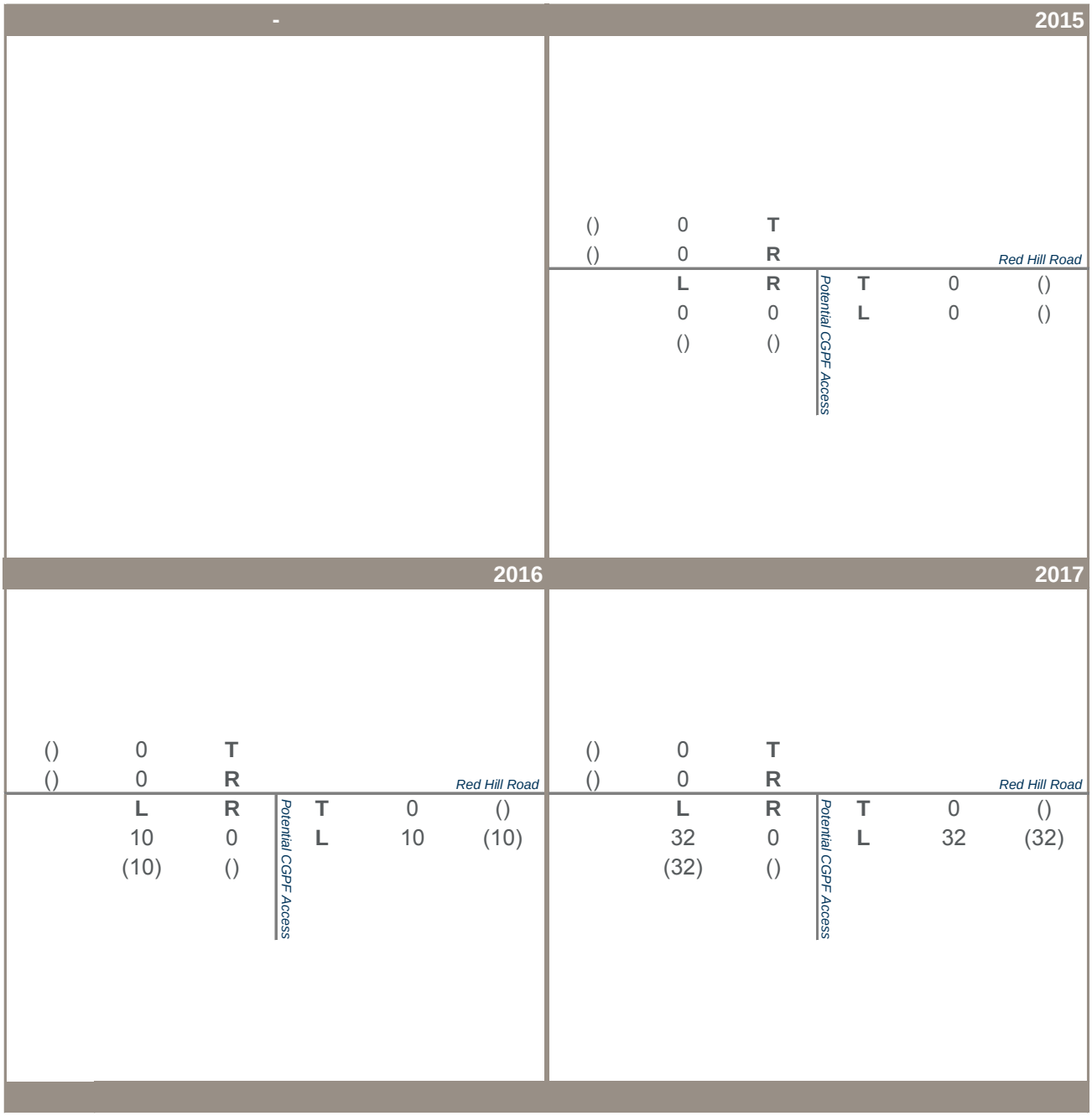
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Project Traffic (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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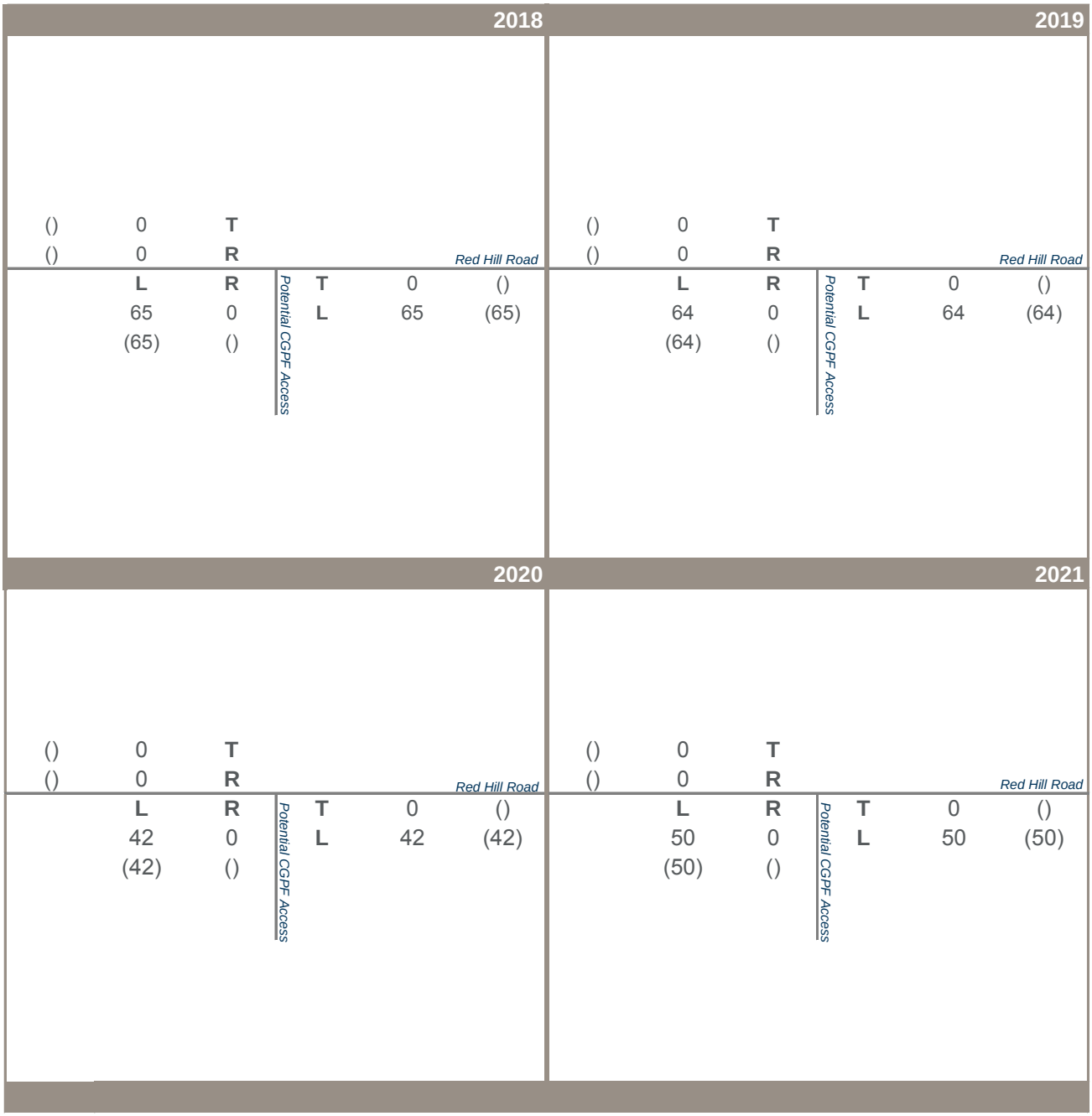
Project Traffic (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

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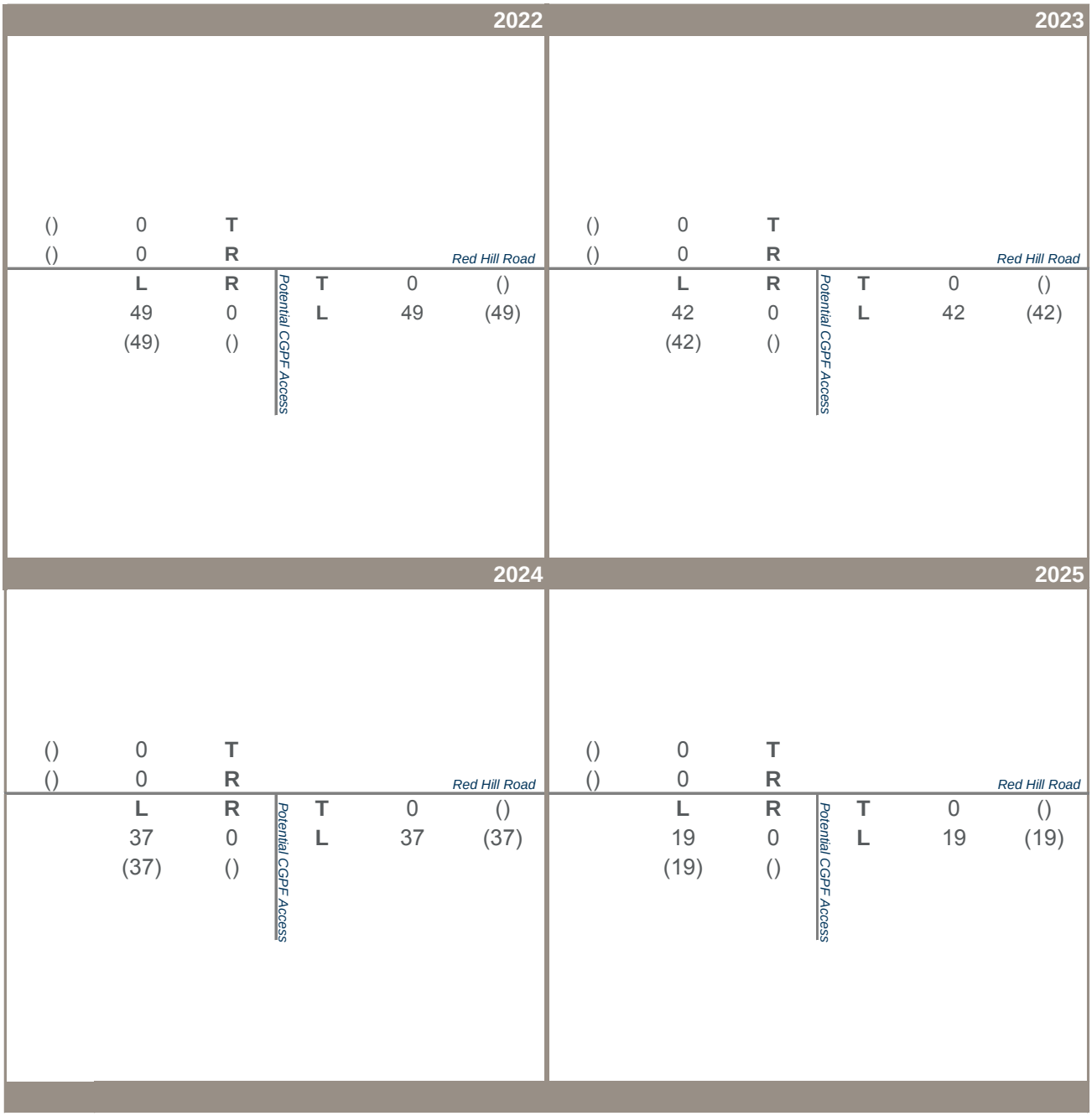
Project Traffic (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

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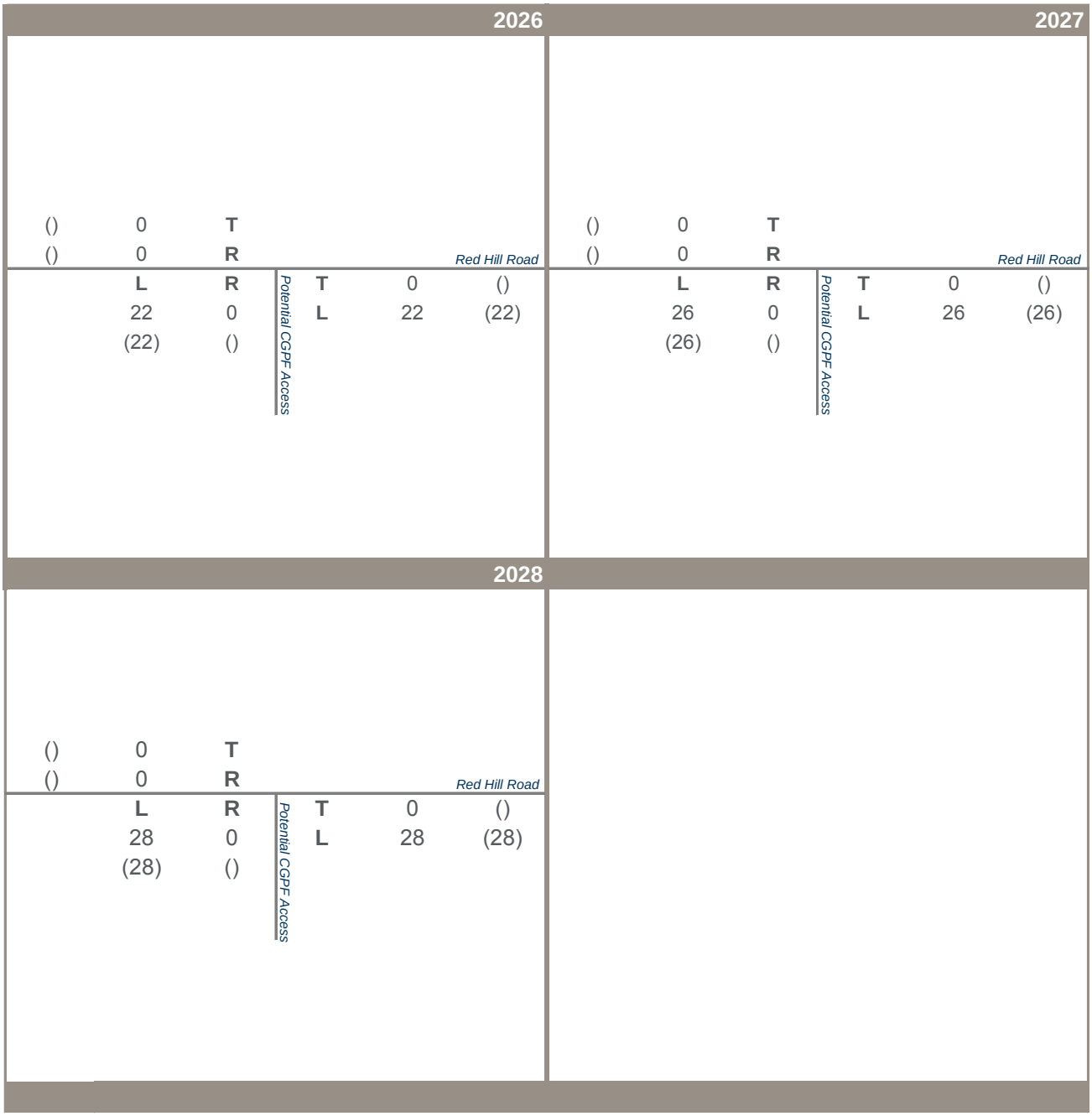
Project Traffic (Peak Hour Intersection Volumes)



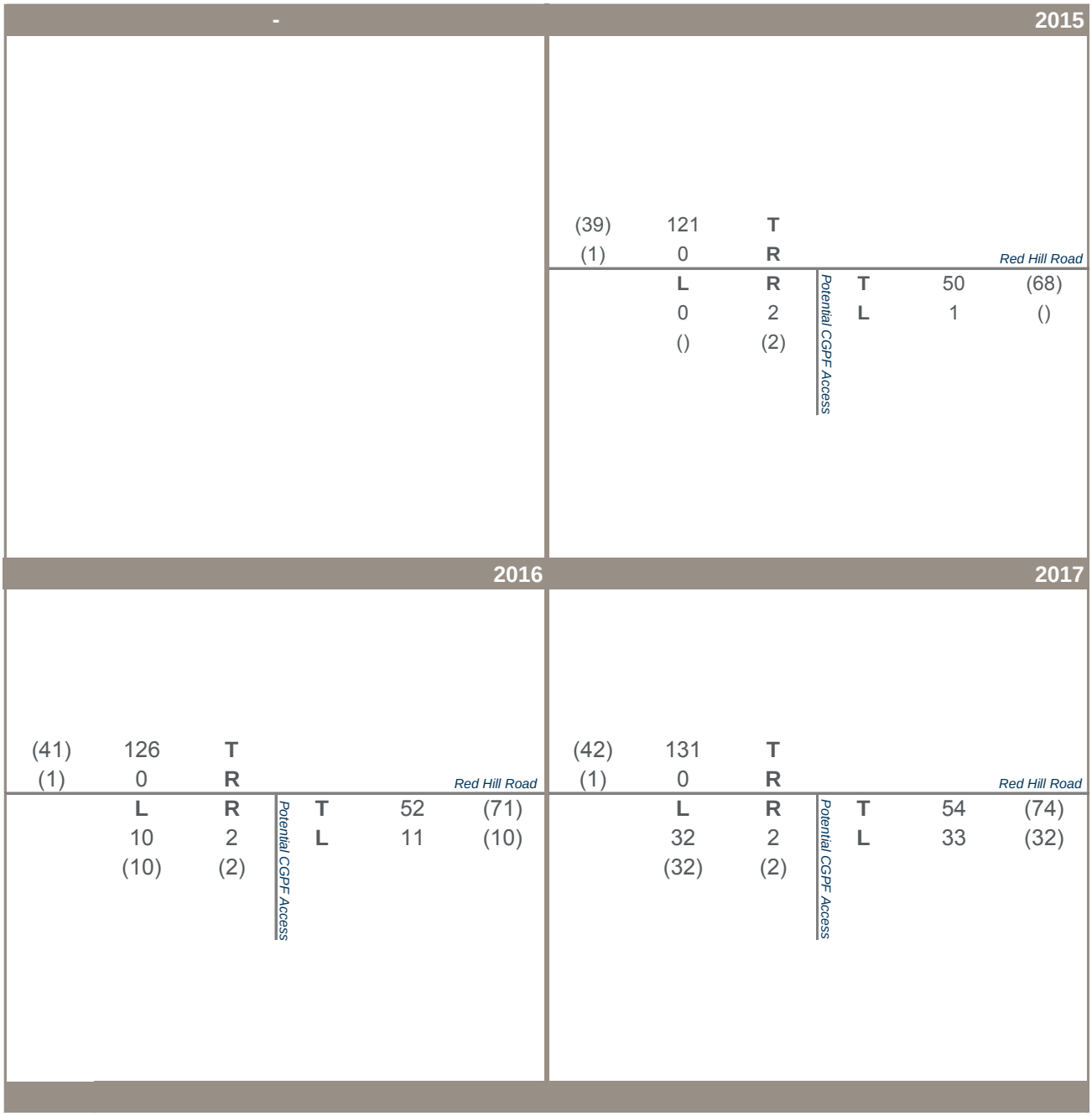
Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

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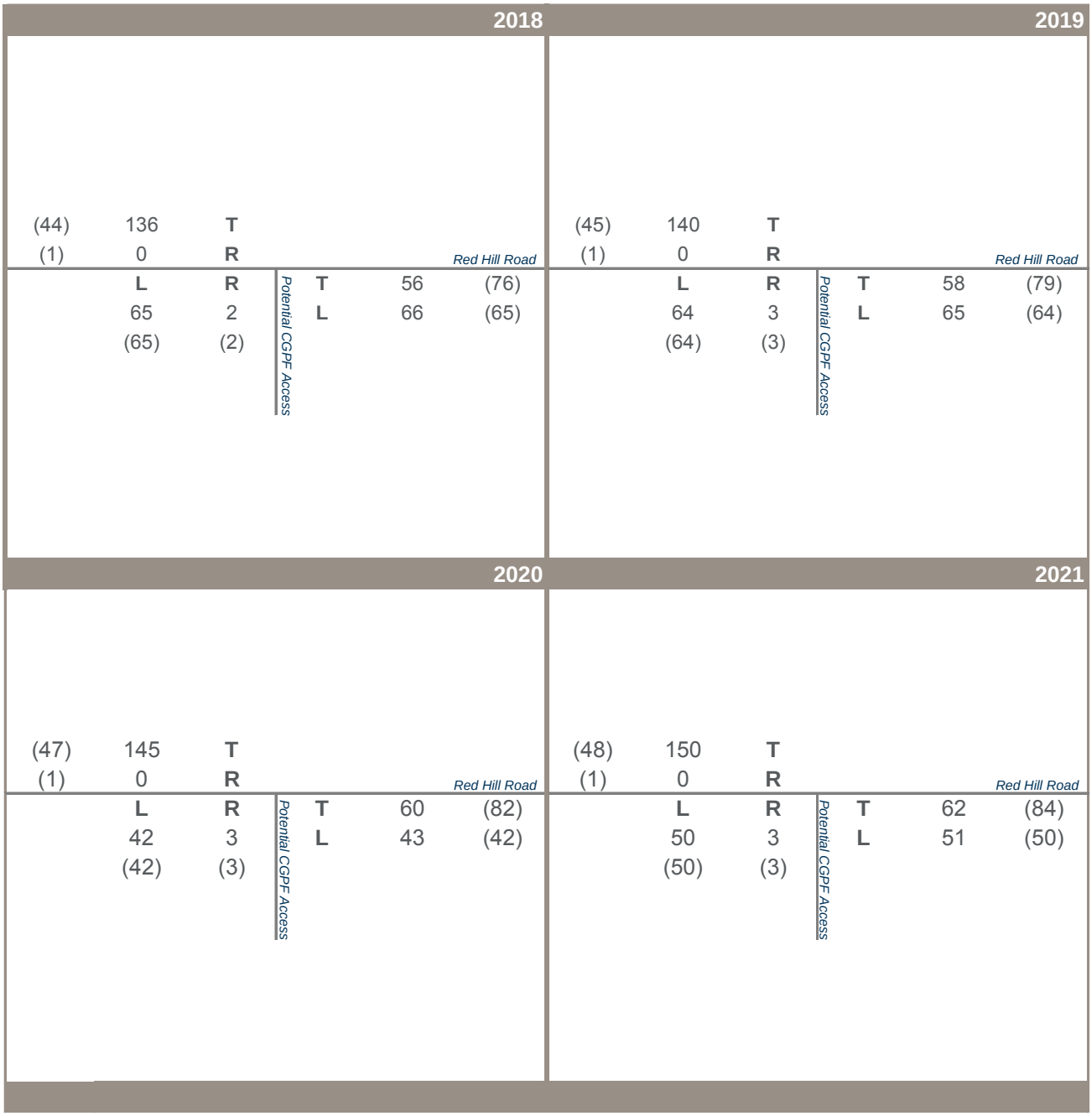
Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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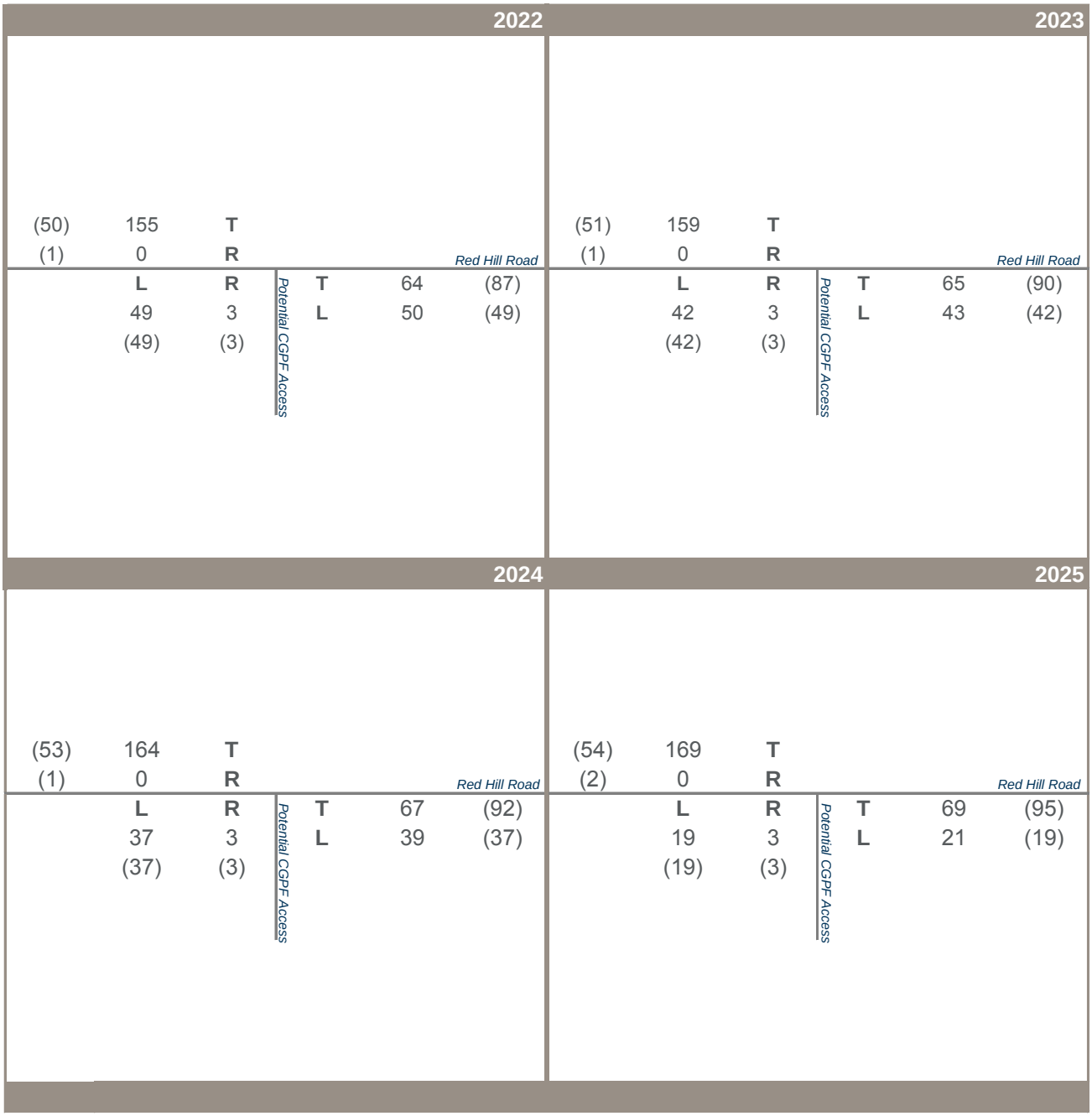
Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

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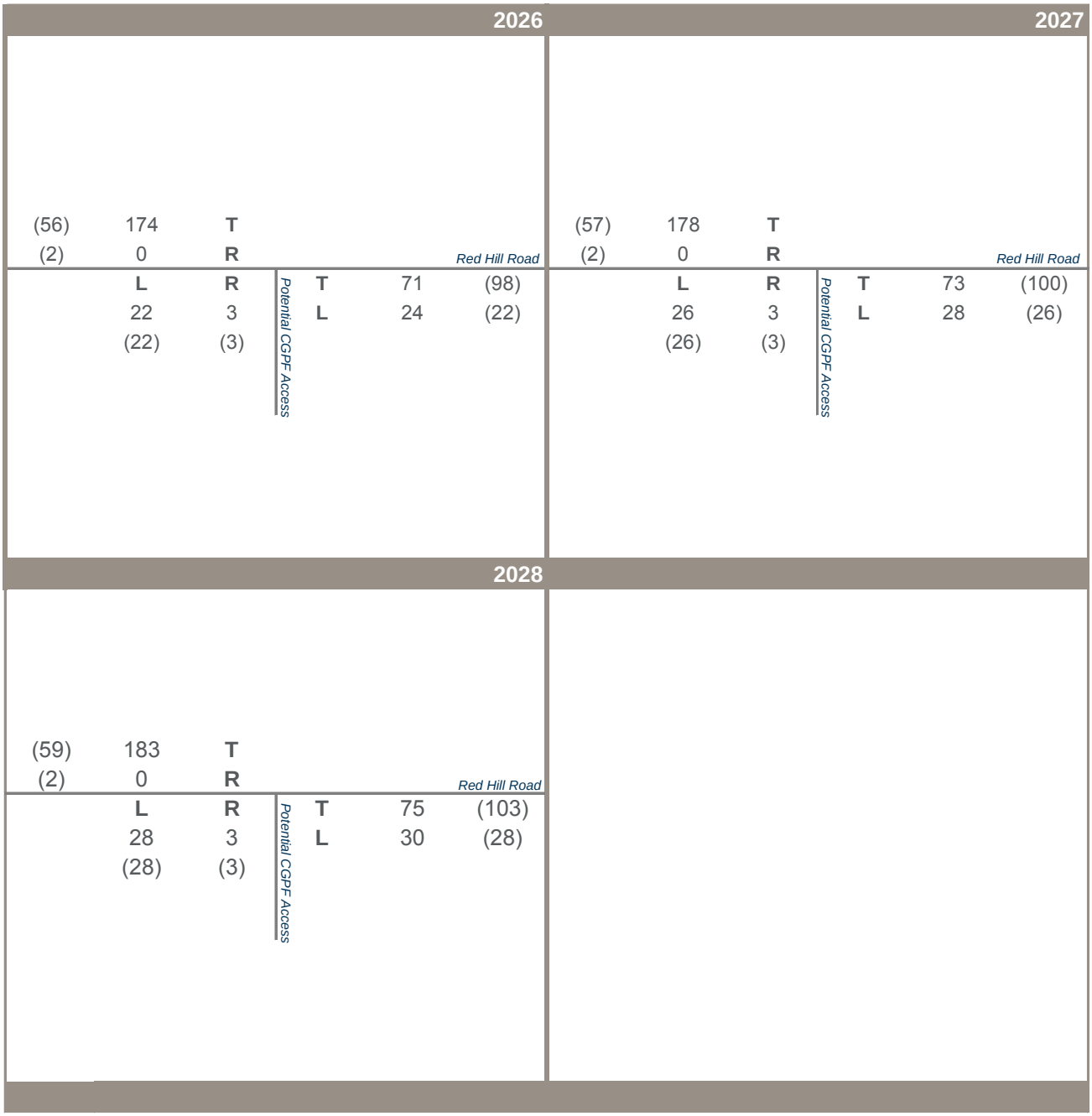
Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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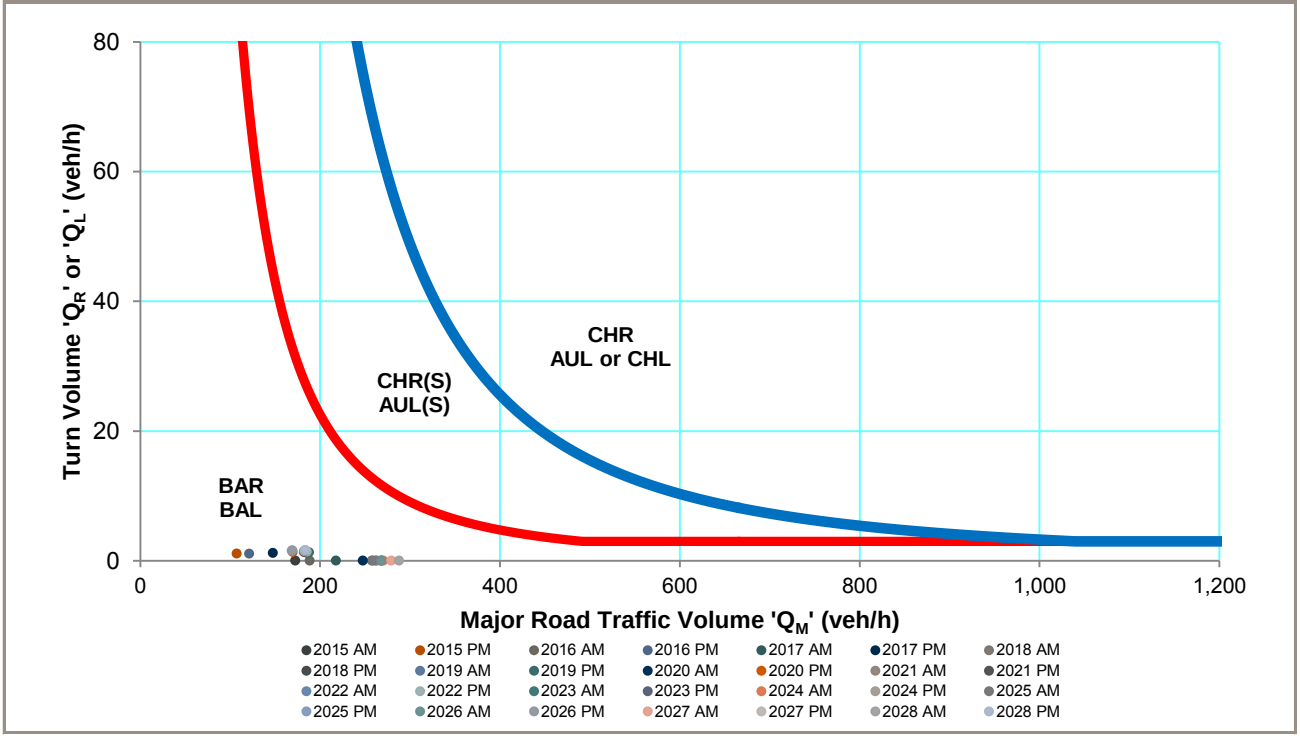
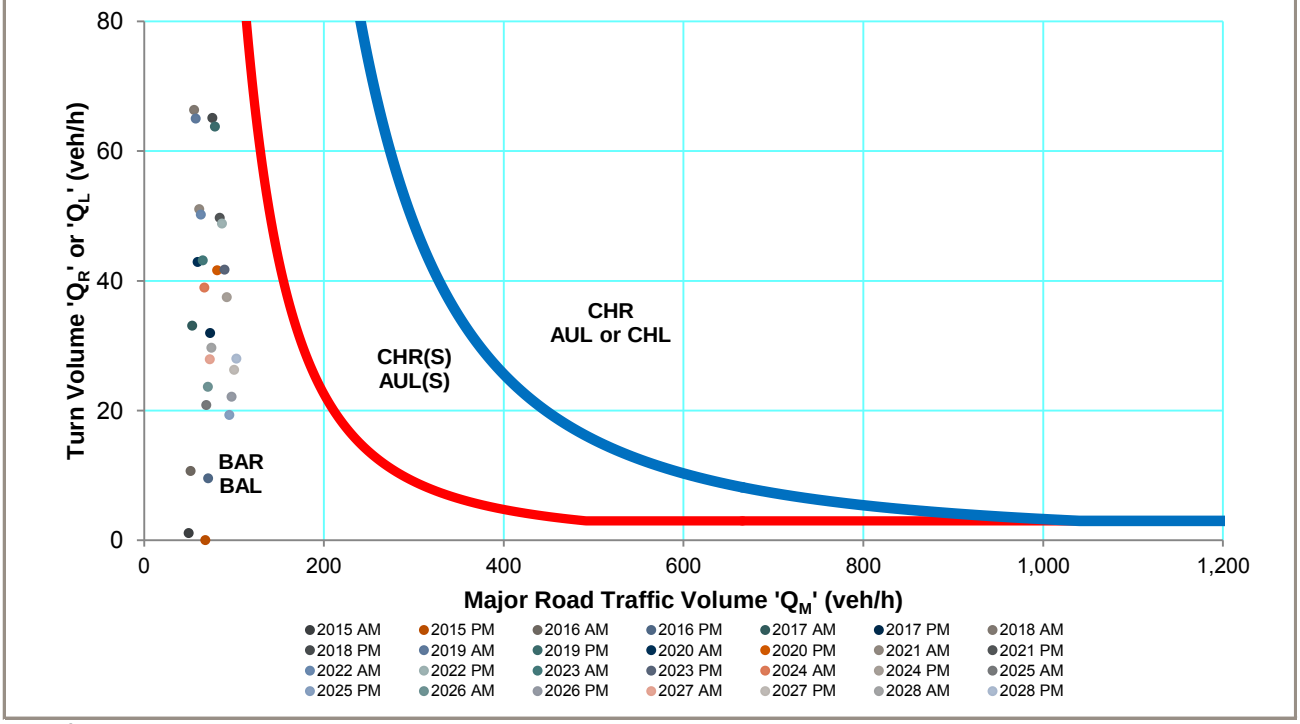
Turn Warrant Assessment

Right Turn



Left Turn



Legend

BAR	Basic Right Turn	**BAL**	Basic Left Turn
CHR	Channelised Right Turn	**CHL**	Channelised Left Turn
CHR(S)	Channelised Right Turn (short)	**CHL(S)**	Channelised Left Turn (short)

Intersection 3 - Red Hill Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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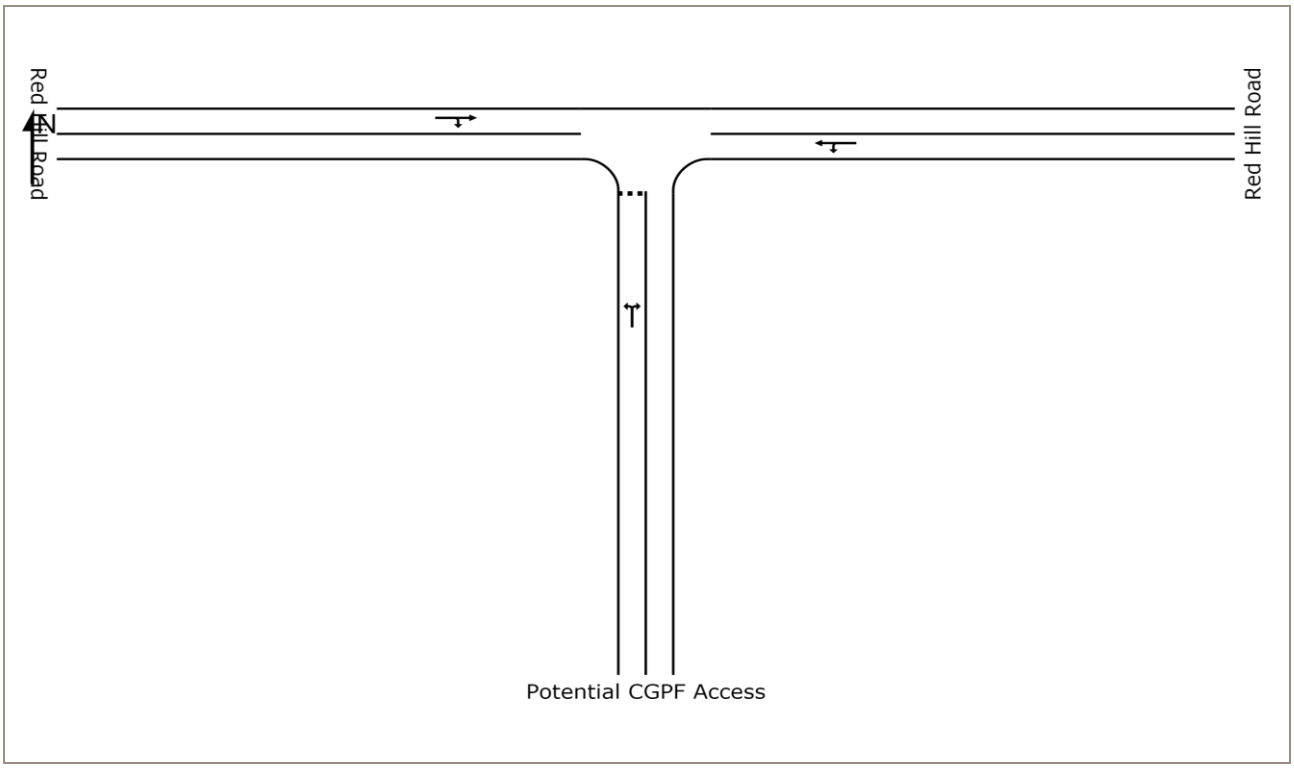
Operational Analysis: Intersection Configuration



Operational Analysis: Summary of Results

Scenario	AM Peak			PM Peak			Accept -able
	DOS	Critical Delay	95th%ile Queue	DOS	Critical Delay	95th%ile Queue	
2013 Survey	0.08	20 sec	3m	0.04	20 sec	1m	✓
2018 Baseline and Project	0.09	20 sec	4m	0.10	20 sec	2m	✓
2028 Baseline and Project	0.13	20 sec	5m	0.09	20 sec	2m	✓

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	23 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Locality Plan

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	23 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Intersection Photos

Eastern Approach: Peak Downs Highway	
Looking West (150m from Intersection)	**Looking East from Intersection**
	

Southern Approach: Moranbah-Dysart Road	
Looking North (150m from Intersection)	**Looking South from Intersection**
	

Western Approach: Peak Downs Highway	
Looking East (150m from Intersection)	**Looking West from Intersection**
	

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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Eastern Approach: Peak Downs Highway		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	Seagull	
Right Turn Treatment	none	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Southern Approach: Moranbah-Dysart Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	Seagull	
Right Turn Treatment	Seagull	
Pavement Condition	Sealed	

Western Approach: Peak Downs Highway		
Jurisdiction	TMR	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	None	
Right Turn Treatment	Seagull	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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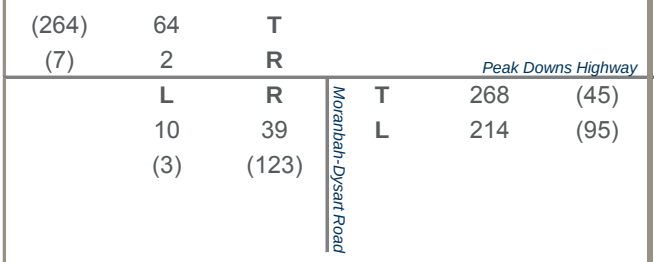
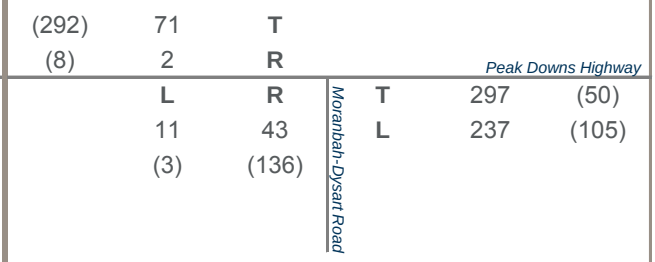
Baseline Traffic (Peak Hour Intersection Volumes)

Surveyed Traffic Volumes — **2013**

AM Peak	5:30am to 6:30am
PM Peak	5:15pm to 6:15pm



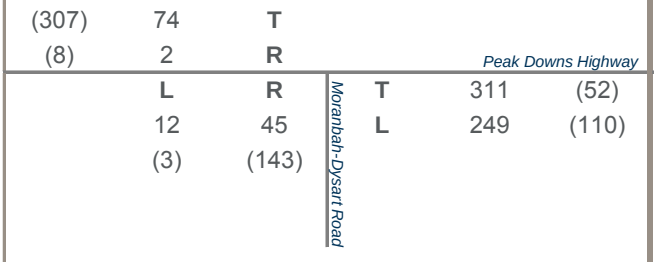
2015



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2015	5.39%	1.11

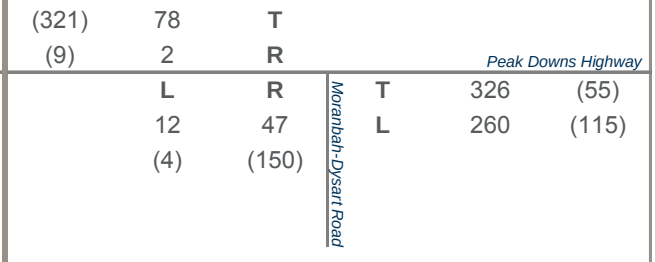
2016



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2016	5.39%	1.16

2017



GROWTH FACTOR

Survey Year	Future Year	Growth Rate	Factor
2013	2017	5.39%	1.22

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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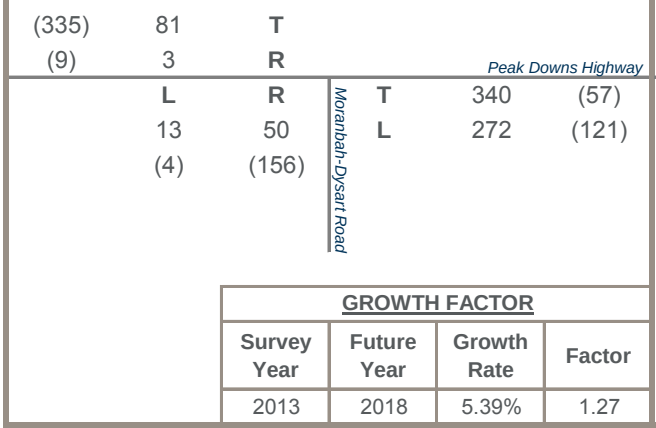
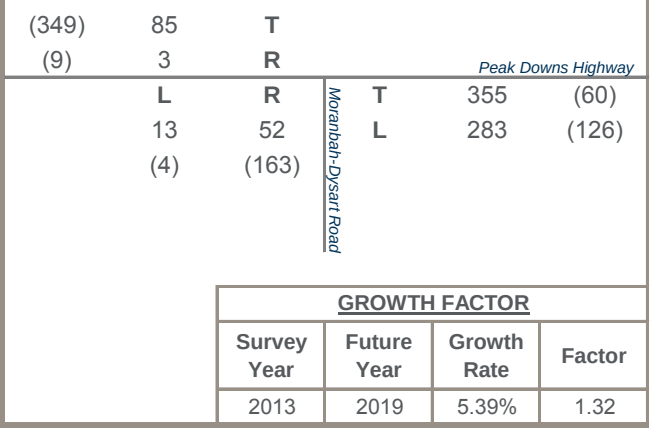
Baseline Traffic (Peak Hour Intersection Volumes)

2018



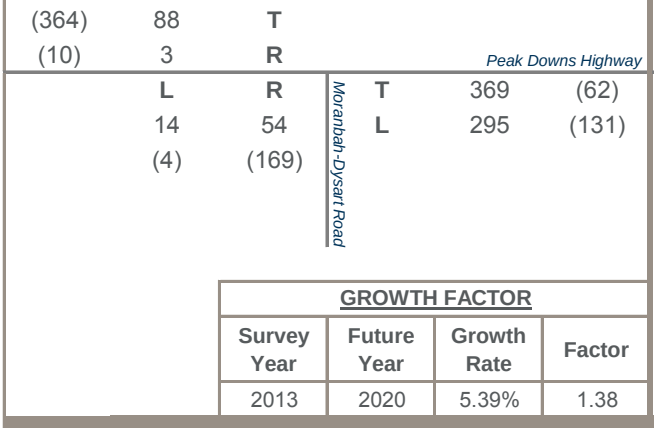
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2018	5.39%	1.27

2019



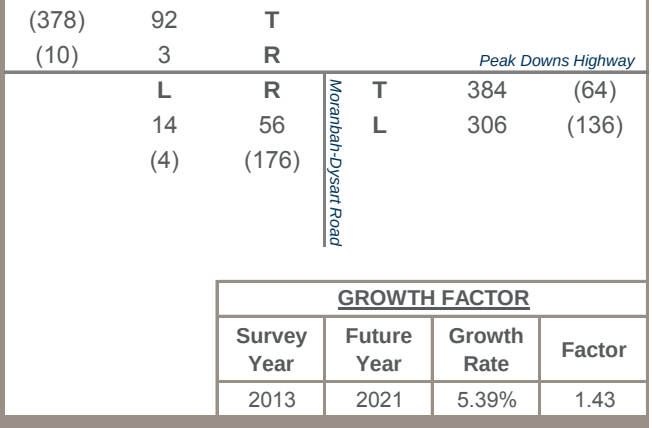
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2019	5.39%	1.32

2020



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2020	5.39%	1.38

2021



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2021	5.39%	1.43

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
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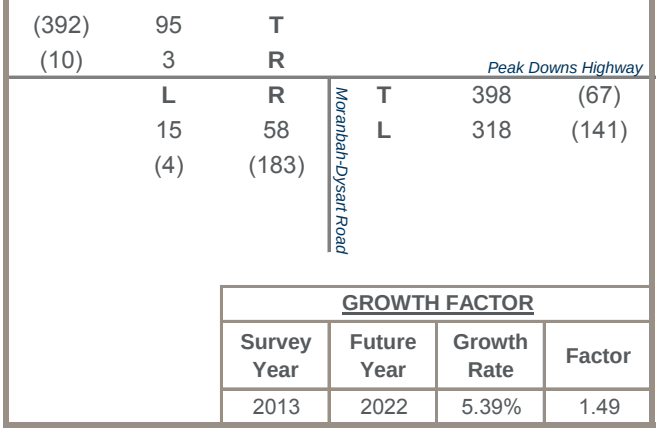
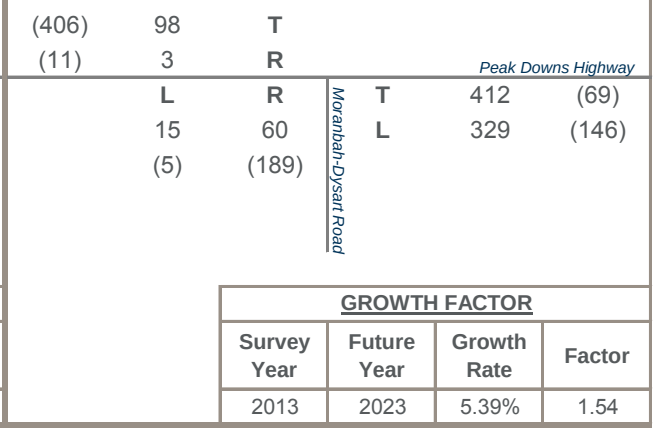
Baseline Traffic (Peak Hour Intersection Volumes)

2022



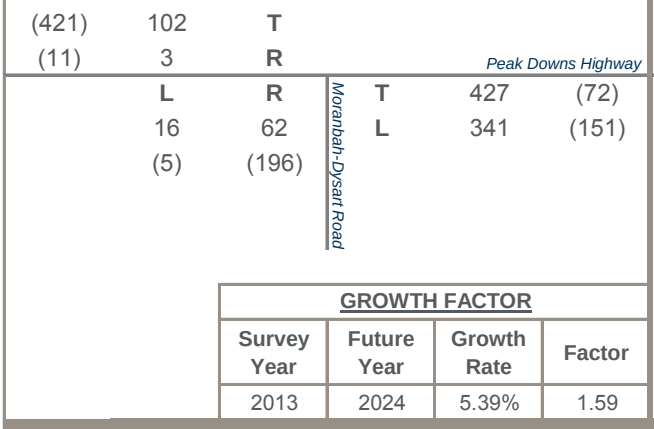
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2022	5.39%	1.49

2023



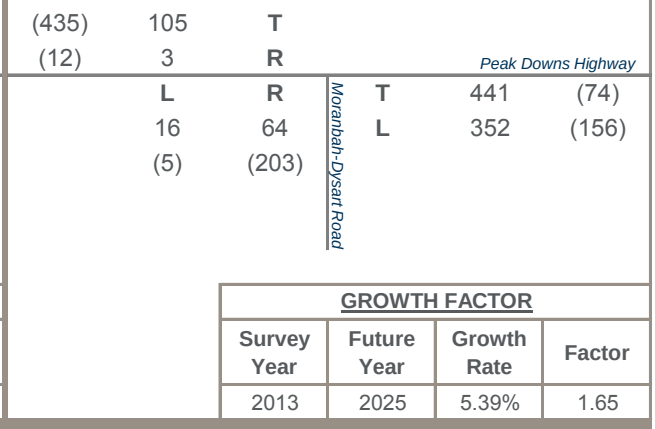
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2023	5.39%	1.54

2024



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2024	5.39%	1.59

2025



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2025	5.39%	1.65

Legend

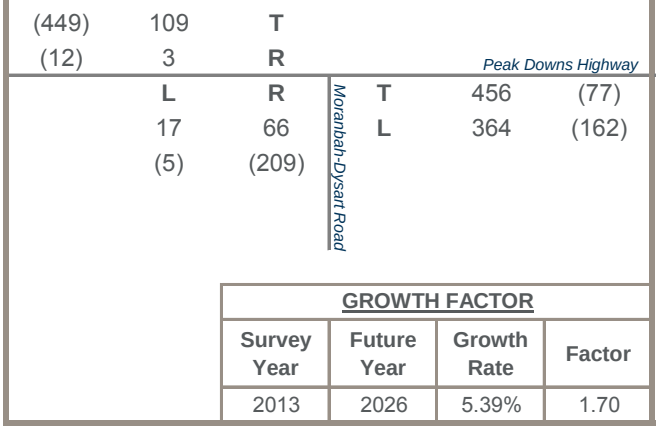
L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

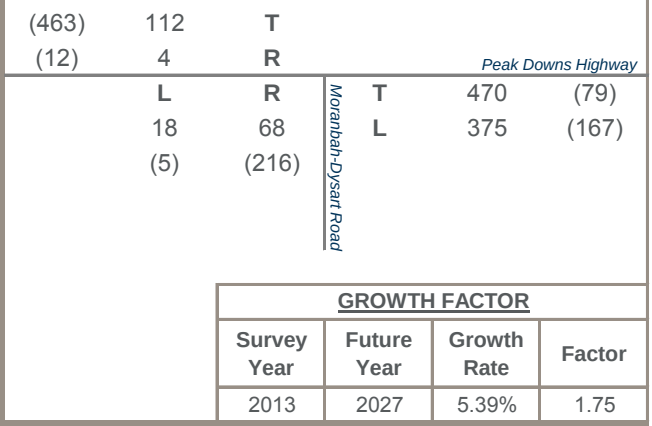
Baseline Traffic (Peak Hour Intersection Volumes)

2026



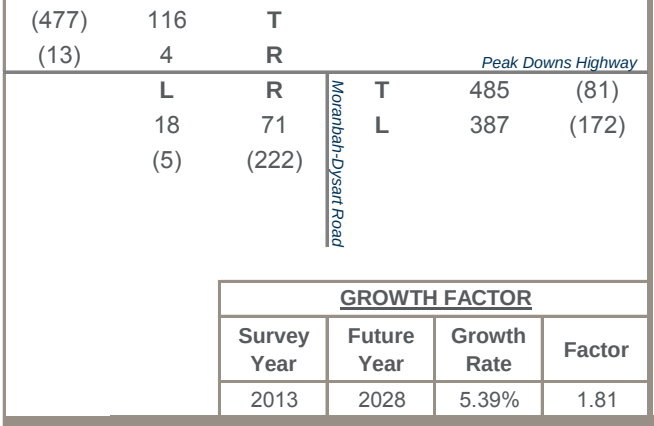
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2026	5.39%	1.70

2027



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2027	5.39%	1.75

2028



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2028	5.39%	1.81

Legend

L	Left Turn Traffic Volume
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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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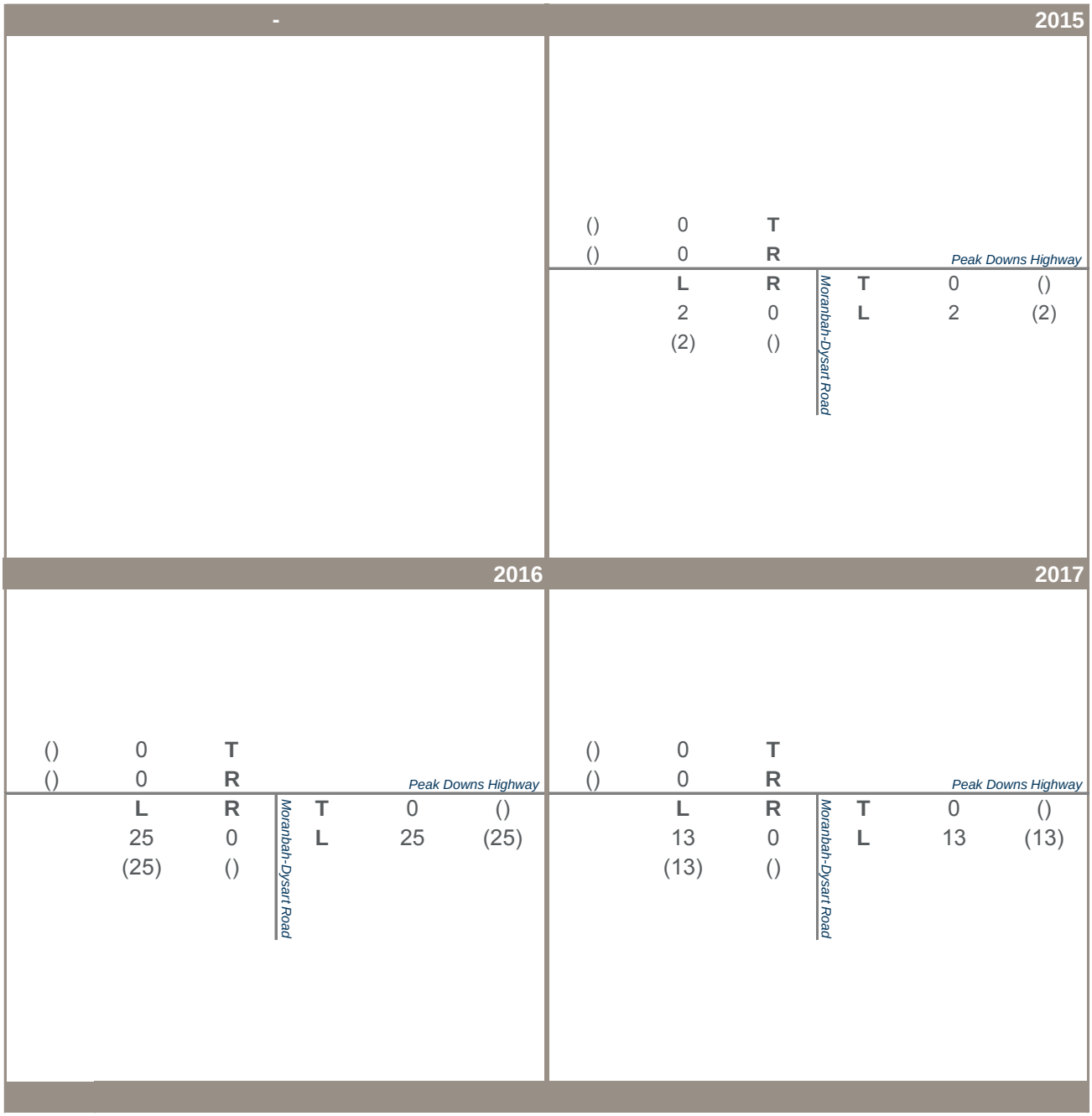
Project Traffic (Peak Hour Intersection Volumes)



Legend

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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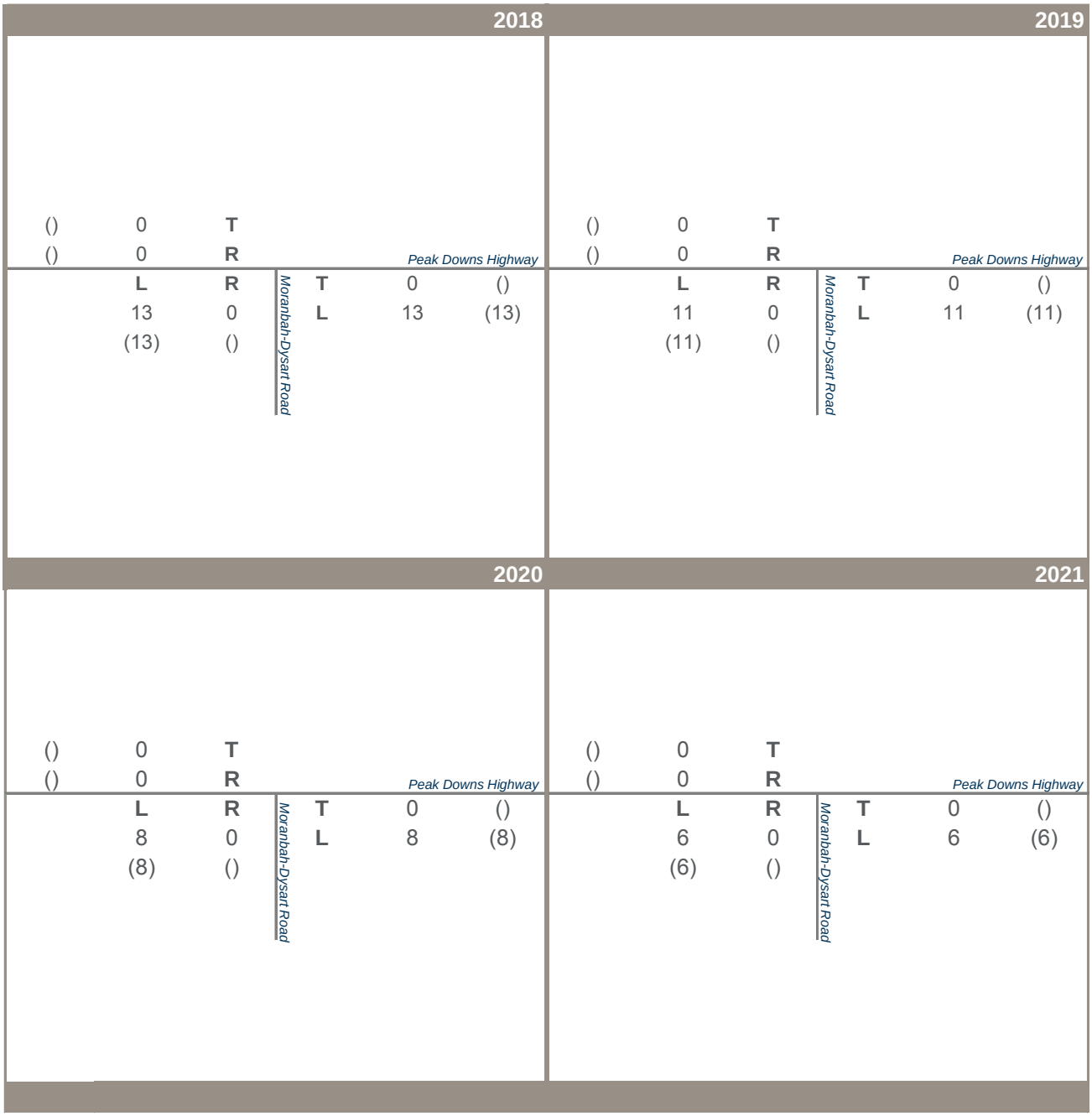

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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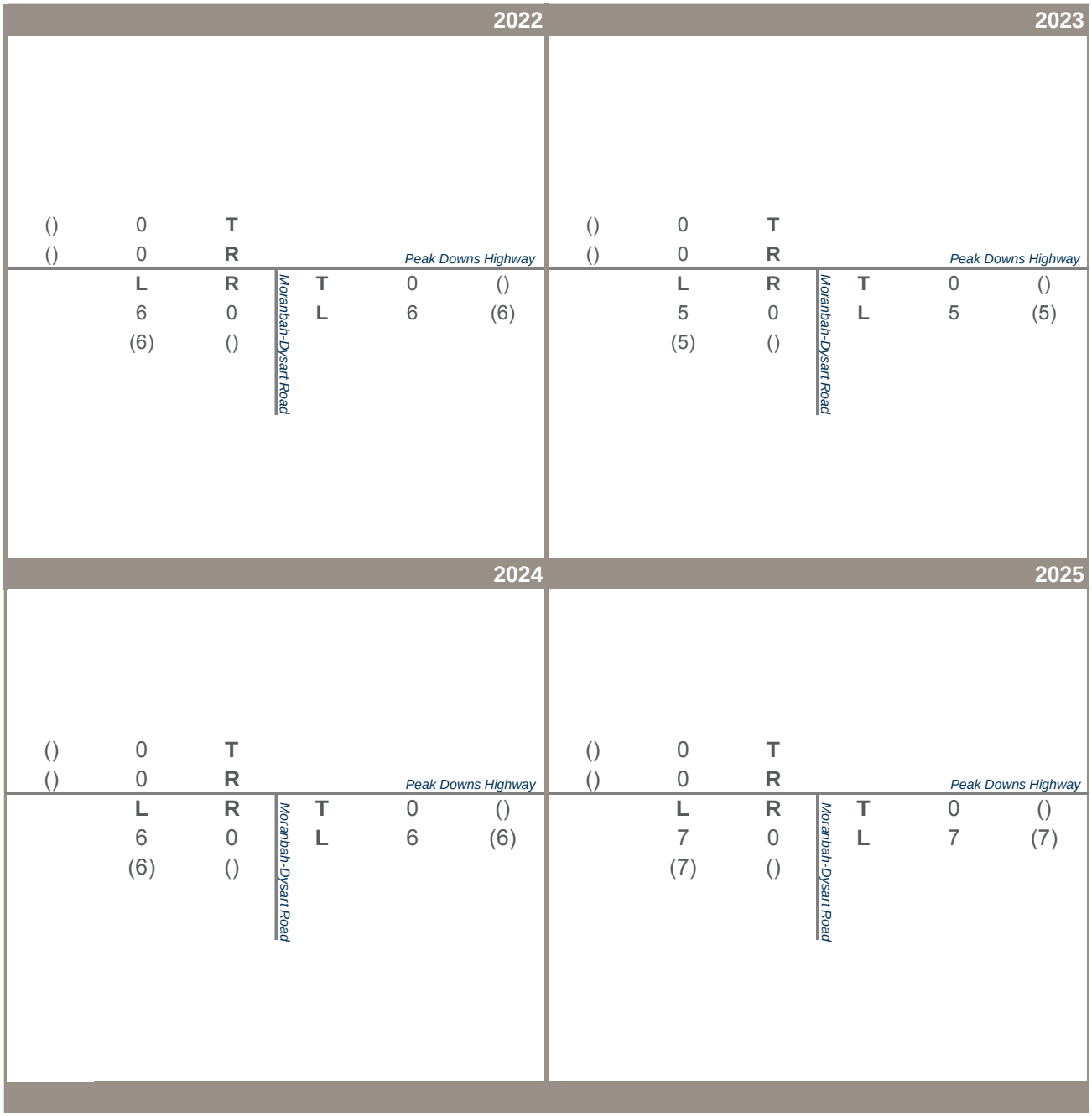

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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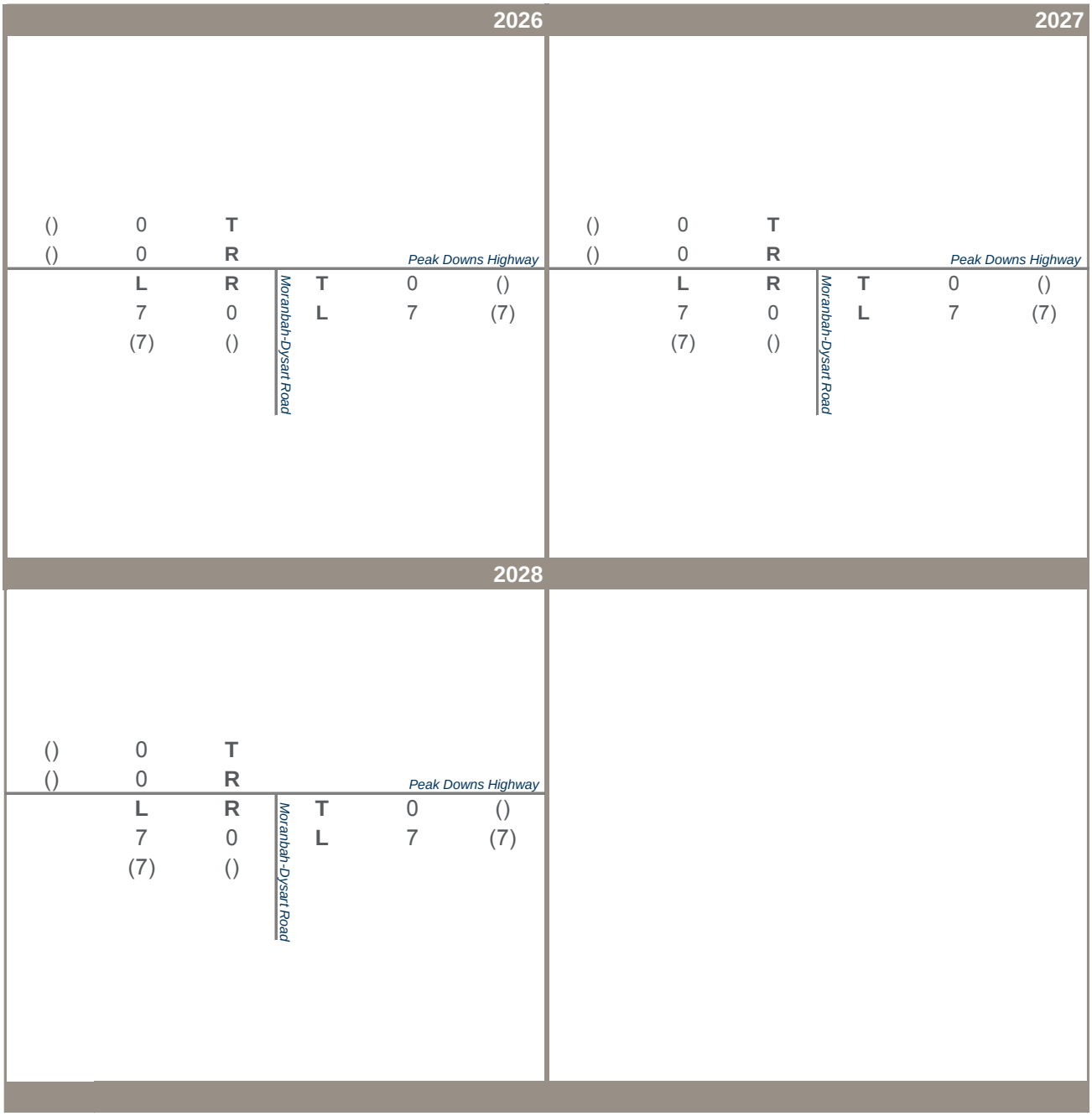

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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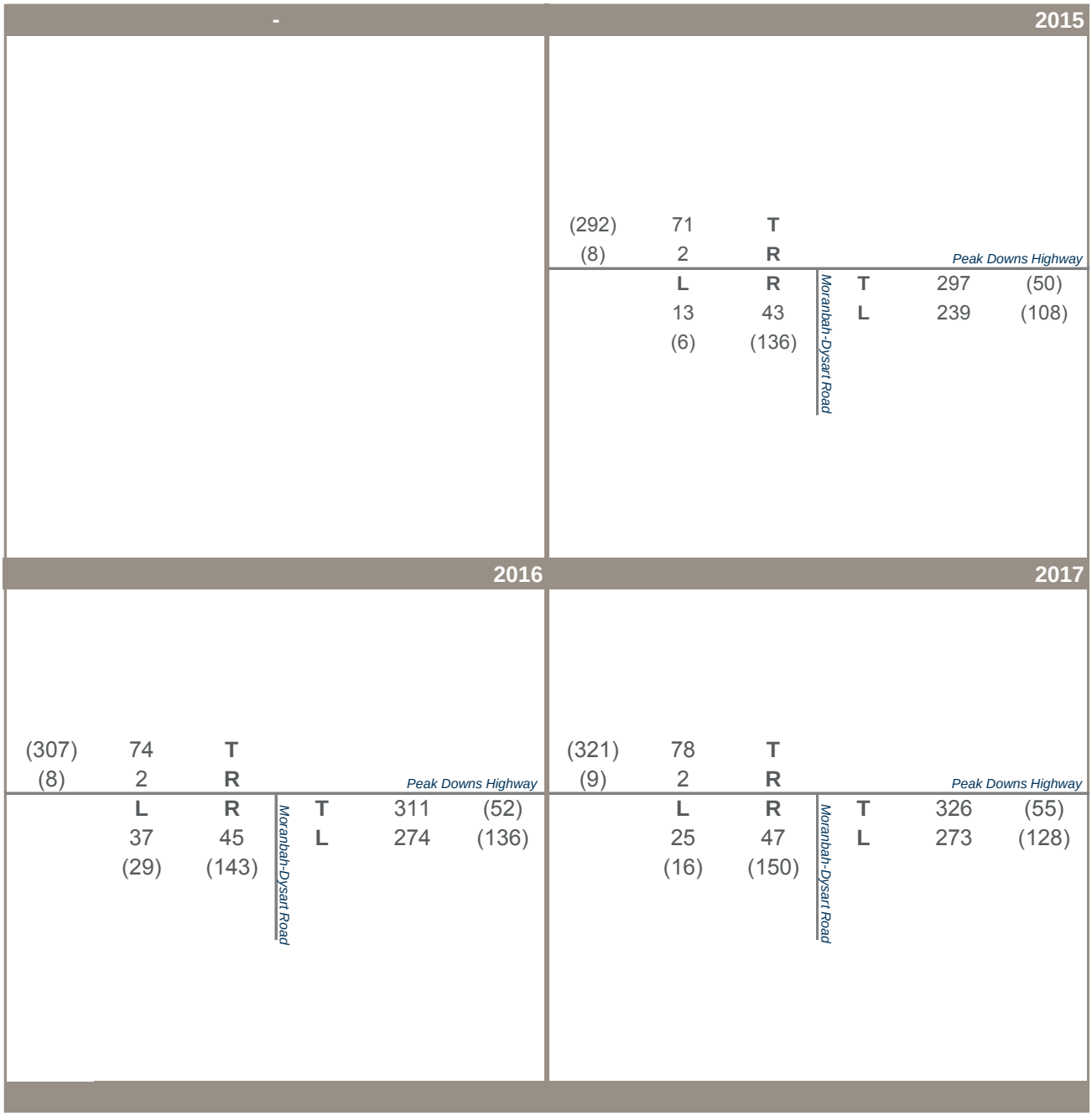
Design Traffic Volumes (Peak Hour Intersection Volumes)



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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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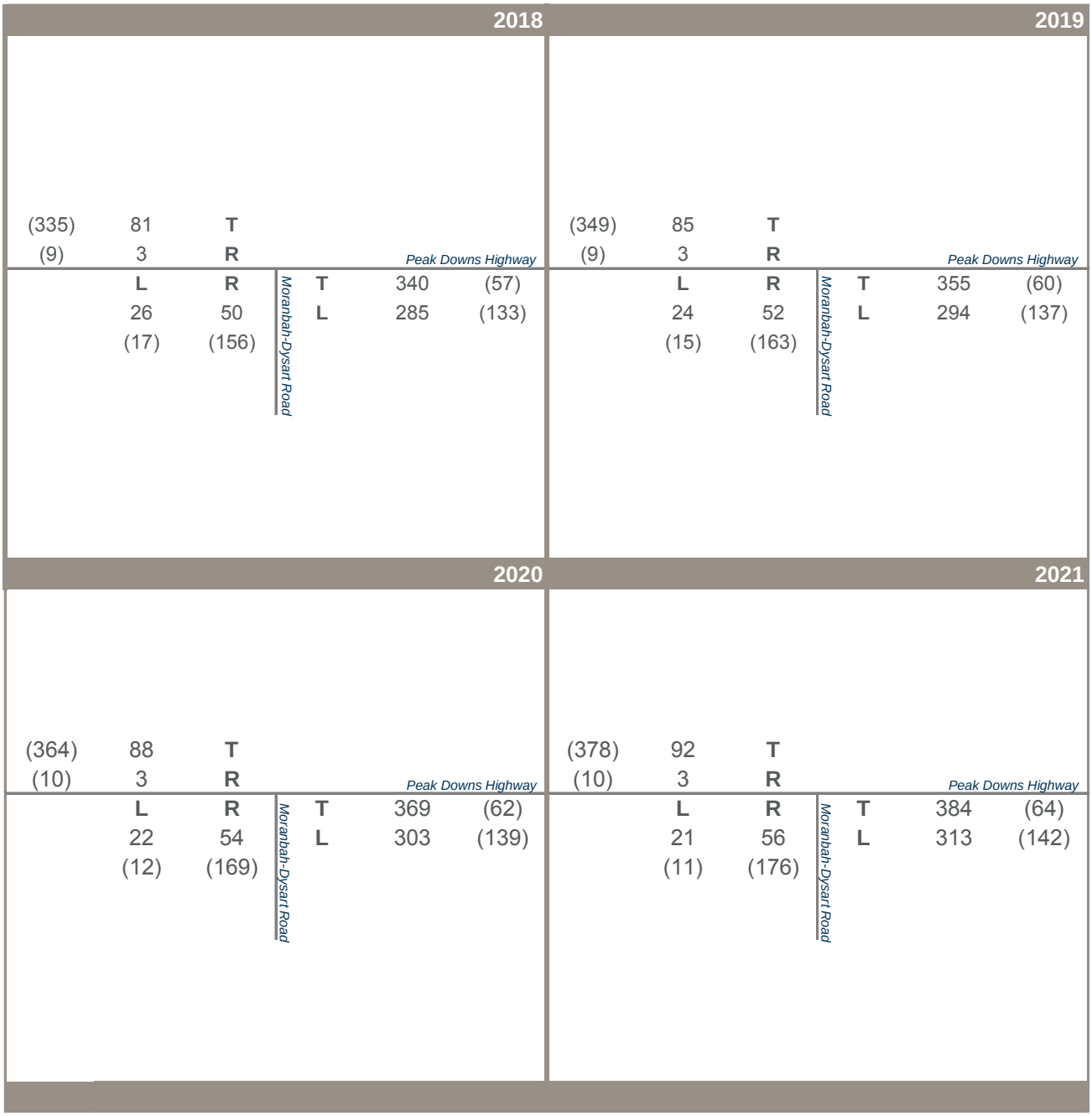

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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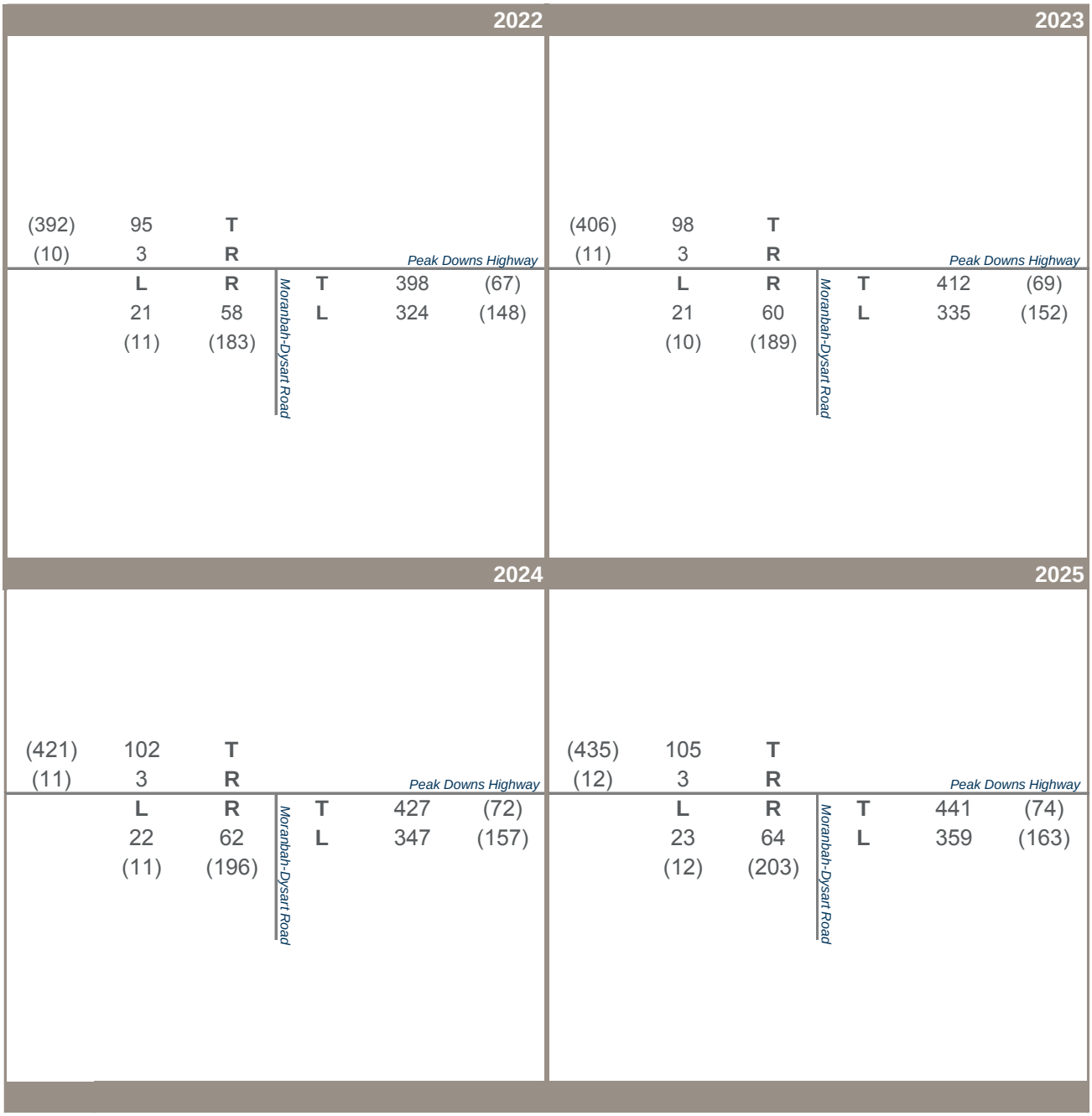

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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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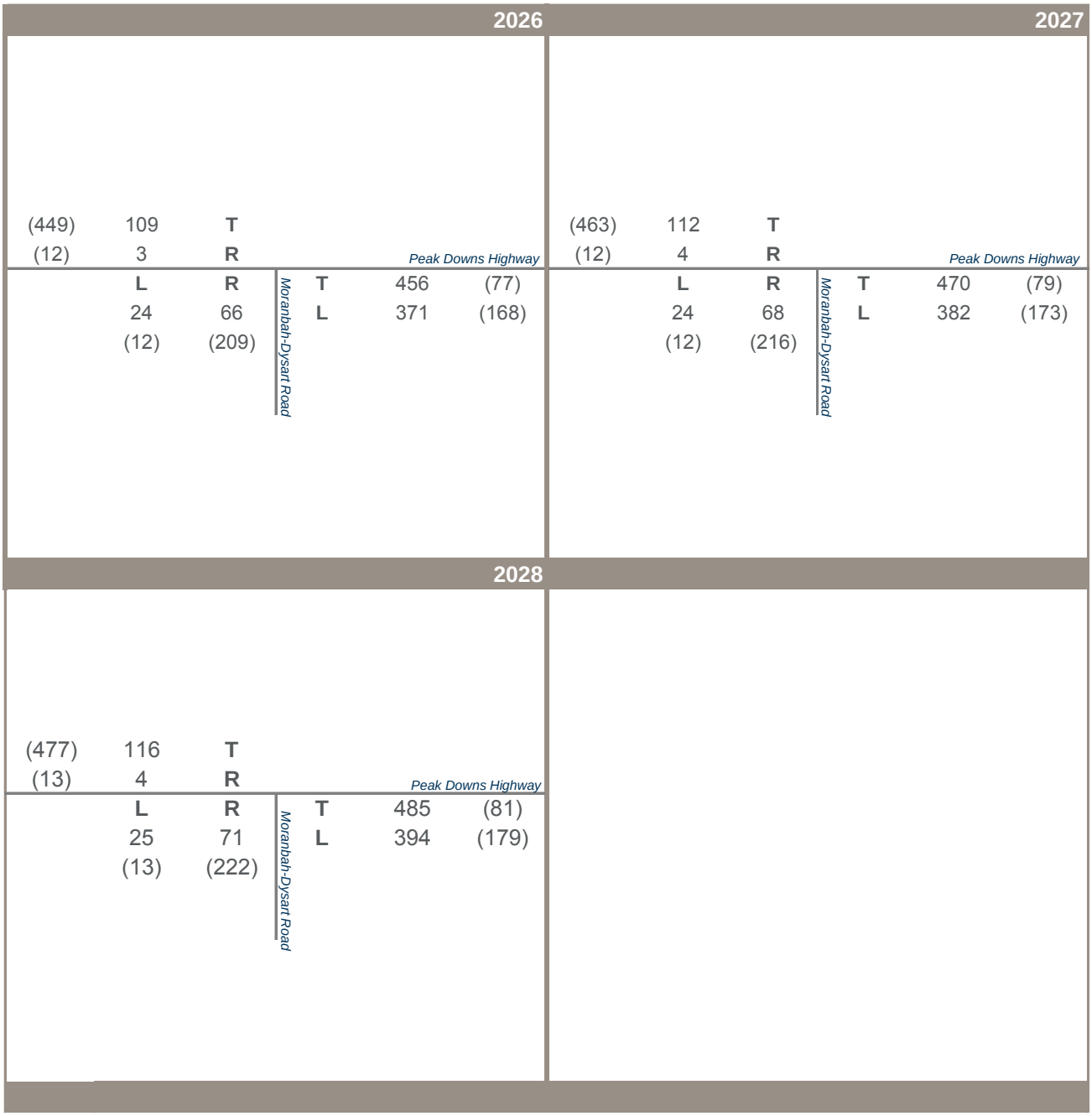

Legend

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R	Right Turn Traffic Volume
#	AM Peak Hour
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Intersection 4 - Peak Downs Highway/Moranbah-Dysart Road

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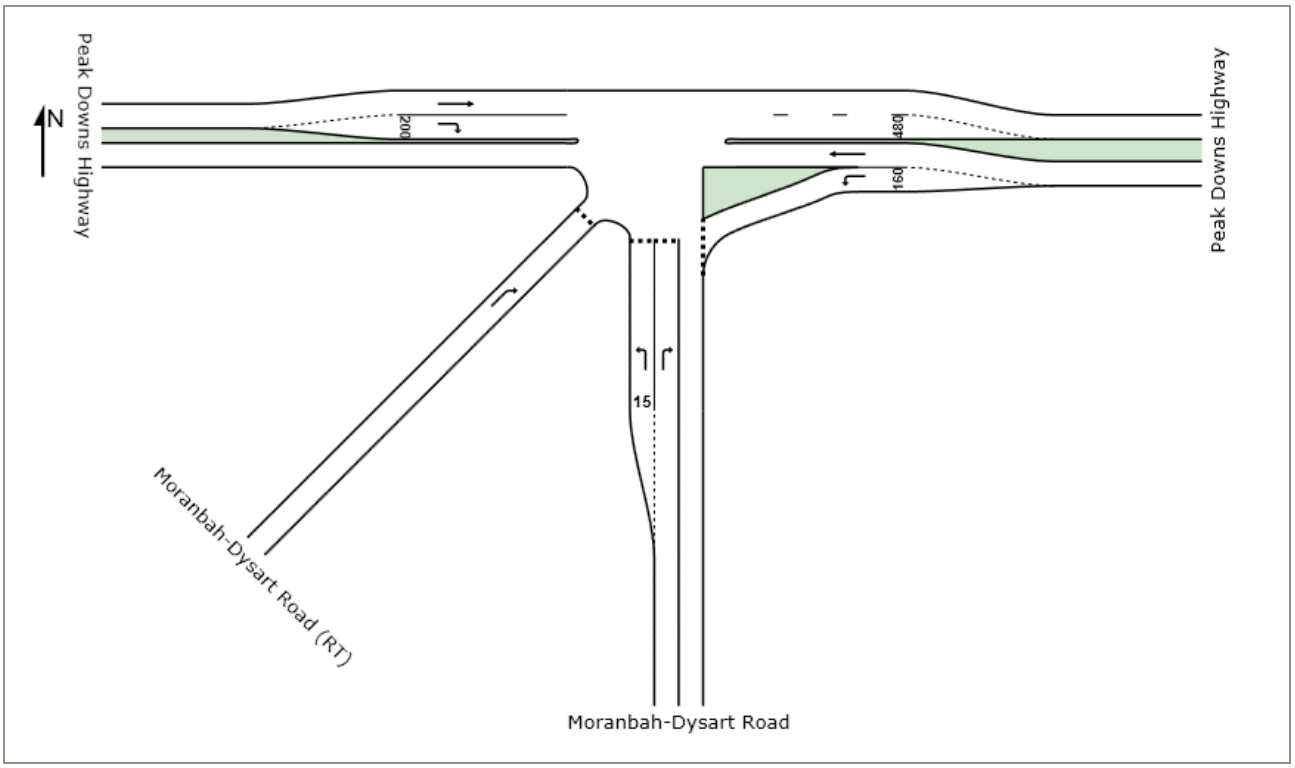
Operational Analysis: Intersection Configuration



Note: Additional right turn leg represents seagull turn treatment.

Operational Analysis: Summary of Results

Scenario	AM Peak			PM Peak			Accept -able
	DOS	Critical Delay	95th%ile Queue	DOS	Critical Delay	95th%ile Queue	
2013 Survey	0.17	21 sec	6m	0.16	20 sec	3m	✓
2018 Baseline and Project	0.21	22 sec	8m	0.21	20 sec	4m	✓
2028 Baseline and Project	0.30	23 sec	12m	0.30	20 sec	6m	✓

Intersection 5 - Moranbah-Dysart Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	23 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Locality Plan

Intersection 5 - Moranbah-Dysart Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	23 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Aerial Photo

Intersection 5 - Moranbah-Dysart Road/Potential CGPF Access

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Intersection Photos

Northern Approach: Moranbah-Dysart Road	
Looking South (150m from Intersection)	**Looking North from Intersection**
	

Eastern Approach: Potential CGPF Access	
Looking West (150m from Intersection)	**Looking East from Intersection**
	

Southern Approach: Moranbah-Dysart Road	
Looking North (150m from Intersection)	**Looking South from Intersection**
	

Intersection 5 - Moranbah-Dysart Road/Potential CGPF Access

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Northern Approach: Moranbah-Dysart Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	none	
Right Turn Treatment	n/a	
Safe Intersection Sight Distance	290m +	
Pavement Condition	Sealed	

Eastern Approach: Potential CGPF Access		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	n/a	
Pavement Condition	Gravel	

Southern Approach: Moranbah-Dysart Road		
Jurisdiction	IRC	
Speed Limit	100km/hr	Default Rural Speed Limit
Left Turn Treatment	n/a	
Right Turn Treatment	none	
Safe Intersection Sight Distance	300m +	
Pavement Condition	Sealed	

Intersection 5 - Moranbah - Dysart Road/Potential CGPF Access

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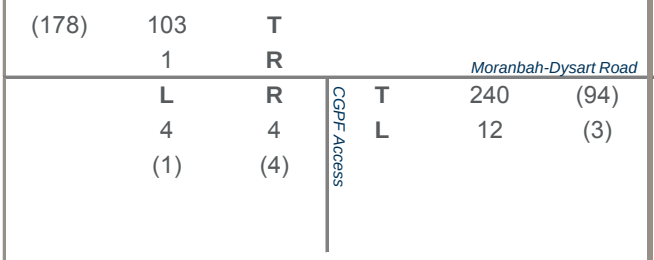
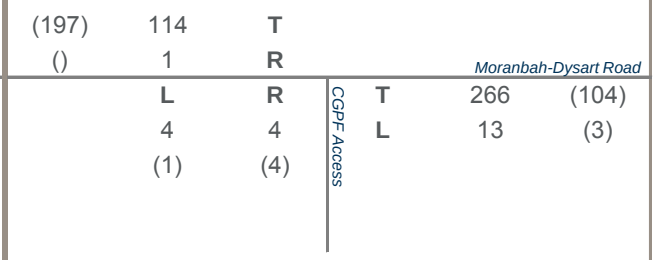
Baseline Traffic (Peak Hour Intersection Volumes)

Surveyed Traffic Volumes — **2013**

AM Peak	5:45am to 6:45am
PM Peak	5:45pm to 6:45pm

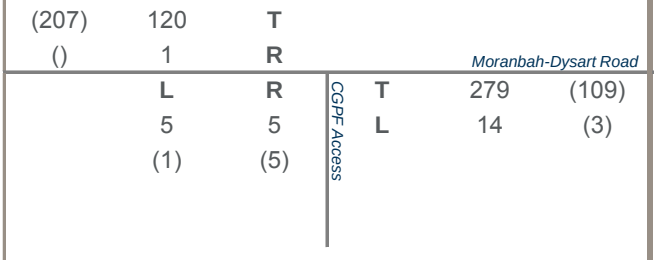




2015

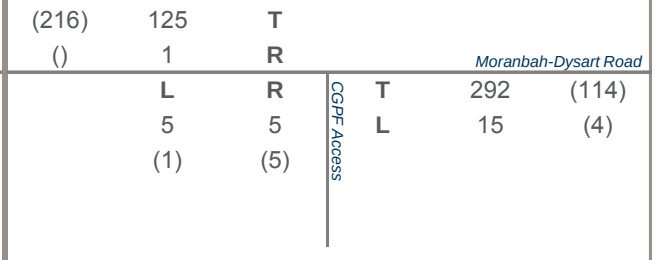
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2015	5.39%	1.11

2016



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2016	5.39%	1.16

2017



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2017	5.39%	1.22

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 5 - Moranbah - Dysart Road/Potential CGPF Access

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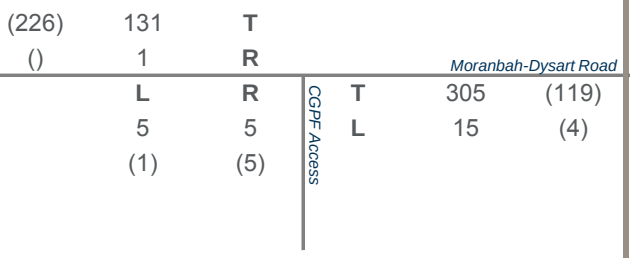
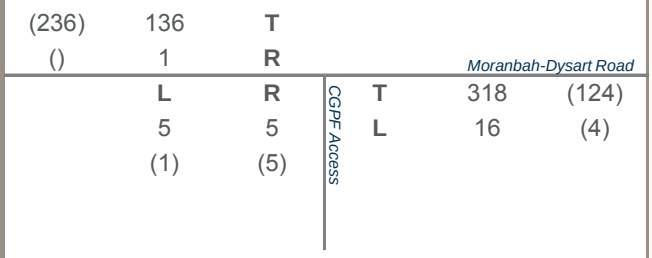
Baseline Traffic (Peak Hour Intersection Volumes)

2018



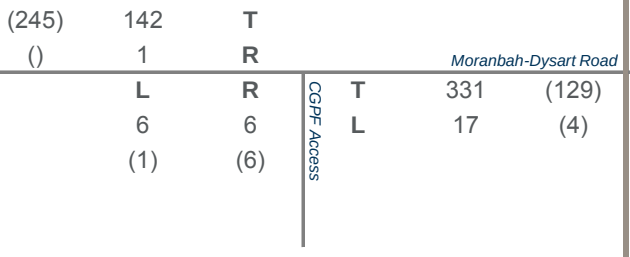
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2018	5.39%	1.27

2019



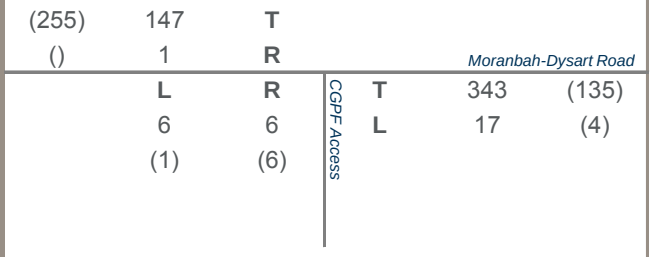
GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2019	5.39%	1.32

2020



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2020	5.39%	1.38

2021



GROWTH FACTOR			
Survey Year	Future Year	Growth Rate	Factor
2013	2021	5.39%	1.43

Legend

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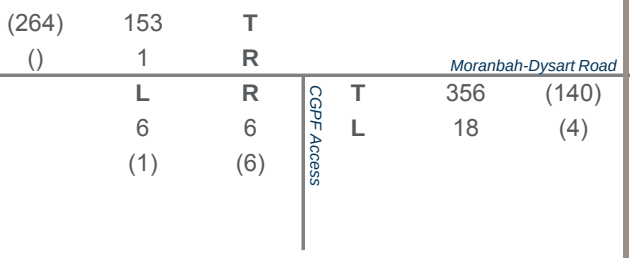
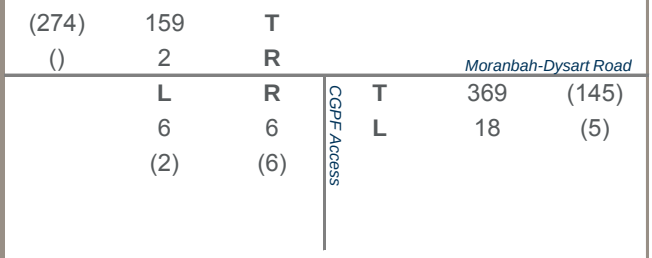
Baseline Traffic (Peak Hour Intersection Volumes)

2022



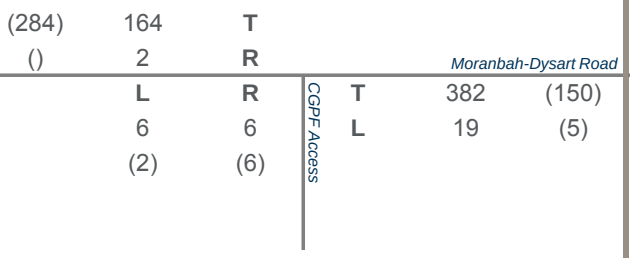
GROWTH FACTOR			
Base Year	Future Year	Growth Rate	Factor
2013	2022	5.39%	1.49

2023



GROWTH FACTOR			
Base Year	Future Year	Growth Rate	Factor
2013	2023	5.39%	1.54

2024



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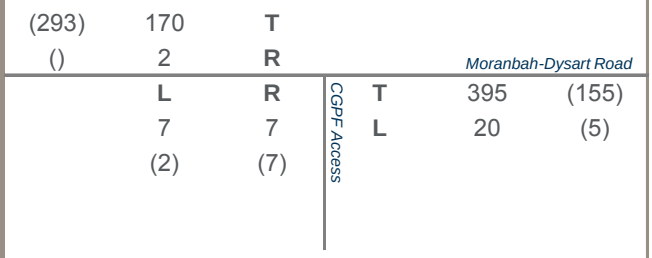

GROWTH FACTOR			
Base Year	Future Year	Growth Rate	Factor
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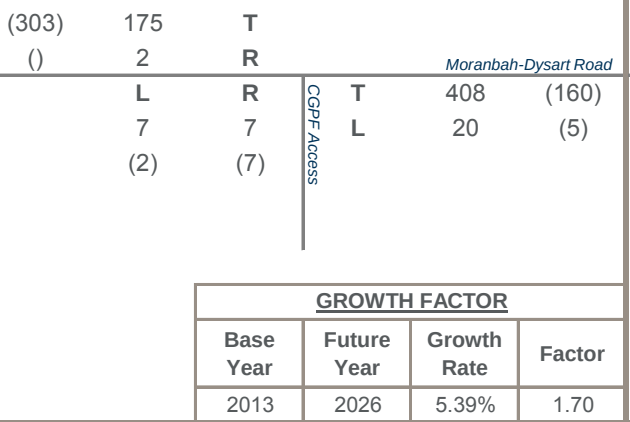
Baseline Traffic (Peak Hour Intersection Volumes)

2026



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Base Year	Future Year	Growth Rate	Factor
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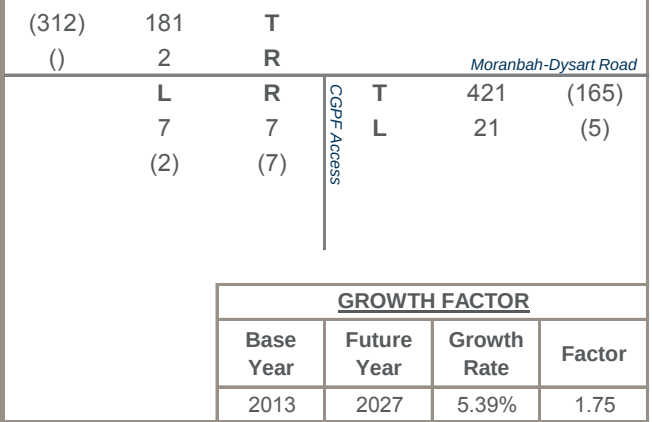
2027



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Base Year	Future Year	Growth Rate	Factor
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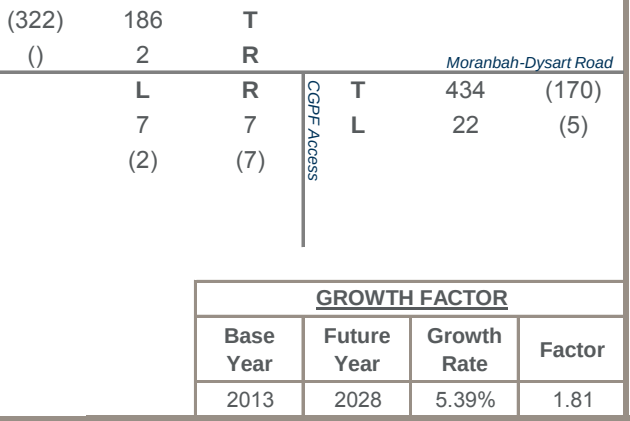

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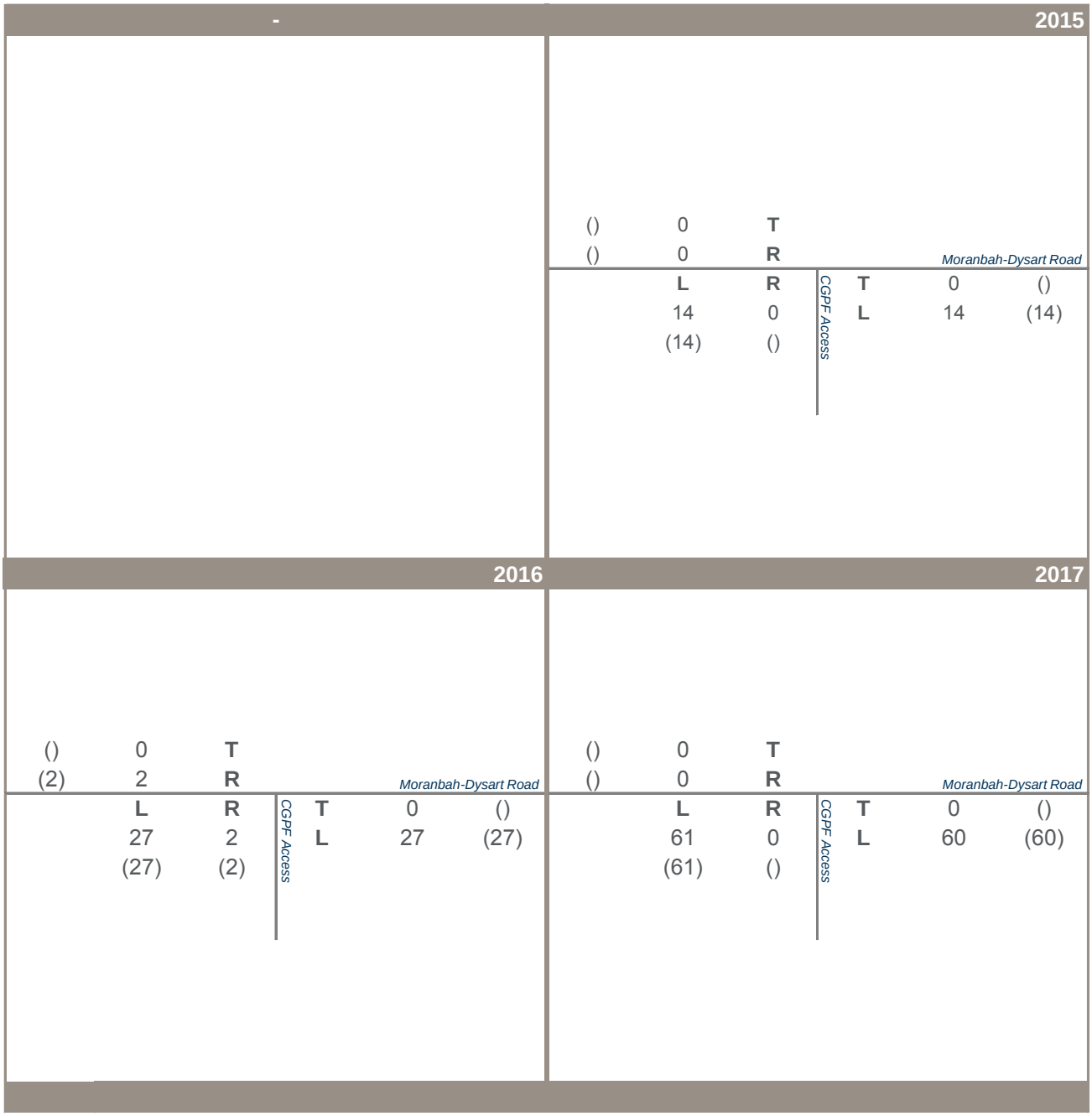

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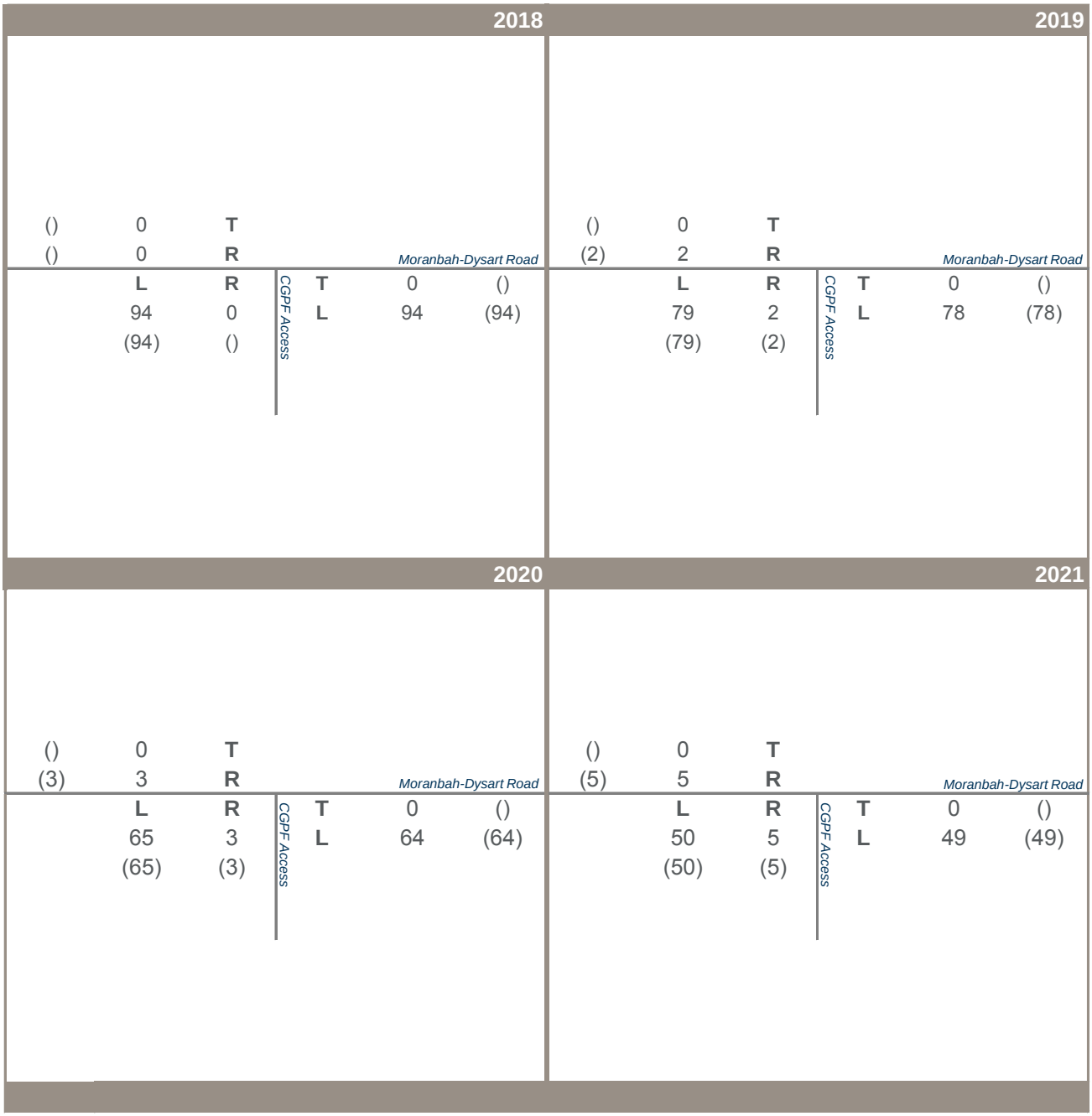

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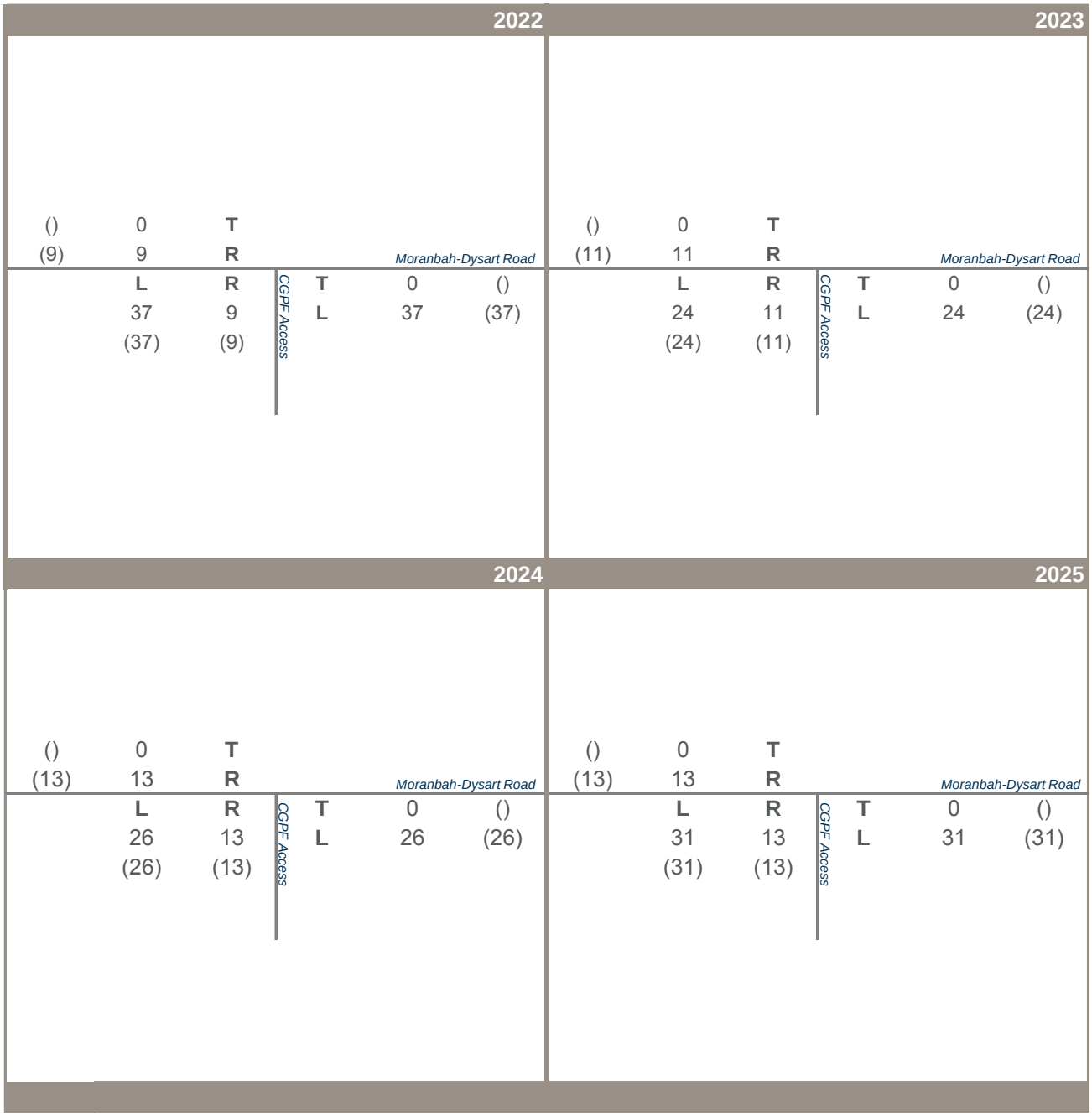

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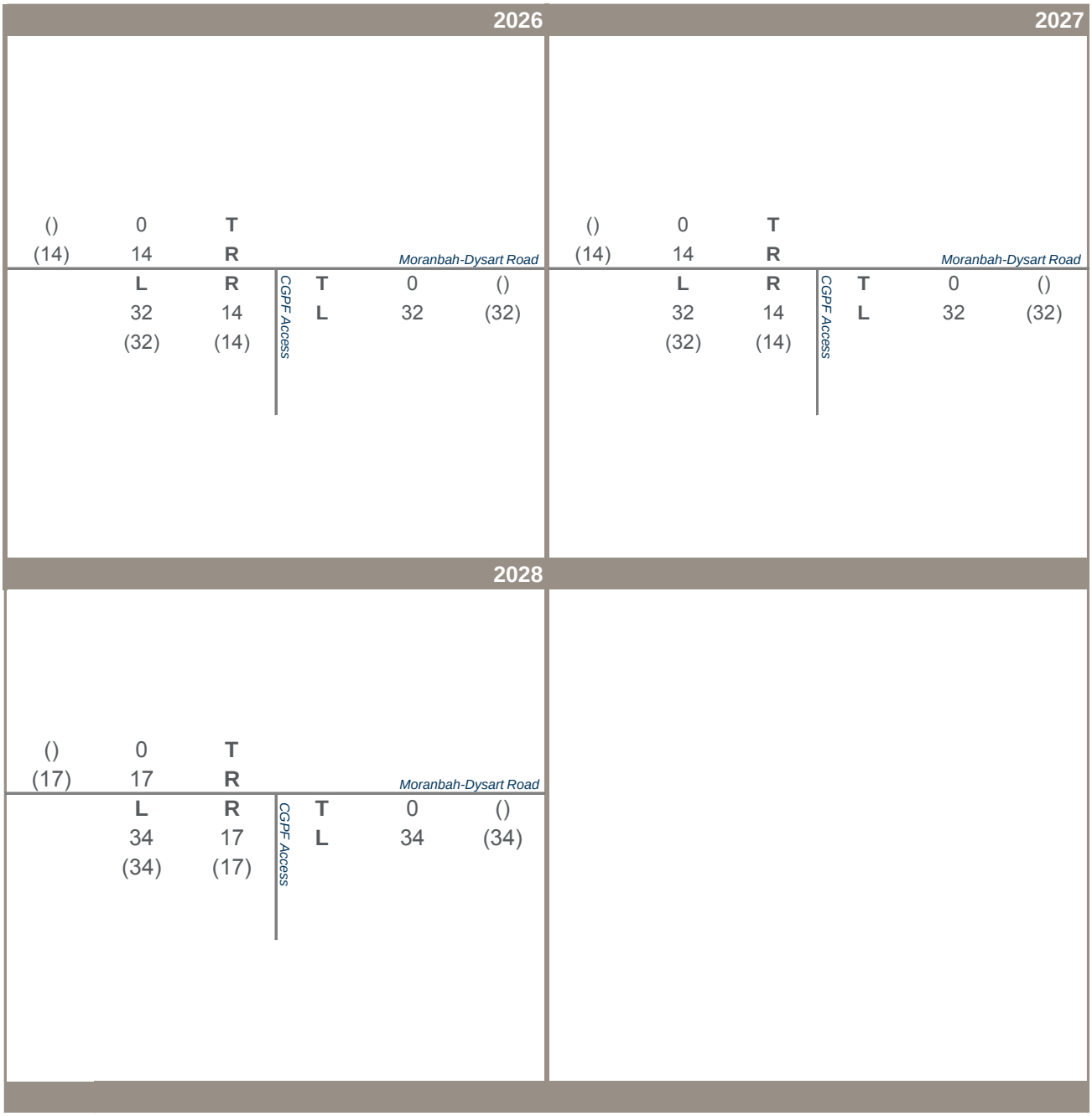

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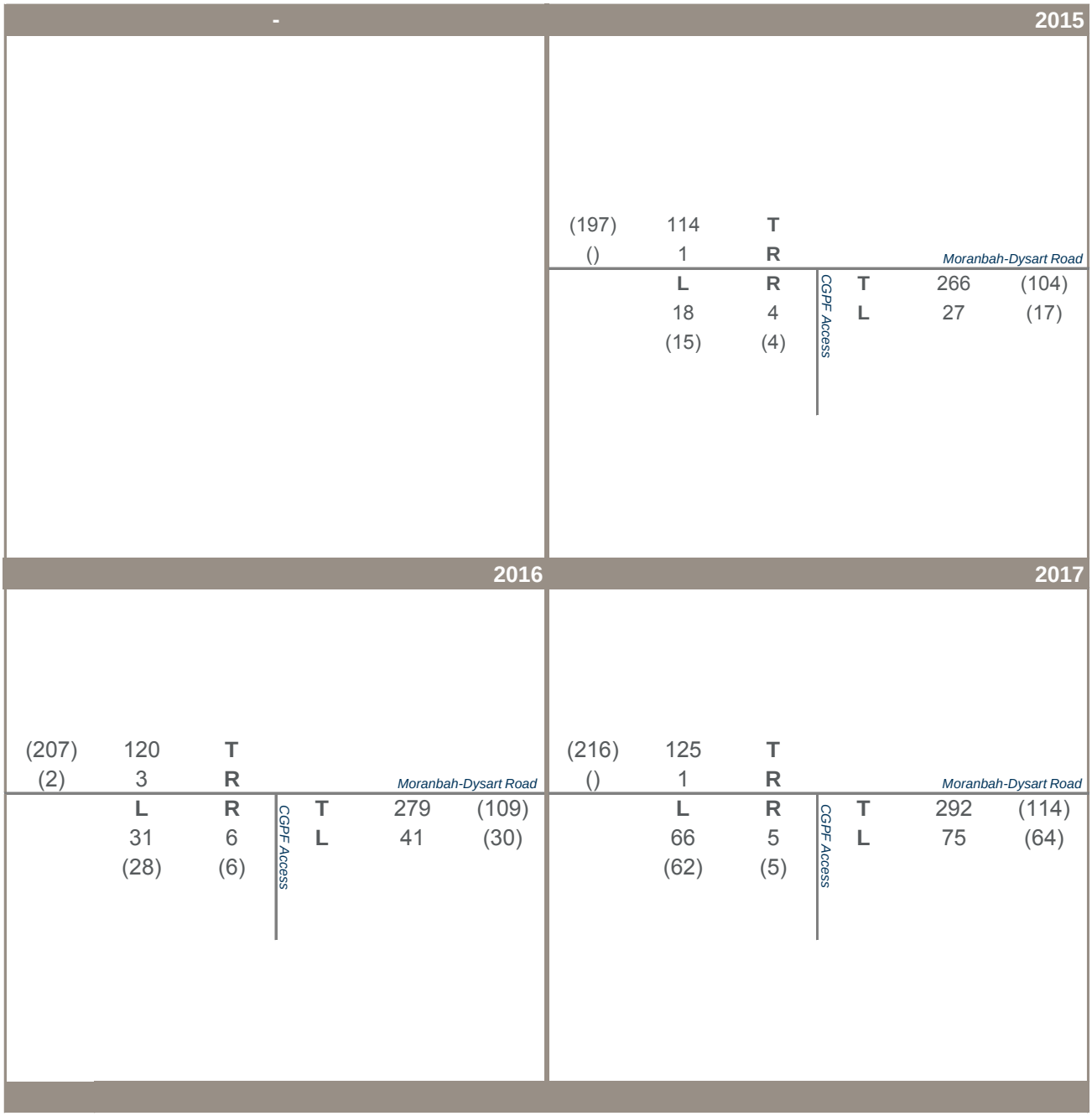
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

Intersection 5 - Moranbah - Dysart Road/Potential CGPF Access

Project:	BGP SREIS RIA	Prepared by:	Nathan Edwards	Date of Inspection:	22 October 2013
Project No:	CEB06466	Reviewed by:	Jeffrey Baczynski	Document Date:	5 December 2013

Design Traffic Volumes (Peak Hour Intersection Volumes)



Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

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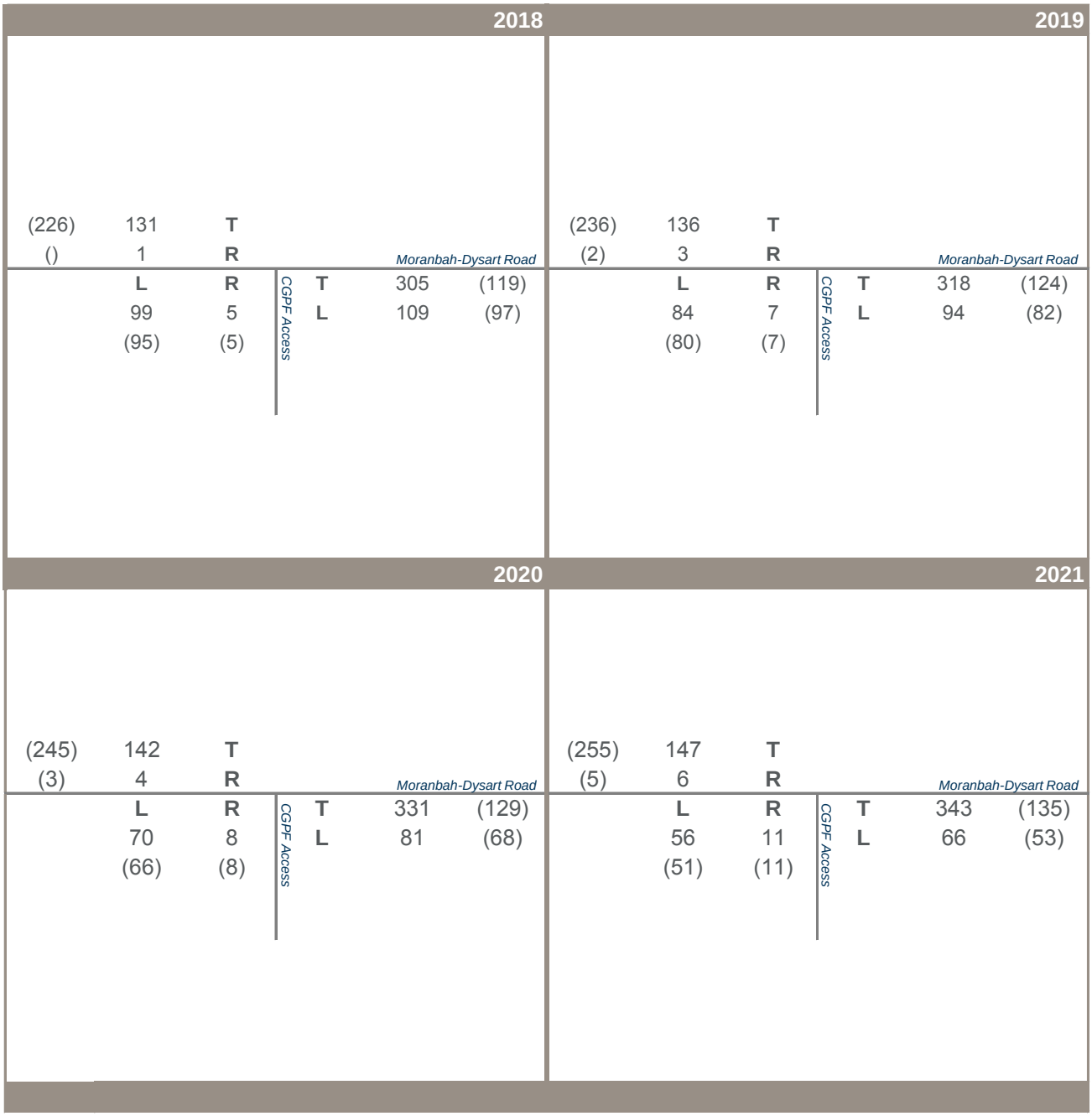

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
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#	AM Peak Hour
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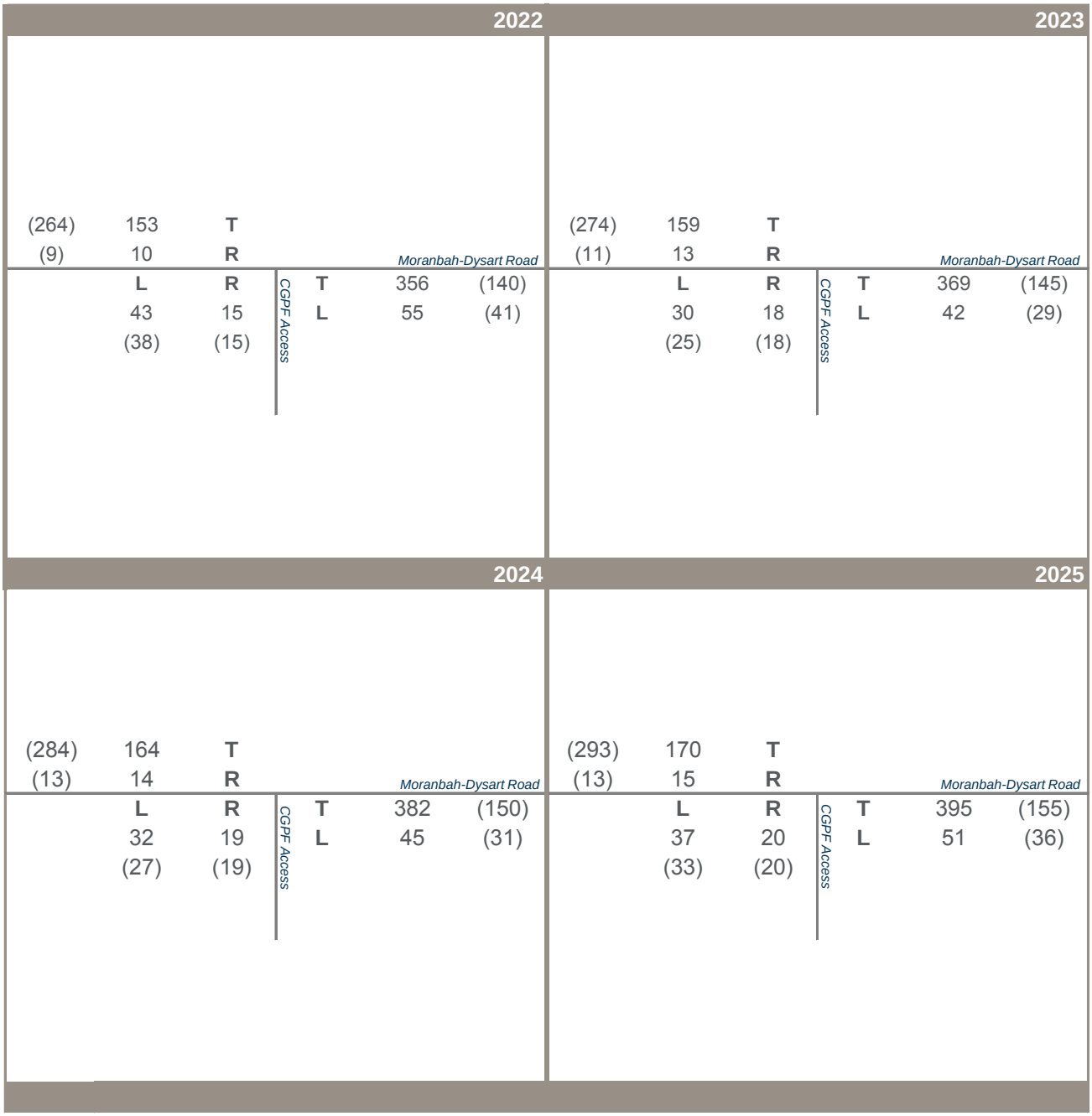

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
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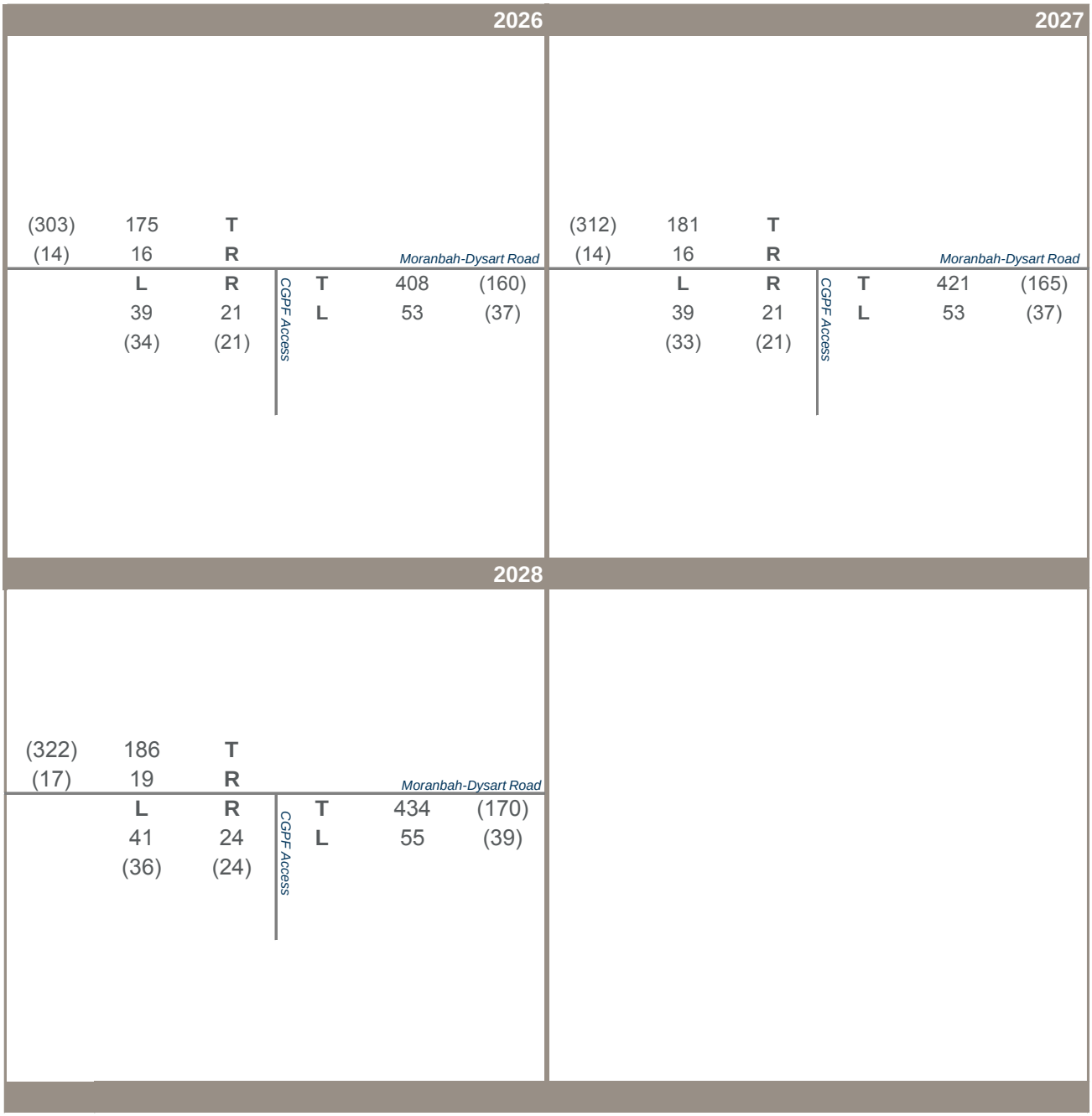

Legend

L	Left Turn Traffic Volume
T	Through Traffic Volumes
R	Right Turn Traffic Volume
#	AM Peak Hour
(#)	PM Peak Hour

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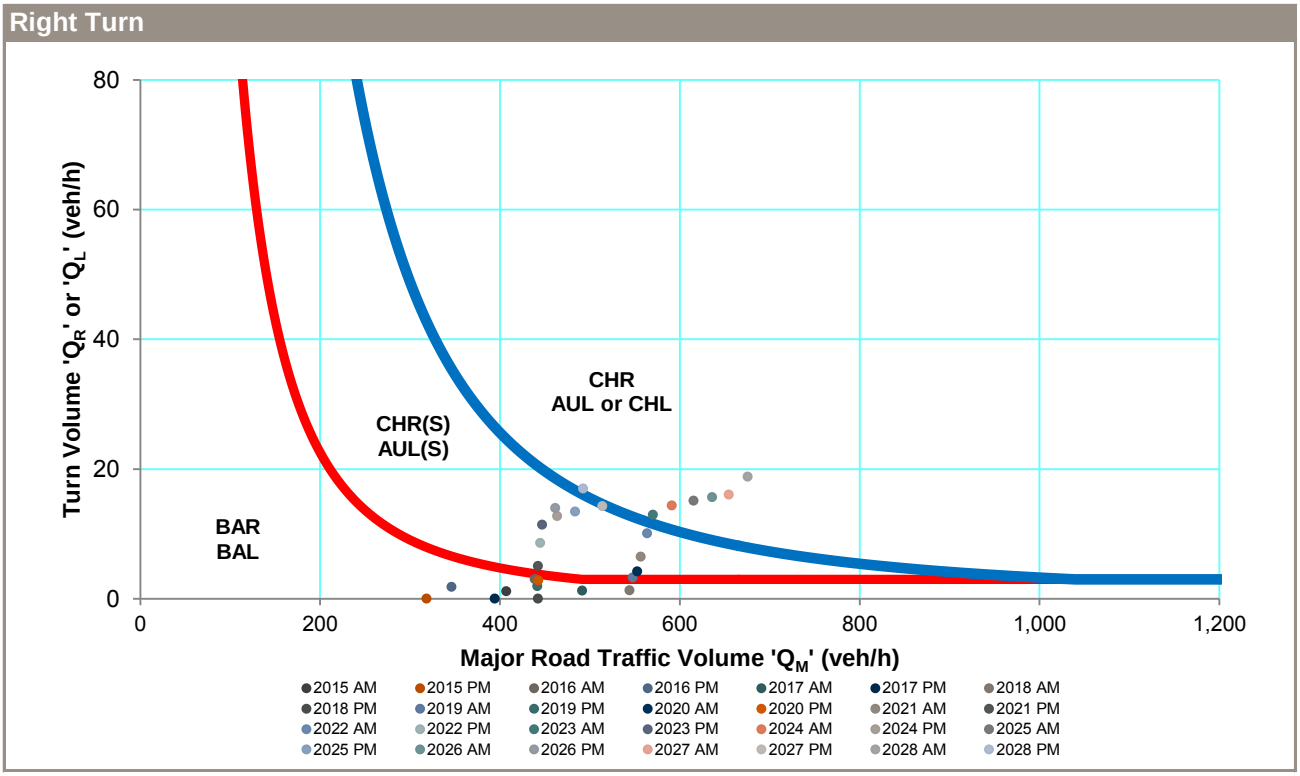
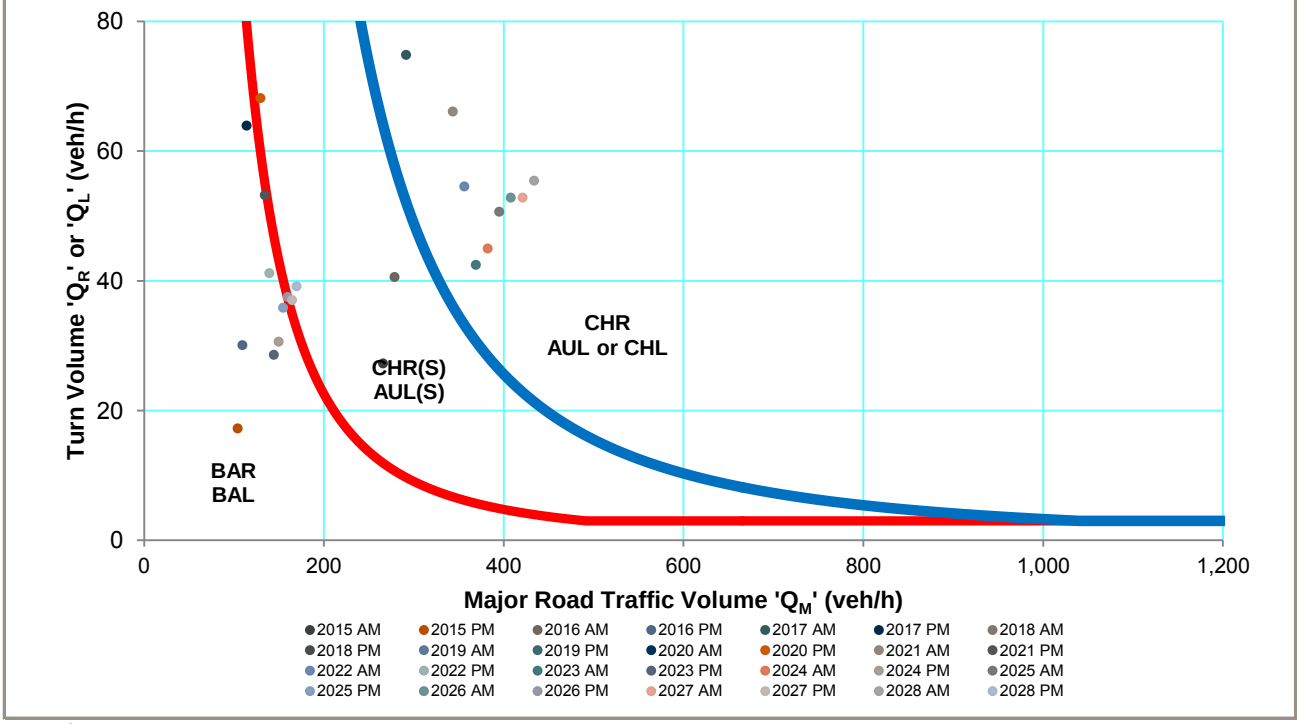
Turn Warrant Assessment

Right Turn



Left Turn



Legend

BAR	Basic Right Turn	**BAL**	Basic Left Turn
CHR	Channelised Right Turn	**CHL**	Channelised Left Turn
CHR(S)	Channelised Right Turn (short)	**CHL(S)**	Channelised Left Turn (short)

Intersection 5 - Moranbah-Dysart Road/Potential CGPF Access

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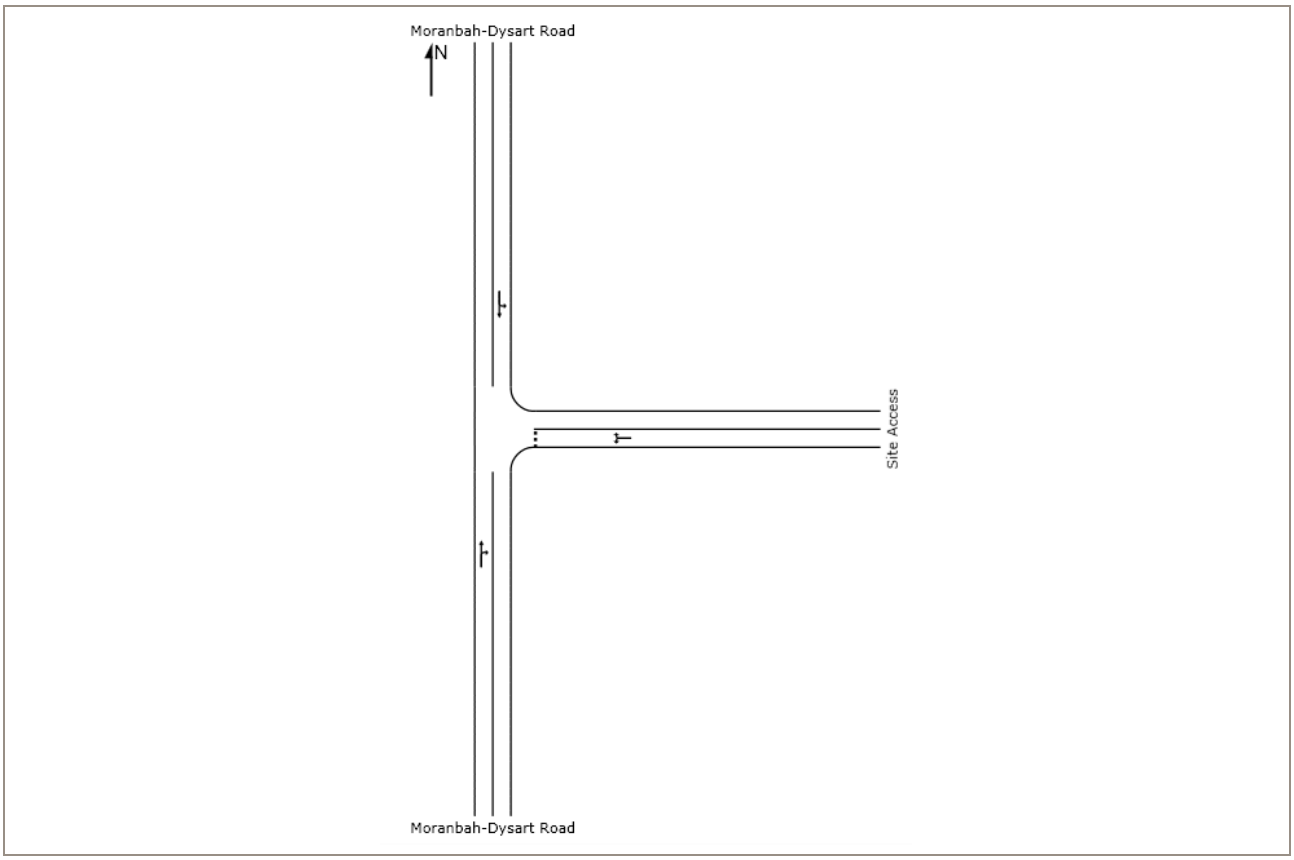
Operational Analysis: Intersection Configuration



Operational Analysis: Summary of Results

Scenario	AM Peak			PM Peak			Accept -able
	DOS	Critical Delay	95th%ile Queue	DOS	Critical Delay	95th%ile Queue	
2013 Survey	0.17	21 sec	4m	0.12	21 sec	5m	✓
2018 Baseline and Project	0.28	22 sec	6m	0.15	21 sec	8m	✓
2028 Baseline and Project	0.33	24 sec	10m	0.23	22 sec	13m	✓