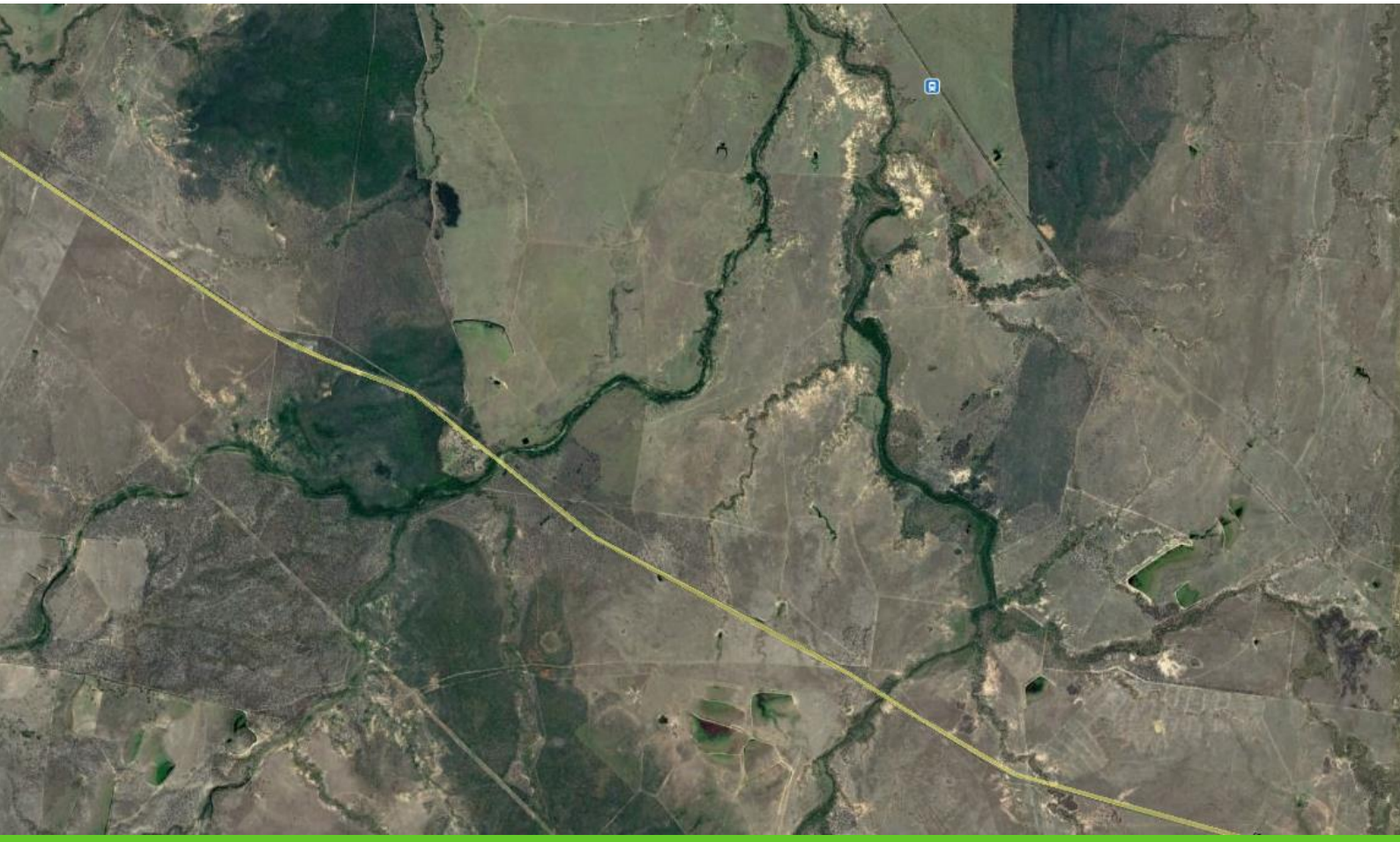
Central Queensland Coal Project

Appendix 4a – Traffic Report

Environmental Impact Statement



Styx Coal Project
Environmental Impact Statement
Road Impact Assessment

Client // Fairway Coal Pty Ltd
Office // QLD
Reference // Q1186620
Date // 29/06/17

Styx Coal Project

Environmental Impact Statement

Road Impact Assessment

Issue: A 29/06/17

Client: Fairway Coal Pty Ltd
Reference: Q1186620
GTA Consultants Office: QLD

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A	29/06/17	Final	Akansha Shetty / Matthew George	Trish Robertson	John Hulbert (RPEQ 08902)	

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Executive Summary

Styx Coal Proprietary Limited and Fairway Coal Proprietary Limited propose to develop the Styx Coal Project located approximately 130km northwest of Rockhampton in the Styx Basin in Central Queensland. The project will initially involve the mining of approximately 2 million tonnes per annum (Mtpa) of high grade thermal coal and/or semi-soft coking coal. As the project ramps up, there will be options to increase mining operations to 5 or 10 Mtpa. Road access to the Project is proposed via the Bruce Highway, with the exact location of the proposed access to be determined.

Assessment Scenarios and Traffic Generation

Design horizons for Road Impact Assessment (RIA) have been developed with due consideration of the Project schedule and with respect to the requirements set out in Department of Transport and Main Road's "*Guidelines for Assessment of Road Impacts of Development*" (GARID). Adopted design horizons are as follows:

- 2018 (Project Year 1): Construction commencement and peak construction
- 2026 (Project Year 9): Construction of western MIA and operation of eastern MIA
- 2029 (Project Year 12): Peak of operational phase
- 2037 (Project Year 20): Decommissioning / rehabilitation and 20-year design horizon.

The workforce will be sourced entirely from the local or regional area, and will include a 100% Drive-in/Drive-out (DIDO) scenario. Local workers are assumed to reside in nearby townships such as Marlborough, Ogmore, St Lawrence and Clairview, whilst regional workers are assumed to reside in either Mackay or Rockhampton. These assumptions apply to all phases of the Project, including construction, operations and decommissioning / rehabilitation personnel.

Estimates of the workforce generated traffic are detailed in Table E.1.

Table E.1: Workforce Traffic Generation Summary

Design year	Bruce Highway Eastern Access				Bruce Highway Western Access				Total (vpd)
	AM Peak (vph)		PM Peak (vph)		AM Peak (vph)		PM Peak (vph)		
	In	Out	In	Out	In	Out	In	Out	
2018	201	102	102	201	0	0	0	0	606
2026	119	100	100	119	70	30	30	70	638
2029	119	100	100	119	119	100	100	119	876
2037	8	0	0	8	8	0	0	8	32

Estimates of the heavy vehicle annual projections are detailed in Table E.2.

Table E.2: Annual Heavy Vehicle Movements

Project Phase	Vehicle Type	Heavy Vehicle Movements (Annual)			
		2018	2026	2029	2037 [1]
Construction	Rigid Truck	40	118	-	-
	Semi-Trailer	77	233	-	-
	B-Double	17	50	-	-
	Oversized	4	12	-	-
	Sub-Total	**138**	**413**	**-**	**-**
Operations	Rigid Truck	1,063	3,319	6,637	-
	Semi-Trailer	54	170	340	-
	B-Double	239	745	1,489	-
	Oversized	8	21	43	-
	Sub-Total	**1,363**	**4,255**	**8,509**	**-**
Project Total	*Rigid Truck*	*1,103*	*3,437*	*6,637*	**-**
	Semi-Trailer	*131*	*403*	*340*	**-**
	B-Double	*256*	*795*	*1,489*	**-**
	Oversized	*12*	*33*	*43*	**-**
	Total	***1,501***	***4,668***	***8,509***	**-**

Annual heavy vehicle traffic generation, converted to projected hourly heavy vehicle movements typically results in less than 3 vehicles per hour (total IN / OUT). To allow for a conservative estimate, a nominal heavy vehicle volume of 10 vehicles per hour (total IN/OUT) has been adopted for a worst-case assessment for the link and turn warrant assessments.

Road Link Assessment

Road Link Assessment has been undertaken to assess the anticipated Project impacts on the proposed haul routes (Bruce Highway from Rockhampton to Mackay), with due consideration of forecast traffic volumes "with" and "without" the Project. The impact of forecast Project traffic exceeds 5% for the following road segments:

- Yeppoon Road – Terra Nova Drive
- Terra Nova Drive – Vass Road
- Vass Road – Caves-Barmoya Road
- Caves-Barmoya Road – Ogmore Road
- Ogmore Road – Rockhampton and Mackay Regional Shire Boundary
- Rockhampton and Mackay Regional Shire Boundary – St Lawrence Connection Road
- St Lawrence Connection Road - Carmila
- Carmila – Oonooie
- Oonooie – Armstrong Beach

The LOS of Terra Nova Drive – Vass Road may decrease from LOS D (adopted LOS threshold) to LOS E as a result of Project traffic, as such it is recommended the following mitigation strategies are considered to offset this impact:

- Provision of a shuttle service for workers to reduce private vehicle usage and overall traffic generation
- Provision of a ride sharing scheme to increase worker vehicle occupancy and decrease overall traffic generation

- Scheduling shift times and heavy vehicle movements such that Project traffic does not coincide with network peak periods.

Access Intersection Assessment

A turn warrant assessment has been undertaken in accordance with the methodology provided in the "*Road Planning & Design Manual*" (RPDM) Volume 3: Part 4A for the proposed Project access. Results of the assessment are summarised in Table E.3, with the access intersection to be designed to accommodate these turn treatments.

Table E.3: Turn Warrant Results – Ultimate Scenario

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (North approach)	Auxiliary Lane (Short) – AUL (S)	Channelised Right Turn - CHR
Bruce Highway (South approach)	Auxiliary Lane (Short) – AUL (S)	Channelised Right Turn - CHR

Pavement Impact Assessment

Based on the calculated development Equivalent Standard Axles (ESAs), impacts of greater than 5% have not been identified for any section of the Bruce Highway. On this basis, and as per the methodology detailed in GARID, assessment of contributions has not been undertaken, with the pavement impacts of the Project considered insignificant.

Additional Impact Considerations

The Project is likely to utilise oversized vehicles for some of the transport activities as part of construction and operations. It is noted that the use of these vehicles will be undertaken in accordance with the National Heavy Vehicle Regulator guidelines, and be subject to permit applications and TMR approvals for the use of such vehicles. The use of these vehicles will be assessed as part of these permit applications.

Preliminary liaison with Queensland Rail (QR) indicates that the requirement to undertaken an Australian Level Crossing Assessment Model (ALCAM) assessment for impacts to rail level crossings will be determined following lodgement of the EIS.

The preparation of a Road Use Management Plan (RMP) will likely be required as the Project progresses. Based on the RIA findings, potential strategies to be considered as part of the RMP to offset road impacts are:

- Operation of a shuttle bus for the Project workforce, to reduce Project traffic
- Implementation of a ridesharing scheme to reduce Project traffic
- Adjusting shift times and heavy vehicle movement scheduling such that Project traffic peaks do not coincide with the network peak period.

List of Abbreviations

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
Austroads GPT	Austroads Guide to Pavement Technology
Austroads GTM	Austroads Guide to Traffic Management
CHPP	Coal Handling and Preparation Plants
DBCT	Dalrymple Bay Coal Terminal
DIDO	Drive-in / Drive-out
EIS	Environmental Impact Statement
EPC	Exploration Permit for Coal
ESA	Equivalent Standard Axles
Fairway Coal	Fairway Coal Proprietary Limited
FIFO	Fly-in / Fly-out
GARID	Guidelines for Assessment of Road Impacts of Development
GTA	GTA Consultants
HGTC	High Grade Thermal Coal
JTW	Journey to Work
LOS	Level of Service
MDL	Mineral Development Licence
MIA	Mine Industrial Area
MLA	Mining Lease Application
Mtpa	Million Tonnes Per Annum
PCE	Passenger Car Equivalents
PCU	Passenger Car Units
PIA	Pavement Impact Assessment
Project	Styx Coal Project
QR	Queensland Rail
QTRIP	Queensland Transport and Roads Investment Program
RIA	Road Impact Assessment
RMP	Road Use Management Plan
ROM	Run of Mine
RPDM	Road Planning & Design Manual
SCR	State Controlled Road
SSCT	Semi-Soft Coking Coal
Styx Coal	Styx Coal Proprietary Limited
TLF	Train Loadout Facility
TMR	Department of Transport and Main Roads
TOR	Terms of Reference
VPD	Vehicles Per Day
VPH	Vehicles Per Hour

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1. Introduction

1.1 Background

Styx Coal Proprietary Limited (Styx Coal) and Fairway Coal Proprietary Limited (Fairway Coal) (the joint Proponents), both wholly owned subsidiaries of Mineralogy Proprietary Limited propose to develop the Styx Coal Project (the Project) located approximately 130km northwest of Rockhampton in the Styx Basin in Central Queensland. The Project will be located within Mining Lease Application (MLA) 80187, which is adjacent to Mineral Development Licence (MDL) 468 and Exploration Permit for Coal (EPC) 1029.

The Project will initially involve the mining of approximately 2 million tonnes per annum (Mtpa) of high grade thermal coal (HGTC) and/or semi-soft coking coal (SSCT). As the Project ramps up, there will be options to increase mining operations to 5 or 10 Mtpa. The Project will consist of a number of open-cut pit operations with associated mining activities and infrastructure, that will use a truck and shovel methodology.

A new train loadout facility (TLF) will be developed to connect into the existing North Coast Rail Line. The TLF will require all new infrastructure and connect to the existing North Coast Rail network which will allow transport of the product coal to the established coal loading infrastructure at the Dalrymple Bay Coal Terminal (DBCT). A transport corridor will also be constructed to transport coal from the mine to the TLF.

Pending the outcomes of the Approvals process, development of the Project is expected to commence in 2018 and extend for approximately 20 years (16 year mine life and four year rehabilitation phase) until the current reserve is depleted. Key components of the Project include:

- Three open cut mining pits with a maximum production rate of 10Mtpa
- Two Coal Handling and Preparation Plants (CHPP)
- Waste rock dumps, mine water dams and associated infrastructure
- Internal haul roads and access roads
- Mine Industrial Area (MIA) including run of mine (ROM) and product coal stockpiles, administration offices, workshops and fuelling facilities
- Raw and potable water supply from local aquifers and surface water
- Power requirements sourced from onsite generators located within the MIA
- Offsite haul roads and TLF.

GTA Consultants was engaged by CDM Smith on behalf of the Proponent in January 2017 to undertake a Road Impact Assessment (RIA) for the Project. This RIA responds to the Transport related items identified in Section 2.17 of the Project's draft Terms of Reference (TOR), dated April 2017.

1.2 Purpose of this Report

This report sets out the assessment of the expected transport implications resulting from the construction, operation and decommissioning / rehabilitation phases of the Project. Specifically, this report responds to Section 2.17 of the Project's draft TOR, and includes consideration of the following:

i The existing traffic conditions proximate to the Project, including an assessment of the haul roads anticipated to service the Project (base case).
ii The traffic generating characteristics of the Project.
iii The anticipated transport impact of the Project on the surrounding Local and State Controlled Road (SCR) network.
iv Proposed changes to road-related infrastructure required by the Project. This includes modifications to roads for access works and realignments and rail lines in the context of rail level crossings and services.
v Expected volumes for heavy vehicle haul movements associated with transport of raw materials, wastes, and hazardous goods for construction and operational phases of the Project.
vi Workforce journey-to-work (JTW) traffic generated by all Project activities, including anticipated traffic modes, volumes, composition, timing and routes.
vii Identification of methods and strategies to reduce any identified traffic impacts.

1.3 Study Methodology

This report has been prepared in response to Section 2.17 of the draft TOR for the Project. As per the requirements of the draft TOR, this report sets out the anticipated road impacts of the Project during the construction, operation and decommissioning / rehabilitation phases. Road impacts have been assessed in accordance with the Department of Transport and Main Roads' (TMR) 'Guidelines for Assessment of Road Impacts of Development' (GARID).

Consistent with the requirements set out in GARID, the methodology adopted for the RIA is as follows:

- Review existing road conditions and operations, and establish a baseline condition (i.e. road operation without the Project)
- Prepare estimates of Project generated traffic based on the intended haul routes of heavy vehicles and workforce requirements
- Prepare scenarios for the traffic assessment which consider baseline and Project traffic generation estimates at critical Project milestones (referred herein as design horizons)
- Determine anticipated road impacts of the Project for each of the identified design horizons, in accordance with threshold levels and rationale provided within GARID. Specifically, the following impacts have been considered:
  - Impact of the proposed vehicular access intersection on the existing road network provided as part of the Project
  - Impact of Project related traffic on existing road link capacity for key haul routes
  - Impact of Project related heavy vehicle movements on existing pavement condition.
- Where impacts were identified as exceeding GARID defined threshold levels, recommendations to mitigate or offset these impacts have been provided.

The adopted methodology is further detailed in Table 1.1.

Table 1.1: RIA Methodology

Assessment Type	RIA Methodology
Access Intersection Assessment	Undertake a Turn Warrant Assessment using the methodology provided within TMR's 'Road Planning & Design Manual' (RPDM) to determine appropriate turn treatments and associated intersection geometry at the proposed access intersection. These initial design considerations will inform the development of the mine plan to be detailed further as the Project progresses. The analysis is provided in Section 6.
Link Impact Assessment	In accordance with GARID defined threshold levels, identify road sections where Project generated traffic is expected to exceed 5% of baseline traffic volumes. The scope of the link impact assessment has included the Bruce Highway between Rockhampton and Mackay (the intended haul route). Where Project impacts of greater than 5% were identified, an analysis of theoretical link capacity was undertaken in accordance with the methodology outlined within Austroads (2009) 'Guide to Traffic Management Part 3: Traffic Studies and Analysis'. Comparison of anticipated link performance against a minimum operational Level of Service (LOS) threshold 'D' was undertaken. The analysis is provided in Section 5.
Pavement Impact Assessment (PIA)	The TMR Northern Region 'Assessment of Road Impacts of Development Proposals – Notes for Contribution Calculations' was developed as a supplement to GARID and specifically identifies the methodology to calculate pavement impacts on SCRs. The PIA has been undertaken in accordance with the formulas and parameters provided in this document, and includes assessment of the Bruce Highway between Rockhampton and Mackay (the intended haul route). The analysis is provided in Section 7.

1.4 Reference Documents and Supporting Data

This report has been prepared with consideration of the following reference resources and documents:

- CDM Smith 'Styx Coal Mine Project Description', dated 28 September 2016
- Draft 'Terms of Reference' for The Environmental Impact Statement for the Styx Coal Project (draft TOR), dated April 2017
- TMR (2006) 'Guidelines for Assessment of Road Impacts of Development'(GARID)
- TMR (2006) 'Road Planning & Design Manual (Edition 2) – Volume 3' (RPDM)
- TMR (2014) 'Road Planning and Design Manual (2nd Edition) – Volume 3: Supplement to Austroads Guide to Road Design Part 4A' (RPDM Volume 3: Part 4A)
- TMR Northern Region (2013) 'Assessment of Road Impacts of Development Proposals – Notes for Contribution Calculations'
- Austroads (2012) 'Guide to Pavement Technology, Part 2: Pavement Structural Design' (Austroads GPT: Part 2)
- Austroads (2009) 'Guide to Traffic Management Part 3: Traffic Studies and Analysis' (Austroads GTM: Part 3)
- Austroads (2010) 'Guide to Road Design Part 4A: Unsignalised and Signalised Intersections' (Austroads GRD: Part 4A)
- 2015 and 2016 Annual Average Daily Traffic (AADT) Segment reports, provided by TMR on 2 February 2017 and 12 June 2017 respectively
- Pavement roughness counts and seal width, provided by TMR on 9 June 2017
- Other background data and Project input assumptions as agreed with CDM Smith and the Proponent.

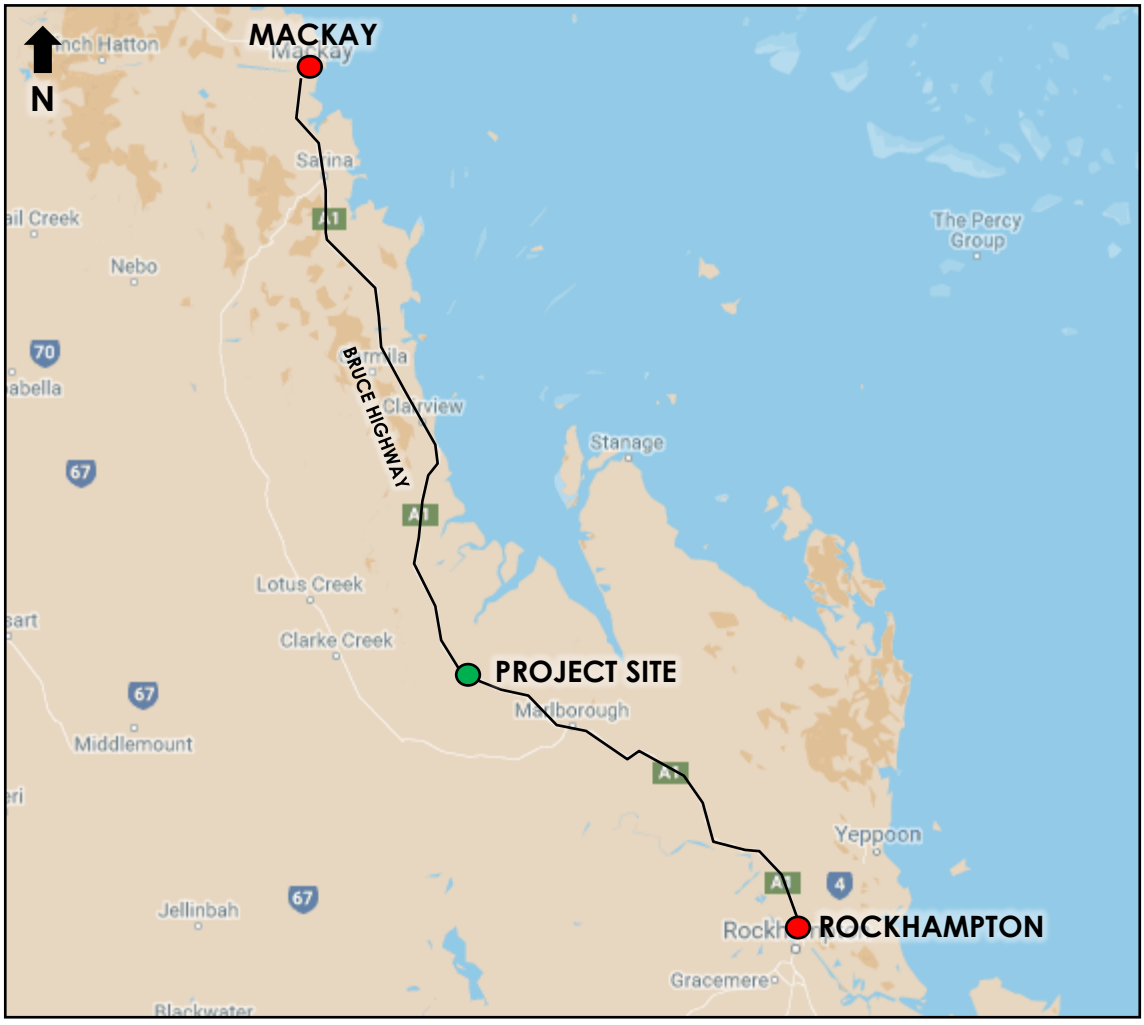
2. Project Description

2.1 Project Location

From a regional context (as shown on Figure 2.1), the Project is located within the Livingston Shire Regional Council area, approximately 130km northwest of Rockhampton in Central Queensland. The nearest towns to the Project are:

- Ogmore: located approximately10 km to the north east
- Marlborough: located approximately 25 km to the south east.

Figure 2.1: Regional Context



(Source: Google Maps)

The indicative mine arrangements are shown on plans provided in Figure 2.2. As shown on the mine arrangement plans, MLA 80187 is intersected by the Bruce Highway, thus creating two distinct mining opportunities on either side of the Highway.

Road access to the Project is proposed via the Bruce Highway as shown in Figure 2.2. A single access intersection is proposed, consisting of linkages to the internal road network on the eastern

and western sides of the Highway. The exact location of the proposed access is yet to be determined, but would be located with respect to appropriate safety and design considerations detailed further in this report.

Figure 2.2: Proposed Mine Arrangement

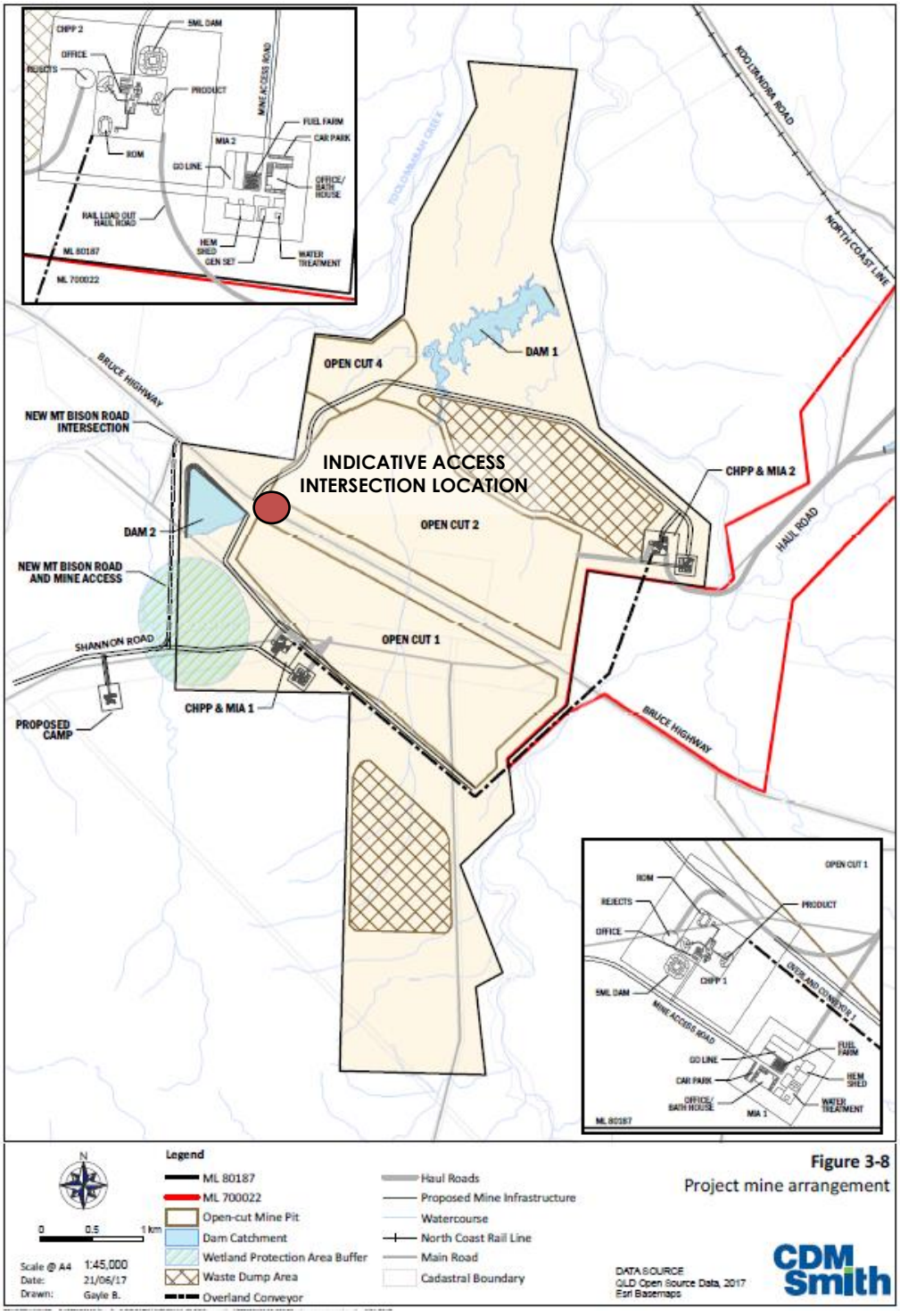


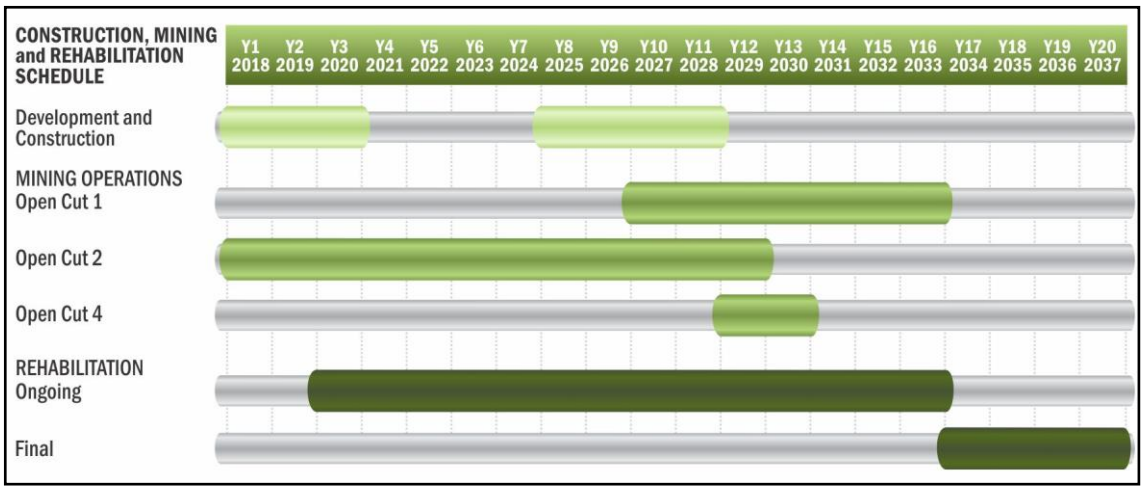
Figure 3-8
Project mine arrangement

2.2 Project Schedule

The assumed Project schedule is shown in Figure 2.3. Key considerations applicable to the RIA are as follows:

- Construction is anticipated to be undertaken in two distinct phases:
  - The initial construction period will commence in the final quarter of 2018 and end in the first quarter of 2020, encompassing a period of around 18 months. During this time, the mine elements to the east of the Bruce Highway will be constructed, necessitating access from the Bruce Highway to the east only.
  - The second construction period is planned to occur between 2025 and 2028. Mine elements to the west of the Bruce Highway will be developed, at which time access to both sides of the Highway will be required.
- Mining operations are expected to commence in 2018 from Open Cut Pit 2 (refer Figure 2.3). As Open Cut pit 2 is located on the eastern side of the Bruce Highway, external road access is only required to the east.
- Mining of Open Cut pit 1 is expected to begin in 2027, following the initial construction activities on the western MIA beginning in 2025. At this time, access to both sides of the highway will be required until the mining resource is depleted.
- Decommissioning / rehabilitation activities are anticipated to commence in 2033 and end in 2037.

Figure 2.3: Project Schedule



(Source: Information provided by CDM Smith, dated 6 June 2017)

2.2.1 Design Horizons for Assessment

With due consideration of the Project schedule, the design horizons as outlined in Table 2.1 have been chosen for the RIA. These design years have been determined with respect to the requirements set out in GARID, and represent the critical design years when considering likely Project traffic generation associated with forecast workforce requirements (further details are provided in Section 2.3).

Table 2.1: Design Horizons for Assessment

Year	Project Year	Project Activities
2018	1	Construction commences including construction of Open Cut Pit 2, eastern CHPP, haul road and TLF. The construction workforce is projected to be at its peak during 2018.
2026	9	Construction of mine components on the western side of the Bruce Highway commences, including the second CHPP and MIA. At this time, it is expected that the eastern MIA will be fully operational and producing up to 5Mtpa. The workforce projections are expected to peak during 2026, when considering combined construction and operational phases.
2029	12	Construction is anticipated to have been completed by this time, with total mine production capacity of towards 10Mtpa. Workforce projections for the operational period is anticipated to be at its peak during 2029.
2037	20	The mine is no longer operational and in the decommissioning / rehabilitation phase. This year also corresponds with the 20-year design horizon for the pavement impact assessment and 10-year design horizon for the network performance assessment, per the requirements set out in GARID.

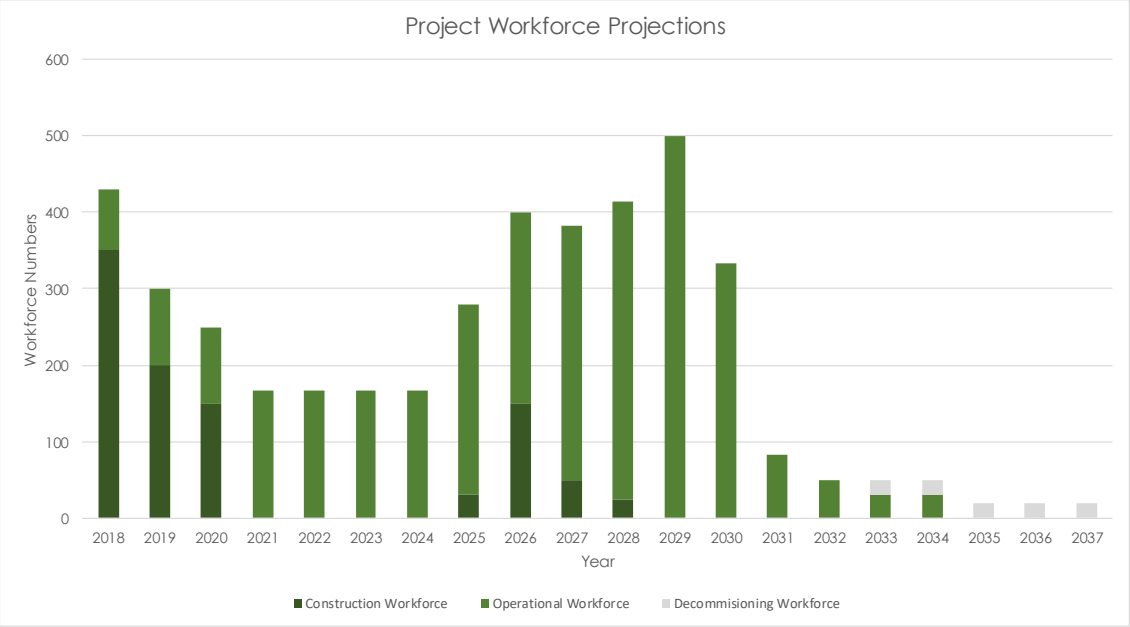
2.3 Workforce Projections

The workforce will be sourced entirely from the local or regional area, and will include a 100% Drive-in/Drive-out (DIDO) scenario. Local workers are assumed to reside in nearby townships such as Marlborough, Ogmore, St Lawrence and Clairview, whilst regional workers are assumed to reside in either Mackay or Rockhampton. These assumptions apply to all phases of the Project, including construction, operations and decommissioning / rehabilitation personnel.

There are no workers assumed to operate on a Fly-in/Fly-out (FIFO) arrangement.

Indicative workforce projections which have formed the basis of the assessment are provided in Figure 2.4.

Figure 2.4: Indicative Workforce Projections



(Source: Information provided by CDM Smith, dated 6 June 2017)

2.4 Haul Movement Projections

All materials, plant and equipment are intended to be delivered to the Project via road-based transport. It is expected that construction traffic will primarily involve a mix of rigid trucks, articulated vehicles (e.g. semi-trailers) and B-Doubles. Some oversize loads are also expected, particularly during the CHPP, dump station, stacker / reclaimer and heavy mining equipment construction and installation phase. These loads will be hauled from either the Port of Brisbane, Port of Mackay or the Port of Gladstone.

Quarry materials for the construction of the access road and haul road base material will be sourced from existing offsite quarries. Once access to site is established, materials will be sourced from a combination of on-lease deposits where possible and licensed offsite quarries. It is not anticipated that forestry materials will be required by the Project.

In terms of operational traffic, heavy vehicle movements have been based upon projections provided by the Proponent and are understood to be based on previous experience and volume-metric cubic metres of likely operational inputs / outputs. It is noted that all ROM and product coal will be hauled internal to the site to the TLF, and will not impact on any local or SCRs (refer to Section 2.5).

Heavy vehicle traffic flows and vehicles types are expected to vary over the Project period, reflecting the types of materials and equipment required at a specific time. Indicative heavy vehicle projections which have formed the basis of the assessment are provided in Table 2.2.

Table 2.2: Total Project Heavy Vehicle Movements

Project Phase	Vehicle Type	Origin / Destination [1]			
		Local	Regional	State	Port
Construction	Rigid Truck	320	380	9	1
	Semi-Trailer	1,015	96	122	170
	B-Double	-	250	50	-
	Oversized	-	-	-	70
	Sub-Total	**1,335**	**726**	**181**	**241**
Operational	Rigid Truck	4,575	37,005	-	845
	Semi-Trailer	-	2,176	-	-
	B-Double	-	9,518	-	-
	Oversized	-	-	-	272
	Sub-Total	**4,575**	**48,699**	**-**	**1,117**

[1] Though origin / destination movements have been disaggregated into 'local', 'regional', 'state' and 'port', the RIA has assumed that these movements will impact haul roads (i.e. the Bruce Highway) for all sections between Mackay and Rockhampton. Though unlikely to occur (as local destinations will have a more localised impact), this is considered the worst-case scenario for the RIA.

2.5 Transport of Coal to Market

It is important to note that all ROM and product coal will be hauled internal to the site using private infrastructure and will not require access to any Council or SCRs. Additionally, a conveyor is proposed to transport product coal from the western MIA and CHPP, under the Bruce Highway at the existing bridge crossing, to the product stockpiles on the eastern side of the Bruce Highway. As such, the Bruce Highway will not be affected by any internal haul movements associated with moving product coal around the mining lease.

Haul movements from the Eastern MIA product stockpiles to the TLF will be undertaken via a dedicated and private haul road. The indicative arrangement and proposed location for the rail

spur connection to the North Coast Line (refer Figure 2.2) indicates that impacts to local or SCR are not expected.

2.6 Mount-Bisson Road Realignment

A realignment of Mount-Bisson Road and corresponding new intersection with the Bruce Highway is currently being investigated outside of the scope of this EIS. Mount-Bisson Road is located directly south of Tooloombah Creek and north of the proposed Project access (refer Figure 2.2).

This realignment and new intersection is intended to provide public access to existing agricultural uses on the western side of the Bruce Highway. Although it is also intended to provide access to a potential onsite accommodation camp, this camp is currently being investigated as an overflow option and has not been considered available for use within this RIA. It is understood that the planning and approvals for the proposed accommodation camp (should it proceed) would be subject to its own separate Development Application and transport assessment.

All traffic associated with the Project is assumed to access the Project site via the single vehicular access point proposed on the Bruce Highway, as shown in Figure 2.2.

3. Existing Environment

3.1 Road Network

The Project seeks to gain direct access to the Bruce Highway, with Project traffic anticipated to be generally limited to the Bruce Highway between Rockhampton and Mackay. Characteristics of the Bruce Highway proximate to the Project (and at the proposed access location) are described in Table 3.1.

Table 3.1: Bruce Highway Road Characteristics (Proximate to the Project Site)

Characteristic	Description
Direction	North – South
Jurisdiction	TMR
Cross-Section	Two-lane / Two-way / Undivided
Pavement	Sealed
AADT	~2,000
Speed Limit	110km/h

The typical cross-section of the Bruce Highway proximate to the Project site is presented in Figure 3.1.

Figure 3.1: Bruce Highway (Typical Cross-Section)

Image provided by CDM Smith (12 June 2017)

The geometry of the Bruce Highway varies to the south of the Project, with provision for overtaking lanes available on approach to Rockhampton and a four-lane / two-way / divided arrangement available south of Yeppoon Road.

In terms of future planning, reference has been made to TMR's 'Queensland Transport and Roads Investment Program 2016-17 to 2019-20' (QTRIP) which outlines State road network projects for Queensland. A summary of works from QTRIP relevant to the Project are presented in Table 3.2.

As described in Table 3.2, a number of capacity improvement projects are planned on the Bruce Highway, generally within close proximity to the regional centres of Mackay and Rockhampton. These works are planned to be undertaken in prior to 2020.

Table 3.2: QTRIP Works Schedule

Project Location	Location Description	Works Description
Bruce Highway (Rockhampton – St Lawrence)	Various intersections	Improve intersections
Bruce Highway Four Laning (Stages 1 and 2) Planning Study	Yeppoon Road – Ramsay Creek	Undertake transport project planning
Bruce Highway (St Lawrence – Mackay)	Kalarka Road and Colonial Drive South	Construct overtaking lane/s
	Spider Creek and Three Mile Creek	Construct overtaking lane/s
	Lagoon Street	Improve Intersection/s
	Sarina Northern Access	Construct Roundabout/s
	Hay Point Road Intersection	Construct Roundabout/s
	Hay Point Road – Temples Lane	Undertake transport project planning

3.2 Baseline Traffic Volumes

Background traffic volumes have been sourced from TMR, by way of 2015 and 2016 AADT segment reports (obtained 2 February and 12 June 2017 respectively) for the Bruce Highway between Rockhampton and Mackay. A copy of these segment reports is contained at Appendix A, with a summary of data provided in Table 3.3.

For the purposes of converting AADT volumes to peak hour volumes (for the link and intersection assessments), a peak-to-daily ratio of 15% has been assumed, in accordance with guidance for rural roads provided in the RPDM 1st Edition – Chapter 5.

Growth rates obtained from historic data detailed within the AADT segment reports indicate that the Bruce Highway has experienced negative growth for various road sections over the past five to ten years. This could be attributable to a slowdown in mining sector projects occurring within the region, and the conclusion of construction activities associated with large project development. As such, a growth rate of 2% per annum (compound) has been adopted to inform the basis of future traffic forecasts, to reflect typical background traffic growth in the absence of major project development. This assumption is considered conservative and therefore appropriate for determining a worst-case scenario for the RIA.

It is further noted that a review of the Coordinator-General projects currently available online indicates that there are no major projects planned in the vicinity of the Project. Should any such projects become apparent in the future, these should be considered in the context of a cumulative impact assessment.

Table 3.3: Baseline Traffic Volumes – Bruce Highway (2015/16)

Road Name	Segment	AADT						Historic Growth	
		NBD	HV%	SBD	HV%	Total	HV%	5 Yr	10 Yr
Bruce Highway (Rockhampton – St Lawrence)	@ Archer St(Lights)	9,388	11.9	6,996	10.4	16,384	11	-6.7%	-
	100m Sth Knight St	16,118	8.5	17,462	8.8	33,580	9	0.0%	0.5%
	@ Boland St	12,153	7.8	12,411	7.8	24,564	8	0.6%	0.4%
	800m Sth Rton-Yeppoon Rd	8,194	10.4	8,516	10.1	16,710	10	0.7%	1.2%
	200m Sth Mason Ave (Parkhurst)	5,969	12.7	5,862	13.6	11,831	13	1.4%	2.0%
	150m North Terra Nova Dr	3,785	19.3	3,710	14.4	7,495	17	-0.8%	0.4%
	200m North 14 Mile Ck Rd	2,022	27.7	2,048	21.7	4,070	25	-1.3%	0.2%
	40m Sth Mountain Ck (Kunwarara)	1,332	24.2	1,295	24.7	2,627	24	-0.3%	1.2%
	1km south of Montrose Creek	1,163	28.6	1,117	29.3	2,280	29	-1.9%	0.0%
	South of Waverley Creek	956	31.4	1,001	30.3	1,957	31	-3.3%	-1.4%
Bruce Highway (St Lawrence – Mackay)	North of Clairview	1,060	28.0	1,099	31.0	2,159	30	-2.3%	-0.9%
	WiM Site Koumala	1,755	21.9	1,721	23.5	3,476	23	0.1%	0.8%
	South of Armstrong's Beach Turnoff	2,053	19.7	2,057	32.9	4,110	26	-0.8%	0.2%
	Sichter Street - Broad Street	4,638	15.7	2,458	9.2	7,096	13	-11.7%	-6.4%
	Between Sarina and Sarina - Homebush TO	3,641	29.7	3,837	26.6	7,478	28	-3.7%	-0.9%
	Sarina - Homebush Road to Hay Point TO	3,204	10.3	3,342	27.2	6,546	19	-4.1%	-1.2%
	North of Macks Truck Stop	5,205	17.8	5,171	16.9	10,376	17	-3.0%	-0.4%
	Broadsound Road Permanent Counter	6,900	12.4	6,845	12.3	13,745	12	-2.0%	-0.9%
	City Gates to Lagoon Street	12,562	15.7	11,856	11.6	24,418	14	-2.1%	3.3%
	Lagoon St to Bridge Rd	9,327	19.2	9,167	11.6	18,494	15	-4.4%	0.5%
	George Street Pedestrian Crossing	10,011	8.5	9,693	8.7	19,704	9	-8.3%	-6.2%

3.3 Road Crash History

Road crash data for the Bruce Highway was sourced from TMR (obtained 2 February 2017) for a five-year period between 2012 – 2017. This crash data provides information on the number of crashes along the Bruce Highway, categorised into the following:

- Crash resulting in fatality
- Crash resulting in hospitalisation

- Crash resulting in medical treatment
- Minor crash
- Crash resulting in property damage only.

Analysis of the recorded accidents on the Bruce Highway, proximate to the Project and specifically its frontage, indicates the following:

- There was a single recorded accident proximate to the Project frontage in the preceding 5-year period
- This accident did not result in a fatality
- The accident involved a single vehicle colliding with an object, causing the vehicle to veer off the carriageway.

It is considered that this type of crash is typical for the use, type and function of the Bruce Highway within the area, and therefore the crash data suggests that the Bruce Highway proximate to the Project does not pose any atypical safety risks or hazards that need to be factored into the access design. Notwithstanding, this would need to be confirmed with detailed site inspections during the detailed design phase for the access intersection.

3.4 Rail Network

3.4.1 Rail Lines

The Project is anticipated to utilise and is located proximate to the North Coast rail line. This line is a principal regional freight and passenger line within the Queensland Rail (QR) network, running the length of coastal Queensland between Nambour in the south and Cairns in the north. Long distance passenger and high-speed Tilt Train services also operate on the line servicing central and north Queensland.

3.4.2 Level Crossings

A total of seven level crossings have been identified on the Bruce Highway between Rockhampton and Mackay. These are located as follows:

- Archer Street / Denison Street Intersection – Rockhampton
- Cambridge Street / Denison Street Intersection – Rockhampton
- Fitzroy Street / Denison Street Intersection – Rockhampton
- Broad Street (Bruce Highway), near Brooks Road – Sarina
- Bruce Highway (near Huntly Road) – Sarina
- Bruce Highway (near Dunnrock Road) – Dunnrock
- Bruce Highway (near Homebush Road) – Rosella.

An inspection of aerial photography and publicly available QR network details, indicate that the train lines associated with these level crossings are minor, single track lines, typically servicing localised land uses. As a result, train services are not expected to be frequent and therefore unlikely to be significantly impacted by anticipated Project road volumes. Notwithstanding, QR has advised that this would need to be confirmed following lodgement of the EIS.

4. Project Traffic Generation

4.1 Design Horizons for Assessment

Project traffic volumes have been estimated based on Proponent provided operational assumptions and forecasts for the Project, for the following scenarios:

- 2018 (Project Year 1): Construction commencement and peak construction
- 2026 (Project Year 9): Construction of western MIA and operation of eastern MIA
- 2029 (Project Year 12): Peak of operational phase
- 2037 (Project Year 20): Decommissioning / rehabilitation and 20-year design horizon.

The rationale for design year selection is provided in Section 2.2.1.

4.2 Workforce Traffic Generation

Traffic generated by the Project workforce has been estimated based on first principles, utilising the workforce projections outlined in Section 2.3. Assumptions have been made regarding the location of the workforce, likely roster arrangements and vehicle occupancies, as detailed in the following sections. These assumptions have been developed in consultation with CDM Smith and the Proponent and are understood to have been derived based on past experience of similar projects.

A summary of the anticipated workforce projections, correlated to the selected design horizons, is provided in Table 4.1.

Table 4.1: Total Workforce Numbers

Workforce Type	Estimated Number of Workers			
	2018	2026	2029	2037
Construction	350	150	-	-
Operational (Shift workers) [1]	60	188	375	-
Operational (Managerial / Contractor) [1]	20	62	125	-
Decommissioning / rehabilitation	-	-	-	20
Total	**430**	**400**	**500**	**20**

[1] Split between shift workers and managerial staff / contractors are assumed to be 75 / 25, respectively.

4.2.1 Location of Workforce

CDM Smith and the Proponent have provided the broader assumptions in relation to the likely residence of the workforce, noting that it is anticipated that the workforce is to be 100% DIDO from surrounding local and regional population centres. Where relevant, ABS population data obtained from the 2011 Census has also been used to provide a sounding board for the likely distribution of the local workforce.

A summary of expected workforce locations and associated directional distribution to the north and south of the Project are summarised in Table 4.2.

Table 4.2: Assumed Workforce Location

Direction from Project	Assumed Origin / Destination of Workforce Movements		Assumed Directional Proportion of Construction, Operations and Decommissioning / rehabilitation workforce
North	Regional	Mackay	13%
	Local	Clairview	35% [1]
	Local	St Lawrence	
	Local	Ogmore	
South	Local	Marlborough	15%
	Regional	Rockhampton	37%

[1] All Journey to Work movements associated with Clairview, St Lawrence and Ogmore are assumed to be originating or destined for St Lawrence, noting that this represents the furthest centre from the Project and therefore allows for a 'worst case' scenario.

4.2.2 Workforce Rosters

The Project is expected to operate on two 12 hour shifts (i.e. day / night shift), during both construction and operational phases.

The assumed splits between night and day staff movements are provided in Table 4.3.

Table 4.3: Workforce Roster Splits

Workforce Type	Assumed Shift Split	
	Day Shift	Night Shift
Construction	70%	30%
Operational (Shift workers)	50%	50%
Operational (Managerial staff / Contractors)	65%	35%
Decommissioning / rehabilitation	100%	Nil

It has been assumed that traffic generation associated with shift starts and ends will occur within a single hour, coinciding with the network peak. All traffic associated with the day shift is assumed to arrive in the AM peak and depart in the PM peak, and vice versa for the night shift.

It is noted that strategies may be provided as part of the recommendations of the Road Use Management Plan (RMP) to stagger arrival / departures or to set shift times such that they do not coincide with the network peaks. The adoption of any such strategies would seek to alleviate the level of impact associated with the Project.

4.2.3 Vehicle Occupancy

A summary of the adopted vehicle occupancy rates are as follows, noting that these are consistent for day and night staff:

- Construction workers: 1.5 persons / vehicle
- Operational (shift workers): 1.2 persons / vehicle
- Operational (managerial staff / contractors): 1.0 persons / vehicle
- Decommissioning / rehabilitation workers: 1.2 persons / vehicle.

These vehicle occupancy rates have been formulated with consideration of 'industry standard' occupancy rates of 1.2 persons per vehicle (for urban areas), adjusted to account for the distinct operational characteristics of the Project. A review of other RIA's conducted for EIS projects of a similar nature reveal that assumed vehicle occupancies are generally higher (as high as 2.5 for some projects), and the adoption of the above rates are therefore considered to be conservative.

The vehicle occupancy rates have been adopted assuming that no shuttle services will be provided, nor any Proponent facilitated ridesharing schemes. This allows for a 'worst case' assessment. It is noted, however, that such strategies may be provided as part of the recommendations of the RMP, which would then be expected to decrease traffic generation (and hence impact) by the Project.

4.2.4 Vehicle Access Point Distribution

The split of workforce traffic requiring access to the east and west of the Bruce Highway has been adopted based on the anticipated Project schedule as described in Section 2.2. Assumptions adopted for the assessment are summarised in Table 4.4.

Table 4.4: Distribution of Traffic at the Project Access Intersection

Design Year	Workforce Type	Eastern Access	Western Access
2018	Operations	100%	-
	Construction	100%	-
2026	Operations	100%	-
	Construction	-	100%
2029	Operations	50%	50%
2037	Decommissioning / rehabilitation	50%	50%

4.2.5 Summary of Workforce Traffic Generation

Based on the assumptions documented in the preceding sections, estimates of workforce generated traffic are detailed in Table 4.5.

Traffic flow diagrams for the proposed access point are provided in Appendix B.

Table 4.5: Workforce Traffic Generation Summary

Design year	Bruce Highway Eastern Access				Bruce Highway Western Access				Total (vpd)
	AM Peak (vph)		PM Peak (vph)		AM Peak (vph)		PM Peak (vph)		
	In	Out	In	Out	In	Out	In	Out	
2018	201	102	102	201	0	0	0	0	606
2026	119	100	100	119	70	30	30	70	638
2029	119	100	100	119	119	100	100	119	876
2037	8	0	0	8	8	0	0	8	32

vph – vehicles per hour; vpd - vehicles per day

4.3 Heavy Vehicle Traffic Generation

The Proponent has provided estimates of heavy vehicle movements for the Project construction and operational phases. Assumptions have been made regarding the anticipated origin / destination of haul movements, including the breakdown into annual and hourly movements, as detailed in the following sections. These assumptions have been developed in consultation with CDM Smith and the Proponent and are understood to have been derived based on past experience of similar projects.

A summary of anticipated two-way heavy vehicle movements for the entirety of the Project is provided in Table 4.6.

Table 4.6: Total Project Heavy Vehicle Movements

Project Phase	Vehicle Type	Origin / Destination			
		Local	Regional	State	Port
Construction	Rigid Truck	320	380	9	1
	Semi-Trailer	1,015	96	122	170
	B-Double	-	250	50	-
	Oversized	-	-	-	70
	Sub-Total	**1,335**	**726**	**181**	**241**
Operations	Rigid Truck	4,575	37,005	-	845
	Semi-Trailer	-	2,176	-	-
	B-Double	-	9,518	-	-
	Oversized	-	-	-	272
	Sub-Total	**4,575**	**48,699**	**-**	**1,117**
Project Total	*Rigid Truck*	*4,895*	*37,385*	*9*	*846*
	Semi-Trailer	*1,015*	*2,272*	*122*	*170*
	B-Double	-	*9,768*	*50*	*0*
	Oversized	-	-	-	*342*
	Total	***5,910***	***49,425***	***181***	***1,358***

4.3.1 Directional Distribution of Heavy Vehicle Movements

Table 4.7 details the directional distribution assumptions used within the RIA, which have been provided by the Proponent.

Table 4.7: Assumed Directional Proportions of Heavy Vehicle Movements

Project Phase	Source of Heavy Vehicle	Direction of Origin	
		From the North	From the South
Construction	Local	50%	50%
	Regional	25%	75%
	State	50%	50%
	Port [1]	40%	60%
Operations	Local	50%	50%
	Regional	25%	75%
	State	-	-
	Port [1]	40%	60%

[1] Ports are assumed to be Mackay (north of Project Site) and Brisbane (south of Project Site)

4.3.2 Annual Heavy Vehicle Movements

The total Project volumes provided in Table 4.6 have been disaggregated into annual projections based on the following rationale:

- Heavy vehicle generation associated with construction have been separated into two distinct time horizons as discussed in Section 2.4. The first construction phase will occur over a period of 18 months between the last quarter of 2018, and the first quarter of 2020. The second construction phase will occur over a four-year period between the first quarter of 2025 and the last quarter of 2028.

- Approximately one third of the construction effort will be required during the first construction phase, and the remaining two thirds will be required during the second construction phase.
- The annualised heavy vehicle operations profile has been approximated based on the workforce projections for the operations phase. It has been assumed that the heavy vehicle generation for each year is directly proportional to the employee requirements for that same year.

Table 4.8 provides a summary of the estimated annual heavy vehicle haul movements for each of the identified design horizons.

Table 4.8: Annual Heavy Vehicle Movements

Project Phase	Vehicle Type	Heavy Vehicle Movements (Annual)			
		2018	2026	2029	2037 [1]
Construction	Rigid Truck	40	118	-	-
	Semi-Trailer	77	233	-	-
	B-Double	17	50	-	-
	Oversized	4	12	-	-
	Sub-Total	**138**	**413**	**-**	**-**
Operations	Rigid Truck	1,063	3,319	6,637	-
	Semi-Trailer	54	170	340	-
	B-Double	239	745	1,489	-
	Oversized	8	21	43	-
	Sub-Total	**1,363**	**4,255**	**8,509**	**-**
Project Total	*Rigid Truck*	*1,103*	*3,437*	*6,637*	**-**
	Semi-Trailer	*131*	*403*	*340*	**-**
	B-Double	*256*	*795*	*1,489*	**-**
	Oversized	*12*	*33*	*43*	**-**
	Total	***1,501***	***4,668***	***8,509***	**-**

[1] Heavy vehicle movement projections have not been scoped by the Proponent for the decommissioning / rehabilitation phase. However, the volume of any heavy vehicle haul movements associated with decommissioning / rehabilitation are expected to be smaller in magnitude when compared to the construction or operational phases.

4.3.3 Hourly Heavy Vehicle Traffic Generation

The annual heavy vehicle traffic generation summarised in Table 4.8 has been converted to projected hourly heavy vehicle movements using the following rationale:

- There are approximately 320 operational days per year
- Haul movements would generally be undertaken in a 12-hour period
- The distribution of haul movements is flat for the 12-hour period
- The split between IN/OUT movements is 50/50.

Using the above rationale, hourly heavy vehicle volumes typically results in less than 3 vehicles per hour (total IN/OUT). To allow for a conservative estimate, a nominal heavy vehicle volume of 10 vehicles per hour (total IN/OUT) has been adopted for a worst-case assessment for the link and turn warrant assessments.

Adopted heavy vehicle traffic generation used in the assessment is presented in Table 4.9.

Table 4.9: Hourly Heavy Vehicle Traffic Generation

Design year	Bruce Highway Eastern Access				Bruce Highway Western Access			
	AM Peak (vph)		PM Peak (vph)		AM Peak (vph)		PM Peak (vph)	
	In	Out	In	Out	In	Out	In	Out
2018	5	5	5	5	0	0	0	0
2026	5	5	5	5	5	5	5	5
2029	5	5	5	5	5	5	5	5

vph – vehicles per hour

5. Road Link Assessment

The following section has been prepared to assess anticipated Project impacts on the proposed haul routes (Bruce Highway from Rockhampton to Mackay), with due consideration of forecast traffic volumes "with" and "without" the Project. This assessment has been undertaken in accordance with the principles outlined in GARID which states:

"Traffic operation impacts need to be considered for any section of state controlled road where the construction or operational traffic generated by the development equals or exceeds 5% of the existing AADT on the road section, intersection movements or turning movements."

5.1 Impact Identification

Table 5.1 summarises the comparison of baseline traffic to Project traffic, to determine whether the 5% traffic impact threshold is exceeded.

Table 5.1: Link Assessment – Impact Identification

Road Name	Road Section	% Increase of AADT			
		2018	2026	2029	2037
Bruce Highway (Rockhampton – St Lawrence)	Yeppoon Road – Terra Nova Drive	6.2%	5.8%	7.3%	0.2%
	Terra Nova Drive – Vass Road	9.8%	9.1%	11.6%	0.3%
	Vass Road – Caves-Barmoya Road	18.1%	16.7%	21.3%	0.6%
	Caves-Barmoya Road – Ogmore Road	39.3%	36.3%	46.2%	1.4%
	Ogmore Road – Rockhampton and Mackay Regional Shire Boundary	41.0%	37.9%	48.2%	1.4%
	Rockhampton and Mackay Regional Shire Boundary – St Lawrence Connection Road	47.7%	44.1%	56.2%	1.7%
Bruce Highway (St Lawrence – Mackay)	St Lawrence Connection Road - Carmila	44.1%	40.8%	51.9%	1.5%
	Carmila – Oonooie	7.2%	6.7%	8.5%	0.3%
	Oonooie – Armstrong Beach	6.1%	5.6%	7.2%	0.2%
	Armstrong Beach – Broad Street	3.5%	3.3%	4.2%	0.1%
	Broad Street – Sarina Homebush Road	3.4%	3.1%	3.9%	0.1%
	Sarina Homebush Road – Hay Point Road	3.8%	3.5%	4.5%	0.1%
	Hay Point Road – Homebush Road (Rosella)	2.4%	2.2%	2.8%	0.1%
	Homebush Road (Rosella) – Archibald Street	1.8%	1.7%	2.1%	0.1%
	Archibald Street – Webberley Street	1.0%	0.9%	1.2%	0.0%
	Webberley Street – Bridge Street	1.4%	1.3%	1.6%	0.0%
	Bridge Street – Gordon Street	1.3%	1.2%	1.5%	0.0%

On the basis of the summary provided in Table 5.1, the impact of forecast Project traffic exceeds 5% for the following road segments:

- Yeppoon Road – Terra Nova Drive
- Terra Nova Drive – Vass Road
- Vass Road – Caves-Barmoya Road
- Caves-Barmoya Road – Ogmore Road
- Ogmore Road – Rockhampton and Mackay Regional Shire Boundary
- Rockhampton and Mackay Regional Shire Boundary – St Lawrence Connection Road
- St Lawrence Connection Road - Carmila

- Carmila – Oonooie
- Oonooie – Armstrong Beach.

A link capacity assessment for these affected roads are provided in Section 5.2.

5.2 Link Capacity Calculations

The theoretical link capacity has been calculated in accordance with Austroads GTM: Part 3 for two-lane, two-way roads. A summary of the input assumptions that have been adopted in the calculations are contained in Table 5.2.

Table 5.2: Road Section Link Capacity Assumptions

Input	Assumption
Lane widths	≥ 3.6m
Clear shoulder width	≥ 1.8m
All passenger cars	Heavy vehicles converted to passenger car units (pcu)
Flow conditions	Uninterrupted flow
Terrain	Level terrain
Directional split	50 / 50 split

PCU (passenger car units) conversion factors were obtained from TMR's 'Cost Benefit Analysis Manual', as follows:

- Car: 1.0
- Rigid Truck: 1.4
- Semi-Trailer: 2.4
- B-Double: 4.1
- Oversized: 4.1.

Based on these assumptions, the threshold link capacity for two-lane, two-way roads corresponding to each Level of Service (LOS) has been calculated as follows:

- LOS A: < 490 pcu/h
- LOS B: 490 – 780 pcu/h
- LOS C: 781 – 1,190 pcu/h
- LOS D: 1,191 – 1,830 pcu/h
- LOS E: 1,831 – 3,200 pcu/h
- LOS F: > 3,200 pcu/h.

It is noted that the above does not include any capacity adjustments to account for overtaking lanes. No documented methodology exists for this calculation, and therefore the analysis provided herein accounts for a conservative assessment of road sections where overtaking lanes are available.

For the purposes of this RIA, LOS D has been assumed as the operational threshold for 'acceptable' link performance.

5.3 Link Capacity Assessment

A summary of the anticipated LOS for each link "with" and "without" Project traffic is provided in Table 5.3. Detailed results are provided in Appendix C.

Table 5.3: Link Capacity Assessment Summary

Road Name	Road Section	Link Capacity					
		2018		2026		2029	
		Base	Project	Base	Project	Base	Project
Bruce Highway (Rockhampton – St Lawrence)	Yeppoon Road – Terra Nova Drive	E	E	E	E	E	E
	Terra Nova Drive – Vass Road	D	D	D	D	D	E
	Vass Road – Caves-Barmoya Road	C	C	C	C	C	D
	Caves-Barmoya Road – Ogmore Road	B	B	B	C	B	C
	Ogmore Road – Rockhampton / Mackay Boundary	B	B	B	C	B	C
	Rockhampton / Mackay Boundary – St Lawrence Connection Road	A	B	B	B	B	C
Bruce Highway (St Lawrence – Mackay)	St Lawrence Connection Road - Carmila	B	B	B	B	B	C
	Carmila – Oonooie	B	B	C	C	C	C
	Oonooie – Armstrong Beach	C	C	C	C	C	C

Table 5.3 indicates that the LOS of Terra Nova Drive – Vass Road may decrease from LOS D to LOS E as a result of Project traffic. It is noted that the estimated capacity of this road section is anticipated to be greater than that calculated, noting that overtaking lanes are currently available on this road section. The presence of these lanes would increase the theoretical link capacity and subsequent LOS, as discussed in Section 5.2.

As detailed in Section 3.1, QTRIP identifies several planned upgrades to the Bruce Highway which are expected to increase road link capacity. Relevant works include:

- The undertaking of a planning project, to increase the Bruce Highway to four lanes from Yeppoon Road to Ramsay Creek (aligns with Yeppoon Road – Terra Nova Drive section / current LOS E)
- The construction of overtaking lanes between Kalarka Road and Colonial Drive South (aligns with St Lawrence Connection Road – Carmila section / current LOS B)
- The construction of overtaking lanes between Spider Creek and Three Mile Creek

5.4 Impact Mitigation

Notwithstanding, it is recommended that mitigation strategies are considered to offset the anticipated impact of Project traffic on Terra Nova Drive – Vass Road link section. It is expected that these strategies will be detailed further within the RMP, and may include:

- Provision of a shuttle service for workers to reduce private vehicle usage and overall traffic generation
- Provision of a ride sharing scheme to increase worker vehicle occupancy and decrease overall traffic generation
- Scheduling shift times and heavy vehicle movements such that Project traffic does not coincide with network peak periods.

6. Access Intersection Assessment

The Project proposes to gain vehicular access to both sides of the Bruce Highway as discussed in Section 2.1. To achieve this access, a new four-way intersection is proposed. It is noted that the location of the intersection is still currently being scoped, and as such, site specific geometric design considerations (e.g. sight distances) have been excluded from the RIA at this preliminary stage. A detailed assessment of the locational aspects will be undertaken in due course as the Project is further developed.

6.1 Turn Warrant Assessment

A turn warrant assessment has been undertaken in accordance with the methodology provided in the RPDM Volume 3: Part 4A for the proposed Project access. The following scenarios have been assessed:

- 2018: Eastern Access Only
- 2029: Eastern and Western Access.

These scenarios constitute the requirements for the anticipated year of opening (i.e. eastern access only) and ultimate (i.e. both eastern and western access with peak Project traffic).

A summary of the results of this assessment are outlined in Table 6.1 and Table 6.2, with detailed results available at Appendix D.

Table 6.1: 2018 Turn Warrant Results

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (North approach)	Auxiliary Lane (Short) – AUL(S)	N/A
Bruce Highway (South approach)	N/A	Channelised Right Turn - CHR

Table 6.2: 2029 Turn Warrant Results

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (North approach)	Auxiliary Lane (Short) – AUL (S)	Channelised Right Turn - CHR
Bruce Highway (South approach)	Auxiliary Lane (Short) – AUL (S)	Channelised Right Turn - CHR

The results of the turn warrant assessment indicate that AUL(S) and CHR turn treatments are required for both the eastern and western access points. It is therefore recommended that these provisions are incorporated in the design of the access intersection, to be progressed pending the confirmation of location.

6.2 Intersection Form

The required form for the access intersection is provided in Figure 6.1 and Figure 6.2, which is based on the requirements set out in Austroads GRD: Part 4A. It is noted that due to the four-way nature of the proposed access intersection, the left and right turn treatments are to be provided for both directions of travel.

Figure 6.1: Auxiliary Left Turn Treatment – General Form

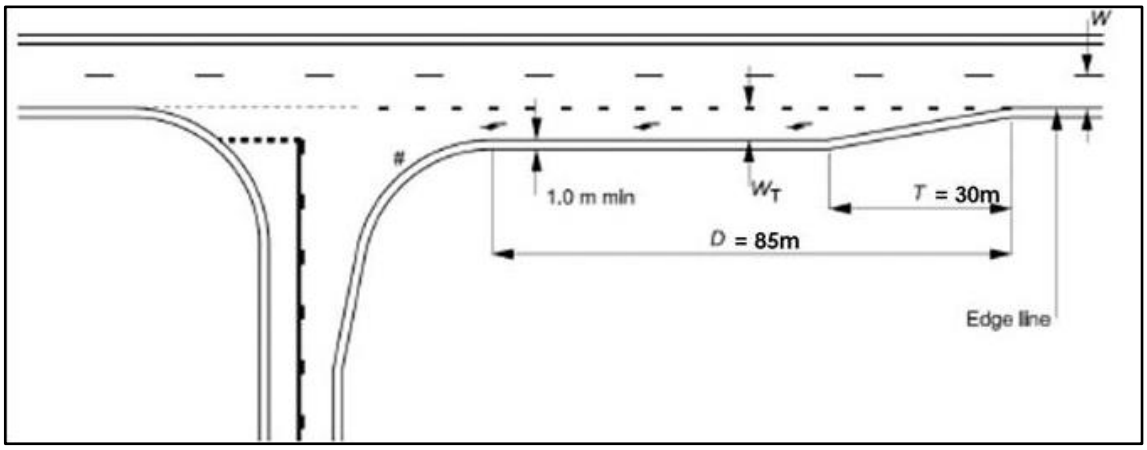
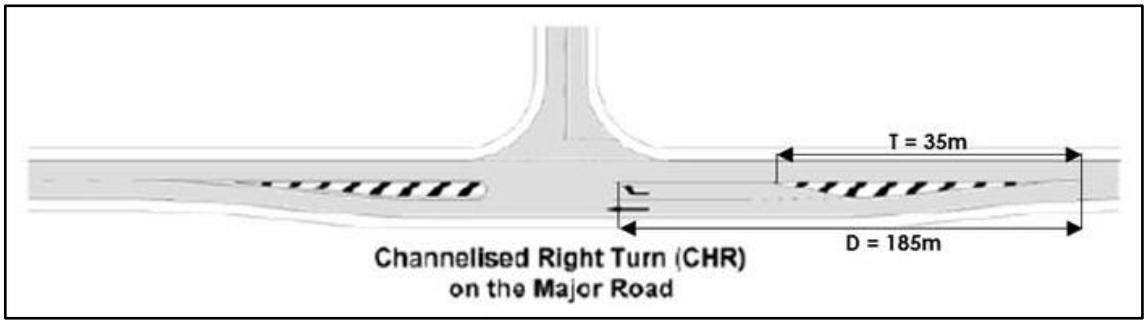


Figure 6.2: Channelised Right Turn Treatment – General Form



7. Pavement Impact Assessment

Identification of pavement impacts to SCRs was undertaken in accordance with the Northern Region 'Assessment of Road Impacts of Development Proposals - Notes for Contribution Calculations'. These guidelines were adopted for the RIA given that liaison with Mackay / Whitsunday District and Fitzroy District indicated that similar methodologies were not available for these districts. Information sourced from TMR (obtained 9 June 2017) which was used in the PIA included:

- Pavement roughness data
- Seal width data by chainage
- AADT segment reports and corresponding heavy vehicle percentages.

7.1 ESA Conversion Factors

Equivalent Standard Axles (ESA) conversion factors have been calculated using the methodology provided by TMR, which is based on the Austroads GPT: Part 2. The adopted ESA conversion factors are as detailed in Table 7.1

Table 7.1: ESA Conversion Factors

Vehicle Type	ESA Conversion Factor	
	Unloaded	Loaded
Bus / Truck	0.54	2.98
Semi-Trailer	0.51	4.93
B-Double	0.53	6.30
Oversized	0.54	7.66

It is noted that a 50 / 50 split has been assumed between loaded and unloaded heavy vehicle entering and exiting the site. This is based on the assumption that there will be deliveries to the site, as well as removal of material from the site.

7.2 Impact Identification

A summary of the Project generated heavy vehicle movements (and ESAs) on each haul segment is provided in Appendix E. Based on the calculated development ESAs, impacts of greater than 5% have not been identified for any section of the Bruce Highway. On this basis, and as per the methodology detailed in GARID, assessment of contributions has not been undertaken, with the pavement impacts of the Project considered insignificant.

8. Additional Impact Considerations

8.1 Oversized Vehicles

The Project is likely to utilise oversized vehicles for some of the transport activities as part of construction and operations. It is noted that the use of these vehicles will be undertaken in accordance with the National Heavy Vehicle Regulator guidelines, and be subject to permit applications and TMR approvals for the use of such vehicles. The use of these vehicles will be assessed as part of these permit applications.

8.2 Rail Level Crossings

Preliminary liaison with QR indicates that the requirement to undertaken an ALCAM assessment for impacts to rail level crossings will be determined following lodgement of the EIS.

8.3 Road Use Management Plan

The preparation of an RMP will likely be required as the Project progresses. It is anticipated that the RMP will include consideration of:

- Public safety at worksites
- Obstructions to road users
- Workforce management strategies to reduce traffic generation
- Management of driver behaviour to ensure that Project traffic is driving in safe manner
- Driver fatigue management strategies
- Defining responsibilities and procedures for implementation, monitoring and RMP strategy amendment.

The outcomes of the RIA are intended to inform the development of the RMP, which will in turn influence the future transport strategies to be adopted. The impact mitigation strategies adopted within the RMP will form the basis upon which State and Local government will monitor and assess the construction and operational activities of the Project.

Based on the RIA findings, potential strategies to be considered as part of the RMP to offset road impacts are:

- Operation of a shuttle bus for the Project workforce, to reduce Project traffic
- Implementation of a ridesharing scheme to reduce Project traffic
- Adjusting shift times and heavy vehicle movement scheduling such that Project traffic peaks do not coincide with the network peak period.

9. Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- Worst case traffic demands for the Project are expected to occur in:
  - 2018 (Project Year 1): Construction commencement and peak construction
  - 2026 (Project Year 9): Construction of western MIA and operation of eastern MIA
  - 2029 (Project Year 12): Peak of operational phase
  - 2037 (Project Year 20): Decommissioning / rehabilitation and 20-year design horizon.
- A total of nine road links on the Bruce Highway are expected to have Project traffic volumes which hare greater than 5% of baseline traffic volumes. Of these links, the Terra Nova Drive – Vass Road link section is exceeded to LOS E as a result of project generated traffic.
- The Terra Nova Drive – Vass Road link section of the Bruce Highway currently incorporates overtaking lanes, which are expected to increase capacity beyond that of a typical road link, thereby improving the anticipated LOS. Further, it is proposed that transport management strategies are investigated as part of the RMP which could be used to reduce Project traffic, and thereby mitigate impacts on this road link.
- A turn warrant assessment indicates that the proposed site access should be provide AUL(S) and CHR turn treatments, for both the eastern and western access points. It is recommended that these treatments are incorporated into the access arrangements as designs further progress.
- Based on the calculated development ESAs, pavement impacts of greater than 5% have not been identified for any section of the Bruce Highway.

Appendices

Appendix A

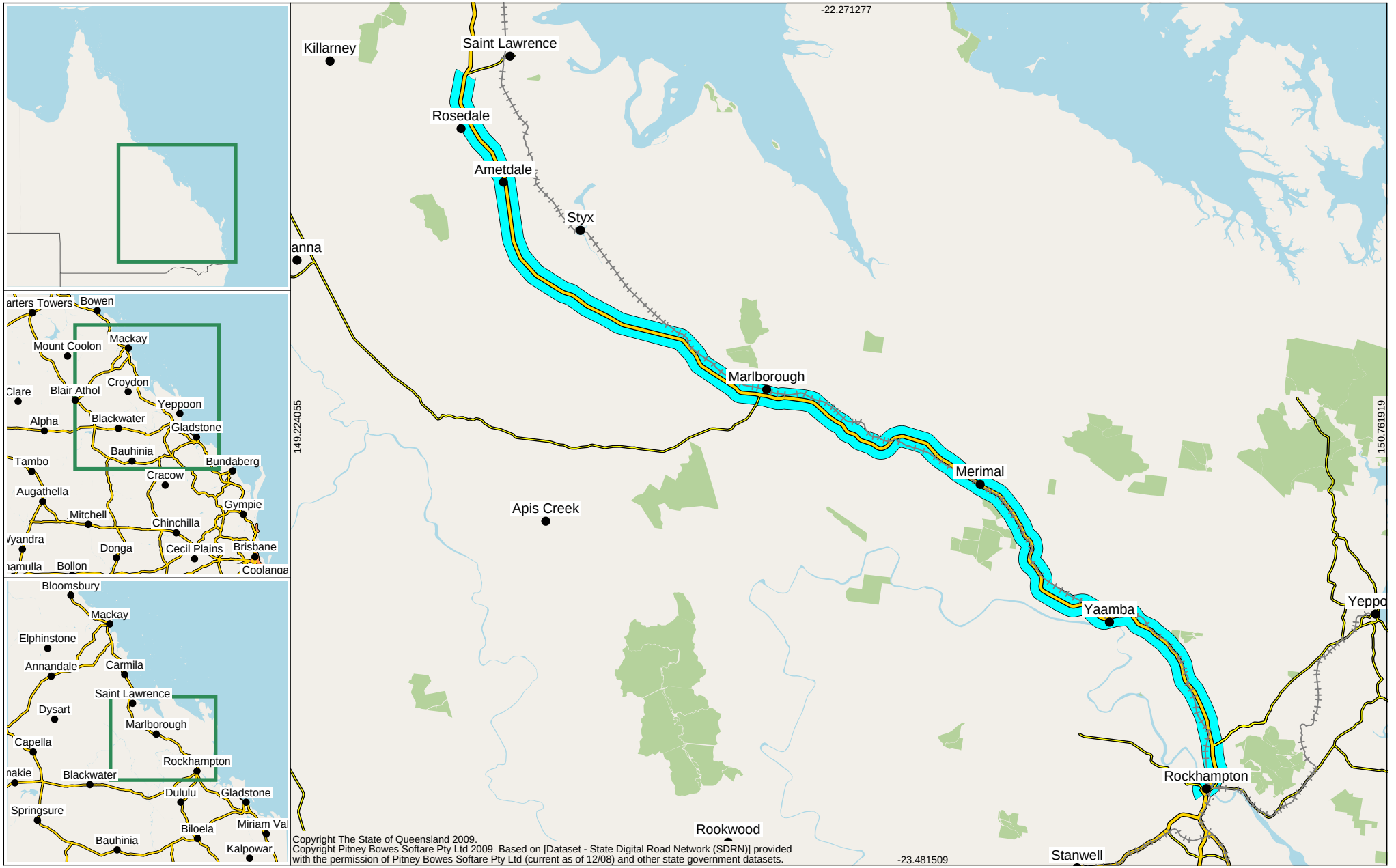
AADT Segment Reports

Traffic Analysis and Reporting System

AADT Segment Analysis Report (Complete)

Road Section 10F - BRUCE HIGHWAY (ROCKHAMPTON-ST LAWRENCE)

Traffic Year 2016



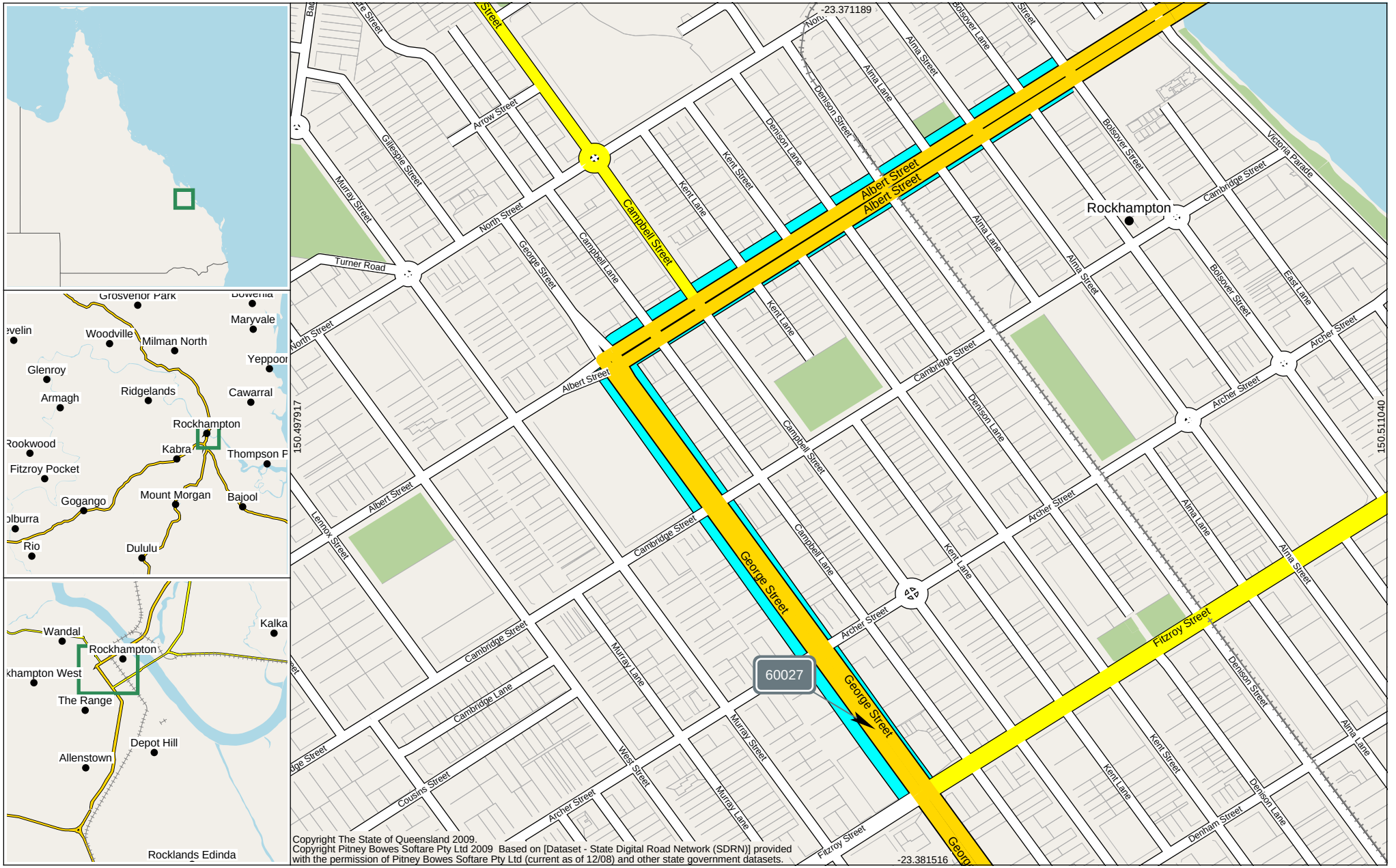
Road Segments Summary - All Vehicles

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	AADT			VKT (Millions)			Data Year	Page
						G	A	B	G	A	B		
404	0.000 km	1.409 km	60027	0.100 km	Bruce Hwy @ Archer St(Lights)	9,388	6,996	16,384	4.82811	3.59794	8.42605	2015	2
404	1.409 km	4.340 km	60017	2.770 km	Bruce Hwy 100m Sth Knight St	16,118	17,462	33,580	17.24328	18.68111	35.92439	2015	3
404	4.340 km	5.517 km	61005	4.750 km	Bruce Hwy at Boland St	12,153	12,411	24,564	5.22099	5.33183	10.55282	2015	4
404	5.517 km	8.550 km	60822	7.736 km	Bruce Hwy 800m Sth Rton-Yeppoon Rd	8,194	8,516	16,710	9.07113	9.42760	18.49872	2015	5
404	8.550 km	13.180 km	60926	10.410 km	Bruce Hwy 200m Sth Mason Ave (Parkhurst)	5,969	5,862	11,831	10.08731	9.90649	19.99380	2015	6
404	13.180 km	19.833 km	60823	13.330 km	Bruce Hwy 150m North Terra Nova Dr	3,785	3,710	7,495	9.19129	9.00916	18.20045	2015	7
404	19.833 km	24.908 km	60160	24.380 km	Bruce Hwy 200m North 14 Mile Ck Rd	2,022	2,048	4,070	3.74550	3.79366	7.53917	2015	8
404	24.908 km	142.630 km	60003	75.230 km	Bruce Hwy 40m Sth MountainCk(Kunwarara)	1,332	1,295	2,627	57.23408	55.64425	112.87833	2015	9
404	142.630 km	149.400 km	61814	144.300 km	1km south of Montrose Creek on Bruce Hwy	1,163	1,117	2,280	2.87383	2.76016	5.63399	2015	10
405	149.400 km	177.923 km	80022	169.650 km	South of Waverley Creek	956	1,001	1,957	9.95282	10.42131	20.37412	2015	11
								Totals	129.44833	128.57350	258.02183		

Road Segments Summary - Heavy Vehicles only

VKT totals are calculated only if traffic class data is available for all sites.

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	HV AADT						HV VKT (Millions)			Data Year	Page
						G		A		B						
						AADT	HV %	AADT	HV %	AADT	HV %	G	A	B		
404	0.000 km	1.409 km	60027	0.100 km	Bruce Hwy @ Archer St(Lights)	1,114	11.87%	729	10.42%	1,843	11.25%	0.57291	0.37491	0.94783	2015	2
404	1.409 km	4.340 km	60017	2.770 km	Bruce Hwy 100m Sth Knight St	1,367	8.48%	1,540	8.82%	2,907	8.66%	1.46244	1.64752	3.10995	2015	3
404	4.340 km	5.517 km	61005	4.750 km	Bruce Hwy at Boland St	945	7.78%	964	7.77%	1,909	7.77%	0.40598	0.41414	0.82012	2015	4
404	5.517 km	8.550 km	60822	7.736 km	Bruce Hwy 800m Sth Rton-Yeppoon Rd	851	10.39%	861	10.11%	1,712	10.25%	0.94210	0.95317	1.89526	2015	5
404	8.550 km	13.180 km	60926	10.410 km	Bruce Hwy 200m Sth Mason Ave (Parkhurst)	759	12.72%	798	13.61%	1,557	13.16%	1.28267	1.34858	2.63125	2015	6
404	13.180 km	19.833 km	60823	13.330 km	Bruce Hwy 150m North Terra Nova Dr	730	19.29%	533	14.37%	1,263	16.85%	1.77269	1.29431	3.06700	2015	7
404	19.833 km	24.908 km	60160	24.380 km	Bruce Hwy 200m North 14 Mile Ck Rd	560	27.70%	444	21.68%	1,004	24.67%	1.03733	0.82245	1.85978	2015	8
404	24.908 km	142.630 km	60003	75.230 km	Bruce Hwy 40m Sth MountainCk(Kunwarara)	322	24.17%	320	24.71%	642	24.44%	13.83587	13.74993	27.58580	2015	9
404	142.630 km	149.400 km	61814	144.300 km	1km south of Montrose Creek on Bruce Hwy	333	28.63%	327	29.27%	660	28.95%	0.82286	0.80803	1.63089	2015	10
405	149.400 km	177.923 km	80022	169.650 km	South of Waverley Creek	300	31.38%	303	30.27%	603	30.81%	3.12327	3.15450	6.27777	2015	11
											Totals	25.25811	24.56754	49.82565		



Site 60027. Point 260000051. Bruce Hwy @ Archer St Lights.
0.10 km

The width of each Road Segment is proportional to its AADT.

0.00 km
Start Point 260000036. George St to Albert St @ Fitzroy St.

1.41 km
End Point 260000727. Albert St to Base Hospital @ Bolsover St.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-1.07%	
A	0.00%	-12.01%	
B	0.00%	-6.74%	

All Vehicles (00)

G	9,388	100%
A	6,996	100%
B	16,384	100%

Light Vehicles (0A)

G	8,276	88.16%
A	6,267	89.58%
B	14,543	88.76%

Heavy Vehicles (0B)

G	1,114	11.87%
A	729	10.42%
B	1,843	11.25%

Short Vehicles (1A)

G	8,276	88.16%
A	6,267	89.58%
B	14,543	88.76%

Trucks and Buses (1B)

G	684	7.29%
A	464	6.63%
B	1,148	7.01%

Articulated Vehicles (1C)

G	239	2.55%
A	156	2.23%
B	395	2.41%

Road Trains (1D)

G	191	2.03%
A	109	1.56%
B	300	1.83%

Short 2-Axle Vehicles (2A)

G	8,015	85.37%
A	6,088	87.02%
B	14,103	86.08%

Short Vehicles Towing (2B)

G	261	2.78%
A	179	2.56%
B	440	2.69%

2-Axle Trucks and Buses (2C)

G	560	5.97%
A	338	4.83%
B	898	5.48%

3-Axle Trucks and Buses (2D)

G	104	1.11%
A	99	1.42%
B	203	1.24%

4-Axle Trucks (2E)

G	20	0.21%
A	27	0.39%
B	47	0.29%

3-Axle Articulated (2F)

G	16	0.17%
A	11	0.16%
B	27	0.16%

4-Axle Articulated (2G)

G	34	0.36%
A	18	0.26%
B	52	0.32%

5-Axle Articulated (2H)

G	33	0.35%
A	21	0.30%
B	54	0.33%

6-Axle Articulated (2I)

G	156	1.66%
A	106	1.52%
B	262	1.60%

B Double (2J)

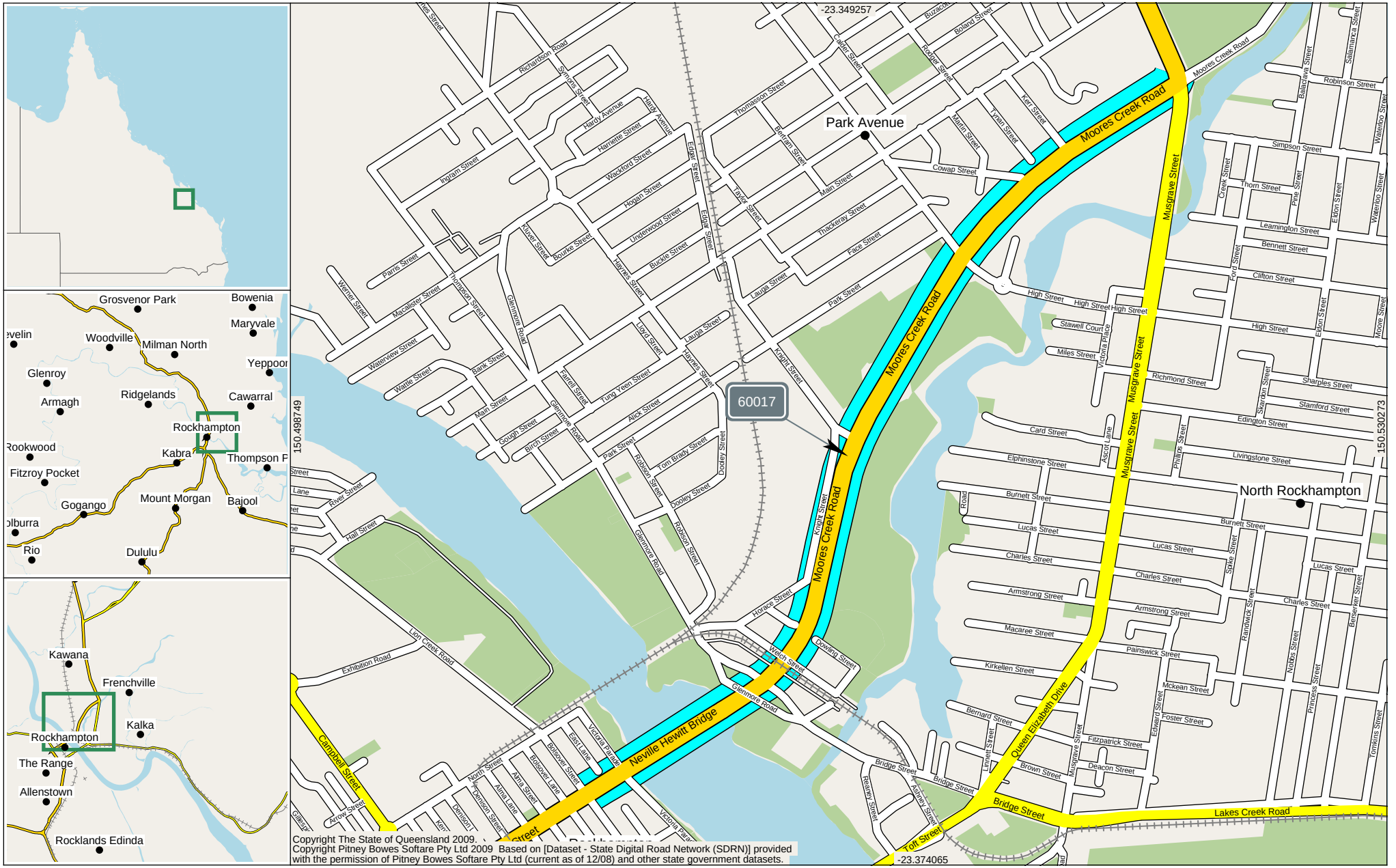
G	188	2.00%
A	107	1.53%
B	295	1.80%

Double Road Trains (2K)

G	3	0.03%
A	2	0.03%
B	5	0.03%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%



Site 60017. Point 260000035. Bruce Hwy 100m Sth Knight St.
2.77 km

1.41 km
Start Point 260000727. Albert St to Base Hospital @ Bolsover St.

4.34 km
End Point 260000037. Moores Creek Rd to city @ Yaamba Rd.

The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-0.07%	0.14%
A	0.00%	0.05%	0.88%
B	0.00%	-0.01%	0.51%

All Vehicles (00)

G	16,118	100%
A	17,462	100%
B	33,580	100%

Light Vehicles (0A)

G	14,752	91.53%
A	15,922	91.18%
B	30,674	91.35%

Heavy Vehicles (0B)

G	1,367	8.48%
A	1,540	8.82%
B	2,907	8.66%

Short Vehicles (1A)

G	14,752	91.53%
A	15,922	91.18%
B	30,674	91.35%

Trucks and Buses (1B)

G	978	6.07%
A	1,105	6.33%
B	2,083	6.20%

Articulated Vehicles (1C)

G	233	1.45%
A	258	1.48%
B	491	1.46%

Road Trains (1D)

G	156	0.97%
A	177	1.01%
B	333	0.99%

Short 2-Axle Vehicles (2A)

G	14,513	90.04%
A	15,655	89.65%
B	30,168	89.84%

Short Vehicles Towing (2B)

G	239	1.48%
A	267	1.53%
B	506	1.51%

2-Axle Trucks and Buses (2C)

G	849	5.27%
A	950	5.44%
B	1,799	5.36%

3-Axle Trucks and Buses (2D)

G	103	0.64%
A	124	0.71%
B	227	0.68%

4-Axle Trucks (2E)

G	26	0.16%
A	31	0.18%
B	57	0.17%

3-Axle Articulated (2F)

G	23	0.14%
A	23	0.13%
B	46	0.14%

4-Axle Articulated (2G)

G	34	0.21%
A	33	0.19%
B	67	0.20%

5-Axle Articulated (2H)

G	29	0.18%
A	33	0.19%
B	62	0.18%

6-Axle Articulated (2I)

G	147	0.91%
A	169	0.97%
B	316	0.94%

B Double (2J)

G	153	0.95%
A	175	1.00%
B	328	0.98%

Double Road Trains (2K)

G	3	0.02%
A	2	0.01%
B	5	0.01%

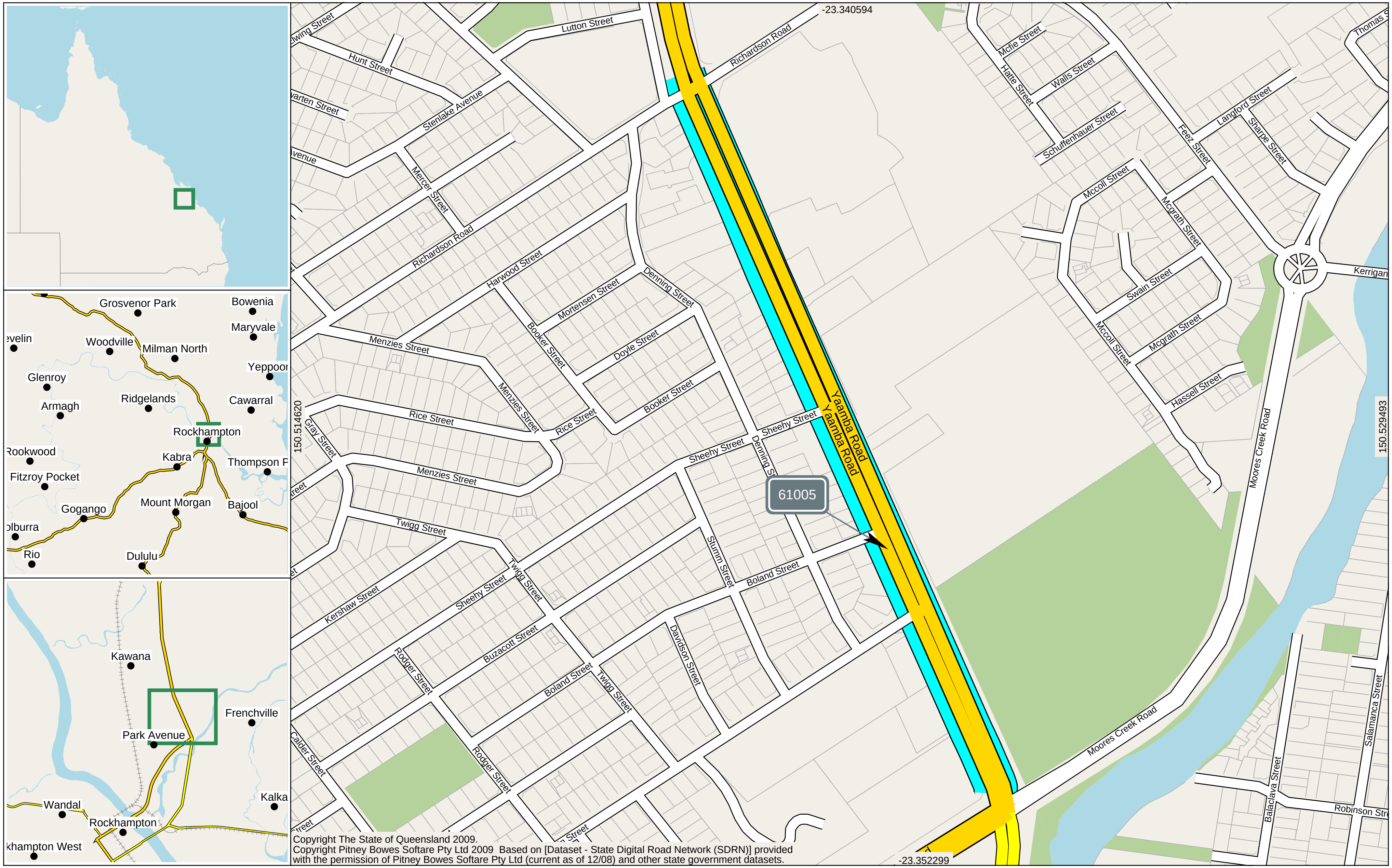
Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%

AADT Segment Analysis Report (Complete)

Area 404 - Fitzroy District Road Section 10F - BRUCE HIGHWAY (ROCKHAMPTON-ST LAWRENCE)

Traffic Year 2016 - Data Collection Year 2015



Site 61005. Point 260000731. Bruce Hwy Boland St Ped Crossing.
4.75 km

4.34 km
Start Point 260000037. Moores Creek Rd to city @ Yaamba Rd.

5.52 km
End Point 260000422. Yaamba Rd to city @ Richardson Rd.

The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-0.14%	-0.39%
A	0.00%	1.29%	1.20%
B	0.00%	0.56%	0.38%

All Vehicles (00)

G	12,153	100%
A	12,411	100%
B	24,564	100%

Light Vehicles (0A)

G	11,209	92.23%
A	11,448	92.24%
B	22,657	92.24%

Heavy Vehicles (0B)

G	945	7.78%
A	964	7.77%
B	1,909	7.77%

Short Vehicles (1A)

G	11,209	92.23%
A	11,448	92.24%
B	22,657	92.24%

Trucks and Buses (1B)

G	648	5.33%
A	642	5.17%
B	1,290	5.25%

Articulated Vehicles (1C)

G	166	1.37%
A	195	1.57%
B	361	1.47%

Road Trains (1D)

G	131	1.08%
A	127	1.02%
B	258	1.05%

Short 2-Axle Vehicles (2A)

G	10,933	89.96%
A	11,123	89.62%
B	22,056	89.79%

Short Vehicles Towing (2B)

G	276	2.27%
A	325	2.62%
B	601	2.45%

2-Axle Trucks and Buses (2C)

G	553	4.55%
A	539	4.34%
B	1,092	4.45%

3-Axle Trucks and Buses (2D)

G	78	0.64%
A	87	0.70%
B	165	0.67%

4-Axle Trucks (2E)

G	17	0.14%
A	16	0.13%
B	33	0.13%

3-Axle Articulated (2F)

G	13	0.11%
A	15	0.12%
B	28	0.11%

4-Axle Articulated (2G)

G	22	0.18%
A	30	0.24%
B	52	0.21%

5-Axle Articulated (2H)

G	26	0.21%
A	27	0.22%
B	53	0.22%

6-Axle Articulated (2I)

G	105	0.86%
A	123	0.99%
B	228	0.93%

B Double (2J)

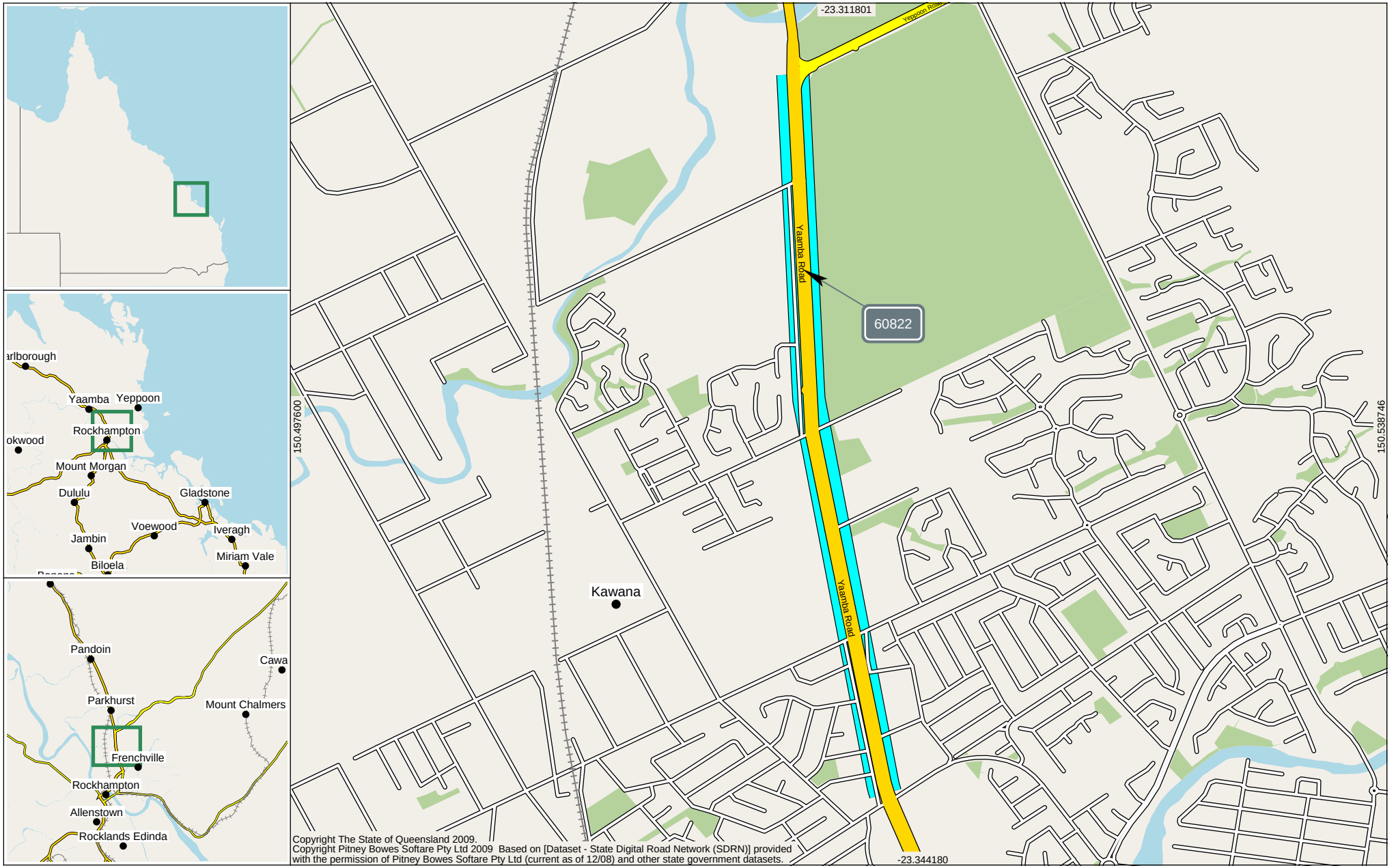
G	130	1.07%
A	123	0.99%
B	253	1.03%

Double Road Trains (2K)

G	1	0.01%
A	4	0.03%
B	5	0.02%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%



Site 60822. Point 260000618. Bruce Hwy Sth Yeppoon Rd Int.
7.74 km

5.52 km
Start Point 260000422. Yaamba Rd to city @ Richardson Rd.

8.55 km
End Point 260000303. Yaamba Rd/Bruce Hwy to City @ Yeppoon Rd.

The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	0.60%	1.20%
A	0.00%	0.80%	1.29%
B	0.00%	0.70%	1.24%

All Vehicles (00)

G	8,194	100%
A	8,516	100%
B	16,710	100%

Light Vehicles (0A)

G	7,342	89.60%
A	7,655	89.89%
B	14,997	89.75%

Heavy Vehicles (0B)

G	851	10.39%
A	861	10.11%
B	1,712	10.25%

Short Vehicles (1A)

G	7,342	89.60%
A	7,655	89.89%
B	14,997	89.75%

Trucks and Buses (1B)

G	551	6.72%
A	573	6.73%
B	1,124	6.73%

Articulated Vehicles (1C)

G	164	2.00%
A	165	1.94%
B	329	1.97%

Road Trains (1D)

G	136	1.66%
A	123	1.44%
B	259	1.55%

Short 2-Axle Vehicles (2A)

G	7,031	85.81%
A	7,365	86.48%
B	14,396	86.15%

Short Vehicles Towing (2B)

G	311	3.80%
A	290	3.41%
B	601	3.60%

2-Axle Trucks and Buses (2C)

G	483	5.89%
A	487	5.72%
B	970	5.80%

3-Axle Trucks and Buses (2D)

G	57	0.70%
A	72	0.85%
B	129	0.77%

4-Axle Trucks (2E)

G	11	0.13%
A	14	0.16%
B	25	0.15%

3-Axle Articulated (2F)

G	16	0.20%
A	16	0.19%
B	32	0.19%

4-Axle Articulated (2G)

G	29	0.35%
A	28	0.33%
B	57	0.34%

5-Axle Articulated (2H)

G	27	0.33%
A	26	0.31%
B	53	0.32%

6-Axle Articulated (2I)

G	92	1.12%
A	95	1.12%
B	187	1.12%

B Double (2J)

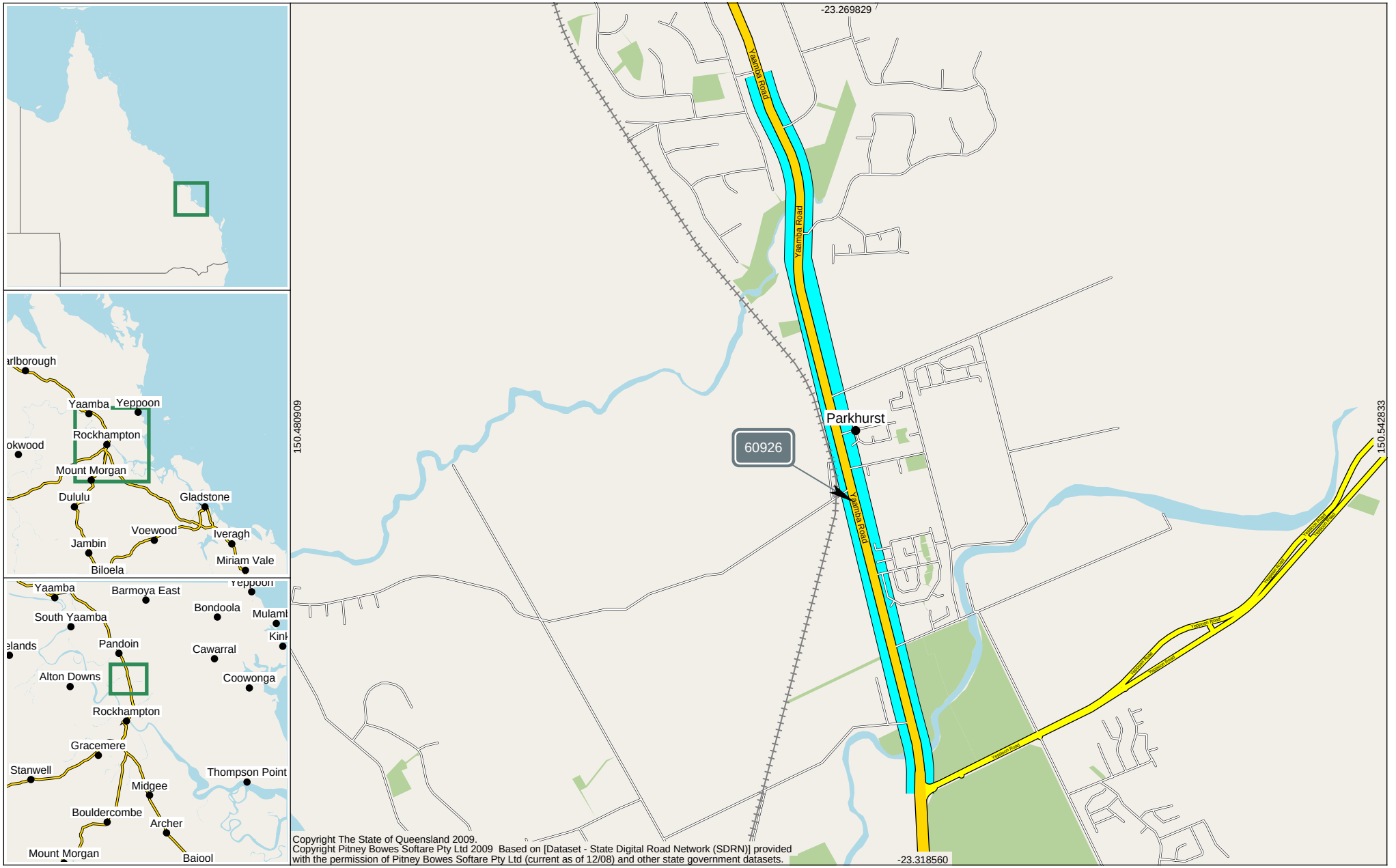
G	134	1.64%
A	122	1.43%
B	256	1.53%

Double Road Trains (2K)

G	2	0.02%
A	1	0.01%
B	3	0.02%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%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Yaamba Road
Parkhurst
60926
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Yaamba
Yeppoon
Rockhampton
Mount Morgan
Dululu
Gladstone
Jambin
Voewood
Iveragh
Miriam Vale
Biloela
Barmoya East
Bondoola
South Yaamba
Pandoin
Cawarral
Alton Downs
Coowonga
Gracemere
Stanwell
Thompson Point
Midgee
Bouldercombe
Archer
Baiool
Copyright The State of Queensland 2009.
Copyright Pitney Bowes Softare Pty Ltd 2009 Based on [Dataset - State Digital Road Network (SDRN)] provided with the permission of Pitney Bowes Softare Pty Ltd (current as of 12/08) and other state government datasets.

Site 60926. Point 260000686. Bruce Hwy 200m Sth Mason Ave (Parkhurst).
10.41 km

The width of each Road Segment is proportional to its AADT.

8.55 km
Start Point 260000303. Yaamba Rd/Bruce Hwy to City @ Yeppoon Rd.

13.18 km
End Point 260000531. Bruce Hwy to Rockhampton @ Terra Nova Dr.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	1.96%	2.15%
A	0.00%	0.90%	1.74%
B	0.00%	1.43%	1.95%

All Vehicles (00)

G	5,969	100%
A	5,862	100%
B	11,831	100%

Light Vehicles (0A)

G	5,210	87.28%
A	5,063	86.37%
B	10,273	86.83%

Heavy Vehicles (0B)

G	759	12.72%
A	798	13.61%
B	1,557	13.16%

Short Vehicles (1A)

G	5,210	87.28%
A	5,063	86.37%
B	10,273	86.83%

Trucks and Buses (1B)

G	457	7.66%
A	480	8.19%
B	937	7.92%

Articulated Vehicles (1C)

G	149	2.50%
A	159	2.71%
B	308	2.60%

Road Trains (1D)

G	153	2.56%
A	159	2.71%
B	312	2.64%

Short 2-Axle Vehicles (2A)

G	4,941	82.78%
A	4,851	82.75%
B	9,792	82.77%

Short Vehicles Towing (2B)

G	269	4.51%
A	212	3.62%
B	481	4.07%

2-Axle Trucks and Buses (2C)

G	390	6.53%
A	416	7.10%
B	806	6.81%

3-Axle Trucks and Buses (2D)

G	57	0.95%
A	55	0.94%
B	112	0.95%

4-Axle Trucks (2E)

G	10	0.17%
A	9	0.15%
B	19	0.16%

3-Axle Articulated (2F)

G	13	0.22%
A	15	0.26%
B	28	0.24%

4-Axle Articulated (2G)

G	30	0.50%
A	32	0.55%
B	62	0.52%

5-Axle Articulated (2H)

G	23	0.39%
A	25	0.43%
B	48	0.41%

6-Axle Articulated (2I)

G	83	1.39%
A	87	1.48%
B	170	1.44%

B Double (2J)

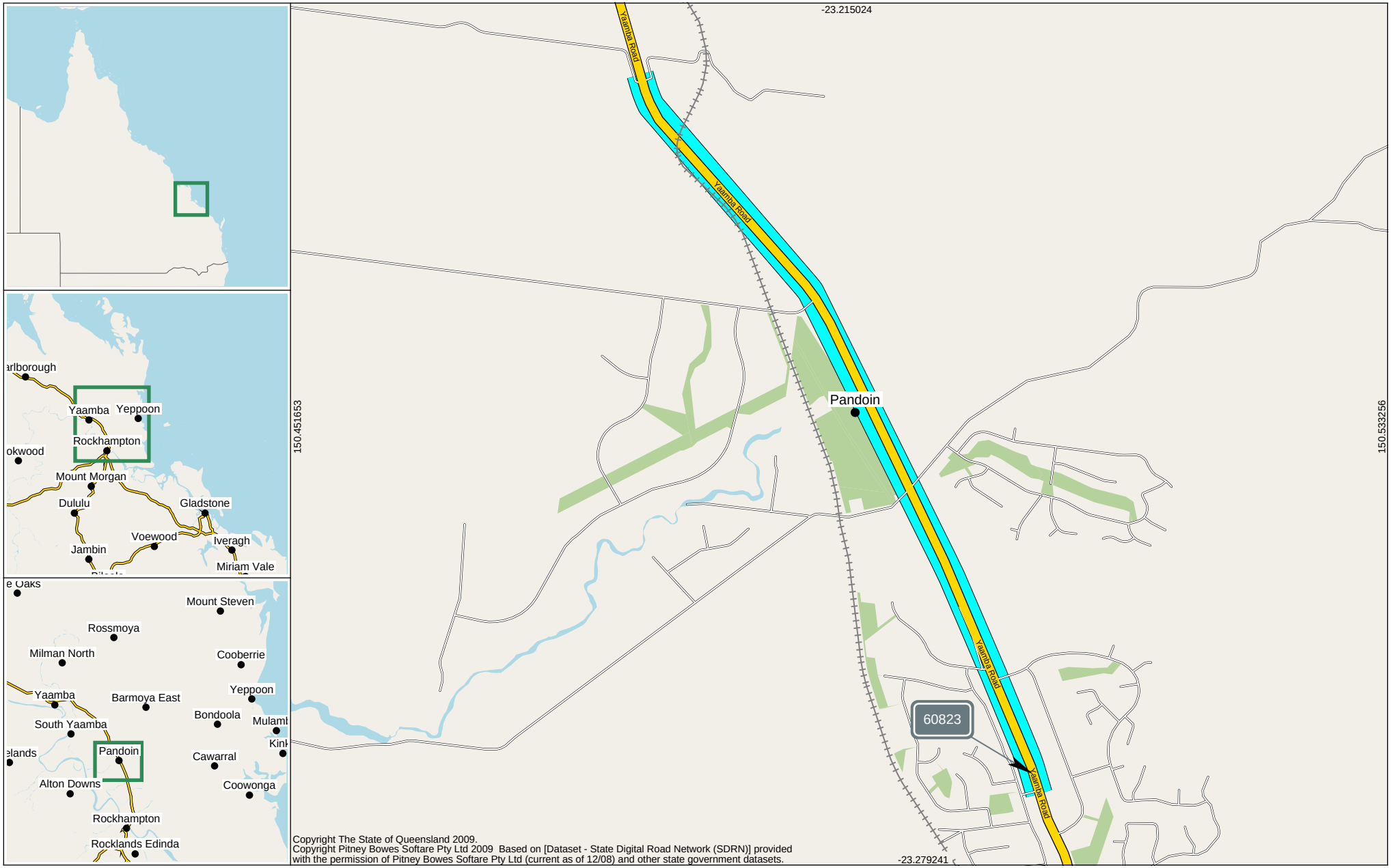
G	152	2.55%
A	158	2.70%
B	310	2.62%

Double Road Trains (2K)

G	1	0.02%
A	1	0.02%
B	2	0.02%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%



Site 60823. Point 260000619. Bruce Hwy 150m North Terra Nova Dr.
13.33 km

13.18 km
Start Point 260000531. Bruce Hwy to Rockhampton @ Terra Nova Dr.

19.83 km
End Point 260000239. Bruce Hwy to R'ton @ Vass Rd/Etna Ck Pri.

The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-0.77%	0.35%
A	0.00%	-0.86%	0.38%
B	0.00%	-0.82%	0.36%

All Vehicles (00)

G	3,785	100%
A	3,710	100%
B	7,495	100%

Light Vehicles (0A)

G	3,055	80.71%
A	3,177	85.63%
B	6,232	83.15%

Heavy Vehicles (0B)

G	730	19.29%
A	533	14.37%
B	1,263	16.85%

Short Vehicles (1A)

G	3,055	80.71%
A	3,177	85.63%
B	6,232	83.15%

Trucks and Buses (1B)

G	416	10.99%
A	248	6.68%
B	664	8.86%

Articulated Vehicles (1C)

G	156	4.12%
A	134	3.61%
B	290	3.87%

Road Trains (1D)

G	158	4.17%
A	151	4.07%
B	309	4.12%

Short 2-Axle Vehicles (2A)

G	2,850	75.30%
A	3,000	80.86%
B	5,850	78.05%

Short Vehicles Towing (2B)

G	205	5.42%
A	177	4.77%
B	382	5.10%

2-Axle Trucks and Buses (2C)

G	374	9.88%
A	208	5.61%
B	582	7.77%

3-Axle Trucks and Buses (2D)

G	36	0.95%
A	34	0.92%
B	70	0.93%

4-Axle Trucks (2E)

G	6	0.16%
A	6	0.16%
B	12	0.16%

3-Axle Articulated (2F)

G	20	0.53%
A	11	0.30%
B	31	0.41%

4-Axle Articulated (2G)

G	37	0.98%
A	22	0.59%
B	59	0.79%

5-Axle Articulated (2H)

G	21	0.55%
A	22	0.59%
B	43	0.57%

6-Axle Articulated (2I)

G	78	2.06%
A	79	2.13%
B	157	2.09%

B Double (2J)

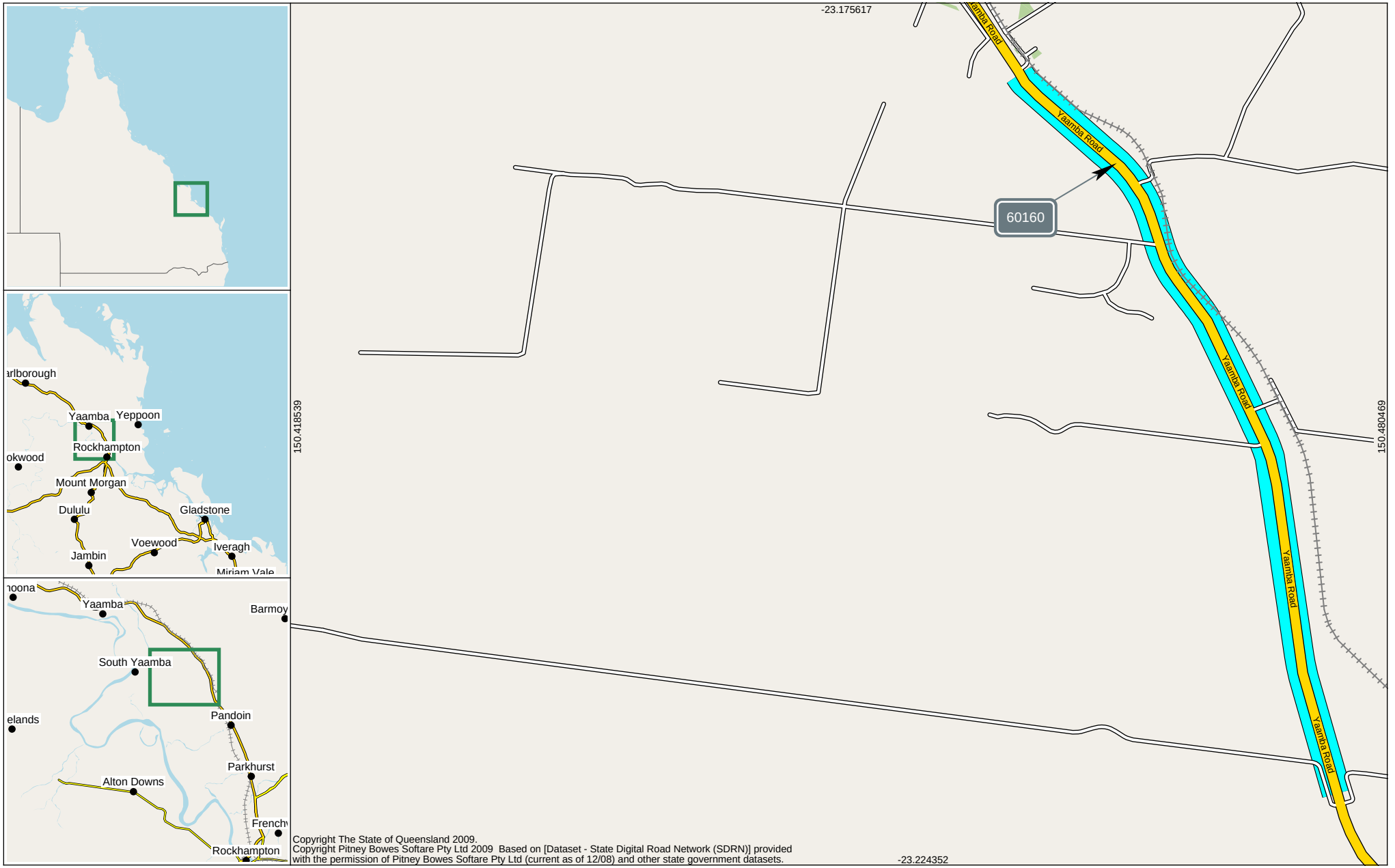
G	157	4.15%
A	150	4.04%
B	307	4.10%

Double Road Trains (2K)

G	1	0.03%
A	1	0.03%
B	2	0.03%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%



Site 60160. Point 260000238. Bruce Hwy 900m North of 14 Mile Ck Rd.
24.38 km

The width of each Road Segment is proportional to its AADT.

19.83 km
Start Point 260000239. Bruce Hwy to R'ton @ Vass Rd/Etna Ck Pri.

24.91 km
End Point 260000005. Bruce Hwy to R'pton @ Caves-Barmoya Rd.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-2.19%	-0.20%
A	0.00%	-0.44%	0.54%
B	0.00%	-1.34%	0.16%

All Vehicles (00)

G	2,022	100%
A	2,048	100%
B	4,070	100%

Light Vehicles (0A)

G	1,461	72.26%
A	1,604	78.32%
B	3,065	75.31%

Heavy Vehicles (0B)

G	560	27.70%
A	444	21.68%
B	1,004	24.67%

Short Vehicles (1A)

G	1,461	72.26%
A	1,604	78.32%
B	3,065	75.31%

Trucks and Buses (1B)

G	253	12.51%
A	138	6.74%
B	391	9.61%

Articulated Vehicles (1C)

G	147	7.27%
A	136	6.64%
B	283	6.95%

Road Trains (1D)

G	160	7.91%
A	170	8.30%
B	330	8.11%

Short 2-Axle Vehicles (2A)

G	1,283	63.45%
A	1,447	70.65%
B	2,730	67.08%

Short Vehicles Towing (2B)

G	178	8.80%
A	157	7.67%
B	335	8.23%

2-Axle Trucks and Buses (2C)

G	224	11.08%
A	105	5.13%
B	329	8.08%

3-Axle Trucks and Buses (2D)

G	25	1.24%
A	28	1.37%
B	53	1.30%

4-Axle Trucks (2E)

G	4	0.20%
A	5	0.24%
B	9	0.22%

3-Axle Articulated (2F)

G	20	0.99%
A	8	0.39%
B	28	0.69%

4-Axle Articulated (2G)

G	29	1.43%
A	16	0.78%
B	45	1.11%

5-Axle Articulated (2H)

G	21	1.04%
A	24	1.17%
B	45	1.11%

6-Axle Articulated (2I)

G	77	3.81%
A	88	4.30%
B	165	4.05%

B Double (2J)

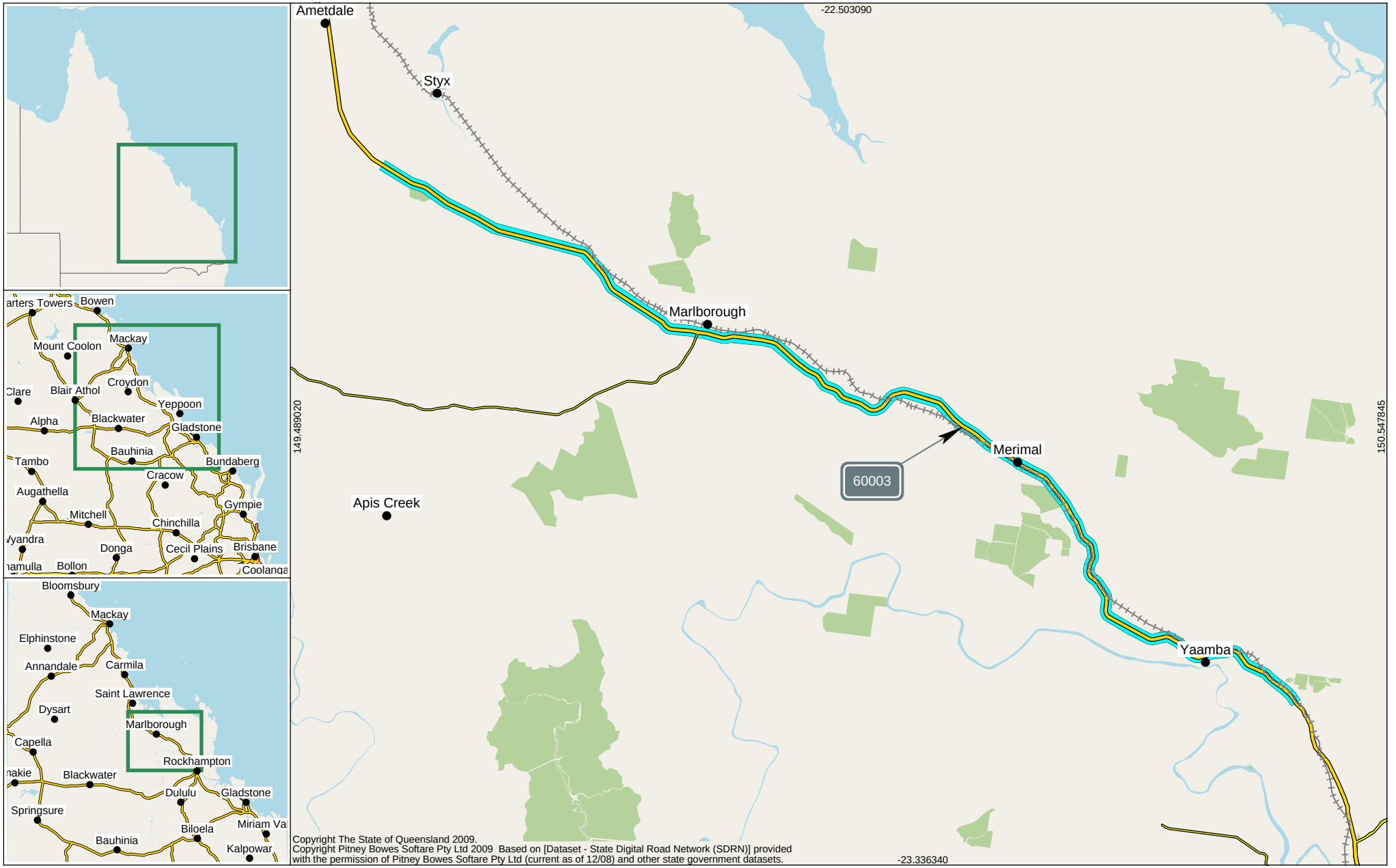
G	159	7.86%
A	169	8.25%
B	328	8.06%

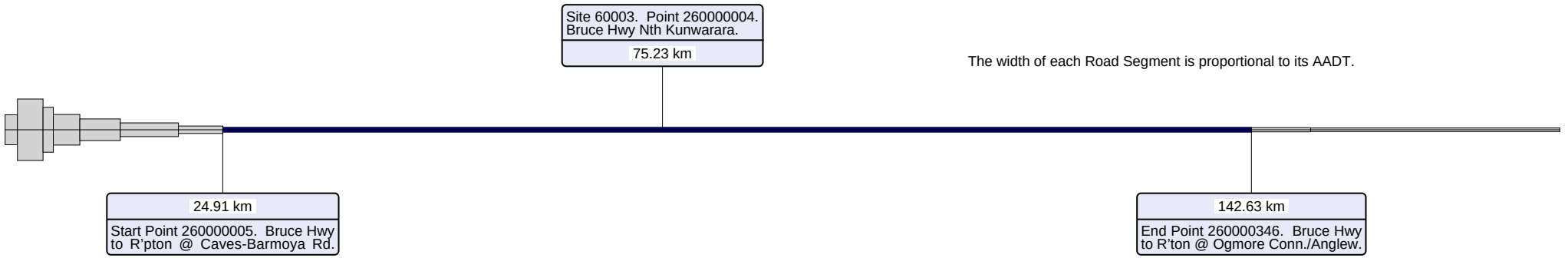
Double Road Trains (2K)

G	1	0.05%
A	1	0.05%
B	2	0.05%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%





This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	0.21%	1.32%
A	0.00%	-0.75%	1.00%
B	0.00%	-0.27%	1.16%

All Vehicles (00)

G	1,332	100%
A	1,295	100%
B	2,627	100%

Light Vehicles (0A)

G	1,010	75.83%
A	977	75.44%
B	1,987	75.64%

Heavy Vehicles (0B)

G	322	24.17%
A	320	24.71%
B	642	24.44%

Short Vehicles (1A)

G	1,010	75.83%
A	977	75.44%
B	1,987	75.64%

Trucks and Buses (1B)

G	109	8.18%
A	107	8.26%
B	216	8.22%

Articulated Vehicles (1C)

G	101	7.58%
A	102	7.88%
B	203	7.73%

Road Trains (1D)

G	112	8.41%
A	111	8.57%
B	223	8.49%

Short 2-Axle Vehicles (2A)

G	884	66.37%
A	866	66.87%
B	1,750	66.62%

Short Vehicles Towing (2B)

G	126	9.46%
A	111	8.57%
B	237	9.02%

2-Axle Trucks and Buses (2C)

G	86	6.46%
A	84	6.49%
B	170	6.47%

3-Axle Trucks and Buses (2D)

G	19	1.43%
A	19	1.47%
B	38	1.45%

4-Axle Trucks (2E)

G	4	0.30%
A	4	0.31%
B	8	0.30%

3-Axle Articulated (2F)

G	7	0.53%
A	7	0.54%
B	14	0.53%

4-Axle Articulated (2G)

G	14	1.05%
A	14	1.08%
B	28	1.07%

5-Axle Articulated (2H)

G	16	1.20%
A	17	1.31%
B	33	1.26%

6-Axle Articulated (2I)

G	64	4.80%
A	64	4.94%
B	128	4.87%

B Double (2J)

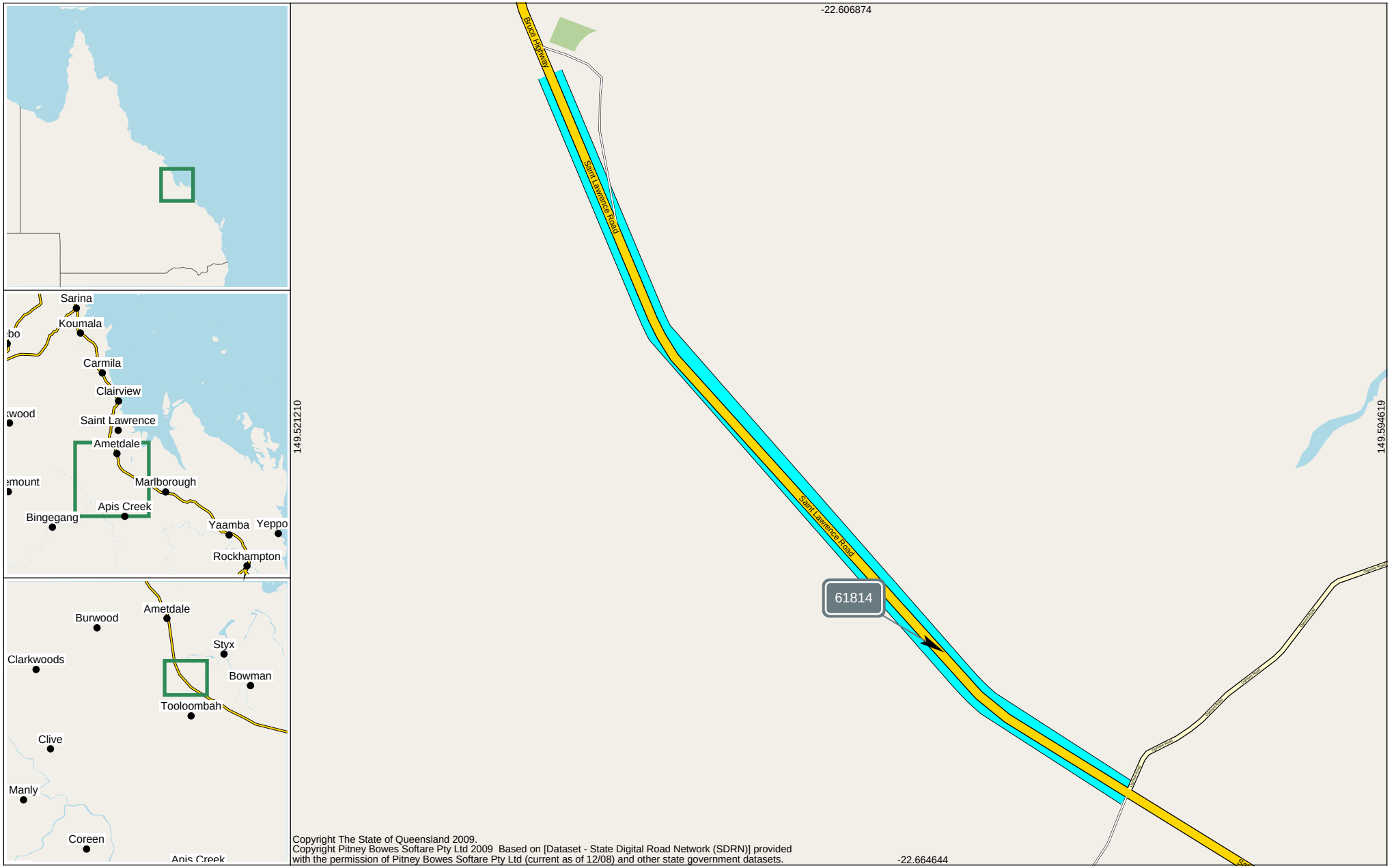
G	110	8.26%
A	108	8.34%
B	218	8.30%

Double Road Trains (2K)

G	2	0.15%
A	3	0.23%
B	5	0.19%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%



The width of each Road Segment is proportional to its AADT.

Site 61814. Point 260015621. 1 km south of Montrose Creek on Bruce Hwy.
144.30 km

142.63 km
Start Point 260000346. Bruce Hwy to R'ton @ Ogmore Conn./Anglew.

149.40 km
End Point 260000249. Rton and Mackay Regional Shire Boundary.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-1.35%	0.19%
A	0.00%	-2.47%	-0.17%
B	0.00%	-1.91%	0.01%

All Vehicles (00)

G	1,163	100%
A	1,117	100%
B	2,280	100%

Light Vehicles (0A)

G	830	71.37%
A	790	70.73%
B	1,620	71.05%

Heavy Vehicles (0B)

G	333	28.63%
A	327	29.27%
B	660	28.95%

Short Vehicles (1A)

G	830	71.37%
A	790	70.73%
B	1,620	71.05%

Trucks and Buses (1B)

G	82	7.05%
A	75	6.71%
B	157	6.89%

Articulated Vehicles (1C)

G	116	9.97%
A	117	10.47%
B	233	10.22%

Road Trains (1D)

G	135	11.61%
A	135	12.09%
B	270	11.84%

Short 2-Axle Vehicles (2A)

G	741	63.71%
A	715	64.01%
B	1,456	63.86%

Short Vehicles Towing (2B)

G	89	7.65%
A	75	6.71%
B	164	7.19%

2-Axle Trucks and Buses (2C)

G	61	5.25%
A	54	4.83%
B	115	5.04%

3-Axle Trucks and Buses (2D)

G	16	1.38%
A	18	1.61%
B	34	1.49%

4-Axle Trucks (2E)

G	5	0.43%
A	3	0.27%
B	8	0.35%

3-Axle Articulated (2F)

G	4	0.34%
A	3	0.27%
B	7	0.31%

4-Axle Articulated (2G)

G	9	0.77%
A	11	0.98%
B	20	0.88%

5-Axle Articulated (2H)

G	20	1.72%
A	23	2.06%
B	43	1.89%

6-Axle Articulated (2I)

G	83	7.14%
A	80	7.16%
B	163	7.15%

B Double (2J)

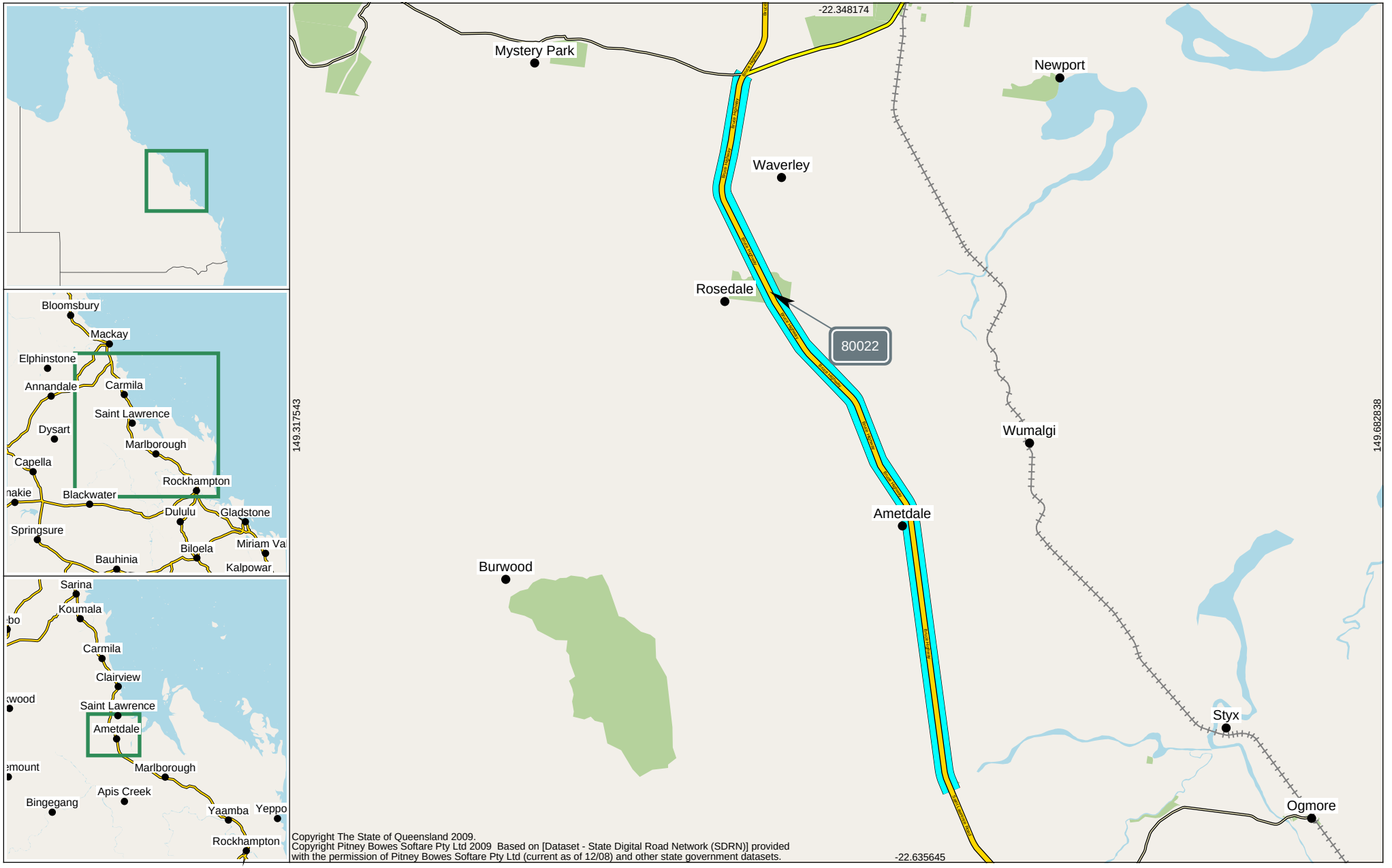
G	134	11.52%
A	133	11.91%
B	267	11.71%

Double Road Trains (2K)

G	1	0.09%
A	2	0.18%
B	3	0.13%

Triple Road Trains (2L)

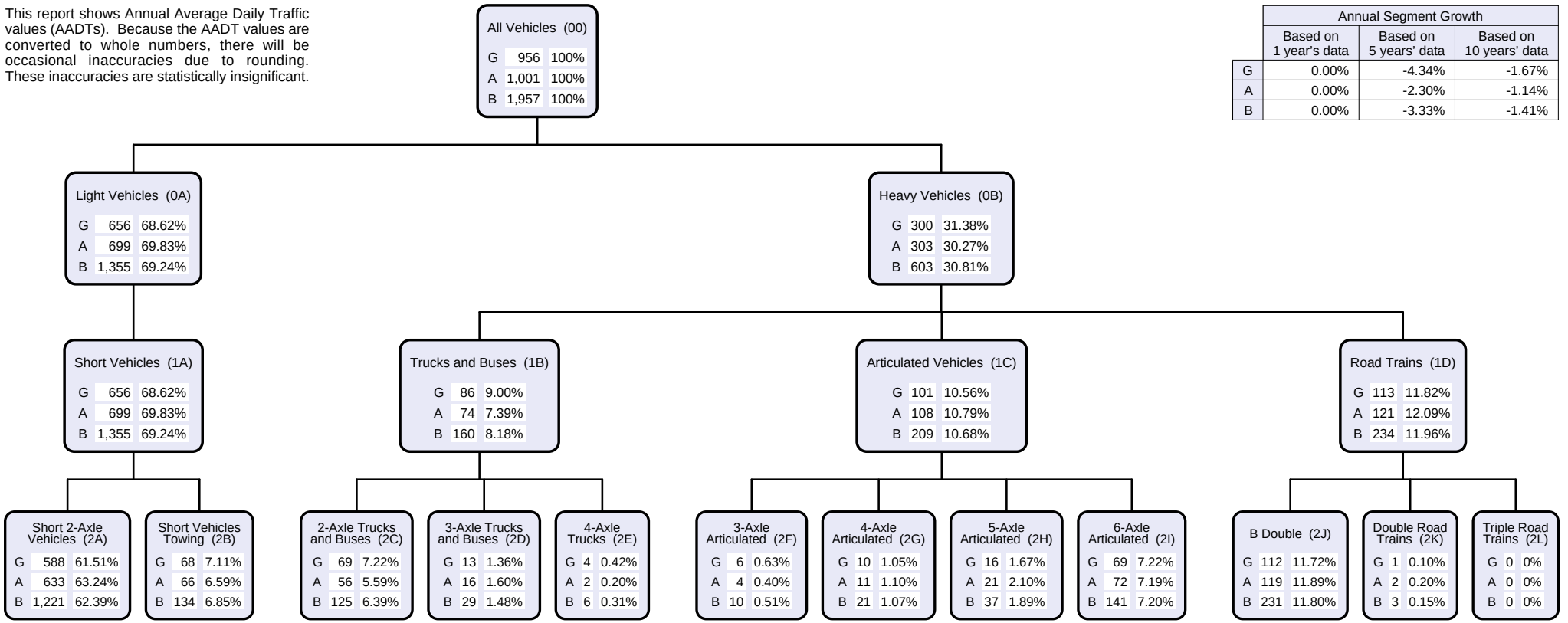
G	0	0%
A	0	0%
B	0	0%



The width of each Road Segment is proportional to its AADT.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.00%	-4.34%	-1.67%
A	0.00%	-2.30%	-1.14%
B	0.00%	-3.33%	-1.41%



Report Notes for AADT Segment Analysis Report (Complete)

AADT Segment Report

Provides AADT Segment details for a Road Section together with the traffic flow data collected at the related Site. Traffic data is reported by the start and end Through Distance of the AADT Segments on each section of road. The road segments are represented diagrammatically with AADT data including:

AADT	by direction of traffic flow
VKT	Vehicle Kilometres Travelled
%VC	Percentage Vehicle Class as per the Austroads vehicle classification scheme

Annual Average Daily Traffic (AADT)

Annual Average Daily Traffic (AADT) is the number of vehicles passing a point on a road in a 24 hour period, averaged over a calendar year.

AADT Segment

Is a subdivision of a Road Section. The boundaries of an AADT Segment are it's Start Point and End Point (or Start and End Through Distance (TDist)) within the Road Section. These distances are measured in kilometres from the begining of the Road Section in Gazettal Direction. AADT Segments are determined by the traffic volume, collected at a count Site, located within the limits of each AADT Segment.

Annual Segment Growth (when displayed)

A percentage that represents the increase or decrease in AADT for the AADT Segment,using an exponential fit, calculated over a 1, 5 or 10 year period.

Area

For administration purposes the Department of Transport and Main Roads has divided Queensland into 12 Districts. The Area field in TSDM reports displays the District Name and Number.

District Name	District
Central West District	401
Darling Downs District	402
Far North District	403
Fitzroy District	404
Mackay/Whitsunday District	405
Metropolitian District	406
North Coast District	407
North West District	409
Northern District	408
South Coast District	410
South West District	411
Wide Bay/Burnett District	412

Data Year

The most recent year the traffic data was collected for this AADT Segment.

Gazettal Direction

The Gazettal Direction is the direction of the traffic flow. It can be easily recognised by referring to the name of the road eg. Road Section: 10A Brisbane - Gympie denotes that the gazettal direction is from Brisbane to Gympie.

G	Traffic flowing in Gazettal Direction
A	Traffic flowing against Gazettal Direction
B	The combined traffic flow in both Directions

Road Section

Is the Gazetted road from which the traffic data is collected. Each Road Section is given a code, allocated sequentially in Gazettal Direction. Larger roads are broken down into sections and identified by an ID code with a suffix for easier data collection and reporting (eg. 10A, 10B, 10C). Road Sections are then broken into AADT Segments which are determined by traffic volume.

Site

The physical location of a traffic counting device. Sites are located at a specified Through Distance along a Road Section.

Site TDist

The Through Distance in gazettal direction from the start of the Road Section at which the site is located.

Site Description

The description of the physical location of the traffic counting device.

Start and End Point

The unique identifier for the Through Distance along a Road Section.

Through Distance

The distance, in kilometres, from the beginning of the Road Section in Gazettal Direction.

Traffic Class

Is the 12 Austroads vehicle categories or classes into which vehicles are placed or binned. Traffic classes are formed in a hierarchical format.

Volume or All Vehicles

00 = 0A + 0B

Light Vehicles

0A = 1A
1A = 2A + 2B

Heavy Vehicles

0B = 1B + 1C + 1D
1B = 2C + 2D + 2E
1C = 2F + 2G + 2H + 2I
1D = 2J + 2K + 2L

The following classes are the categories for which data can be captured:

Volume

00 All vehicles.

2-Bin

0A Light vehicles
0B Heavy vehicles

4-Bin

1A Short vehicles
1B Truck or bus
1C Articulated vehicles
1D Road train

12-Bin

2A Short 2 axle vehicles
2B Short vehicles towing
2C 2 axle truck or bus
2D 3 axle truck or bus
2E 4 axle truck
2F 3 axle articulated vehicle
2G 4 axle articulated vehicle
2H 5 axle articulated vehicle
2I 6 axle articulated vehicle
2J B double
2K Double road train
2L Triple road train

Vehicle Kilometres Travelled (VKT)

Daily VKT is a measure of the traffic demand. It is calculated by the length of an AADT Segment in kilometres multiplied by its AADT. The yearly VKT is the daily VKT multiplied by 365 days.

AADT Segment Summary - All Vehicles

The Total VKT can be used to gauge the demand on an entire Road Section.

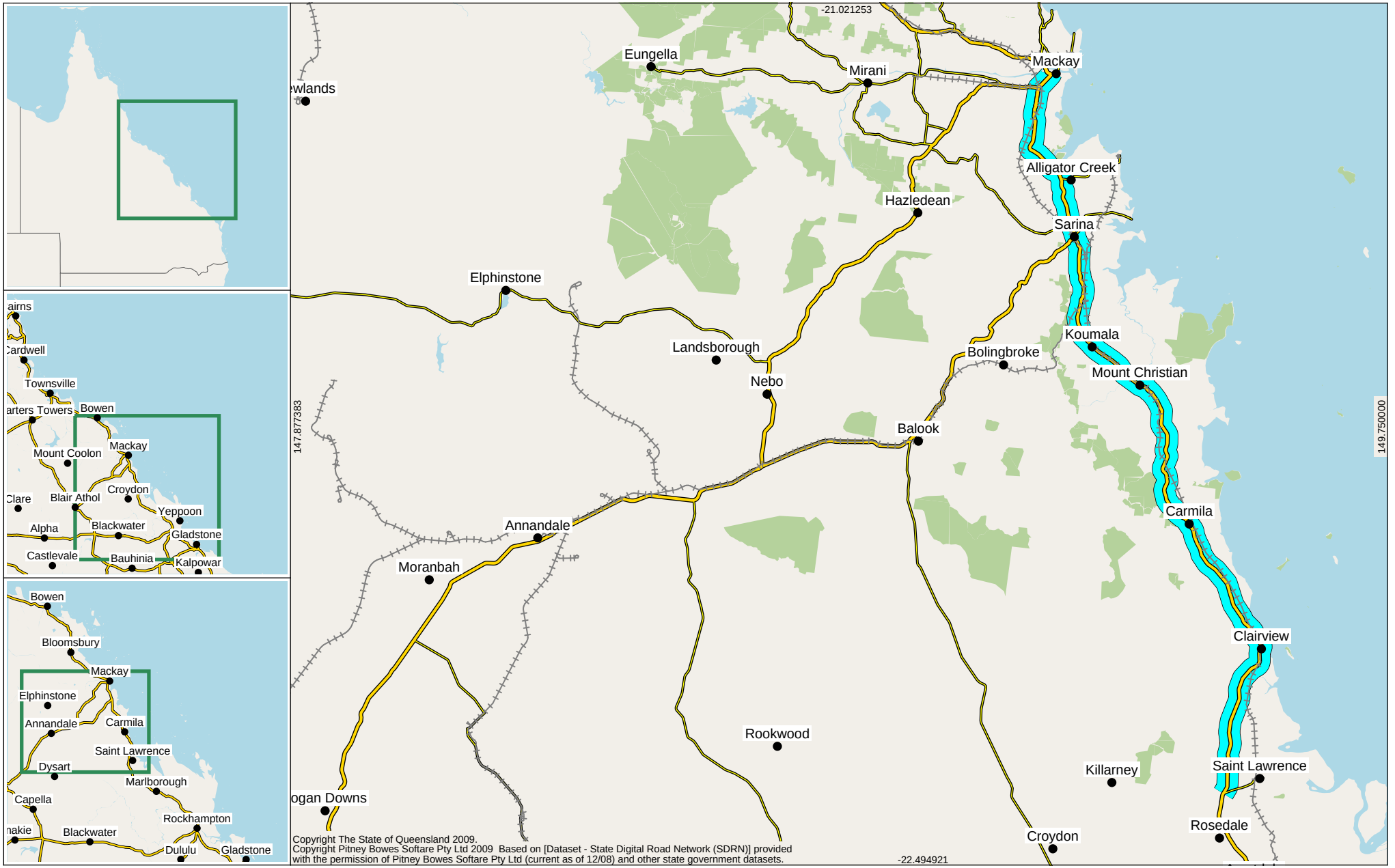
AADT Segment Summary - Heavy Vehicles only

A blank field indicates that vehicle classification data was not collected for this AADT Segment.

AADT Segment Analysis Report (Complete)

Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)

Traffic Year 2016



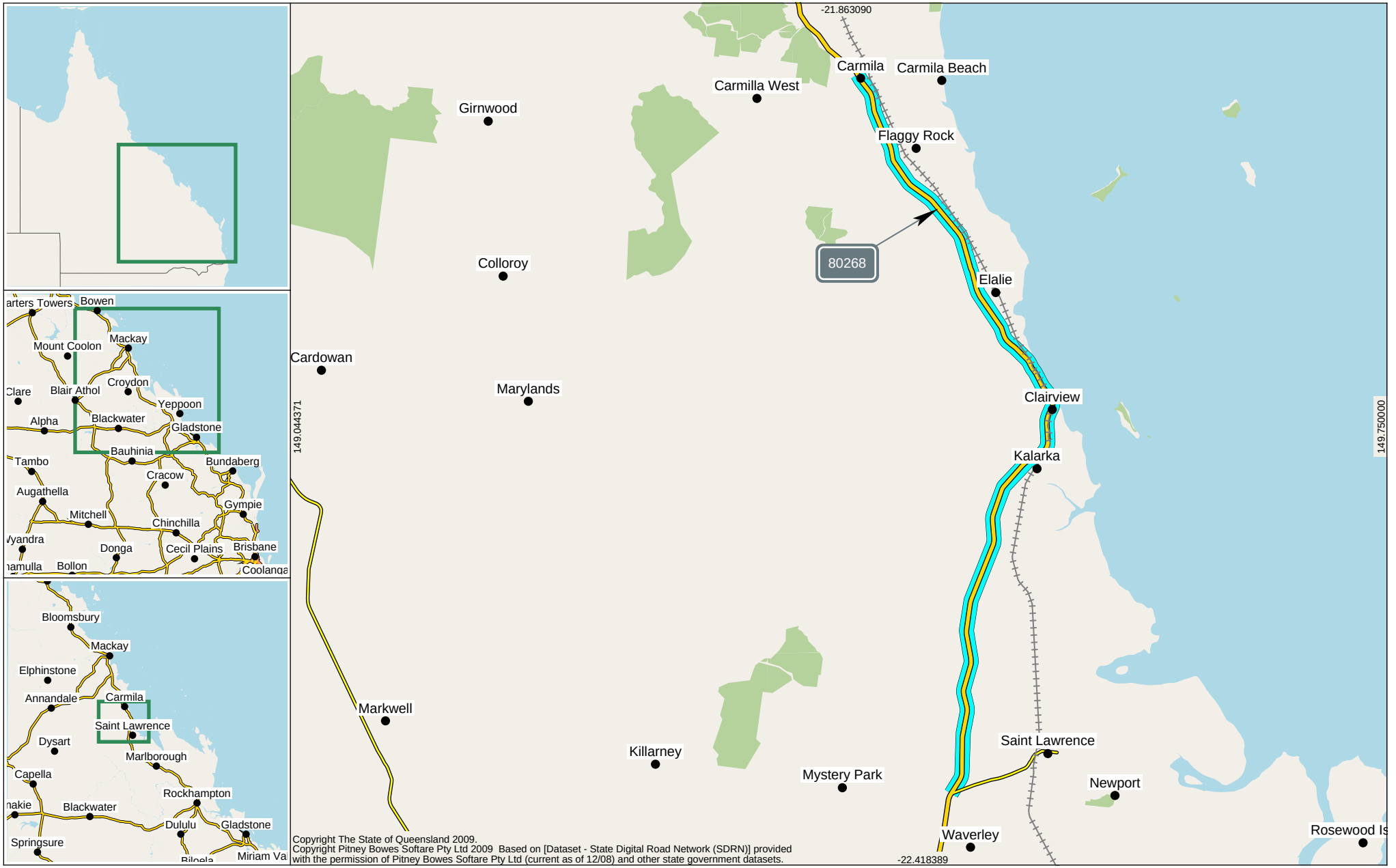
Road Segments Summary - All Vehicles

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	AADT			VKT (Millions)			Data Year	Page
						G	A	B	G	A	B		
405	0.000 km	57.254 km	80268	46.187 km	North of Clairview	1,060	1,099	2,159	22.15157	22.96658	45.11816	2016	2
405	57.254 km	113.685 km	80042	104.273 km	WiM Site Koumala	1,755	1,721	3,476	36.14829	35.44798	71.59627	2016	3
405	113.685 km	119.910 km	80008	118.245 km	South of Armstrong's Beach Turnoff	2,053	2,057	4,110	4.66467	4.67376	9.33843	2016	4
405	119.910 km	121.719 km	82703	120.855 km	Sichter Street - Broad Street	4,638	2,458	7,096	3.06240	1.62298	4.68538	2016	5
405	121.719 km	123.070 km	82720	121.701 km	Between Sarina and Sarina - Homebush TO	3,641	3,837	7,478	1.79543	1.89208	3.68751	2016	6
405	123.070 km	132.491 km	83112	126.615 km	Sarina - Homebush Road to Hay Point TO	3,204	3,342	6,546	11.01748	11.49202	22.50950	2016	7
405	132.491 km	144.639 km	80199	137.642 km	North of Macks Truck Stop	5,205	5,171	10,376	23.07907	22.92832	46.00739	2016	8
405	144.639 km	152.558 km	80003	147.630 km	Broadsound Road Permanent Counter	6,900	6,845	13,745	19.94400	19.78503	39.72903	2016	9
405	152.558 km	153.690 km	83224	153.355 km	City Gates to Lagoon Street	12,562	11,856	24,418	5.19037	4.89866	10.08903	2016	10
405	153.690 km	154.517 km	83225	154.389 km	Lagoon St to Bridge Rd	9,327	9,167	18,494	2.81540	2.76710	5.58251	2016	11
405	154.517 km	156.004 km	80140	155.129 km	George Street Pedestrian Crossing	10,011	9,693	19,704	5.43352	5.26092	10.69444	2016	12
								Totals	135.30221	133.73544	269.03765		

Road Segments Summary - Heavy Vehicles only

VKT totals are calculated only if traffic class data is available for all sites.

Region	Segment Start Tdist	Segment End Tdist	Site	Site Tdist	Description	HV AADT						HV VKT (Millions)			Data Year	Page
						G		A		B						
						AADT	HV %	AADT	HV %	AADT	HV %	G	A	B		
405	0.000 km	57.254 km	80268	46.187 km	North of Clairview	297	28.02%	341	31.03%	638	29.55%	6.20662	7.12612	13.33274	2016	2
405	57.254 km	113.685 km	80042	104.273 km	WiM Site Koumala	384	21.88%	404	23.47%	788	22.67%	7.90937	8.32132	16.23068	2016	3
405	113.685 km	119.910 km	80008	118.245 km	South of Armstrong's Beach Turnoff	404	19.68%	676	32.86%	1,080	26.28%	0.91794	1.53596	2.45389	2016	4
405	119.910 km	121.719 km	82703	120.855 km	Sichter Street - Broad Street	729	15.72%	225	9.15%	954	13.44%	0.48135	0.14856	0.62991	2016	5
405	121.719 km	123.070 km	82720	121.701 km	Between Sarina and Sarina - Homebush TO	1,083	29.74%	1,019	26.56%	2,102	28.11%	0.53404	0.50248	1.03653	2016	6
405	123.070 km	132.491 km	83112	126.615 km	Sarina - Homebush Road to Hay Point TO	330	10.30%	910	27.23%	1,240	18.94%	1.13476	3.12919	4.26394	2016	7
405	132.491 km	144.639 km	80199	137.642 km	North of Macks Truck Stop	924	17.75%	876	16.94%	1,800	17.35%	4.09703	3.88420	7.98124	2016	8
405	144.639 km	152.558 km	80003	147.630 km	Broadsound Road Permanent Counter	857	12.42%	839	12.26%	1,696	12.34%	2.47710	2.42507	4.90218	2016	9
405	152.558 km	153.690 km	83224	153.355 km	City Gates to Lagoon Street	1,973	15.71%	1,376	11.61%	3,349	13.72%	0.81520	0.56854	1.38374	2016	10
405	153.690 km	154.517 km	83225	154.389 km	Lagoon St to Bridge Rd	1,793	19.22%	1,066	11.63%	2,859	15.46%	0.54123	0.32178	0.86300	2016	11
405	154.517 km	156.004 km	80140	155.129 km	George Street Pedestrian Crossing	846	8.45%	844	8.71%	1,690	8.58%	0.45917	0.45809	0.91726	2016	12
											Totals	25.57382	28.42130	53.99512		



Site 80268. Point 280002197. North of Clairview.
46.19 km

The width of each Road Segment is proportional to its AADT.

0.00 km
Start Point 280002198. Bruce Hwy to Mackay @ St.Lawrence Conn.

57.25 km
End Point 280002101.

This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-0.19%	-3.25%	-1.23%
A	0.46%	-1.32%	-0.49%
B	0.14%	-2.30%	-0.86%

All Vehicles (00)

G	1,060	100%
A	1,099	100%
B	2,159	100%

Light Vehicles (0A)

G	764	72.08%
A	759	69.06%
B	1,523	70.54%

Heavy Vehicles (0B)

G	297	28.02%
A	341	31.03%
B	638	29.55%

Short Vehicles (1A)

G	764	72.08%
A	759	69.06%
B	1,523	70.54%

Trucks and Buses (1B)

G	86	8.11%
A	128	11.65%
B	214	9.91%

Articulated Vehicles (1C)

G	92	8.68%
A	98	8.92%
B	190	8.80%

Road Trains (1D)

G	119	11.23%
A	115	10.46%
B	234	10.84%

Short 2-Axle Vehicles (2A)

G	689	65.00%
A	690	62.78%
B	1,379	63.87%

Short Vehicles Towing (2B)

G	75	7.08%
A	69	6.28%
B	144	6.67%

2-Axle Trucks and Buses (2C)

G	70	6.60%
A	109	9.92%
B	179	8.29%

3-Axle Trucks and Buses (2D)

G	14	1.32%
A	15	1.36%
B	29	1.34%

4-Axle Trucks (2E)

G	2	0.19%
A	4	0.36%
B	6	0.28%

3-Axle Articulated (2F)

G	6	0.57%
A	10	0.91%
B	16	0.74%

4-Axle Articulated (2G)

G	12	1.13%
A	15	1.36%
B	27	1.25%

5-Axle Articulated (2H)

G	16	1.51%
A	14	1.27%
B	30	1.39%

6-Axle Articulated (2I)

G	58	5.47%
A	59	5.37%
B	117	5.42%

B Double (2J)

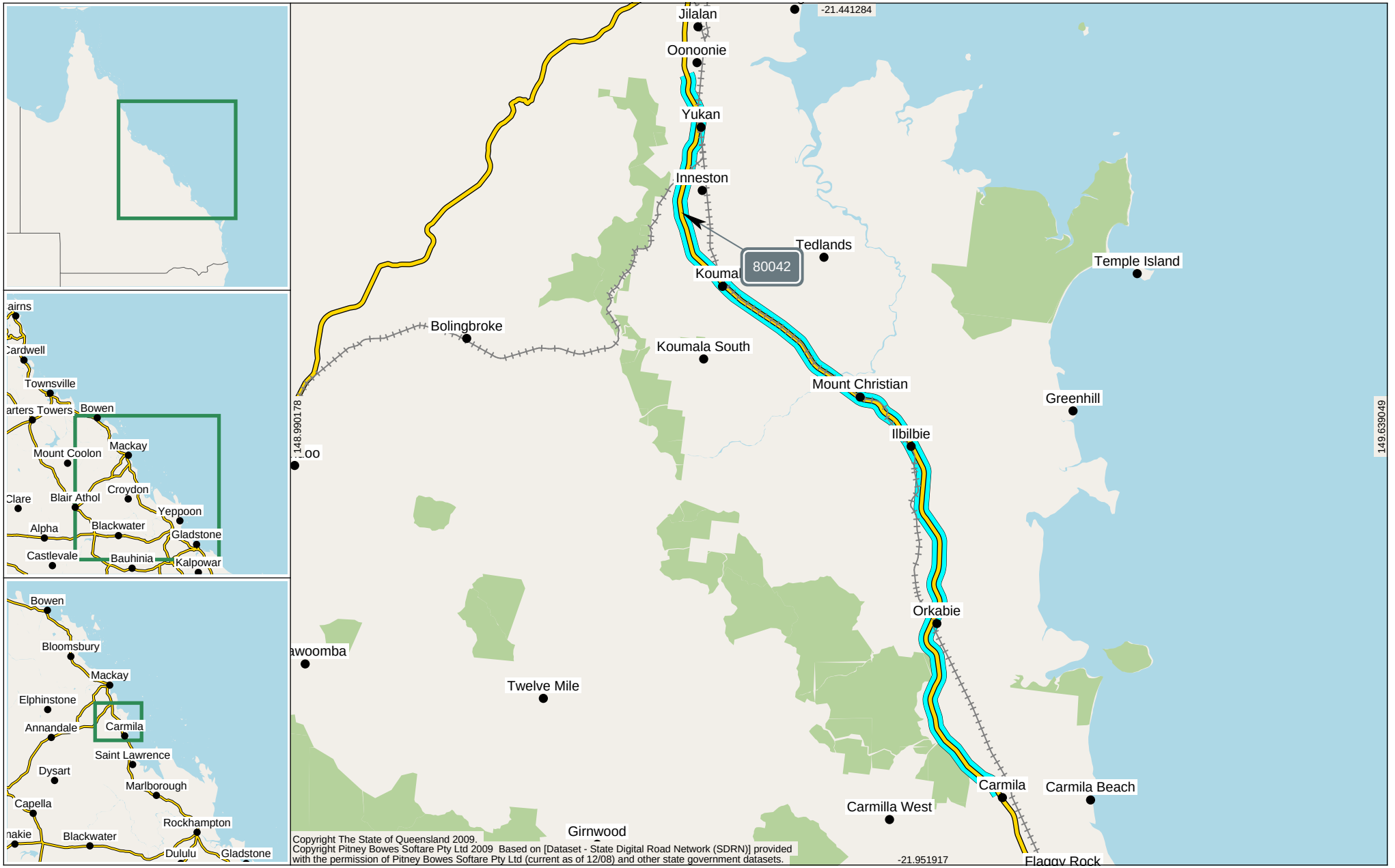
G	117	11.04%
A	111	10.10%
B	228	10.56%

Double Road Trains (2K)

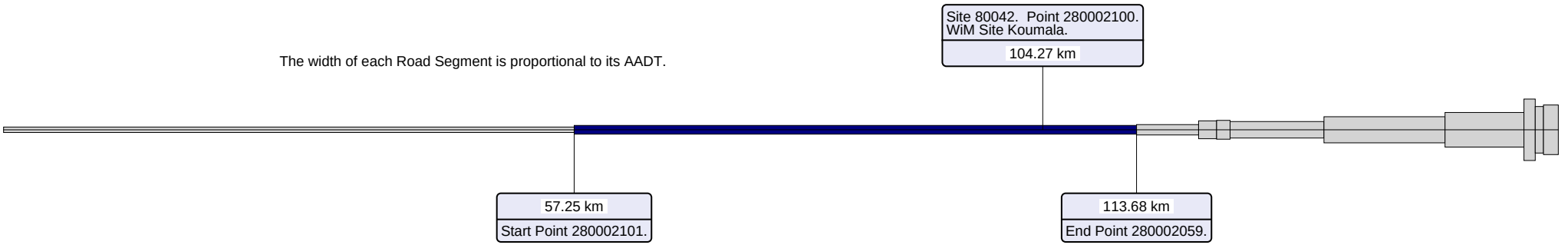
G	2	0.19%
A	3	0.27%
B	5	0.23%

Triple Road Trains (2L)

G	0	0.00%
A	1	0.09%
B	1	0.05%



The width of each Road Segment is proportional to its AADT.



This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.86%	0.10%	1.03%
A	0.00%	0.08%	0.64%
B	0.43%	0.09%	0.84%

All Vehicles (00)

G	1,755	100%
A	1,721	100%
B	3,476	100%

Light Vehicles (0A)

G	1,372	78.18%
A	1,317	76.53%
B	2,689	77.36%

Heavy Vehicles (0B)

G	384	21.88%
A	404	23.47%
B	788	22.67%

Short Vehicles (1A)

G	1,372	78.18%
A	1,317	76.53%
B	2,689	77.36%

Trucks and Buses (1B)

G	161	9.17%
A	159	9.24%
B	320	9.21%

Articulated Vehicles (1C)

G	111	6.32%
A	125	7.26%
B	236	6.79%

Road Trains (1D)

G	112	6.38%
A	120	6.97%
B	232	6.67%

Short 2-Axle Vehicles (2A)

G	1,245	70.94%
A	1,163	67.58%
B	2,408	69.28%

Short Vehicles Towing (2B)

G	127	7.24%
A	154	8.95%
B	281	8.08%

2-Axle Trucks and Buses (2C)

G	132	7.52%
A	126	7.32%
B	258	7.42%

3-Axle Trucks and Buses (2D)

G	25	1.42%
A	29	1.69%
B	54	1.55%

4-Axle Trucks (2E)

G	4	0.23%
A	4	0.23%
B	8	0.23%

3-Axle Articulated (2F)

G	10	0.57%
A	11	0.64%
B	21	0.60%

4-Axle Articulated (2G)

G	22	1.25%
A	22	1.28%
B	44	1.27%

5-Axle Articulated (2H)

G	18	1.03%
A	18	1.05%
B	36	1.04%

6-Axle Articulated (2I)

G	61	3.48%
A	74	4.30%
B	135	3.88%

B Double (2J)

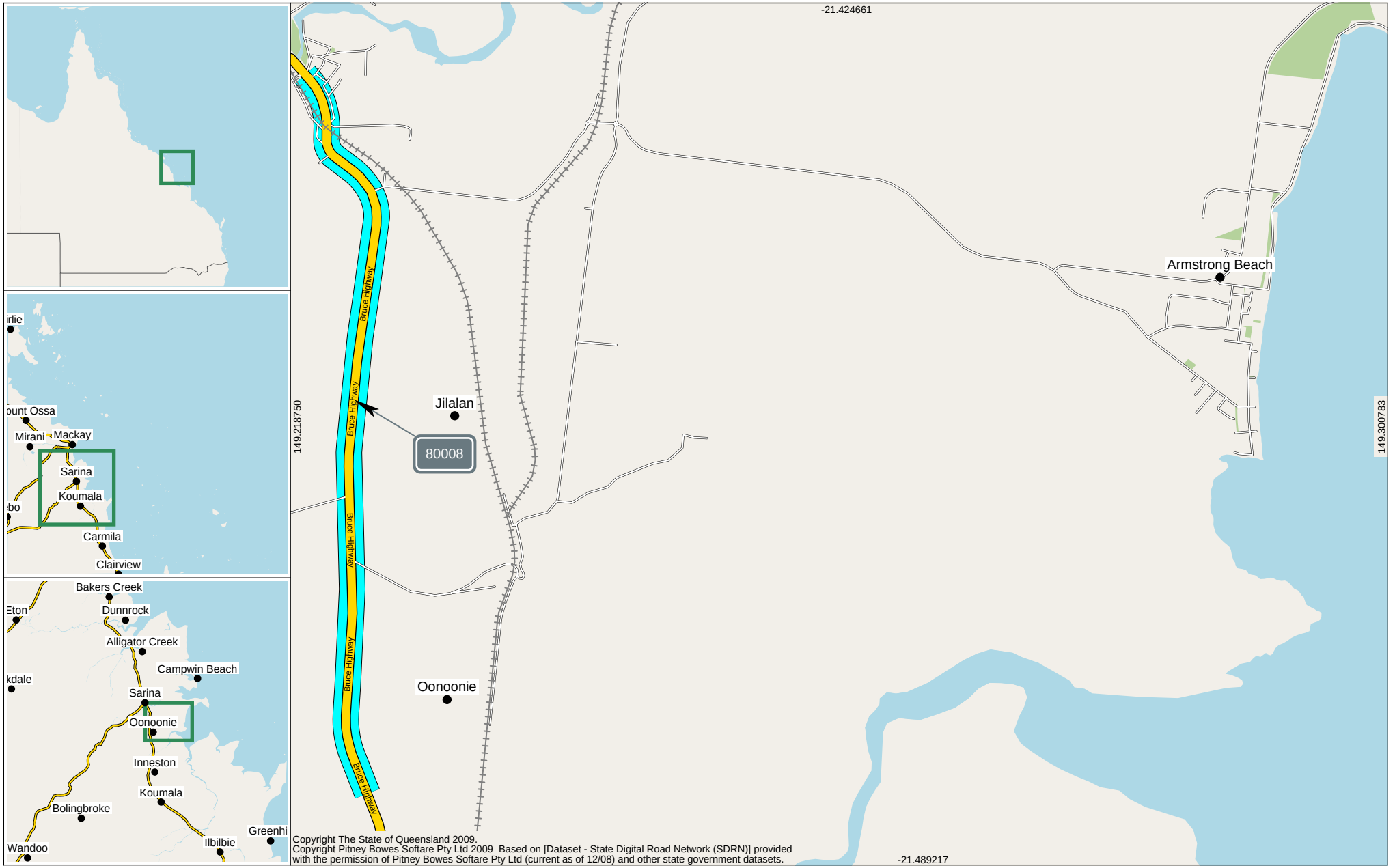
G	111	6.32%
A	119	6.91%
B	230	6.62%

Double Road Trains (2K)

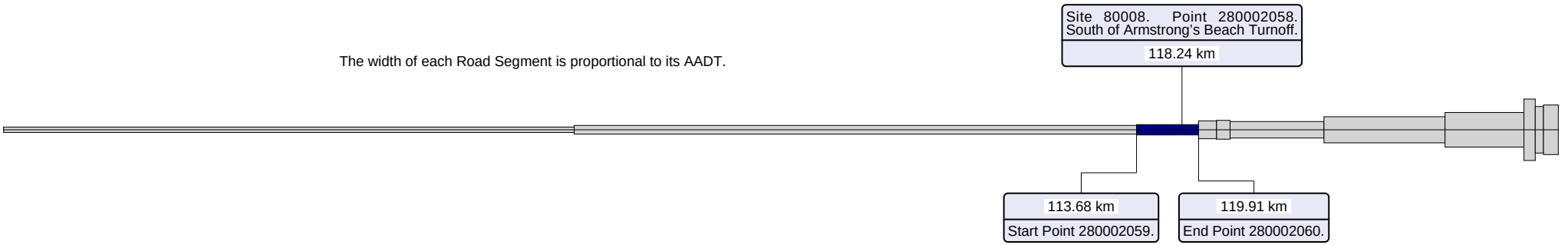
G	1	0.06%
A	1	0.06%
B	2	0.06%

Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%

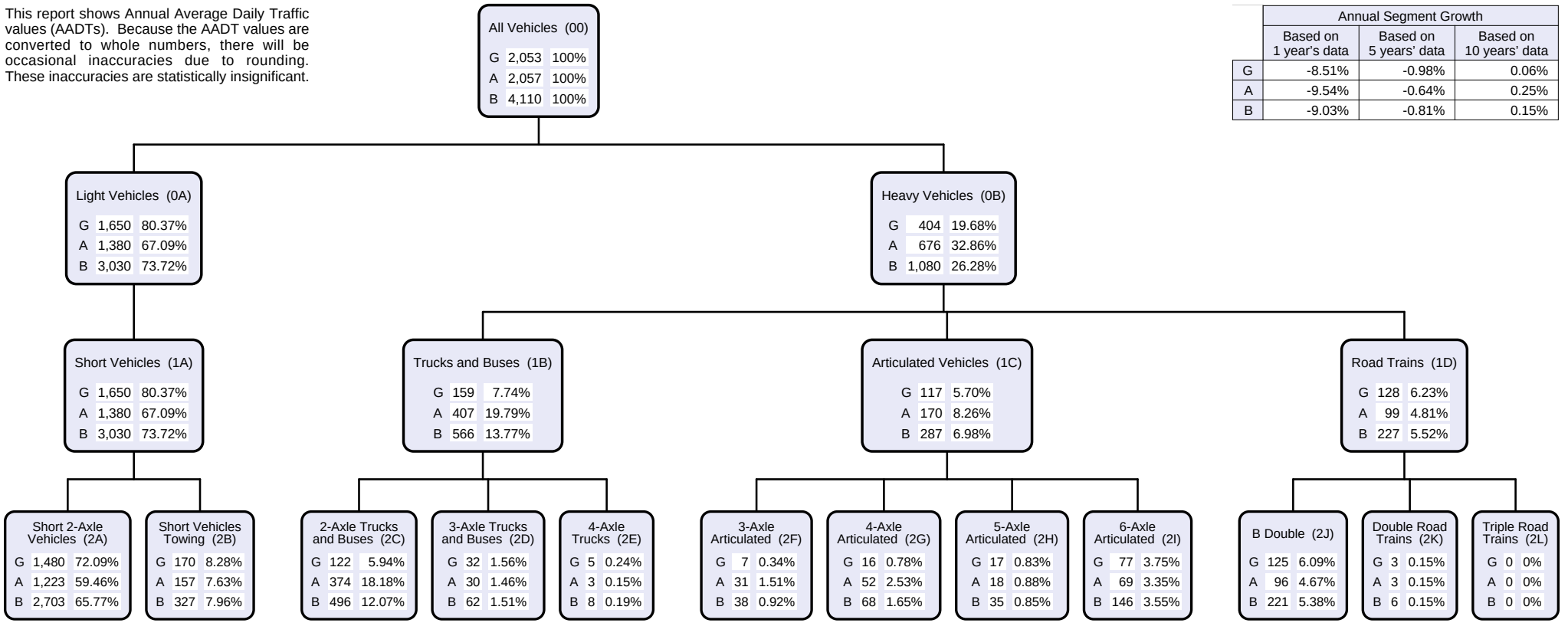


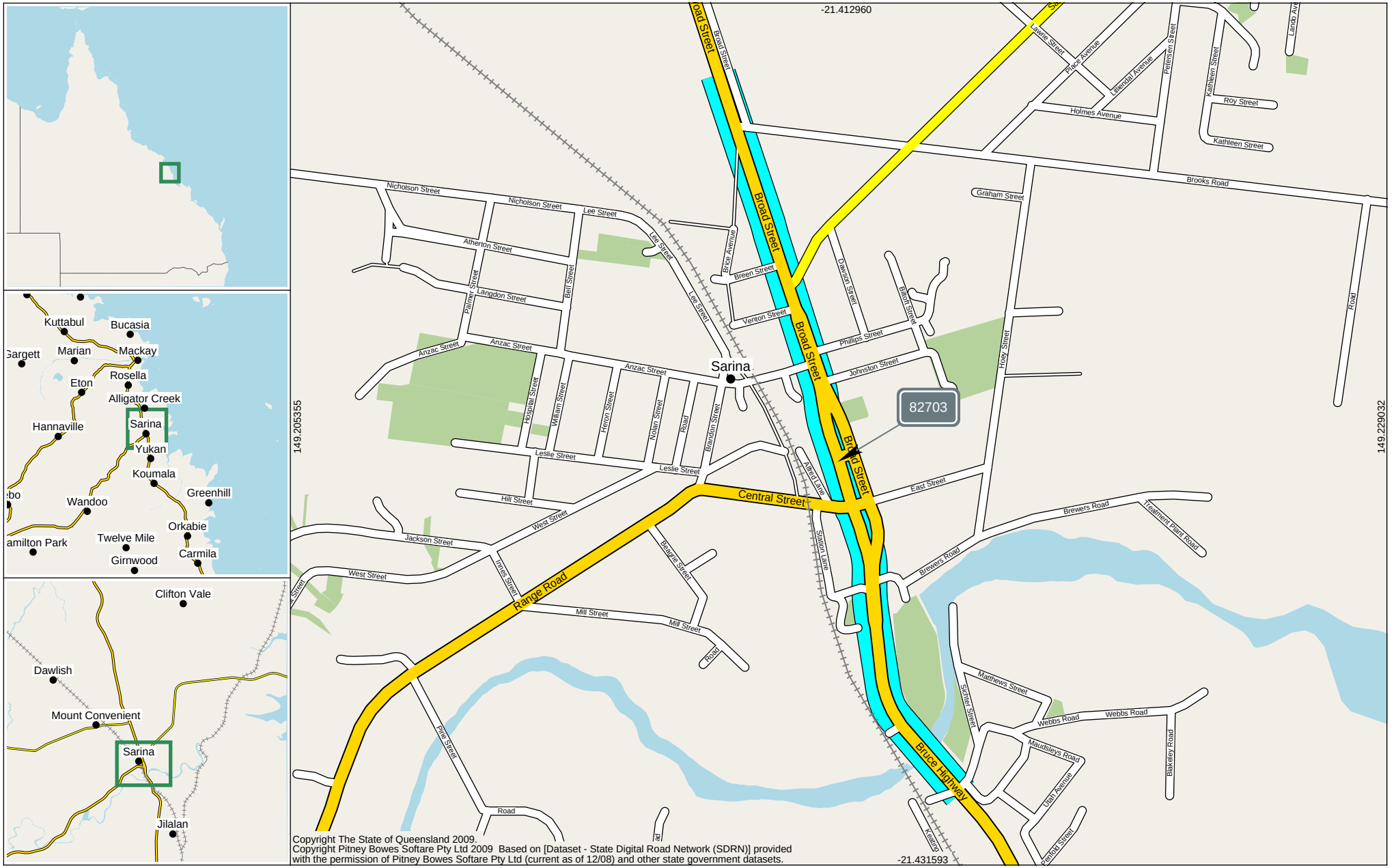
The width of each Road Segment is proportional to its AADT.



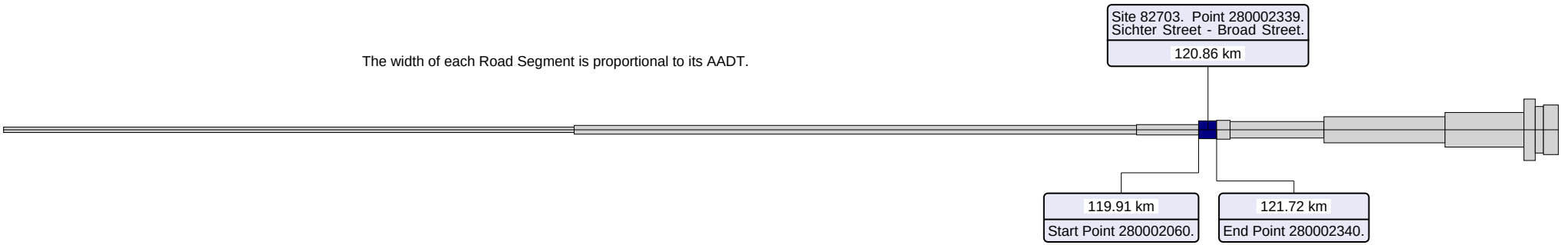
This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-8.51%	-0.98%	0.06%
A	-9.54%	-0.64%	0.25%
B	-9.03%	-0.81%	0.15%



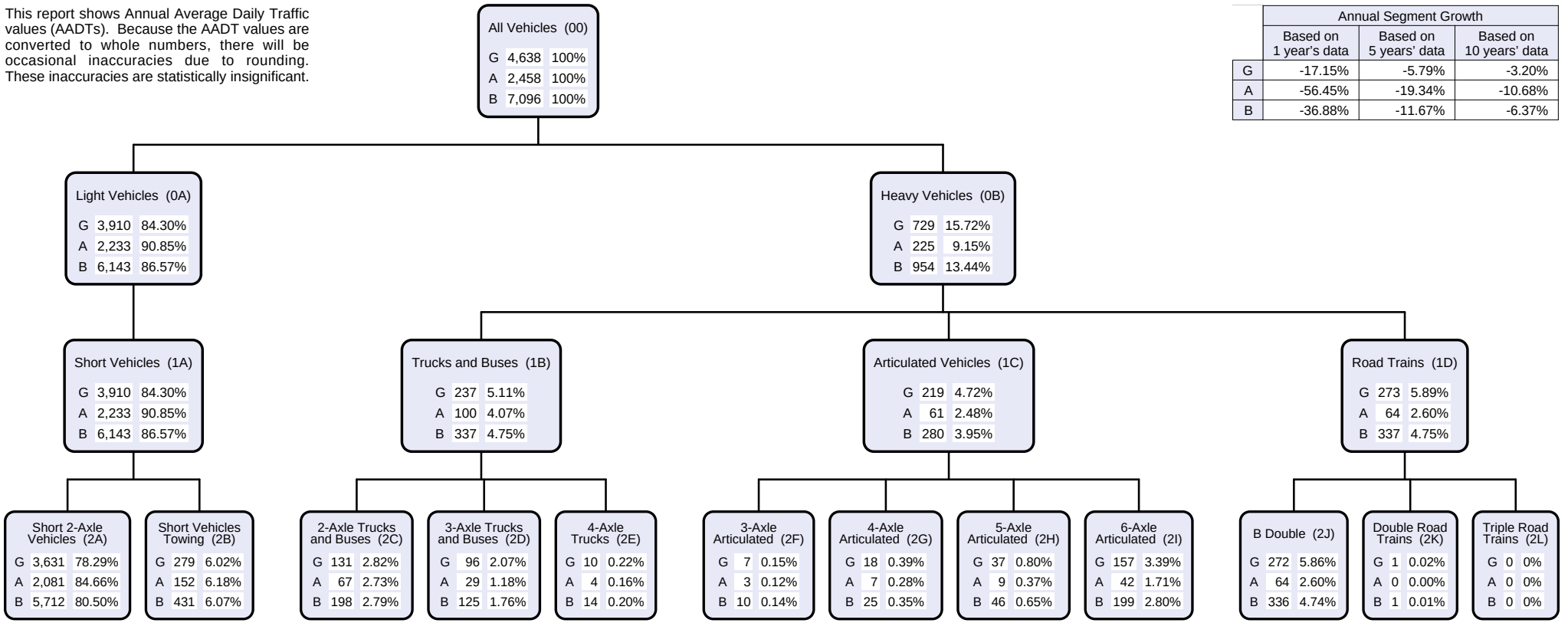


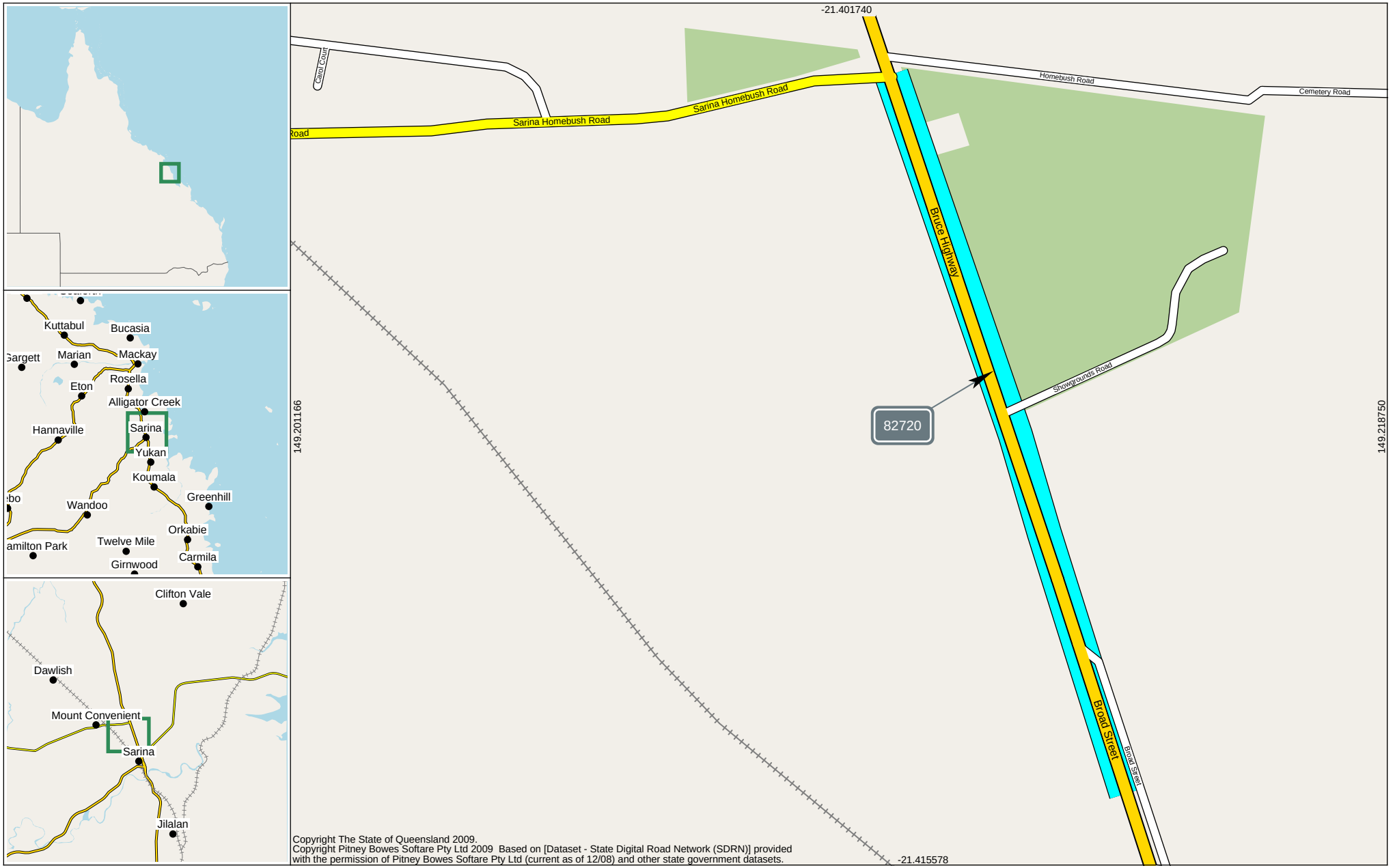
The width of each Road Segment is proportional to its AADT.



This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-17.15%	-5.79%	-3.20%
A	-56.45%	-19.34%	-10.68%
B	-36.88%	-11.67%	-6.37%





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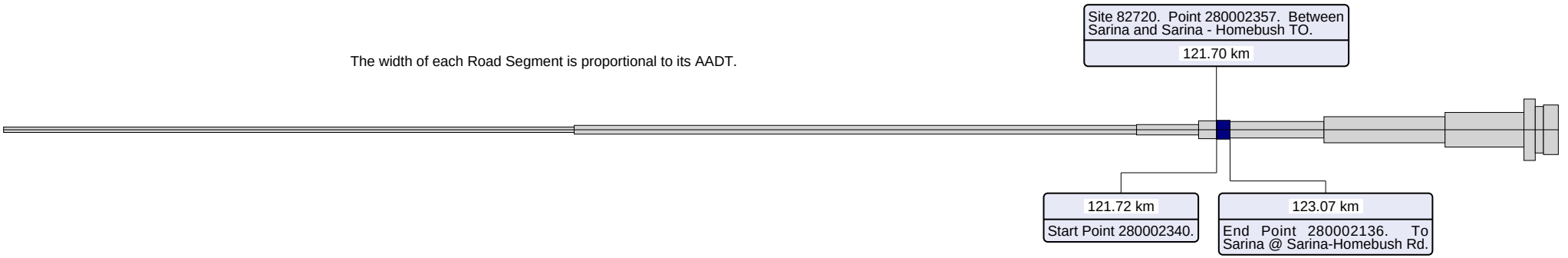

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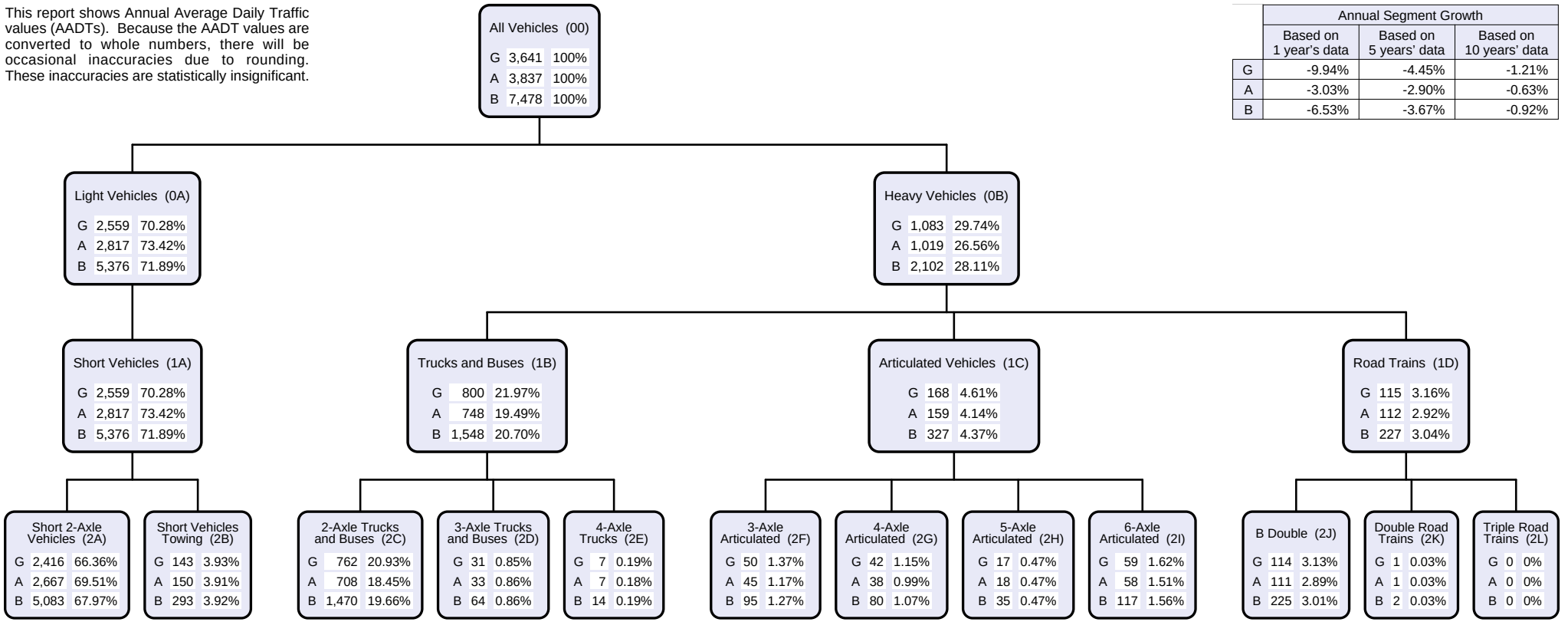
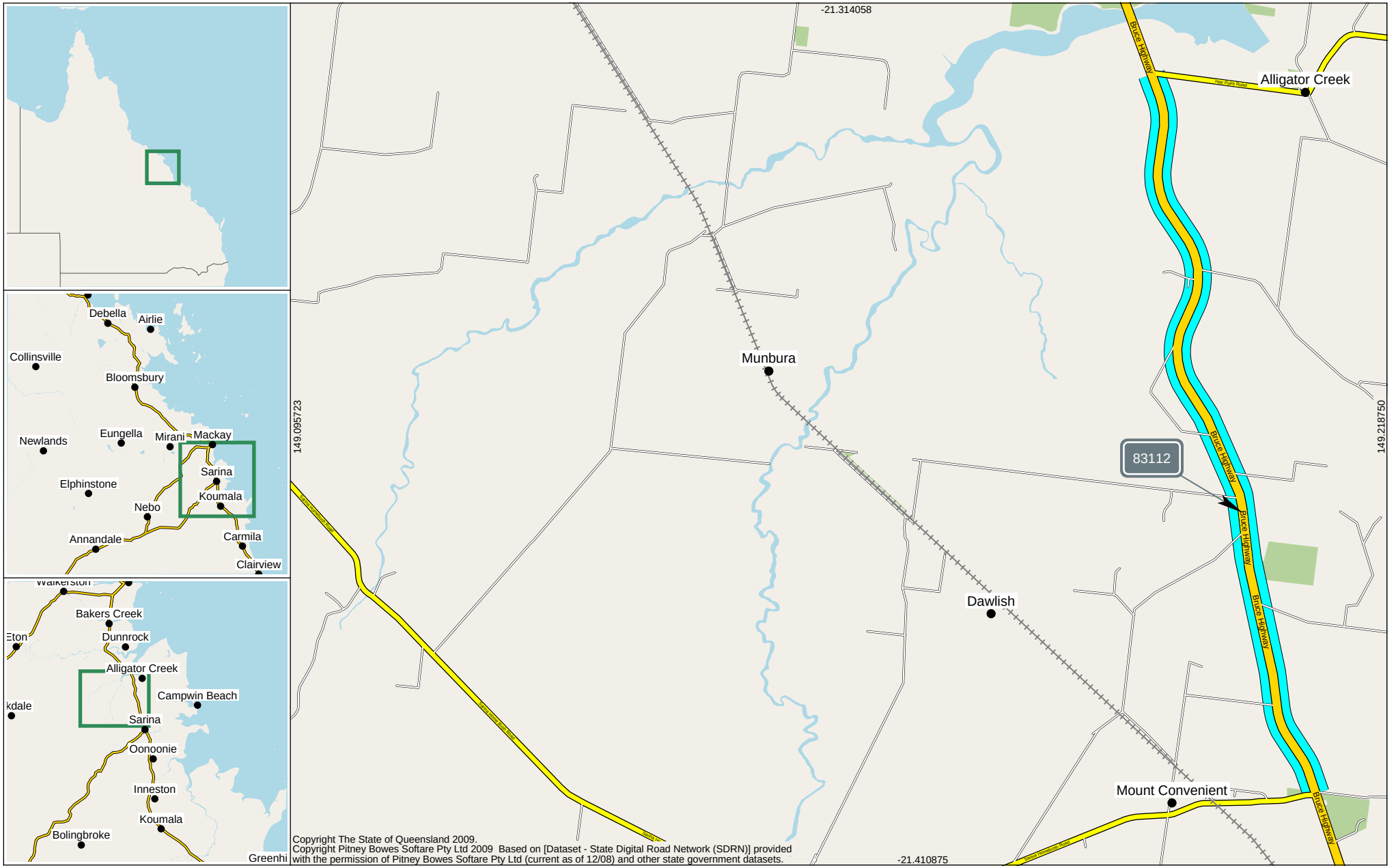
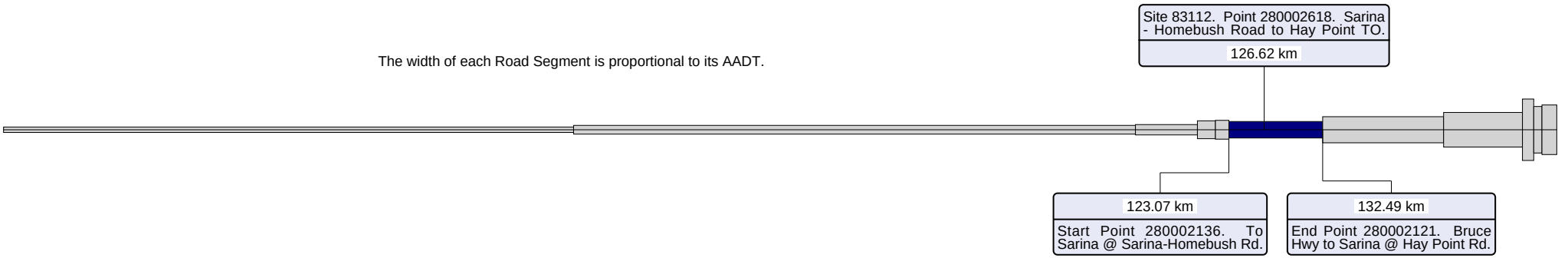
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-9.94%	-4.45%	-1.21%
A	-3.03%	-2.90%	-0.63%
B	-6.53%	-3.67%	-0.92%





The width of each Road Segment is proportional to its AADT.



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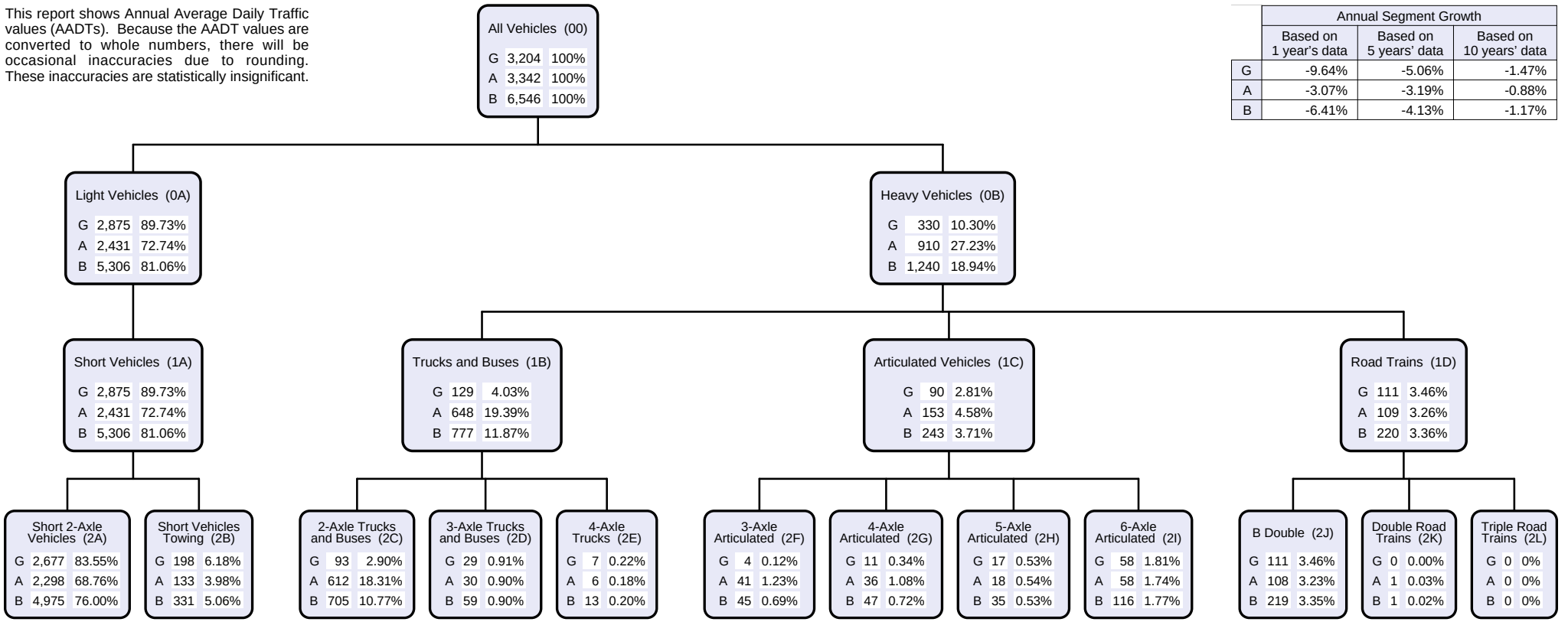
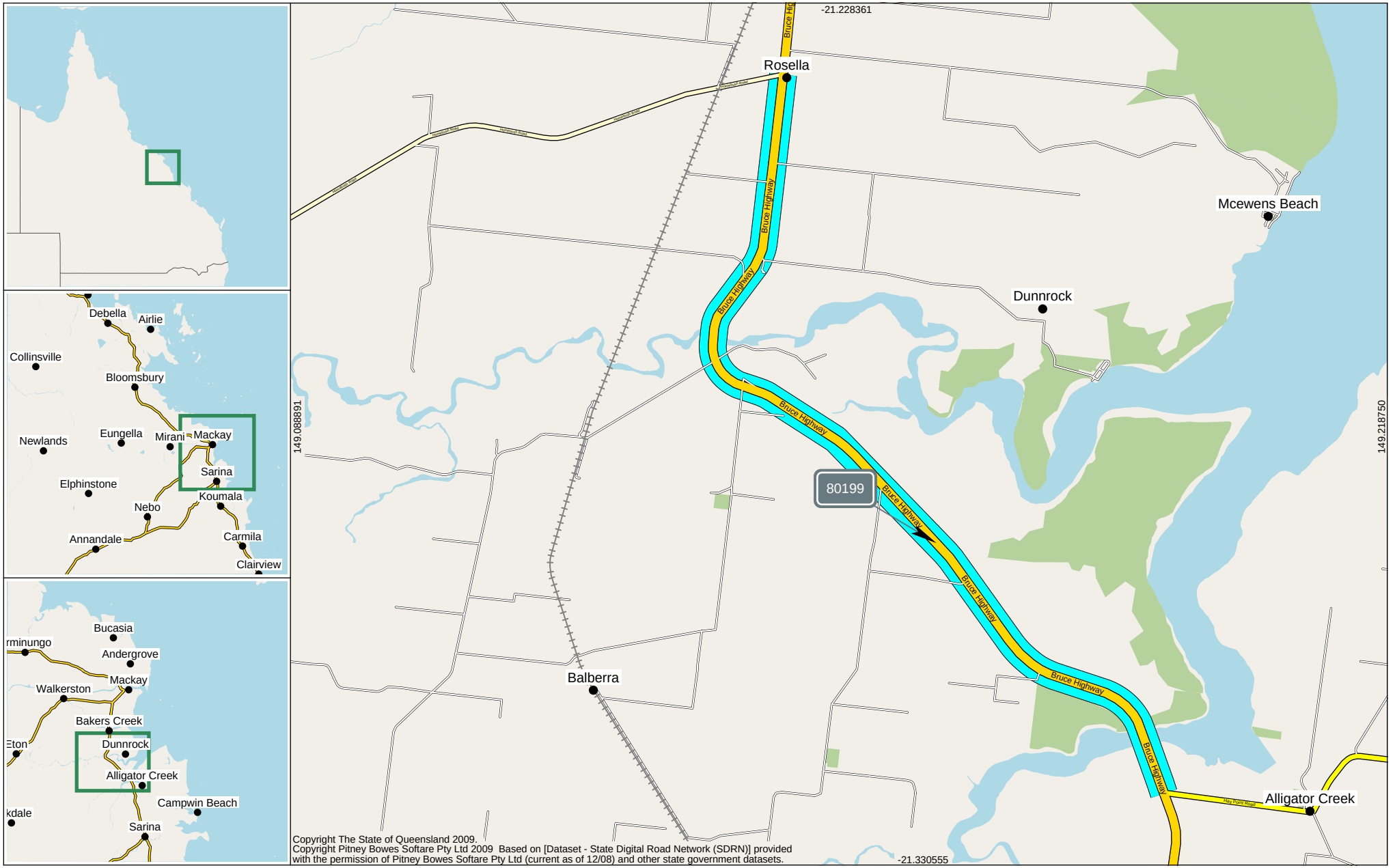
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-9.64%	-5.06%	-1.47%
A	-3.07%	-3.19%	-0.88%
B	-6.41%	-4.13%	-1.17%





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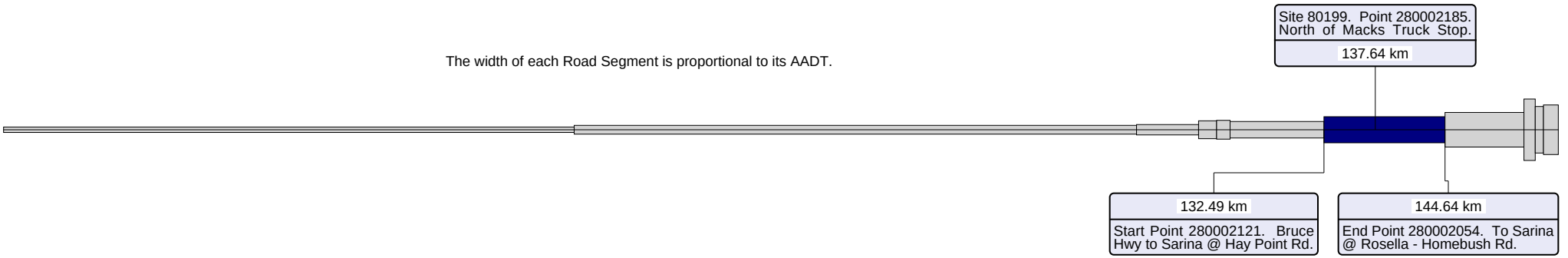

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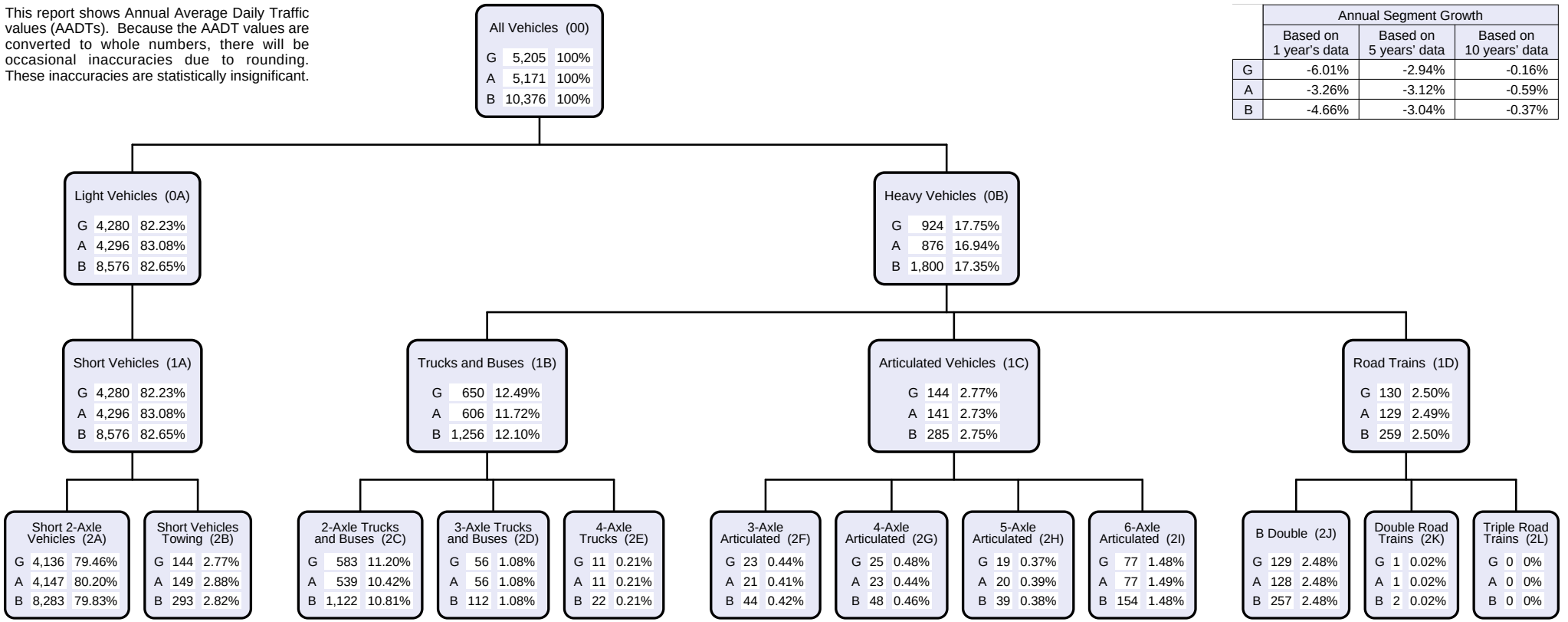
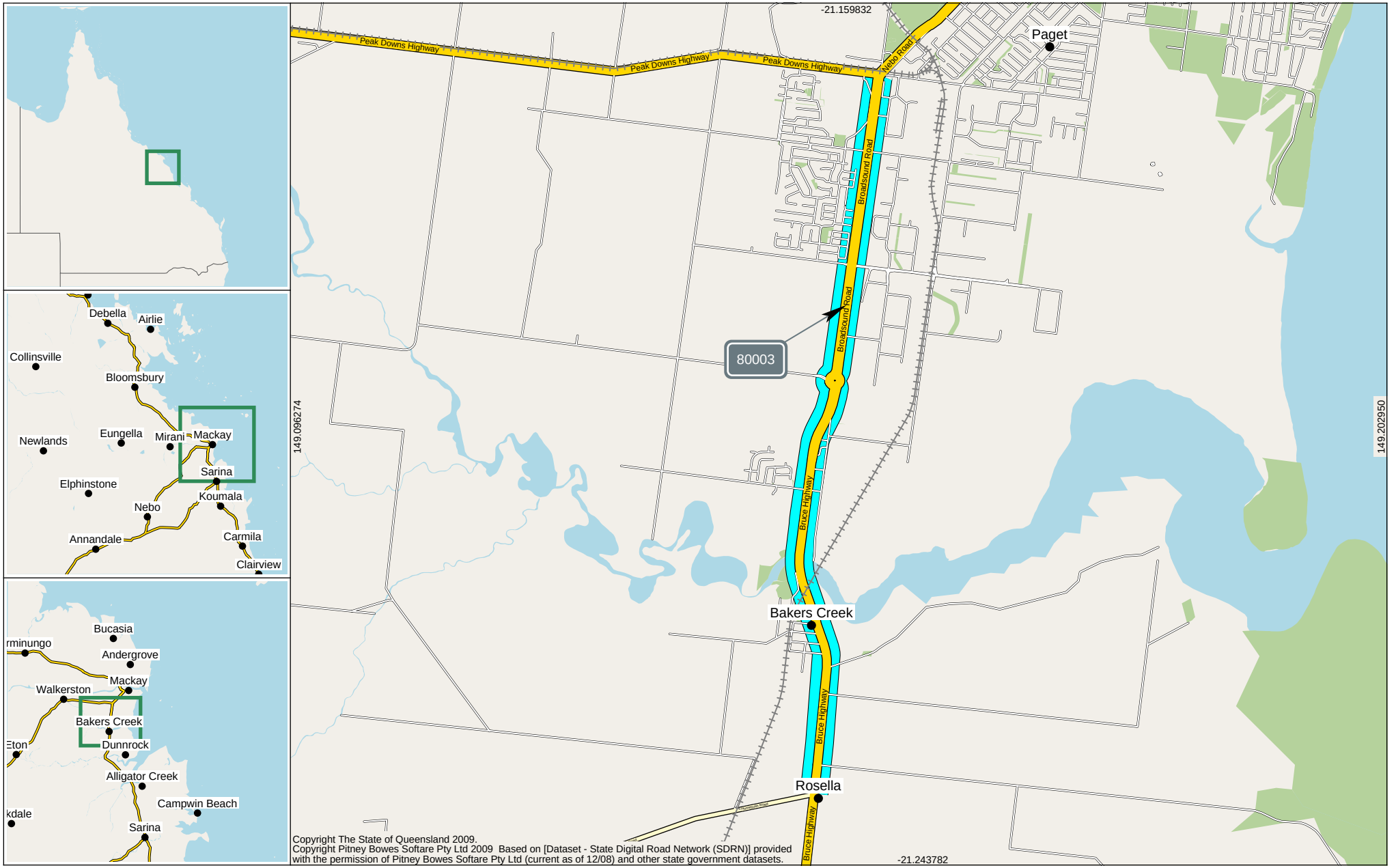
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-6.01%	-2.94%	-0.16%
A	-3.26%	-3.12%	-0.59%
B	-4.66%	-3.04%	-0.37%





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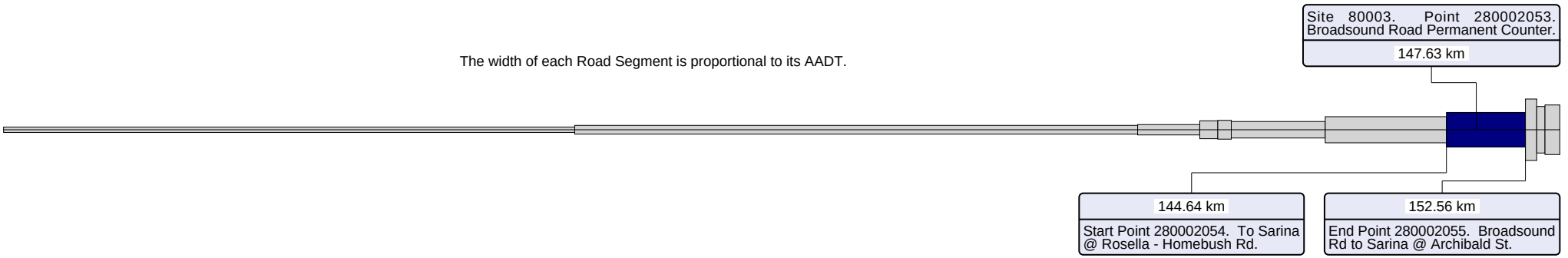

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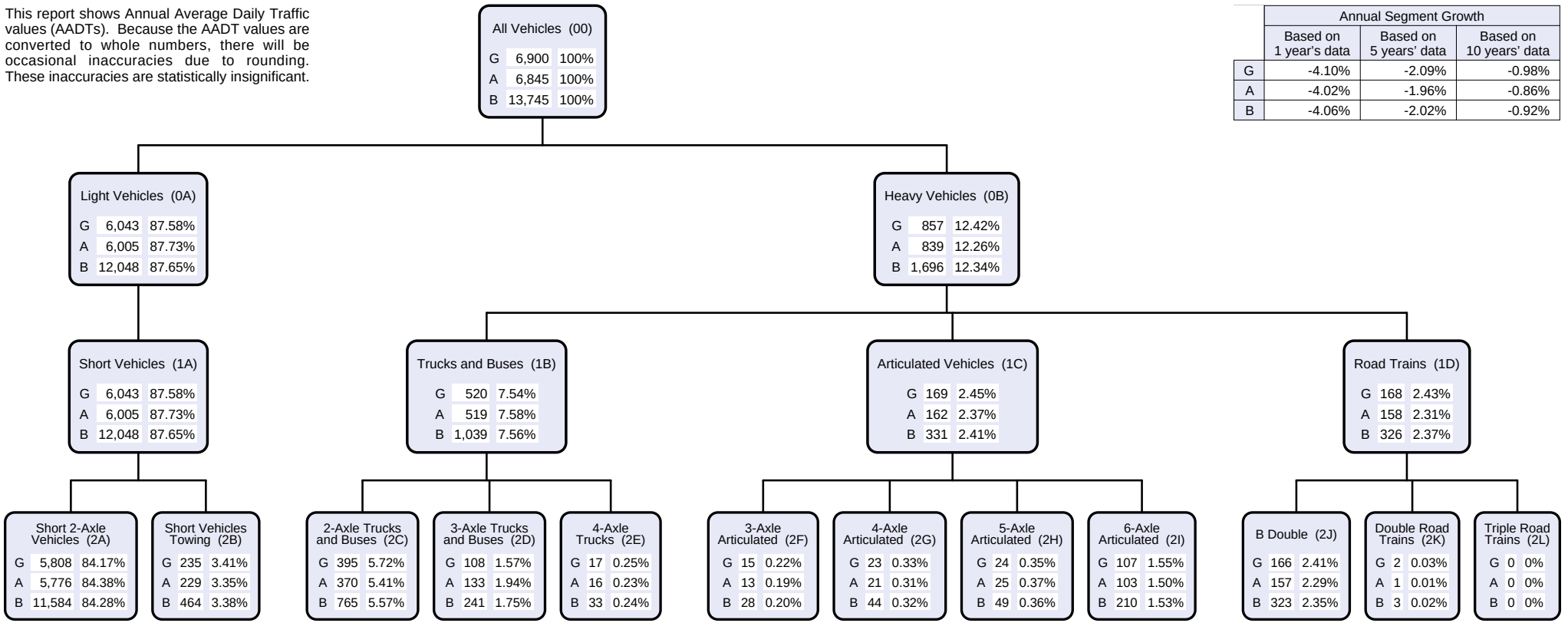
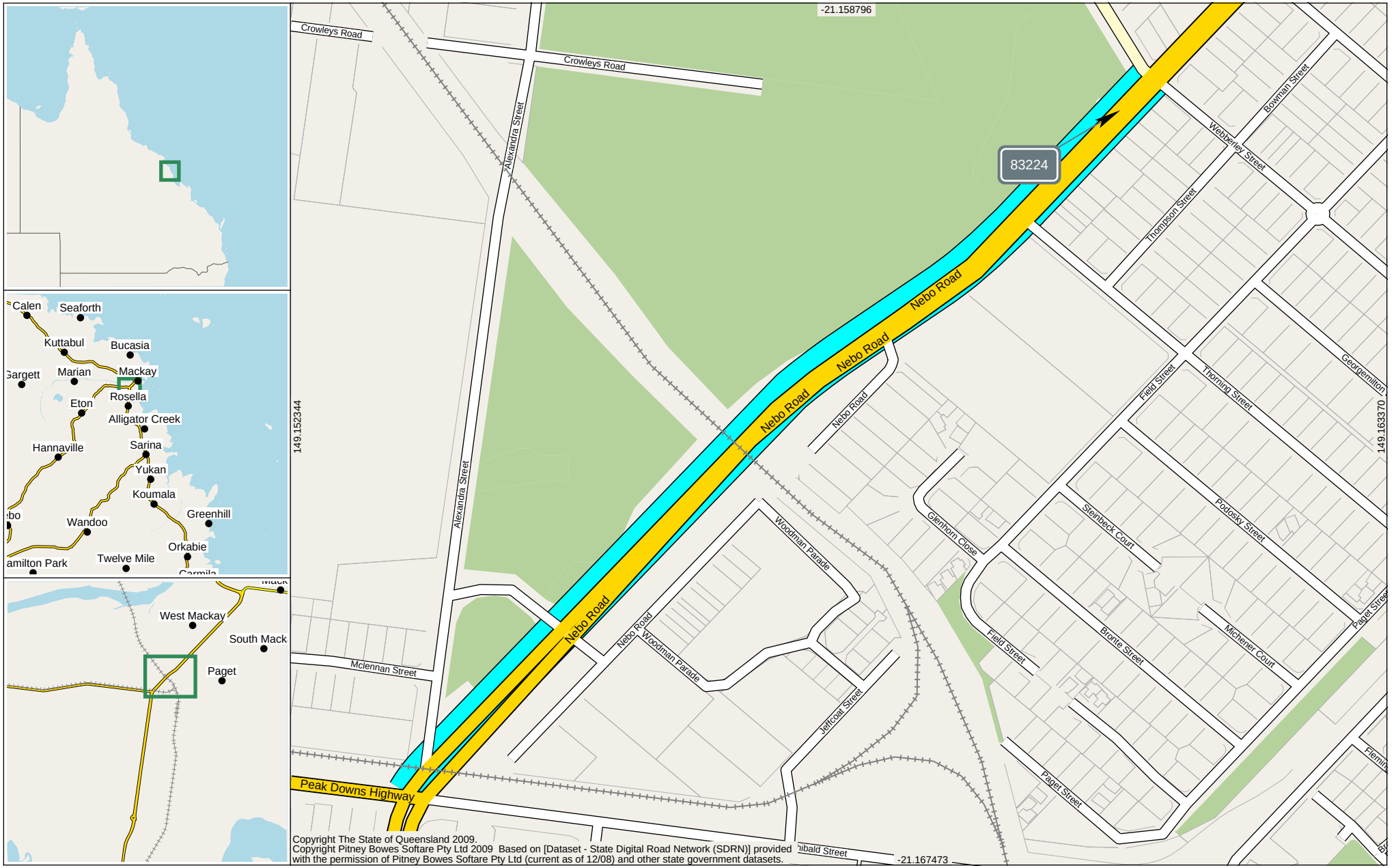
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-4.10%	-2.09%	-0.98%
A	-4.02%	-1.96%	-0.86%
B	-4.06%	-2.02%	-0.92%





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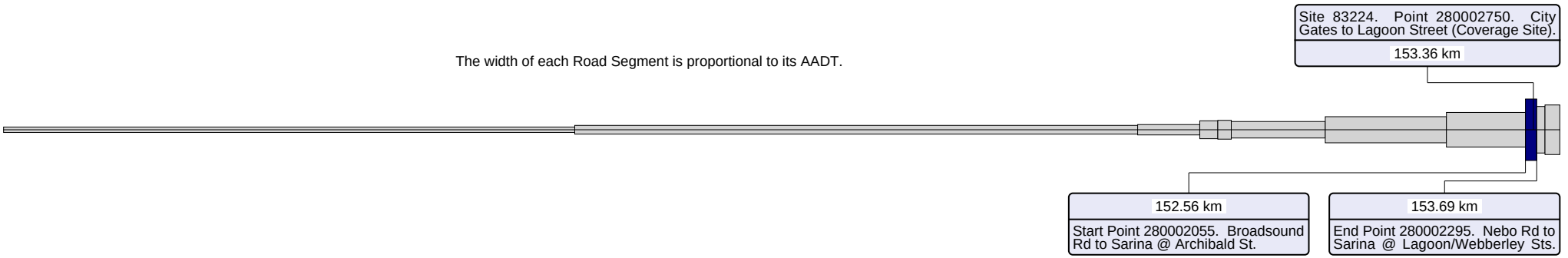

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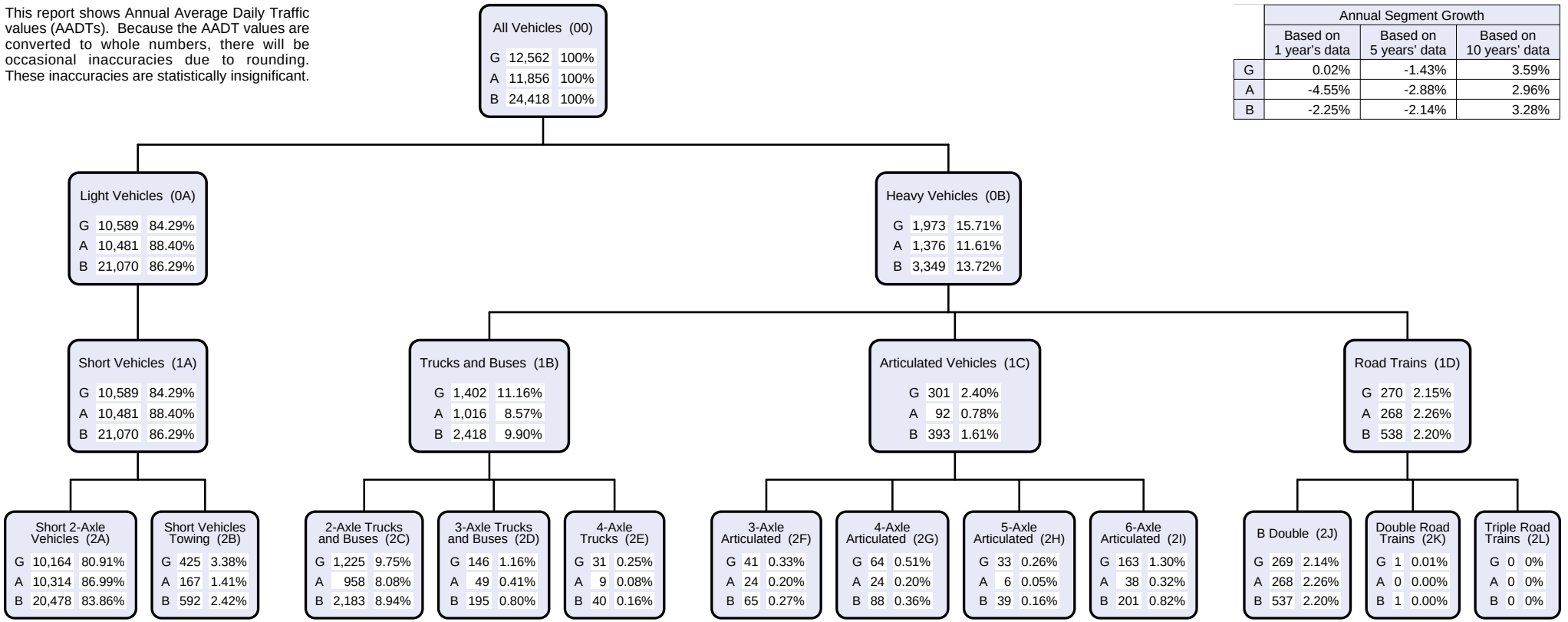
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	0.02%	-1.43%	3.59%
A	-4.55%	-2.88%	2.96%
B	-2.25%	-2.14%	3.28%

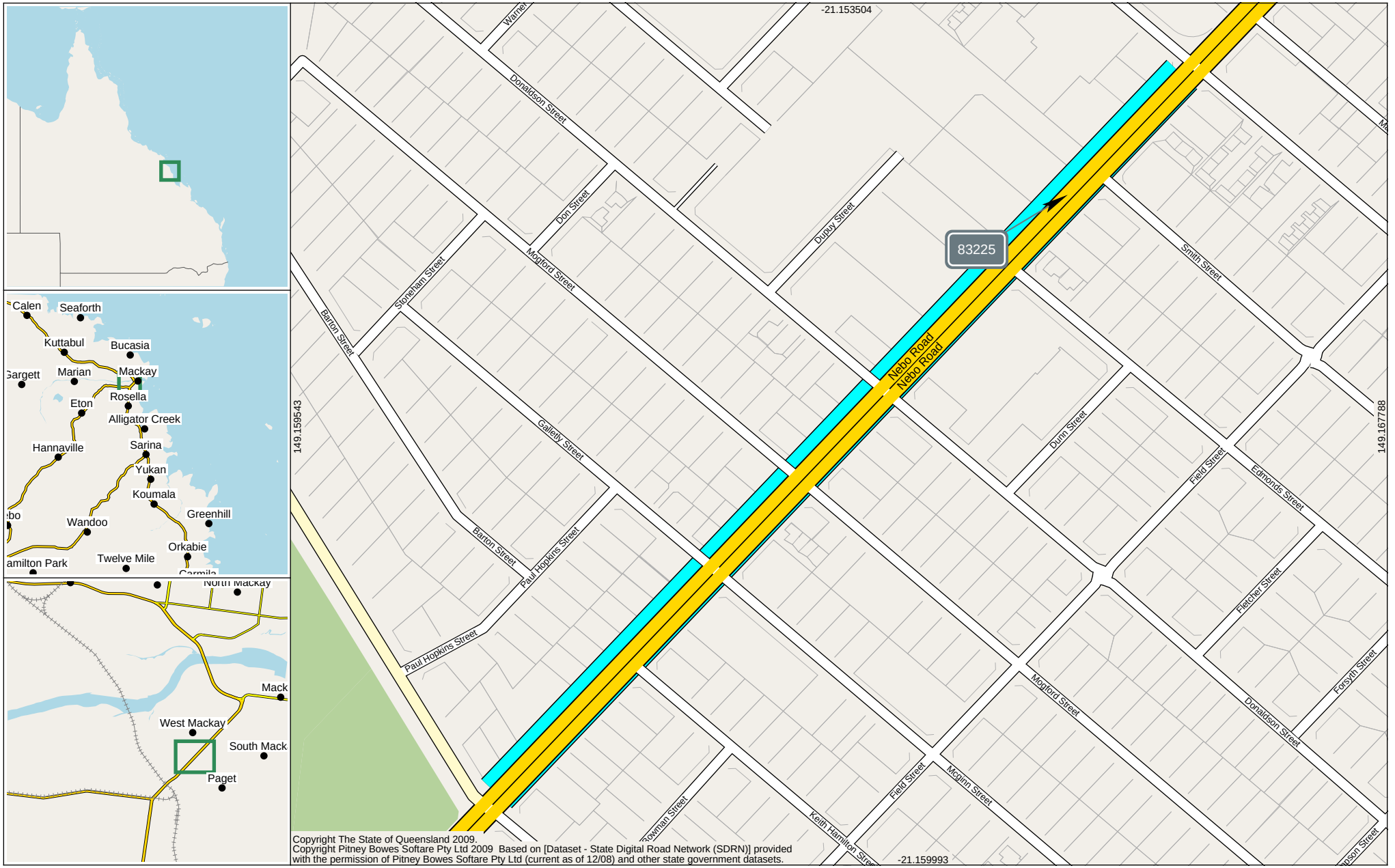


Traffic Analysis and Reporting System

AADT Segment Analysis Report (Complete)

Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)

Traffic Year 2016 - Data Collection Year 2016



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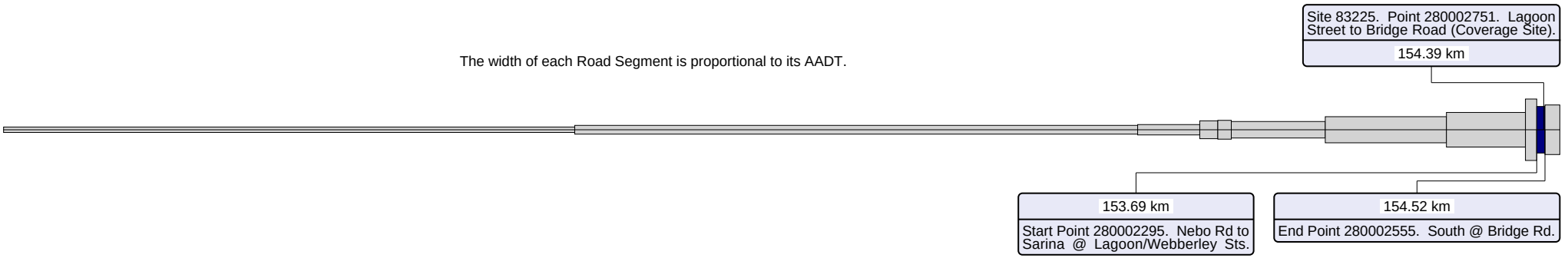

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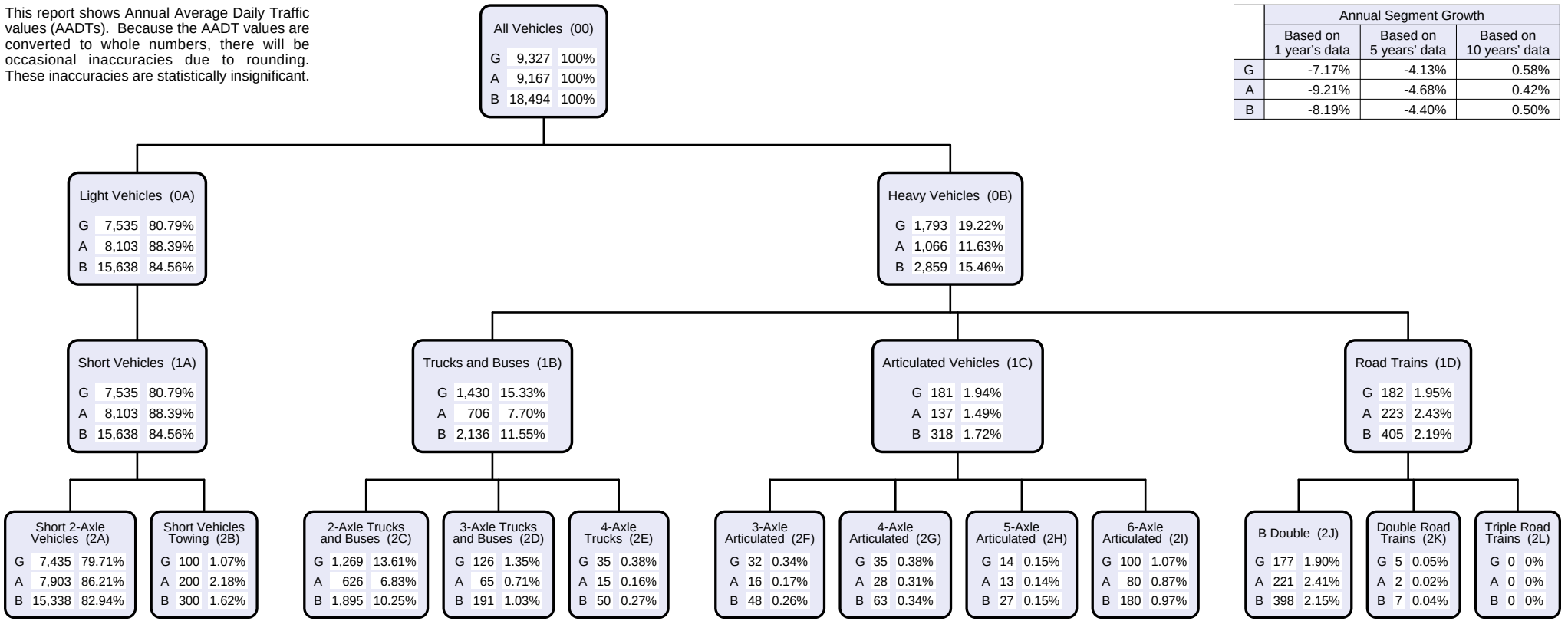
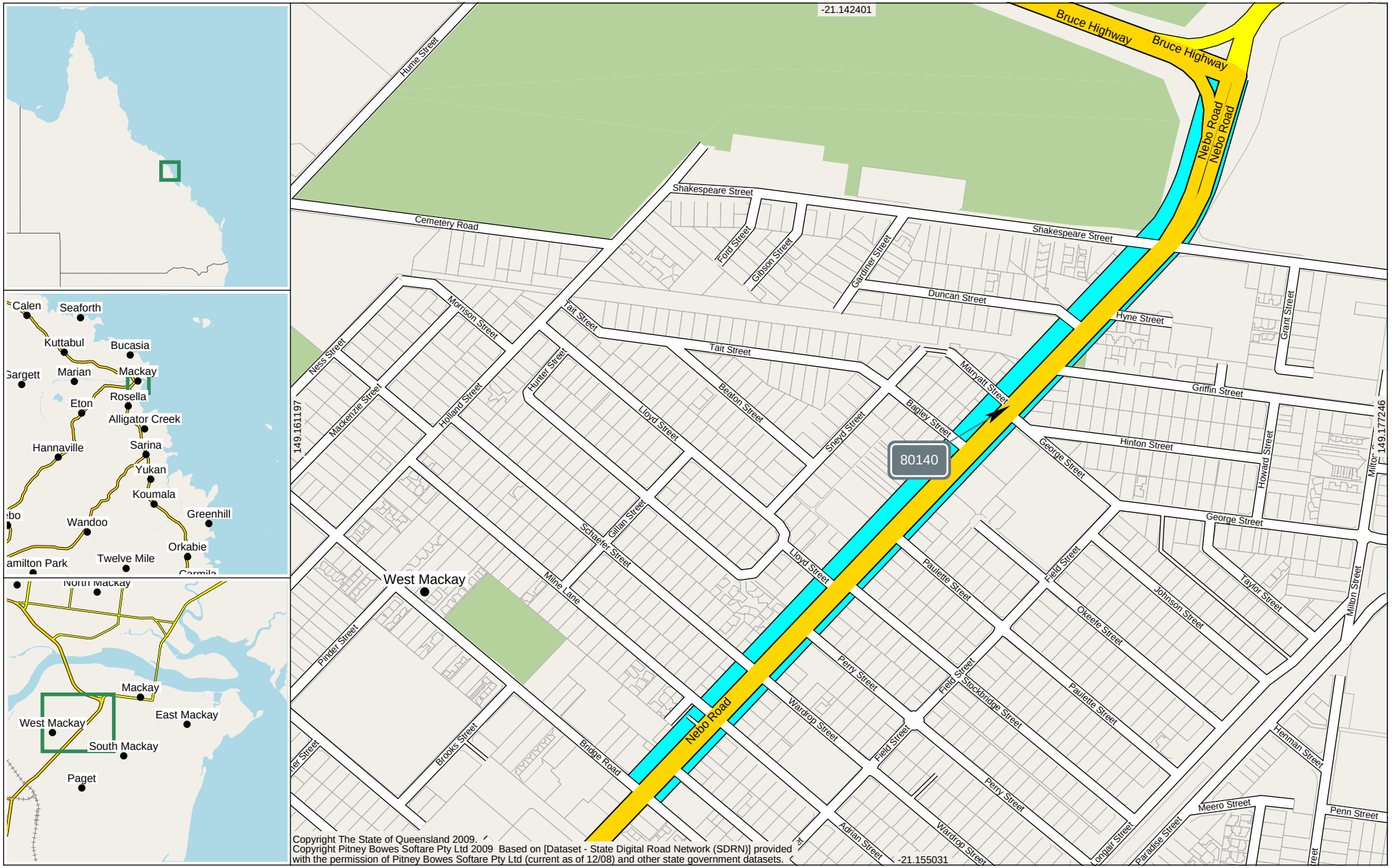
	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-7.17%	-4.13%	0.58%
A	-9.21%	-4.68%	0.42%
B	-8.19%	-4.40%	0.50%





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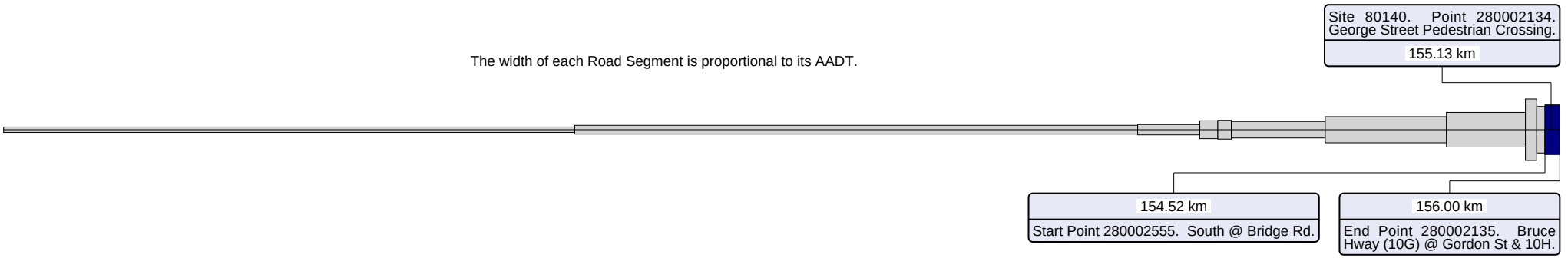


This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

	Annual Segment Growth		
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-18.52%	-8.39%	-6.17%
A	-17.07%	-8.24%	-6.17%
B	-17.81%	-8.31%	-6.17%

All Vehicles (00)

G	10,011	100%
A	9,693	100%
B	19,704	100%

Light Vehicles (0A)

G	9,164	91.54%
A	8,850	91.30%
B	18,014	91.42%

Heavy Vehicles (0B)

G	846	8.45%
A	844	8.71%
B	1,690	8.58%

Short Vehicles (1A)

G	9,164	91.54%
A	8,850	91.30%
B	18,014	91.42%

Trucks and Buses (1B)

G	527	5.26%
A	524	5.41%
B	1,051	5.33%

Articulated Vehicles (1C)

G	112	1.12%
A	101	1.04%
B	213	1.08%

Road Trains (1D)

G	207	2.07%
A	219	2.26%
B	426	2.16%

Short 2-Axle Vehicles (2A)

G	8,962	89.52%
A	8,643	89.17%
B	17,605	89.35%

Short Vehicles Towing (2B)

G	202	2.02%
A	207	2.14%
B	409	2.08%

2-Axle Trucks and Buses (2C)

G	438	4.38%
A	446	4.60%
B	884	4.49%

3-Axle Trucks and Buses (2D)

G	73	0.73%
A	63	0.65%
B	136	0.69%

4-Axle Trucks (2E)

G	16	0.16%
A	15	0.15%
B	31	0.16%

3-Axle Articulated (2F)

G	12	0.12%
A	13	0.13%
B	25	0.13%

4-Axle Articulated (2G)

G	19	0.19%
A	16	0.17%
B	35	0.18%

5-Axle Articulated (2H)

G	14	0.14%
A	14	0.14%
B	28	0.14%

6-Axle Articulated (2I)

G	67	0.67%
A	58	0.60%
B	125	0.63%

B Double (2J)

G	205	2.05%
A	217	2.24%
B	422	2.14%

Double Road Trains (2K)

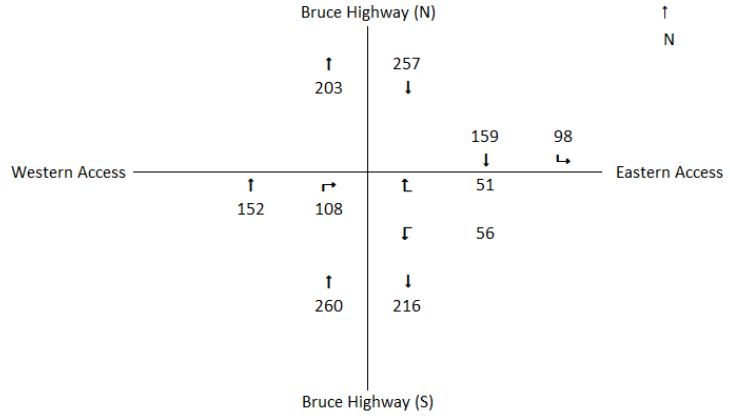
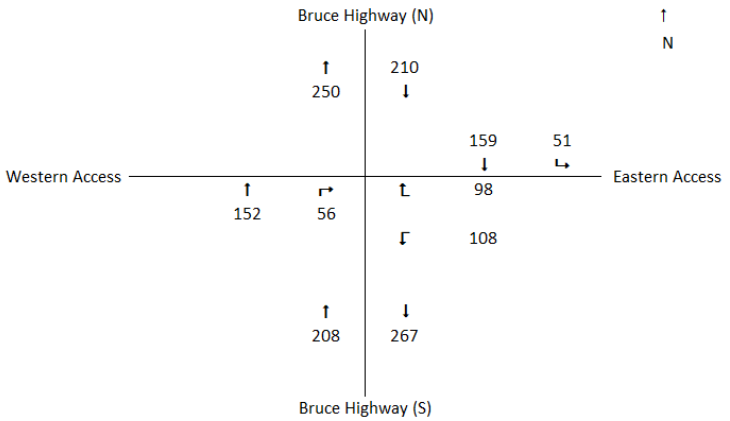
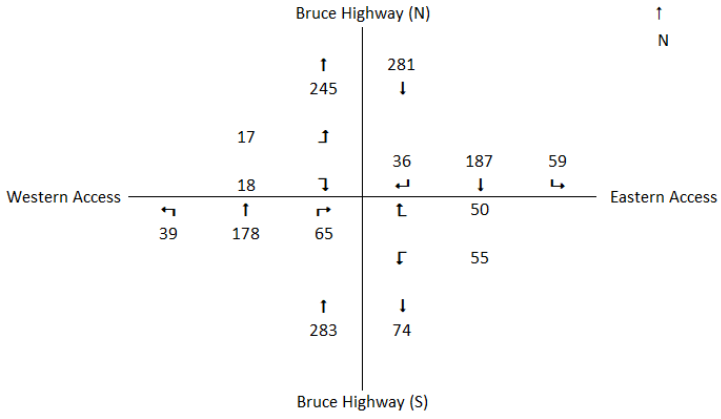
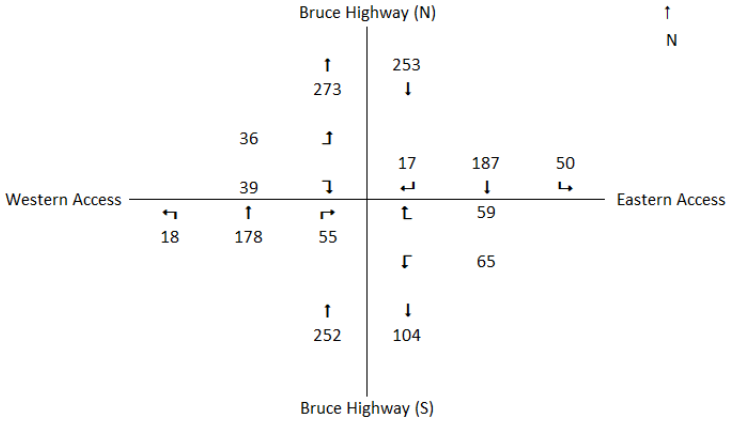
G	2	0.02%
A	2	0.02%
B	4	0.02%

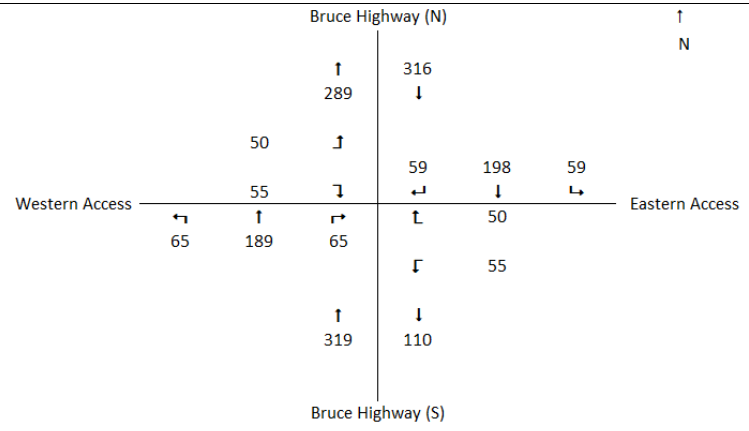
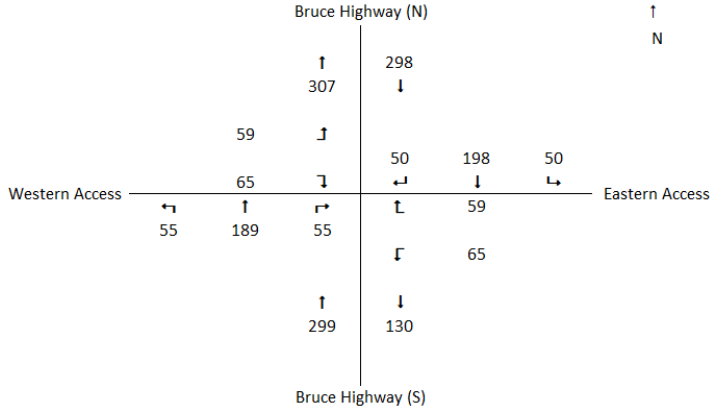
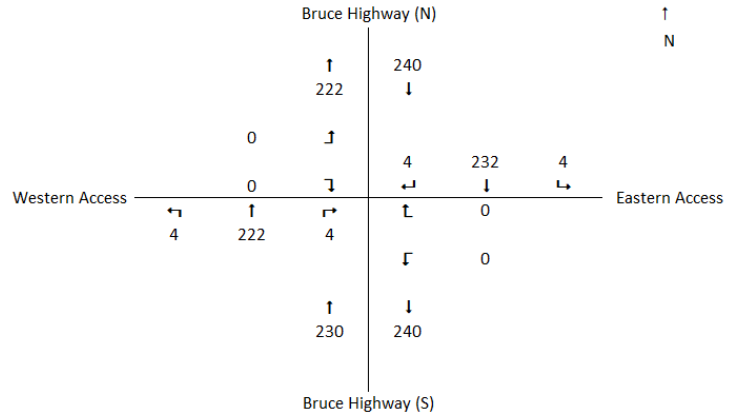
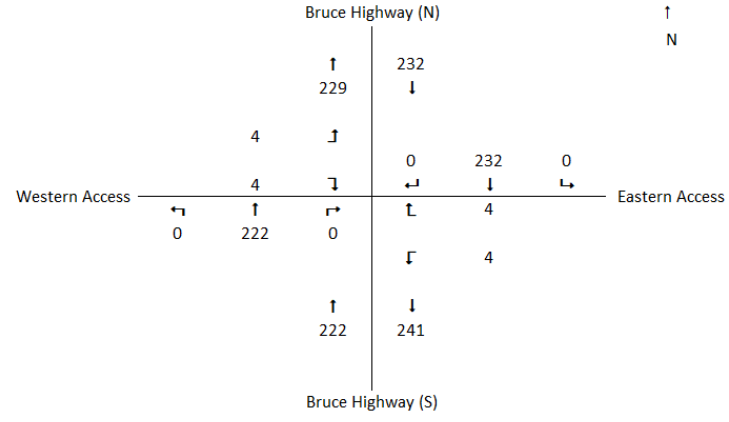
Triple Road Trains (2L)

G	0	0%
A	0	0%
B	0	0%

Appendix B

Peak Hour Traffic Flow Diagrams

Assessment Year	AM Peak	PM Peak
2018		
2026		

2029	 Bruce Highway (N) N 316 289 50 59 198 59 Western Access 55 50 Eastern Access 65 189 65 55 319 110 Bruce Highway (S)	 Bruce Highway (N) N 298 307 59 50 198 50 Western Access 65 59 Eastern Access 55 189 55 65 299 130 Bruce Highway (S)
2037	 Bruce Highway (N) N 240 222 0 4 232 4 Western Access 0 0 Eastern Access 4 222 4 230 240 Bruce Highway (S)	 Bruce Highway (N) N 232 229 4 0 232 0 Western Access 4 Eastern Access 0 222 0 4 222 241 Bruce Highway (S)

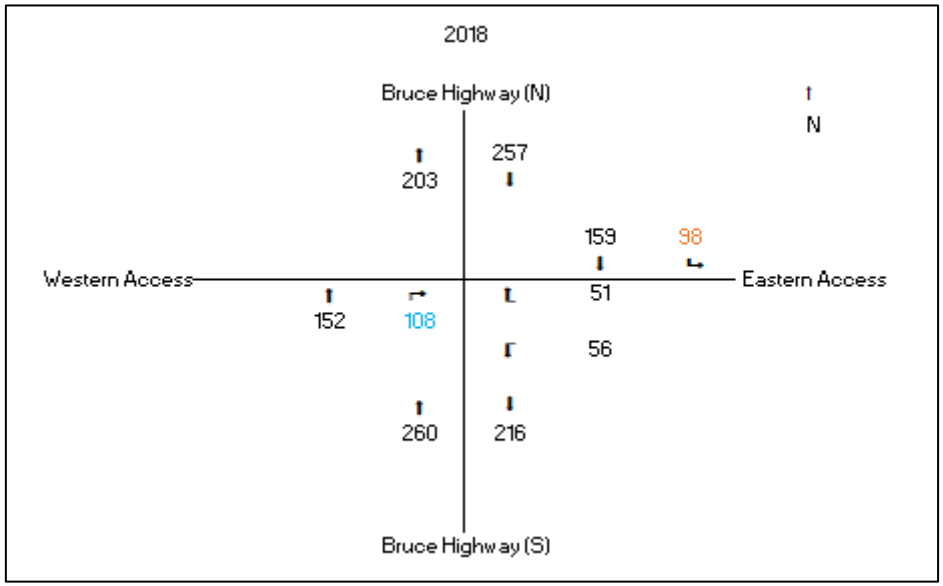
Appendix C

Link Capacity Assessment

Road Name	Road Section	Year											
		2018				2026				2029			
		Baseline		Baseline + Project		Baseline		Baseline + Project		Baseline		Baseline + Project	
		PCU/hr	LOS	PCU/hr	LOS	PCU/hr	LOS	PCU/hr	LOS	PCU/hr	LOS	PCU/hr	LOS
Bruce Highway	Yeppoon Road – Terra Nova Drive	2,230	E	2,355	E	2,612	E	2,755	E	2,772	E	2,959	E
	Terra Nova Drive – Vass Road	1,489	D	1,614	D	1,745	D	1,887	E	1,852	E	2,039	E
	Vass Road – Caves-Barmoya Road	905	C	1,030	C	1,060	C	1,203	D	1,125	C	1,312	D
	Caves-Barmoya Road – Ogmore Road	588	B	763	B	690	B	888	C	732	B	993	C
	Ogmore Road – Rockhampton and Mackay Regional Shire Boundary	548	B	706	B	642	B	822	C	681	B	918	C
	Rockhampton and Mackay Regional Shire Boundary – St Lawrence Connection Road	478	A	636	B	560	B	740	B	595	B	831	C
	St Lawrence Connection Road - Carmila	503	B	661	B	589	B	769	B	625	B	862	C
	Carmila – Oonoonie	739	B	780	B	865	C	913	C	918	C	981	C
	Oonoonie – Armstrong Beach	890	C	932	C	1,043	C	1,090	C	1,107	D	1,169	D

Appendix D

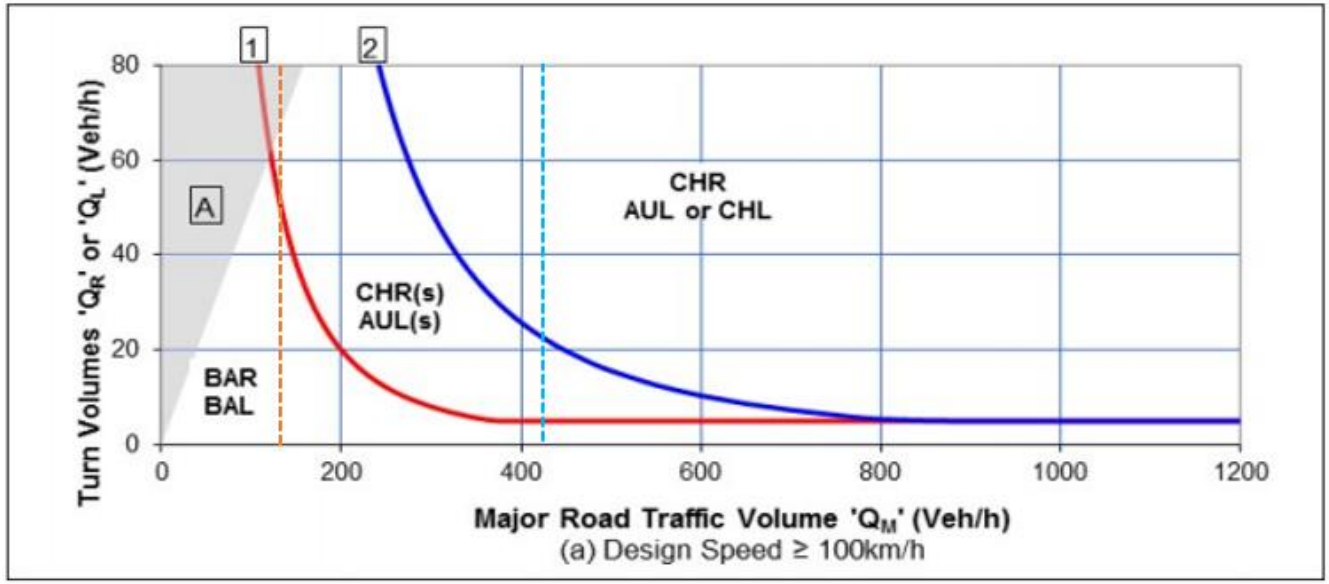
Turn Warrant Assessment

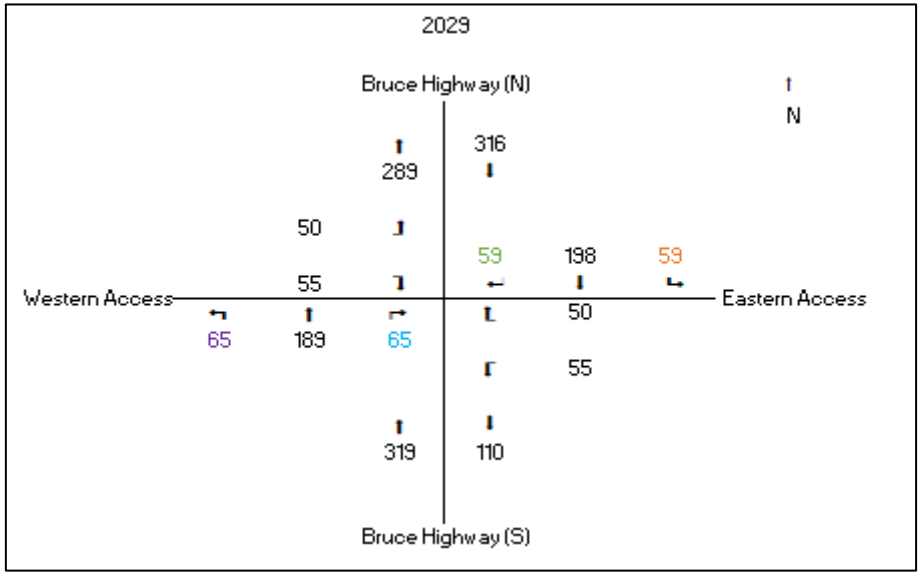


Turn Warrant Assessment - 2018

Parameters	Bruce Highway (N)		Bruce Highway (S)	
	Left Turn	Right Turn	Left Turn	Right Turn
Ql/r	98 [1]	N/A	N/A	108 [1]
Qm	159	N/A	N/A	409
Turn Treatment	AUL(S)	N/A	N/A	CHR

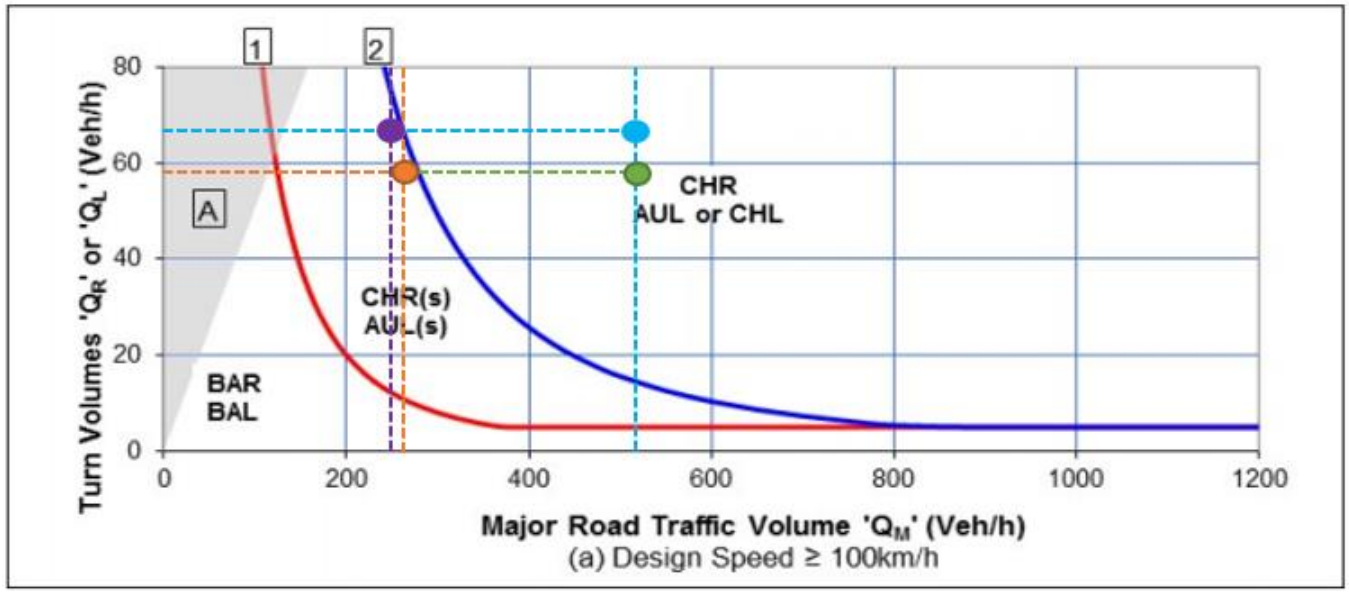
[1] Turn volume exceeds the extents of the chart





Turn Warrant Assessment - 2029

Parameters	Bruce Highway (N)		Bruce Highway (S)	
	Left Turn	Right Turn	Left Turn	Right Turn
Ql/r	59	59	65	65
Qm	257	511	254	511
Turn Treatment	AUL(s)	CHR	AUL(s)	CHR



Appendix E

Pavement Impact Assessment

Sect No.	Road No.	Road Name	Road Section	Towards / Away - Development Generated ESA's (By Year)																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1	60027	Bruce Highway	Bruce Hwy @ Archer St(Lights)	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
2	60017	Bruce Highway	Bruce Hwy 100m Sth Knight St	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
3	61005	Bruce Highway	Bruce Hwy at Boland St	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
4	60822	Bruce Highway	Bruce Hwy 800m Sth Rton-Yeppoon R	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
5	60926	Bruce Highway	Bruce Hwy 200m Sth Mason Ave (Parkhurst)	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
6	60823	Bruce Highway	Bruce Hwy 150m North Terra Nova Dr	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
7	60160	Bruce Highway	Bruce Hwy 200m North 14 Mile Ck Rd	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
8	60003	Bruce Highway	Bruce Hwy 40m Sth MountainCk(Kunwarara)	3,529	1,821	4,321	2,202	2,202	2,202	2,202	3,669	3,669	4,764	5,502	6,595	4,393	1,095	659	395	395	0	0	0
9	61814	Bruce Highway	1km south of Montrose Creek on Bruce Hwy	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
10	80022	Bruce Highway	South of Waverley Creek	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
11	80268	Bruce Highway	North of Clairview	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
12	80042	Bruce Highway	WiM Site Koumala	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
13	80008	Bruce Highway	South of Armstrong's Beach Turnoff	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
14	82703	Bruce Highway	Sichter Street - Broad Street	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
15	82720	Bruce Highway	Between Sarina and Sarina - Homebush TO	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
16	83112	Bruce Highway	Sarina - Homebush Road to Hay Point TO	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
17	80199	Bruce Highway	North of Macks Truck Stop	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
18	80003	Bruce Highway	Broadsound Road Permanent Counter	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
19	83224	Bruce Highway	City Gates to Lagoon Street	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
20	83225	Bruce Highway	Lagoon St to Bridge Rd	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0
21	80140	Bruce Highway	George Street Pedestrian Crossing	1,372	708	1,681	856	856	856	856	1,427	1,427	1,853	2,140	2,565	1,708	426	256	154	154	0	0	0

Sect No.	Road No.	Road Name	Road Section	Towards / Away - Development Generated ESA % (By Year)																		
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037
1	60027	Bruce Highway	Bruce Hwy @ Archer St(Lights)	0.3%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.5%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2	60017	Bruce Highway	Bruce Hwy 100m Sth Knight St	0.2%	0.1%	0.3%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3	61005	Bruce Highway	Bruce Hwy at Boland St	0.3%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.5%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
4	60822	Bruce Highway	Bruce Hwy 800m Sth Rton-Yeppoon R	0.4%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.5%	0.6%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
5	60926	Bruce Highway	Bruce Hwy 200m Sth Mason Ave (Parkhurst)	0.4%	0.2%	0.5%	0.2%	0.2%	0.2%	0.2%	0.4%	0.4%	0.5%	0.5%	0.6%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
6	60823	Bruce Highway	Bruce Hwy 150m North Terra Nova Dr	0.5%	0.3%	0.6%	0.3%	0.3%	0.3%	0.3%	0.5%	0.4%	0.6%	0.6%	0.7%	0.5%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
7	60160	Bruce Highway	Bruce Hwy 200m North 14 Mile Ck Rd	0.6%	0.3%	0.7%	0.4%	0.4%	0.4%	0.3%	0.6%	0.6%	0.7%	0.8%	0.9%	0.6%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
8	60003	Bruce Highway	Bruce Hwy 40m Sth MountainCk(Kunwarara)	1.0%	0.5%	1.2%	0.6%	0.6%	0.6%	0.5%	0.9%	0.9%	1.1%	1.3%	1.5%	1.0%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
9	61814	Bruce Highway	1km south of Montrose Creek on Bruce Hwy	0.4%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.5%	0.6%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
10	80022	Bruce Highway	South of Waverley Creek	0.4%	0.2%	0.5%	0.2%	0.2%	0.2%	0.2%	0.4%	0.4%	0.5%	0.5%	0.6%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
11	80268	Bruce Highway	North of Clairview	0.4%	0.2%	0.5%	0.2%	0.2%	0.2%	0.2%	0.4%	0.3%	0.4%	0.5%	0.6%	0.4%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
12	80042	Bruce Highway	WiM Site Koumala	0.3%	0.2%	0.4%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.4%	0.4%	0.5%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
13	80008	Bruce Highway	South of Armstrong's Beach Turnoff	0.2%	0.1%	0.3%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.3%	0.3%	0.3%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	82703	Bruce Highway	Sichter Street - Broad Street	0.3%	0.1%	0.3%	0.2%	0.2%	0.1%	0.1%	0.2%	0.2%	0.3%	0.3%	0.4%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15	82720	Bruce Highway	Between Sarina and Sarina - Homebush TO	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
16	83112	Bruce Highway	Sarina - Homebush Road to Hay Point TO	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	80199	Bruce Highway	North of Macks Truck Stop	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
18	80003	Bruce Highway	Broadsound Road Permanent Counter	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
19	83224	Bruce Highway	City Gates to Lagoon Street	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	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%
20	83225	Bruce Highway	Lagoon St to Bridge Rd	0.1%	0.0%	0.1%	0.1%	0.1%	0.0%	0.0%	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%
21	80140	Bruce Highway	George Street Pedestrian Crossing	0.1%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

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