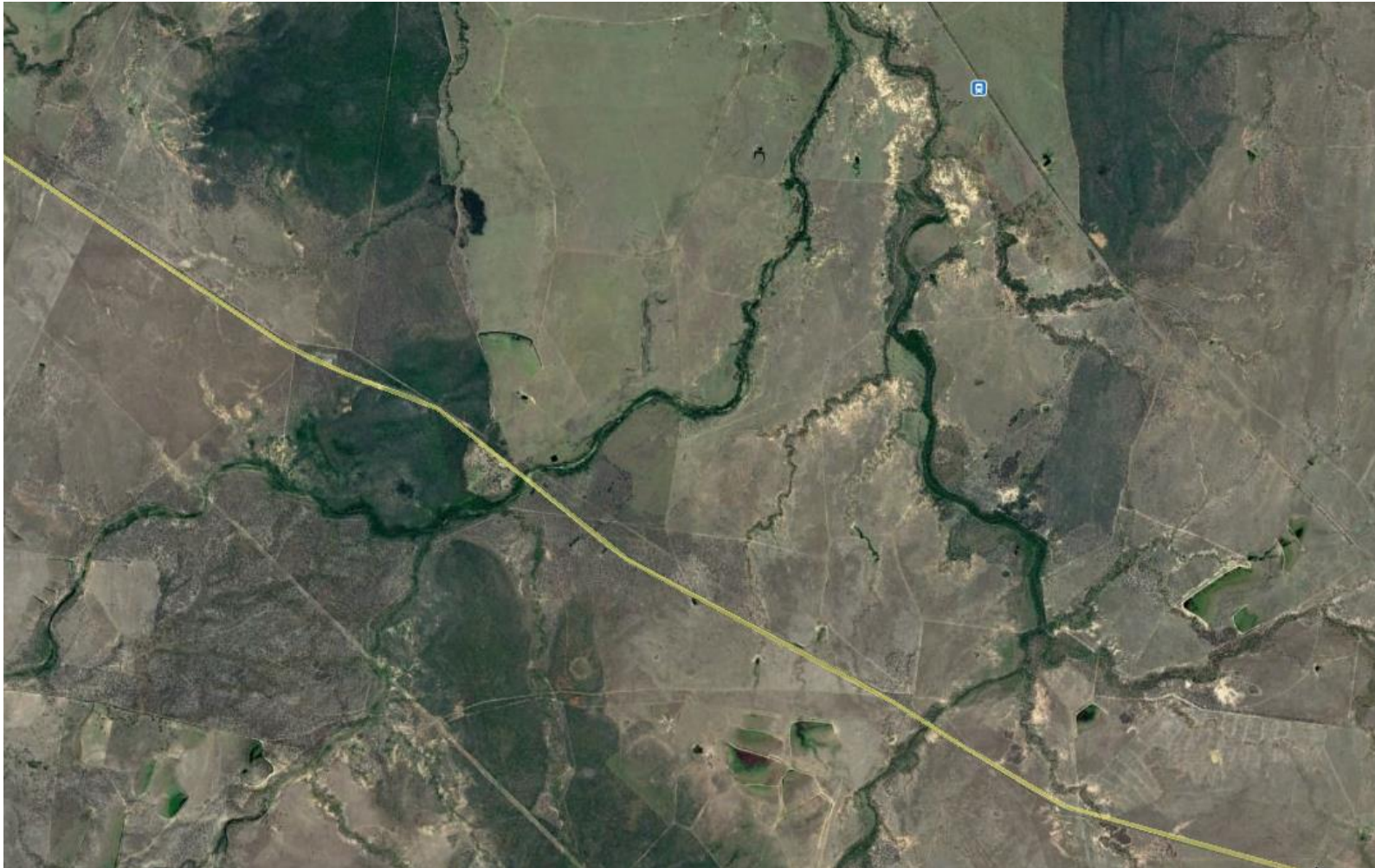


Central Queensland Coal Project

Appendix 4a – Road Impact Assessment

**Supplementary
Environmental Impact
Statement**



Central QLD Coal Project Environmental Impact Statement Road Impact Assessment

Client // Central Queensland Coal and Fairway Coal
Proprietary Limited

Office // QLD

Reference // Q155380

Date // 29/10/18

Central QLD Coal Project

Environmental Impact Statement

Road Impact Assessment


Issue: A 29/10/18

Client: Central Queensland Coal and Fairway Coal Proprietary Limited

Reference: Q155380

GTA Consultants Office: QLD

Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
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Executive Summary

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

Assessment Scenarios and Traffic Generation

Design horizons for Road Impact Assessment (RIA) have been developed with due consideration of the Project schedule (based on the best estimates of the Project at the time of analysis) and with respect to the requirements set out in Department of Transport and Main Road's "Guide to Traffic Impact Assessment" (GTIA). Adopted design horizons are as follows:

- 2020 (Project Year 2): Peak of construction phase
- 2028 (Project Year 10): Construction of western MIA and continued operation of eastern MIA
- 2030 (Project Year 12): Peak of operational phase
- 2038 (Project Year 20): Decommissioning/rehabilitation and 20-year design horizon.

The workforce will be sourced 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, Ogmoo, St Lawrence, Clairview, Yaamba and The Caves. These assumptions are understood to be the best Project estimate based on discussions with the Proponent and apply to all phases of the Project, inclusive of construction, operations and decommissioning/rehabilitation personnel.

Estimates of the workforce generated traffic based on the latest and best estimates of workforce numbers for the Project 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	
2020	176	95	95	176	0	0	0	0	542
2028	59	50	50	59	141	10	10	23	402
2030	119	100	100	119	119	100	100	119	876
2038	8	0	0	8	8	0	0	8	32

vph – vehicles per hour; vpd - vehicles per day

Estimated projections of annual the heavy vehicle movements based on the latest and best estimates are detailed in Table E.2.

Table E.2: Annual Heavy Vehicle Movements

Project Phase	Vehicle Type	Heavy Vehicle Movements (Annual)			
		2020	2028	2030	2038 ^[1]
Construction	Rigid Truck	157	65	-	-
	Semi-Trailer	312	233	-	-
	B-Double	67	50	-	-
	Oversized	16	7	-	-
	Sub-Total	552	355	-	-
Operations	Rigid Truck	1,719	2,575	5,150	-
	Semi-Trailer	88	132	264	-
	B-Double	386	578	1,155	-
	Oversized	11	17	33	-
	Sub-Total	2,204	3,302	6,602	-
Project Total	<i>Rigid Truck</i>	1,876	2,640	5,150	-
	<i>Semi-Trailer</i>	400	365	264	-
	<i>B-Double</i>	453	628	1,155	-
	<i>Oversized</i>	27	24	33	-
	Total	2,756	3,657	6,602	-

[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.

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

Road Link Assessment

A 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 of the Bruce Highway:

- 150m North Terra Nova Dr
- 200m North 14 Mile Ck Rd
- 40m Sth Mountain Ck (Kunwarara)
- 1km south of Montrose Creek
- South of Waverley Creek
- North of Clairview

All impacted links are expected to be contained within the theoretical capacity with the Project generated traffic, with the exception of 150m North Terra Nova Dr. This road link is expected to operate marginally over capacity with the addition of Project generated traffic.

The section of the Bruce Highway relevant to North Terra Nova Dr contains overtaking lanes which results in increased operational capacity compared to the calculated theoretical

capacity which does not take into account the effects of overtaking lanes. Therefore, it is expected that the 150m North Terra Nova Dr road link will be contained within the operational capacity with the addition of Project generated traffic.

Notwithstanding, mitigation measures to offset any potential operational impacts as a result of the Project generated traffic have been considered and will be detailed in the Road-Use Management Plan (RMP). These strategies are as follows:

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

The road link assessment has not been extended beyond Rockhampton and Mackay on the following basis:

- The workforce is not expected to be located in areas beyond Rockhampton in the south and beyond Mackay to the north. Further, the Proponent's workforce fatigue management policy would also eliminate the likelihood that members of the workforce would travel from areas beyond The Caves and Clairview for typical weekday commuting travel purposes. As such, based on current planning and a reasonable expectation of where the workforce would reside, traffic generated by the workforce is not expected to extend to the SCR south of Rockhampton or north of Mackay.
- Although there are state trips associated with heavy vehicles which will result in vehicle trips outside of the Rockhampton to Mackay corridor, these trips account to a relatively small percentage (in the order of about 10 – 20 vehicle movements per hour for the Project design horizons) of the overall Project generated traffic. Furthermore, these trips are expected to diminish beyond Rockhampton and Mackay post each construction period, in turn lessening the Project generated traffic impacts on the SCR network.

Intersection Assessment

Given that Project traffic is typically adding to the through movements along these intersections, it is expected that the road link assessment captures any Project generated impacts on SCR intersections. Furthermore, turning movements from local areas will be dispersed onto multiple intersections based on workforce and heavy vehicle origins, further minimising impacts to each intersection. As such, minimal Project generated impacts are expected to occur at SCR intersections.

The Project initially proposed to provide a single four-way access intersection to access both sides of the Bruce Highway. After further discussions and development of access designs, it was determined that the originally proposed four-way access intersection would be amended to two new vehicular accesses each forming a T-intersection with the Bruce Highway. A turn warrant assessment has been undertaken in accordance with the methodology provided in the "Road Planning and Design Manual" (RPDM) Volume 3: Part 4A for the proposed Project access. Results of the assessment are summarised in Table E.3, with the concept designs provided at Appendix E.

Table E.3: Turn Warrant Results – Ultimate Scenario

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (Eastern Mine)	Auxiliary Lane (Full) – AUL	Channelised Right Turn - CHR
Bruce Highway (Western Mine)	Auxiliary Lane (Full) – AUL	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 expected to accommodate Project traffic. On this basis, assessment of contributions has not been undertaken, with the pavement impacts of the Project considered insignificant.

The pavement impact assessment has not been extended beyond Rockhampton and Mackay, given that impacts of greater than 5% have not been identified for any sections of the Bruce Highway between Rockhampton and Mackay where Project traffic is expected to be highly concentrated (due to its proximity to the site access). Furthermore, Project generated traffic is expected to disperse onto the surrounding network beyond Rockhampton and Mackay, with background traffic (AADT) along Bruce Highway also expected to increase closer to larger regional areas such as Brisbane. This increase in background traffic coupled with dispersion of Project generated traffic outside of Rockhampton and Mackay will further lessen the impact on SCR network beyond these regions.

Road Safety Risk Assessment

All identified potential risks as a result of the Project are expected to be within a medium level, with relevant mitigation measures detailed in the RMP. Furthermore, a road safety audit is required for major developments with AADT's larger than 8,000 on roads with speeds exceeding 80 km/hr (DTMR 2017). As such, the RMP details the need to undertake a road safety audit on impacted SCR road links at the detailed design stage of the Project, particularly the detailed design and approval stage for each of the Project's site accesses with the Bruce Highway.

Additional Impact Considerations

The Project is likely to utilise oversized vehicles for some of the transport activities as part of construction and operations. 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 undertake 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 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 include:

- Operation of a shuttle bus for the Project workforce, to reduce Project traffic.
- Implementation of a workforce ridesharing scheme to reduce Project traffic.
- Adjusting shift times and heavy vehicle movement scheduling such that Project traffic peaks do not coincide with the road network peak.
- Policies focussing on driver behaviour and fatigue management.

List of Abbreviations

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
Austrroads GPT	Austrroads Guide to Pavement Technology
Austrroads GTM	Austrroads 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
GTIA	Guide to Traffic Impact Assessment
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	Central Queensland 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 and Design Manual
SCR	State Controlled Road
SSCC	Semi-Soft Coking Coal
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

Central Queensland Coal Proprietary Limited (Central Queensland Coal) and Fairway Coal Proprietary Limited (Fairway Coal) (the joint Proponents), propose to develop the Central Queensland Coal Mine Project (the Project). As Central Queensland Coal is the senior proponent, Central Queensland Coal is referred to throughout this Supplementary Environmental Impact Statement (SEIS). The Project comprises the Central Queensland Coal Mine where coal mining and processing activities will occur along with a train loadout facility (TLF).

The Project is located 130 km northwest of Rockhampton in the Styx Coal Basin in Central Queensland. The Project is located within the Livingstone Shire Council Local Government Area. The Project is generally located on the "Mamelon" property, described as real property Lot 11 on MC23, Lot 10 on MC493 and Lot 9 on MC496. The TLF is located on the "Strathmuir" property, described as real property Lot 9 on MC230. A small section of the haul road to the TLF is located on the "Brussels" property described as real property Lot 85 on SP164785.

The Project will involve mining a maximum combined tonnage of up to 10 million tonnes per annum (Mtpa) of semi-soft coking coal (SSCC) and high grade thermal coal (HGTC). The Project will be located within Mining Lease (ML) 80187 and ML 700022, which are adjacent to Mineral Development Licence 468 and Exploration Permit for Coal 1029, both of which are held by the Proponent. It is intended that all aspects of the Project will be authorised by a site specific environmental authority (EA).

Development of the Project is expected to commence in 2019 with initial early construction works and extend operationally for approximately 19 years until the depletion of the current reserve, and rehabilitation and mine closure activities are successfully completed.

The Project consists of two open cut operations that will be mined using a truck and shovel methodology. The run-of-mine (ROM) coal will ramp up to approximately 2 Mtpa during Stage 1 (2019 - 2022), where coal will be crushed, screened and washed to SSCC grade with an estimate 80% yield. Stage 2 of the Project (2023 - 2037) will include further processing of up to an additional 4 Mtpa ROM coal within another coal handling and preparation plant (CHPP) to SSCC and up to 4 Mtpa of HGTC with an estimated 95% yield. At full production two CHPPs, one servicing Open Cut 1 and the other servicing Open Cut 2, will be in operation. Rehabilitation works will occur progressively through mine operation, with final rehabilitation and mine closure activities occurring between 2036 to 2038.

A new TLF will be developed to connect into the existing Queensland Rail North Coast Rail Line. This connection will allow the product coal to be transported to the established coal loading infrastructure at the Dalrymple Bay Coal Terminal (DBCT).

Access to the Project will be via the Bruce Highway. The Project will employ a peak workforce of approximately 275 people during construction and between 100 (2019) to 500 (2030) during operation, with the workforce reducing to approximately 20 during decommissioning. Central Queensland Coal will manage the Project construction and ongoing operations with the assistance of contractors.

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 Terms of Reference (TOR), dated April 2017 and follow-up consultation with the DTMR through 2018.

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 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 TOR for the Project. As per the requirements of the 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) 'Guide to Traffic Impact Assessment' (GTIA).

Consistent with the requirements set out in GTIA, 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 GTIA. 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 GTIA defined threshold levels, recommendations to “avoid”, “manage” or “mitigate” these impacts have been provided.
- Review and assess road safety risks that might arise as a result of the Project and identify mitigation measures to ensure no worsening of these risks.

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 and 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.
Road Link Impact Assessment	In accordance with GTIA defined threshold levels, identify road sections where Project generated traffic is expected to exceed 5% of baseline traffic volumes. The scope of the road 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 road 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 road 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 GTIA 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.
Road Safety Risk Assessment	Development should ensure that a road’s safety is not significantly worsened as a result of the development and that any pre-existing or development-introduced unacceptable safety risk is addressed. ‘Significantly worsened’ is defined in terms of the change in the safety risk rating (for example, from low to medium or from medium to high). A road safety risk assessment in accordance with GTIA is to be undertaken to identify potential road safety risks and ensure they are not ‘significantly worsened’ as a result of the Project. The analysis is provided in Section 8.

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, updated 2018
- 'Terms of Reference' for The Environmental Impact Statement for the Styx Coal Project (TOR), dated April 2017
- TMR (2017) 'Guide to Traffic Impact Assessment' (GTIA)
- TMR (2006) 'Road Planning and 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.

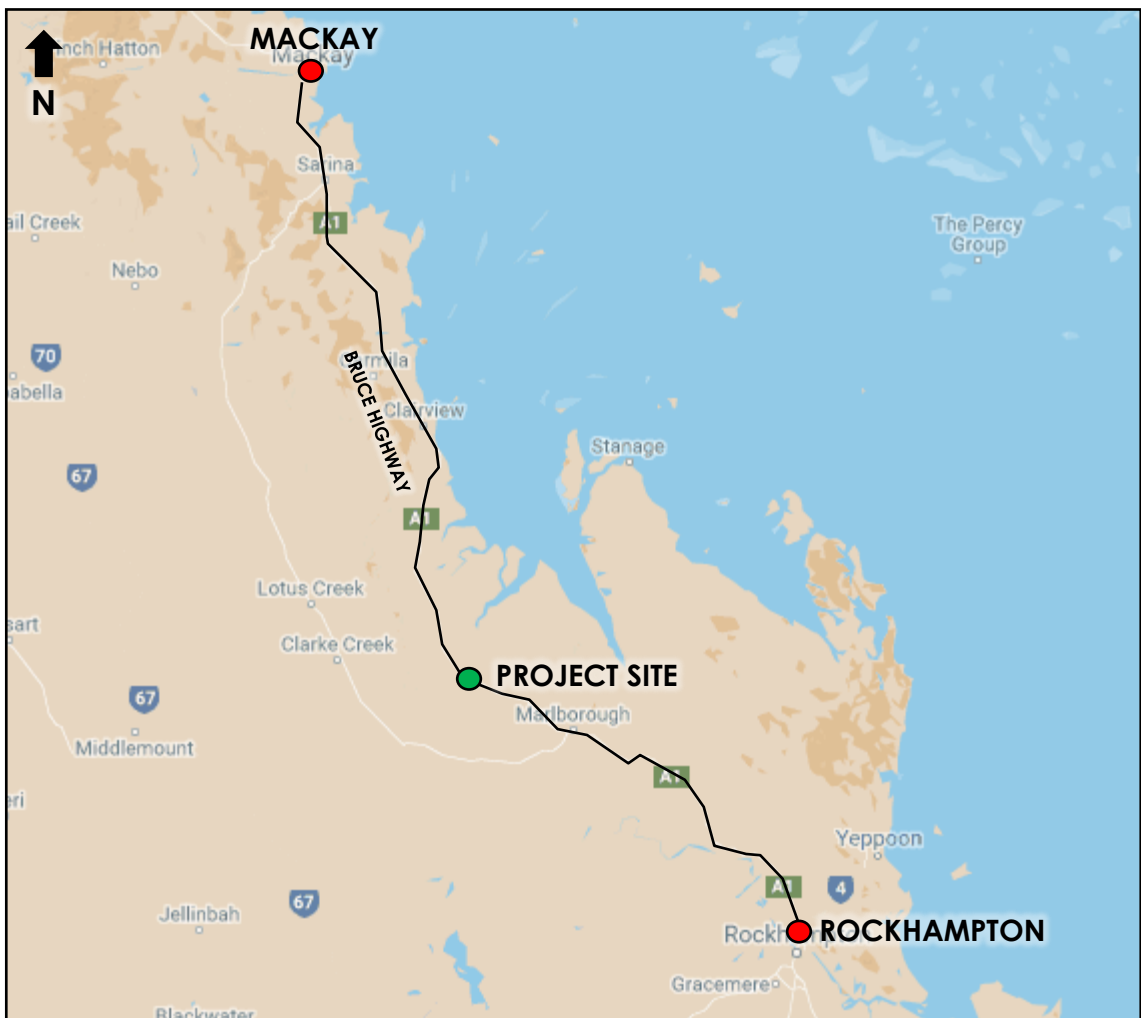
2. Project Description

2.1 Project Location

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

- Ogmore: located approximately 10 km to the north of the Project
- Marlborough: located approximately 25 km to the south east of the Project.

Figure 2.1: Project Location

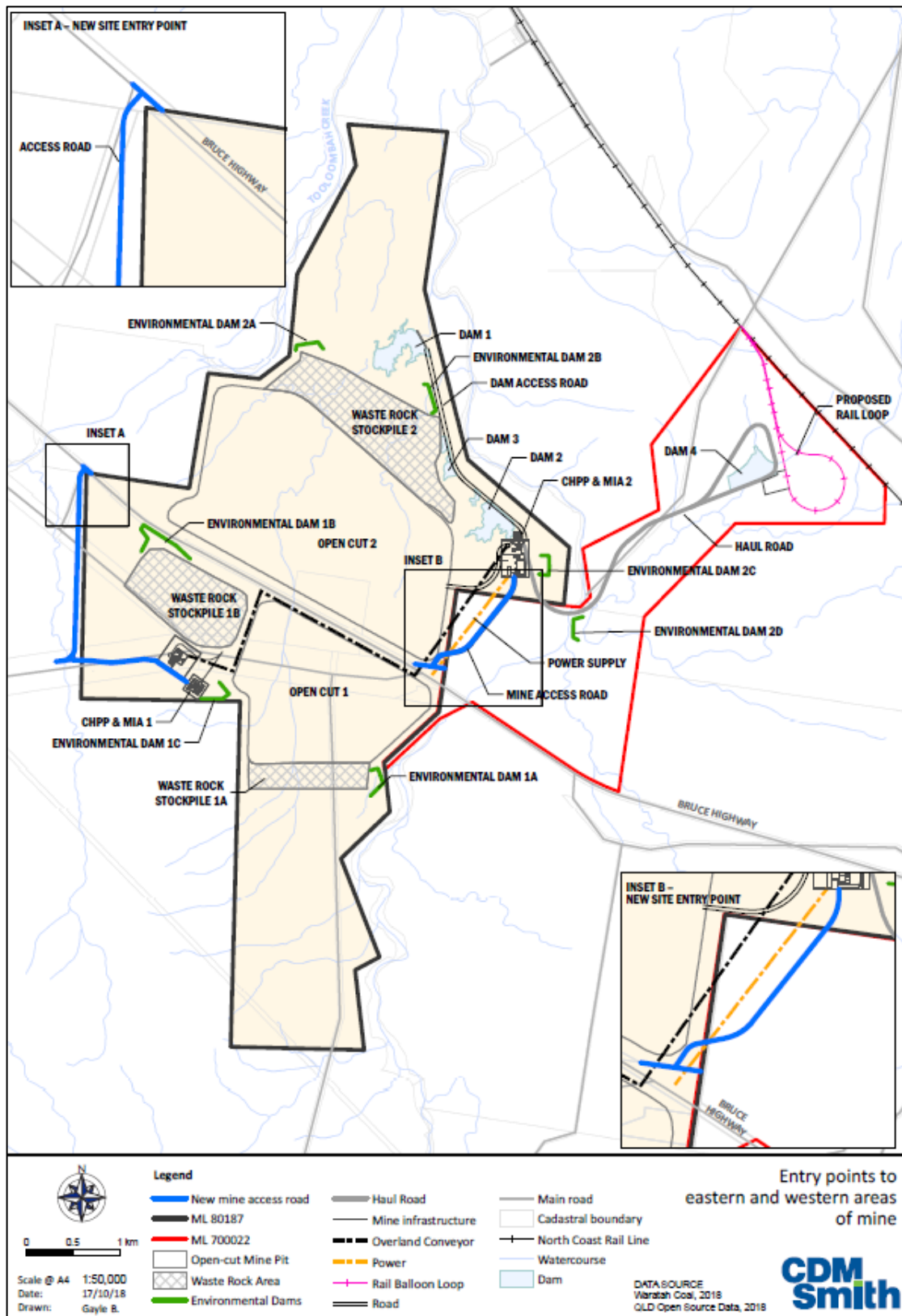


(Source: Google Maps)

The indicative mine arrangements are shown on plans provided in Figure 2.2. As shown on the mine arrangement plans, MLA 80178 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 from the Bruce Highway as shown in Figure 2.2. The Project proposes two new vehicular accesses each forming a T-intersection with the Bruce Highway.

Figure 2.2: Proposed Mine Arrangements

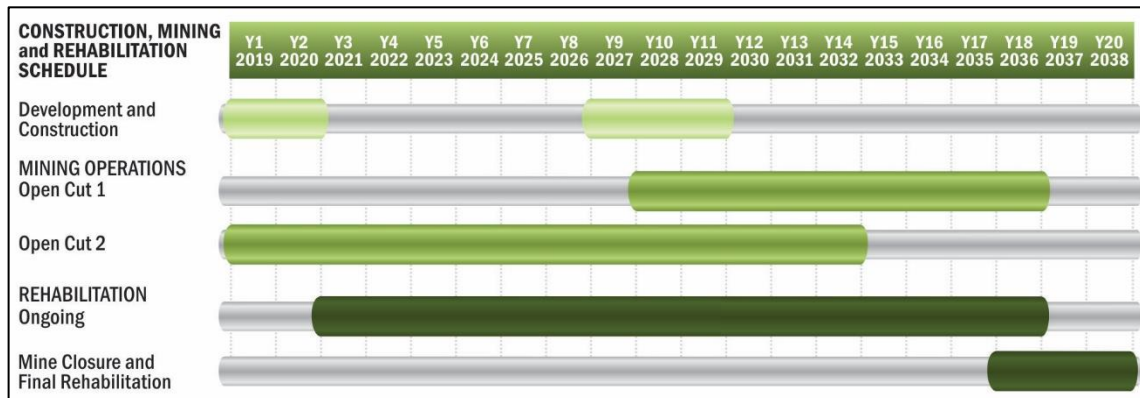


2.2 Project Schedule

The assumed Project schedule is shown in Figure 2.3 and is based on the Proponent's best knowledge of the Project to date. 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 2019 and end in 2020. 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 2027 and 2029. 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 2019 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 2028, following the initial construction activities on the western MIA beginning in 2027. At this time, access to both sides of the highway will be required until the mining resource is depleted.
- Decommissioning / rehabilitation activities are currently anticipated to commence in 2036 and end in 2038.

Figure 2.3: Project Schedule



(Source: Information provided by CDM Smith, dated 22 August 2018)

2.2.1 Design Horizons for Assessment

The design horizons as outlined in Table 2.1 form the basis of the RIA. These design horizons have been determined with respect to the requirements set out in GTIA 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
2020	2	Construction commencement including construction of Open Cut Pit 2, eastern CHPP, haul road and TLF. The combined construction and operation workforce is projected to be at its peak during 2020.
2028	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 be near peak during 2028, when considering combined construction and operational phases.
2030	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 2030.
2038	20	The mine is no longer operational, and the decommissioning, / rehabilitation phase is complete. This year also corresponds with the 20-year design horizon for the pavement impact assessment.

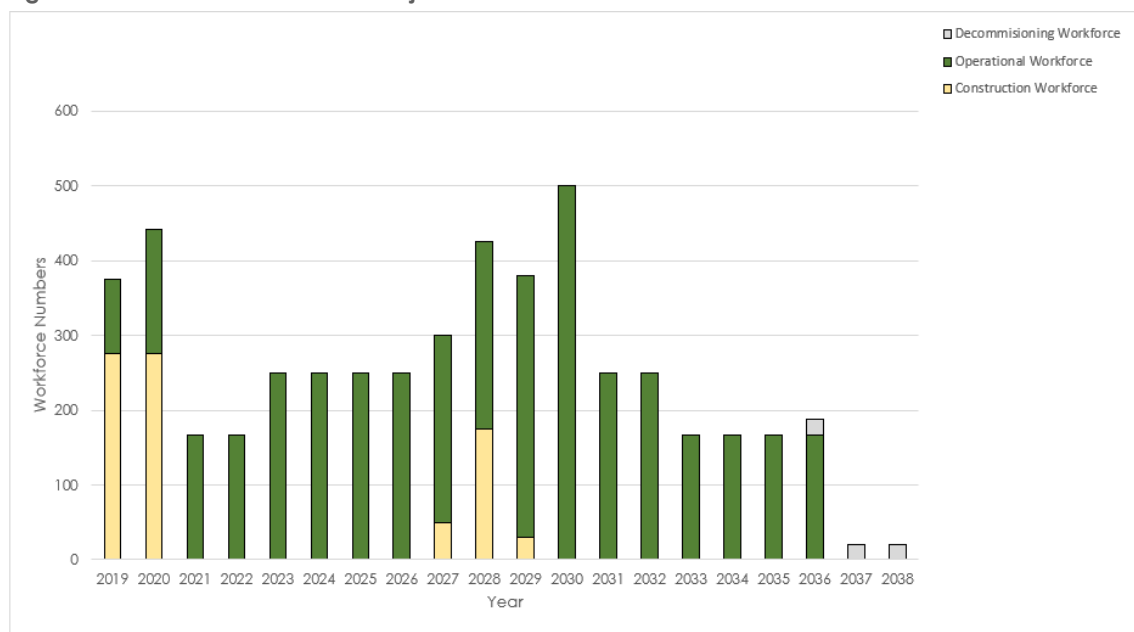
2.3 Workforce Projections

The Project's workforce will be sourced from people residing within the local or regional area (e.g. existing residents and/or new residents that choose to reside locally or regionally as a result of the Project's approval) 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, Clairview, Yaamba and The Caves. These assumptions are the best Project estimates to date based on discussions with the Proponent and apply to all phases of the Project, including construction, operations and decommissioning / rehabilitation personnel.

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

Indicative workforce projections (based on best knowledge of the Project to date) 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 22 August 2018)

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 oversized loads are also expected, particularly during the CHPP, dump station, stacker/reclaimer and heavy mining equipment construction and installation phase. The CHPP will be transported to site in containerised format from the Port of Mackay, Port of Gladstone and or Port of Brisbane. Other Project infrastructure is expected to be transported from regional centres such as Rockhampton, Gladstone and Mackay. Heavy Mining equipment will be transported to site from either Rockhampton, or Mackay, or, from existing mining operations in the Bowen Basin, via Rockhampton or Mackay.

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.

Heavy vehicle movements associated with the operational phase have been based upon projections provided by the Proponent and are based on best knowledge of the Project to date. 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 associated 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 (based on best knowledge of the Project to date) 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		
		Local	Regional	State
Construction (2019 – 2020 and 2027 – 2029)	Rigid Truck	320	380	10
	Semi-Trailer	1,015	96	292
	B-Double	-	250	50
	Oversized	-	-	70
	Sub-Total	1,335	726	422
Operational (2019 – 2036)	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

Although origin/destination movements have been disaggregated into 'local', 'regional' and 'state', the RIA has assumed that these movements will impact haul roads (i.e. the Bruce Highway) for all sections between Rockhampton and Mackay. Though unlikely to occur (as local destinations will have a more localised impact), this is considered the worst-case scenario for the RIA. State-based movements are inclusive of heavy vehicle movements originating from the Port of Mackay, Gladstone and / or Rockhampton.

2.5 Transport of Coal to Market

All ROM and product coal will be hauled internal to the site using private infrastructure and will not require access to, or movement upon, any Council or SCRs.

The conveyor arrangement proposed in the original EIS to transport product coal from the western MIA and CHPP, under the Bruce Highway at the existing Deep Creek bridge crossing has been redesigned and repositioned and will no longer be located under the existing Deep Creek road bridge. The conveyor will now pass beneath the Bruce Highway at a location that will be determined in conjunction with DTMR. As construction of the conveyor will not commence until 2029 based on current planning, the selection of the final location of the culvert and the design of the culvert and conveyor arrangement has not been finalised.

The final design and construction of the culvert arrangement that will accommodate the conveyor beneath the Bruce Highway will be undertaken to be consistent with the design and construction requirements in place at the time of construction. It is; however, expected that a staged construction approach will be required to maintain the movement of two-way traffic along the Bruce Highway at all times through the construction zone.

Approval of the culvert design and for construction will be required from the Fitzroy District DTMR Office and a Traffic Management Plan (TMP) to undertake works in and near the Bruce Highway will be required prior to the commencement of construction. The TMP will be prepared in accordance with the requirements of the GTIA.

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 are intended to provide public access to existing agricultural uses on the western side of the Bruce Highway. Although it was initially intended to provide access to a potential onsite accommodation camp, this accommodation camp will now not proceed and hence, has not been considered within this RIA.

All traffic associated with the Project is assumed to access the Project site via the two proposed access intersections each forming a T-intersection with the Bruce Highway, as shown in Figure 2.2.

As construction of the infrastructure on the western side of the Bruce Highway will not commence until 2028 based on current planning, the design of the intersection has not been finalised.

Approval of the intersection design and for construction will be required from the Fitzroy District DTMR Office and a TMP to undertake works in and near the Bruce Highway will be required prior to the commencement of construction. The TMP will be prepared in accordance with the requirements of the GTIA.

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 locations) 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.

Consultation with TMR and review of TMR’s ‘Queensland Transport and Roads Investment Program 2017-18 to 2020-21’ (QTRIP) has been undertaken with regards to known future planning

for the Bruce Highway between Rockhampton and Mackay. For the Bruce Highway between Rockhampton and Mackay the works identified in QTRIP are presented in Table 3.2.

Table 3.2: QTRIP Works Schedule

Project Location	Location Description	Works Description
Bruce Highway – Rockhampton northern access upgrade	Rockhampton – Yeppoon Road – Parkhurst	Duplicate from two to four lanes
Bruce Highway (St Lawrence – Mackay)	Kalarka Road and Mosquito Creek	Construct overtaking lane/s
	Camila	Construct overtaking lane/s
	Lagoon Street	Improve Intersection/s
	Sarina Northern Access	Construct Roundabout/s
	Hay Point Road – Temples Lane	Undertake transport project planning

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 Rockhampton and Mackay. These works are planned to be undertaken prior to 2021.

Upgrades identified in Table 3.2, are generally projects to improve road capacity, safety and intersection operations along the Bruce Highway proximate to the site, and therefore, are expected to have a net benefit to the Project. Details regarding the extent of these upgrade works is not currently known. On this basis, the additional capacity likely to be available from the upgrades has not been considered in the RIA to allow for a worst-case assessment.

It should also be noted that there may be a need to improve / upgrade (e.g. road widenings) sections / elements of the Bruce Highway in the future as a result of other future projects and developments (by others), or currently unknown growth in traffic which may result in road capacity impacts. Should any future improvements / upgrades be required to the Bruce Highway proximate to the Project site due to the above-mentioned factors, it is expected that TMR and/or the future proponent of these projects will be responsible for providing the required future upgrades.

3.2 Baseline Traffic Volumes

Background traffic volumes have been sourced from TMR, by way of 2015 and 2016 (Annual Average Daily Traffic (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 road 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.

A review of growth rates obtained from historic data detailed within the AADT segment reports indicates 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 (linear) 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.

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 Rail Network

3.3.1 Rail Lines

The Project will 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.

3.3.2 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 completion of the SEIS process.

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 (understood to have been derived based on best knowledge of the Project to date), for the following scenarios:

- 2020 (Project Year 2): Peak of construction phase
- 2028 (Project Year 10): Construction of western MIA and continued operation of eastern MIA
- 2030 (Project Year 12): Peak of operational phase
- 2038 (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 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 the Proponent and have been derived based on best knowledge of the Project to date.

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

Table 4.1: Total Workforce Numbers

Workforce Type	Estimated Number of Workers			
	2020	2028	2030	2038
Construction	275	175	-	-
Operational (Shift workers) [1]	75	188	375	-
Operational (Managerial/Contractor) [1]	25	62	125	-
Decommissioning/rehabilitation	-	-	-	20
Total	375	425	500	20

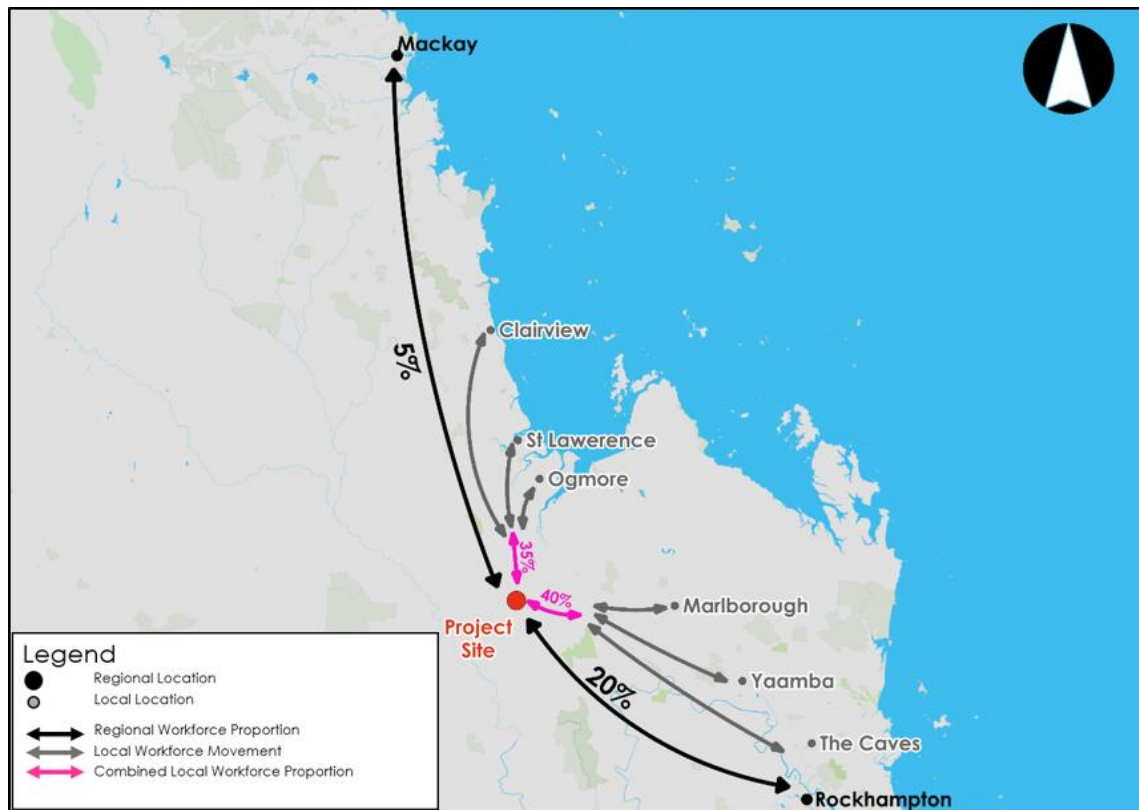
[1] Split between shift workers and managerial staff / contractors are assumed to be 75 / 25, respectively.

The rehabilitation workforce is incorporated into construction and operational workforce estimates, except during those times when dedicated rehabilitation activities are occurring (i.e. separate from construction and operations). During these times, the workforce is expected to be substantially reduced when compared to peak periods (i.e. ~ 5% of peak workforce of other design years). As such analysis of the decommission/rehabilitation years (2036 – 2038) has been excluded from this RIA as significant impacts are not expected during this phase.

4.2.1 Location of Workforce

It is anticipated that the workforce is to be 100% DIDO from surrounding local and regional population centres. A summary of expected workforce locations and associated directional distribution to the north and south of the Project, based on best knowledge of the Project to date are presented in Figure 4.1.

Figure 4.1: Assumed Directional Proportions of Workforce



- [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.
- [2] All Journey to Work movements associated with The Caves, Yaamba and Marlborough are assumed to be originating or destined for The Caves, 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 4.2 and are based on best knowledge of the Project to date.

Table 4.2: 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 start and end times 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 and the majority of traffic will not clash due to the hot-seat shift changeover at the Mine.

Strategies are 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, or to potentially transport workers in vehicles with greater capacities including

mini-buses. 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 are 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, when arriving or departing the Project, has been adopted based on the anticipated Project schedule as described in Section 2.2. Assumptions adopted for the assessment are summarised in Table 4.3.

Table 4.3: Distribution of Traffic at the Project Access Intersections

Design Year	Workforce Type	Eastern Access	Western Access
2020	Operations	100%	-
	Construction	100%	-
2028	Operations	50%	50%
	Construction	-	100%
2030	Operations	50%	50%
2033	Operations		100%
2038	Decommissioning / rehabilitation	50%	50%

4.2.5 Summary of Workforce Traffic Generation

Estimates of workforce generated traffic, based on the assumptions documented in the preceding sections, are detailed in Table 4.4.

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

Table 4.4: 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	
2020	176	95	95	176	-	-	-	-	542
2028	59	50	50	59	141	10	10	23	402
2030	119	100	100	119	119	100	100	119	876
2038	8	-	-	8	8	-	-	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 the Proponent and are understood to have been derived based on best knowledge of the Project to date.

A summary of anticipated two-way heavy vehicle movements for the life of the Project is provided in Table 4.5.

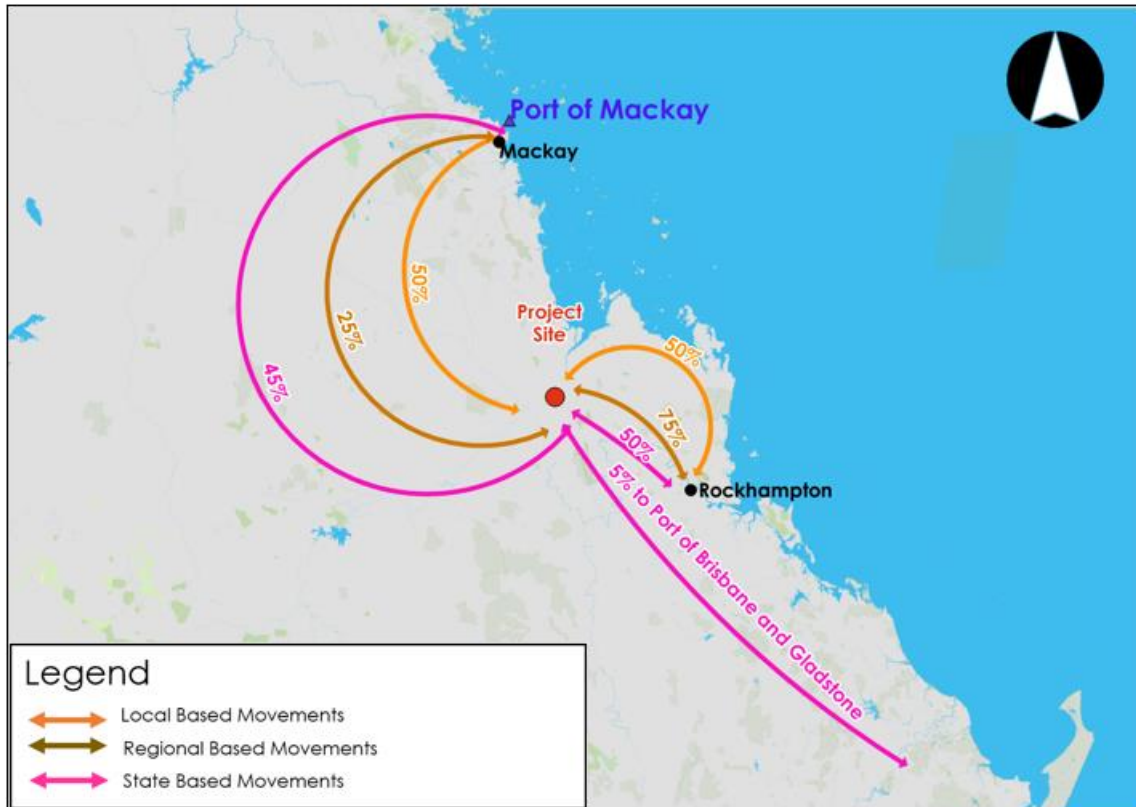
Table 4.5: Total Project Heavy Vehicle Movements

Project Phase	Vehicle Type	Origin / Destination		
		Local	Regional	State ^[1]
Construction (2019 – 2020 and 2027 – 2029)	Rigid Truck	320	380	10
	Semi-Trailer	1,015	96	292
	B-Double	-	250	50
	Oversized	-	-	70
	Sub-Total	1,335	726	422
Operational (2019 – 2036)	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	<i>Rigid Truck</i>	4,895	37,385	855
	<i>Semi-Trailer</i>	1,015	2,272	292
	<i>B-Double</i>	-	9,768	50
	<i>Oversized</i>	-	-	342
	Total	5,910	49,425	1,539

[1] Note that state-based movements include movements from the Port of Gladstone, Port of Mackay and / or, Port of Brisbane

The directional distribution assumptions used within the RIA are presented in Figure 4.2. These assumptions are derived based on best knowledge of the Project to date.

Figure 4.2: Assumed Construction and Operational Directional Proportions of Heavy Vehicle Movements



4.3.1 Annual Heavy Vehicle Movements

The total Project volumes provided in Table 4.5 have been disaggregated into annual projections based on the following rationale:

- Heavy vehicle generation associated with construction has been separated into two distinct time horizons as discussed in Section 2.4. The first construction phase will occur from 2019 to 2020. The second construction phase will occur over a three-year period between 2027 and 2029.
- Approximately two thirds of the construction effort will be required during the first construction phase, and the remaining one third 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.

Estimated projections of the annual heavy vehicle haul movements for each of the identified design horizons are summarised at Table 4.6.

Table 4.6: Annual Heavy Vehicle Movements

Project Phase	Vehicle Type	Heavy Vehicle Movements (Annual)			
		2020	2028	2030	2038 ^[1]
Construction	Rigid Truck	157	65	-	-
	Semi-Trailer	312	233	-	-
	B-Double	67	50	-	-
	Oversized	16	7	-	-
	Sub-Total	552	355	-	-
Operations	Rigid Truck	1,719	2,575	5,150	-
	Semi-Trailer	88	132	264	-
	B-Double	386	578	1,155	-
	Oversized	11	17	33	-
	Sub-Total	2,204	3,302	6,602	-
Project Total	<i>Rigid Truck</i>	1,876	2,640	5,150	-
	<i>Semi-Trailer</i>	400	365	264	-
	<i>B-Double</i>	453	628	1,155	-
	<i>Oversized</i>	27	24	33	-
	Total	2,756	3,657	6,602	-

[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.

4.3.2 Hourly Heavy Vehicle Traffic Generation

The annual heavy vehicle traffic generation summarised in Table 4.6 has been converted to projected hourly movements using the following rationale based on best knowledge of the Project to date:

- There are approximately 250 operational days per year
- Haul movements would generally be undertaken in a 12-hour period
- The distribution of haul movements is uniform (i.e. 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 of in and out movements). To allow for a conservative estimate, a nominal heavy vehicle volume of 10 vehicles per hour (total of in and out movements) has been adopted for a worst-case assessment for the road link and intersection turn warrant assessments.

Adopted heavy vehicle traffic generation used in the assessment is presented in Table 4.7.

Table 4.7: 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
2020	5	5	5	5	-	-	-	-
2028	5	5	5	5	5	5	5	5
2030	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 GTIA which defines the impact assessment area to be:

“All road links where the development traffic exceeds 5% of the base traffic in either direction on the link’s annual average daily traffic (AADT) in the year of opening of each stage.”

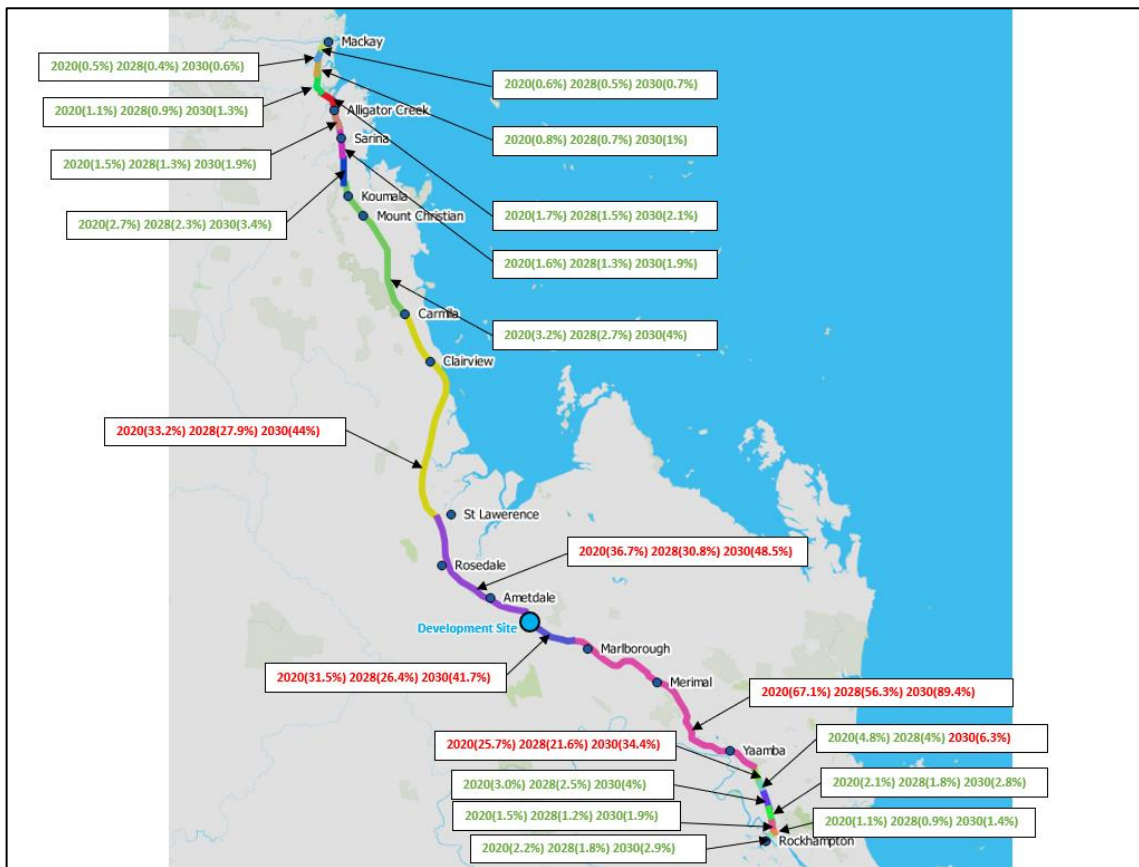
5.1 Impact Identification

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

Table 5.1: Road Link Assessment – Impact Identification Table

Road Name	Road Section	% Increase of AADT		
		2020	2028	2030
Bruce Highway (Rockhampton – St Lawrence)	@ Archer St (Lights) (Rockhampton)	2.2%	1.8%	2.9%
	100m Sth Knight St	1.1%	0.9%	1.4%
	@ Boland St	1.5%	1.2%	1.9%
	800m Sth Rton-Yeppoon Rd	2.1%	1.8%	2.8%
	200m Sth Mason Ave (Parkhurst)	3.0%	2.5%	4.0%
	150m North Terra Nova Dr	4.8%	4.0%	6.3%
	200m North 14 Mile Ck Rd	25.7%	21.6%	34.4%
	40m Sth Mountain Ck (Kunwarara)	67.1%	56.3%	89.4%
	1km south of Montrose Creek	31.5%	26.4%	41.7%
	South of Waverley Creek (St Lawrence)	36.7%	30.8%	48.5%
Bruce Highway (St Lawrence – Mackay)	North of Clairview (St Lawrence)	33.2%	27.9%	44.0%
	WiM Site Koumala	3.2%	2.7%	4.0%
	South of Armstrong's Beach Turnoff	2.7%	2.3%	3.4%
	Sichter Street - Broad Street	1.6%	1.3%	1.9%
	Between Sarina and Sarina - Homebush TO	1.5%	1.3%	1.8%
	Sarina - Homebush Road to Hay Point TO	1.7%	1.5%	2.1%
	North of Macks Truck Stop	1.1%	0.9%	1.3%
	Broadsound Road Permanent Counter	0.8%	0.7%	1.0%
	City Gates to Lagoon Street	0.5%	0.4%	0.6%
	Lagoon St to Bridge Rd	0.6%	0.5%	0.7%
George Street Pedestrian Crossing (Mackay)	0.6%	0.5%	0.7%	

Figure 5.1: Road Link Assessment – Impact Identification Map



On the basis of the summary provided in Table 5.1 and the results shown in Figure 5.1, the impact of forecast Project traffic exceeds 5% of the forecast AADT for the following road segments of the Bruce Highway during the design horizons of 2020, 2028 and 2030:

- 150m North Terra Nova Dr
- 200m North 14 Mile Ck Rd
- 40m Sth Mountain Ck (Kunwarara)
- 1km south of Montrose Creek
- South of Waverley Creek
- North of Clairview.

A road link capacity assessment for these affected roads has been completed and is presented in Section 5.2.

The road link assessment has not been extended beyond Rockhampton and Mackay on the following basis:

- The workforce is not expected to be located in areas beyond Mackay to the north and beyond Rockhampton in the south. It should also be highlighted that the Proponent’s workforce fatigue management policy would also eliminate the likelihood that members of the workforce would travel from areas beyond The Caves to Clairview for typical weekday commuting travel purposes. As such, based on current planning and a reasonable expectation of where the workforce would reside, traffic generated by the workforce is not expected to be present on the SCR to the south of Rockhampton or north of Mackay.

- Although there are state trips associated with heavy vehicles which will result in vehicle trips outside of the Rockhampton to Mackay cordon, these trips account to a relatively small percentage (in the order of about 10 – 20 vehicle movements per hour for the Project design horizons) of the overall Project generated traffic. Furthermore, these trips would be expected to diminish beyond Rockhampton and Mackay post each construction period, in turn lessening the Project generated traffic impacts on the SCR network.

5.2 Road Link Capacity Assessment

The theoretical baseline road link capacity of affected road links (as identified in Section 5.1) has been calculated in accordance with Austroads GTM: Part 3 for a single-lane flow of traffic. This applied methodology excludes overtaking lanes from the calculation and assumes a single lane of traffic flow in one direction. The guide mentions if single lane conditions without overtaking is retained over a significant length of the road, then as the traffic volume increases the speeds of all vehicles in a traffic stream tend to that of the slowest vehicle and stop-start conditions may develop. Once this occurs, the maximum flow rate of a single lane is reduced to an 'operational capacity' of about 1800 pcu/h.

In general, 1800 pcu/h can be regarded as the capacity of a single lane without overtaking, however capacity will be affected by factors such as the pavement width and restricted lateral clearances (e.g. shoulder width), the presence of heavy vehicles and the grade of the road. It is noted from data provided by TMR (received 22 August 2018), that the affected road links of the Bruce Highway have sections with lane widths of less than 3.6m and shoulder widths of less than 1.8m, as such appropriate capacity reduction factors are to be applied to determine the theoretical capacity of these road links.

The following equation as detailed in Austroads GTM: Part 3 has been used to calculate the capacity of affected link sections:

$$C = 1800 * f_w * f_{hv}$$

where

C = Capacity in veh/h under prevailing roadway and traffic conditions

f_w = adjustment factor for narrow lanes and shoulder (obtained from Table 5.3)

f_{hv} = adjustment factor for heavy vehicles = $1 / (1 + P_{hv} (E_{hv} - 1))$

P_{hv} = the proportion of heavy vehicles in traffic stream, expressed as a decimal

E_{hv} = the average passenger car equivalent for heavy vehicles (obtained from Table 5.6)

5.2.1 Narrow Lane and Shoulder Adjustment Factor

Adjustment factors for narrow lane and shoulder widths is required to determine the theoretical capacity of affected sections. Data regarding lane and shoulder widths of affected links along Bruce Highway was sourced from TMR (received 22 August 2018). Based on this information, narrowest lane and shoulder widths for affected road links were determined as shown in Table 5.2.

Table 5.2: Narrowest Lane and Shoulder Widths of Affected Links

Road Name	Affected Section	Narrowest Lane Width (m)	Narrowest Shoulder Width (m)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	3.0	0.5
	200m North 14 Mile Ck Rd	3.5	0.5
	40m Sth Mountain Ck (Kunwarara)	3.0	0.5
	1km south of Montrose Creek	3.5	1.5
	South of Waverley Creek	3.0	0.5
Bruce Highway (St Lawrence – Mackay)	North of Clairview	3.0	2.0

Adjustment factors for lane and shoulder widths are provided in Austroads GTM: Part 3, however these factors have only been provided for set lane and shoulder widths. As such, interpolation (linear) of these factors has been undertaken to correspond to the lane and shoulder widths highlighted in Table 5.2. Factors reproduced from Austroads GTM: Part 3 are shown in Table 5.3, with interpolated factors highlighted in blue.

Table 5.3: Lane Adjustment Factors

Lateral Clearance	Lane Widths										
	3.7m	3.6m	3.5m	3.4m	3.3m	3.2m	3.1m	3m	2.9m	2.8m	2.7m
2m	1.00	0.98	0.96	0.94	0.92	0.90	0.86	0.82	0.78	0.74	0.70
1.5m	0.95	0.93	0.91	0.89	0.87	0.85	0.81	0.78	0.74	0.70	0.67
1m	0.90	0.88	0.86	0.84	0.82	0.80	0.77	0.73	0.70	0.66	0.63
0.5m	0.78	0.76	0.75	0.73	0.72	0.70	0.67	0.65	0.62	0.59	0.57
0m	0.65	0.64	0.63	0.62	0.61	0.60	0.58	0.56	0.54	0.52	0.50

Based on the information presented in Table 5.2 and Table 5.3, lane adjustment factors for all affected links are detailed in Table 5.4.

Table 5.4: Adopted Lane Adjustment Factors

Road Name	Affected Section	Adopted Lane Adjustment Factor (f_w)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	0.65
	200m North 14 Mile Ck Rd	0.75
	40m Sth Mountain Ck (Kunwarara)	0.65
	1km south of Montrose Creek	0.91
	South of Waverley Creek	0.65
Bruce Highway (St Lawrence – Mackay)	North of Clairview	0.82

5.2.2 Heavy Vehicle Adjustment Factor

As mentioned in Section 5.2, heavy vehicle adjustment factor is calculated based on the proportion of heavy vehicles in a traffic stream, and the average passenger car equivalent for heavy vehicles. The proportion of heavy vehicles in the existing traffic stream for the affected road links, has been extracted from the AADT reports for each direction, and are detailed in Table 5.5.

Table 5.5: Heavy Vehicle Proportions of Existing Traffic

Road Name	Affected Section	Heavy Vehicle Proportion (P_{hv}) – Gazetted Direction	Heavy Vehicle Proportion (P_{hv}) – Against Gazetted Direction
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	0.19	0.14
	200m North 14 Mile Ck Rd	0.28	0.22
	40m Sth Mountain Ck (Kunwarara)	0.24	0.25
	1km south of Montrose Creek	0.29	0.29
	South of Waverley Creek	0.31	0.30
Bruce Highway (St Lawrence – Mackay)	North of Clairview	0.28	0.31

[1] It should be noted that the Gazetted direction is northbound and Against direction is southbound.

Average passenger car equivalent conversion factors for heavy vehicles is based on the grade of the road, with these relevant factors reproduced from Austroads GTM: Part 3 in Table 5.6.

Table 5.6: Average Passenger Car Equivalents for Heavy Vehicles on Grades

Grade	Passenger Car Equivalent (E_{hv})
Level	2.00
Moderate	4.00
Long Sustained	8.00

For this assessment, the grade of all affected road links has been assumed to be 'moderate' which equates to a passenger car equivalent factor of 4.

Based on the above-mentioned proportions of heavy vehicles and average passenger car equivalent factor, heavy vehicle adjustment factors to determine the baseline capacity of the affected road links are detailed in Table 5.7.

Table 5.7: Heavy Vehicle Adjustment Factors

Road Name	Affected Section	Heavy Vehicle Adjustment Factor (f_{hv}) – Gazetted Direction	Heavy Vehicle Adjustment Factor (f_{hv}) – Against Gazetted Direction
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	0.63	0.70
	200m North 14 Mile Ck Rd	0.55	0.61
	40m Sth Mountain Ck (Kunwarara)	0.58	0.57
	1km south of Montrose Creek	0.54	0.53
	South of Waverley Creek	0.52	0.52
Bruce Highway (St Lawrence – Mackay)	North of Clairview	0.54	0.52

[1] It should be noted that the Gazetted direction is northbound and Against direction is southbound.

5.2.3 Theoretical Baseline Road Link Capacity

Based on the factors determined in the Sections 5.2.1 and 5.2.2 and application of the equation detailed in Section 5.2, the theoretical baseline capacity of affected road links for each direction is as shown in Table 5.8.

Table 5.8: Theoretical Baseline Road Link Capacity of Affected Links

Road Name	Affected Section	Theoretical Baseline Capacity (C) – Gazetted Direction (veh/h)	Theoretical Baseline Capacity (C) – Against Gazetted Direction (veh/h)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	740	810
	200m North 14 Mile Ck Rd	730	810
	40m Sth Mountain Ck (Kunwarara)	670	670
	1km south of Montrose Creek	880	870
	South of Waverley Creek	600	610
Bruce Highway (St Lawrence – Mackay)	North of Clairview	800	760

[1] It should be noted that the Gazetted direction is northbound and Against direction is southbound.

5.3 Baseline Volumes vs Theoretical Capacity

Hourly baseline volumes for the Project design horizons have been calculated from the AADT reports based a peak to daily ratio of 15%, and a linear growth rate of 2% per annum (as outlined in Section 3.2). These hourly baseline volumes are detailed in Table 5.9 and Table 5.10.

Table 5.9: Baseline Volumes vs Theoretical Capacity – Gazetted Direction

Road Name	Affected Section	Theoretical Capacity (veh/h)	Baseline 2020 Volumes (veh/h)	Baseline 2028 Volumes (veh/h)	Baseline 2030 Volumes (veh/h)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	740	630	720	740
	200m North 14 Mile Ck Rd	730	330	380	400
	40m Sth Mountain Ck (Kunwarara)	670	220	250	260
	1km south of Montrose Creek	880	190	220	230
	South of Waverley Creek	600	160	180	190
Bruce Highway (St Lawrence – Mackay)	North of Clairview	800	180	200	210

Table 5.10: Baseline Volumes vs Theoretical Capacity – Against Gazetted Direction

Road Name	Affected Section	Theoretical Capacity (veh/h)	Baseline 2020 Volumes (veh/h)	Baseline 2028 Volumes (veh/h)	Baseline 2030 Volumes (veh/h)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	810	610	700	720
	200m North 14 Mile Ck Rd	810	340	390	400
	40m Sth Mountain Ck (Kunwarara)	670	210	250	250
	1km south of Montrose Creek	870	180	210	220
	South of Waverley Creek	610	170	190	200
Bruce Highway (St Lawrence – Mackay)	North of Clairview	760	180	210	220

As presented Table 5.9 in and Table 5.10, future baseline volumes (i.e. background traffic only) are expected to be contained within the theoretical capacity for all affected road links.

Overtaking lanes are present within the following road links:

- 150m North Terra Nova Dr
- 200m North 14 Mile Ck Rd
- 40m Sth Mountain Ck (Kunwarara).

Given that overtaking lanes are present at the above mentioned links, the operational capacity of these links are expected to be greater than the calculated theoretical capacities in Table 5.9 and Table 5.10 which does not account for overtaking lanes. Presence of overtaking lanes within these road links further emphasises that the baseline volumes are expected to be contained within capacity for the design horizons.

5.4 Project Generated Volumes vs Theoretical Capacity

Peak hour Project generated traffic volumes have been added onto the baseline traffic volumes to determine if the affected road links operate within capacity with the addition of Project traffic. Table 5.11 and Table 5.12 details the baseline plus Project generated traffic volumes in each direction for the relevant design horizons.

Table 5.11: Project Generated Volumes vs Theoretical Capacity – Gazetted Direction

Road Name	Affected Section	Theoretical Capacity (veh/h)	Baseline + Project 2020 Volumes (veh/h)	Baseline + Project 2028 Volumes (veh/h)	Baseline + Project 2030 Volumes (veh/h)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	740	680	770	830
	200m North 14 Mile Ck Rd	730	510	550	670
	40m Sth Mountain Ck (Kunwarara)	670	510	530	720
	1km south of Montrose Creek	880	310	330	410
	South of Waverley Creek	600	280	300	370
Bruce Highway (St Lawrence – Mackay)	North of Clairview	800	290	310	390

Table 5.12: Project Generated Volumes vs Theoretical Capacity –Against Gazetted Direction

Road Name	Affected Section	Theoretical Capacity (veh/h)	Baseline + Project 2020 Volumes (veh/h)	Baseline + Project 2028 Volumes (veh/h)	Baseline + Project 2030 Volumes (veh/h)
Bruce Highway (Rockhampton – St Lawrence)	150m North Terra Nova Dr	810	670	760	820
	200m North 14 Mile Ck Rd	810	510	550	670
	40m Sth Mountain Ck (Kunwarara)	670	510	530	710
	1km south of Montrose Creek	870	300	330	400
	South of Waverley Creek	610	280	300	380
Bruce Highway (St Lawrence – Mackay)	North of Clairview	760	300	320	400

As presented in Table 5.11 and Table 5.12, all affected links are expected to be contained within capacity with the addition of Project generated traffic, with the exception of 150m North Terra Nova Dr. Results of the analysis indicate that 150m North Terra Nova Dr is expected to operate over capacity in 2028 and 2030 for the Gazetted direction and 2030 for the Against Gazetted direction.

As previously mentioned in Section 5.3, overtaking lanes are present within this road link which is expected to increase the capacity of this road link. Furthermore, the Project generated volumes are only marginally over capacity (less than 15% over capacity for each design horizons, in both directions). Consequently, it is expected that the 150m North Terra Nova Dr road link will operate within capacity for the design horizons in both directions, given the increased capacity as a result of overtaking lanes within this road link. Notwithstanding, mitigation measures to offset any potential operational impacts as a result of the Project generated traffic have been considered and detailed in Section 5.5.

5.5 Operational Impact Mitigation

Strategies to further offset any potential operational impacts that may occur due to Project generated traffic have been considered. It is expected that these strategies will be detailed further within the RMP, and may include:

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

6. Intersection Assessment

6.1 State Controlled Road Intersections

Traffic generated impacts at SCR intersections have been considered within this RIA, for impacted road links identified in Section 5. Given that Project traffic is typically adding to the through movements along these intersections, it is expected the road link assessment captures any Project impact on SCR intersections. Furthermore, turning movements from local areas will be dispersed onto multiple intersections based on workforce and heavy vehicle origins, further minimising impacts to each intersection. As such, minimal Project generated impacts are expected to occur at SCR intersections.

6.2 Access Intersection

The Project proposes two new vehicular accesses each forming a T-intersection with the Bruce Highway. The locations of these two T-intersections are shown in Figure 2.2.

The eastern mine entry access is proposed to be located approximately 600 m north of Deep Creek and 25 km north of Marlborough. The western mine access is indicatively proposed to be located approximately 29 km north of Marlborough.

6.2.1 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:

- 2020: Eastern Access Only
- 2030: Eastern and Western Access.

These scenarios constitute the requirements for the peak construction phase (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: 2020 Turn Warrant Results

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (Eastern Mine)	Auxiliary Lane (Full) – AUL	Channelised Right Turn - CHR

Table 6.2: 2030 Turn Warrant Results

Major Road	Required Turn Treatment	
	Left Turn Movement	Right Turn Movement
Bruce Highway (Eastern Mine)	Auxiliary Lane (Full) – AUL	Channelised Right Turn - CHR
Bruce Highway (Western Mine)	Auxiliary Lane (Full) – AUL	Channelised Right Turn - CHR

The results of the turn warrant assessment indicate that AUL and CHR turn treatments are required for both the eastern and western access. It is therefore recommended that these provisions are

incorporated in the design of the both accesses. It should be noted that these turn treatments are required at the year of opening (i.e. 2019), which is prior to the peak construction phase.

6.2.2 Intersection Form

The required form for the left and right turn treatments for the access intersections is provided in Figure 6.1 and Figure 6.2. These treatments are based on the requirements set out in Austroads GRD: Part 4A.

Figure 6.1: Auxiliary Left Turn Treatment – General Form

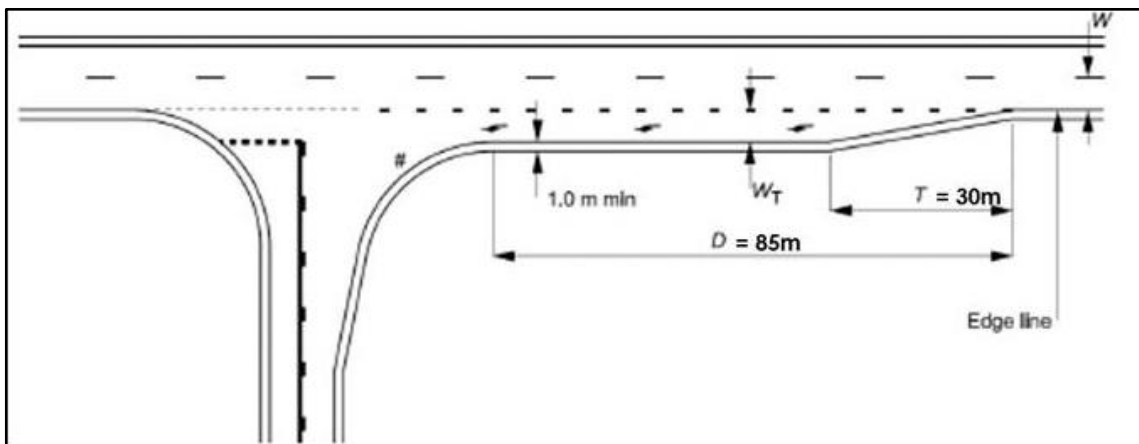
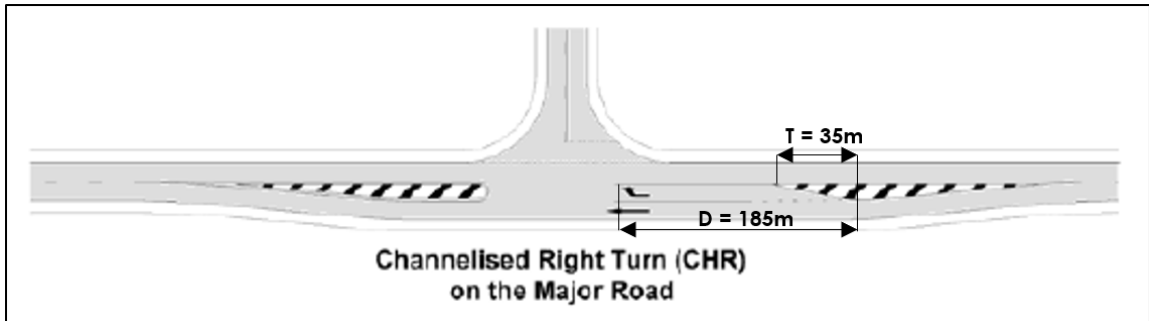


Figure 6.2: Channelised Right Turn Treatment – General Form



Concept intersection details showing the general arrangements of the eastern and western access have been prepared (by others) and are shown in Figure 6.3 and Figure 6.4 with preliminary drawings for the eastern access shown in Appendix E. Preliminary drawings for the western access will be prepared and provided to DTMR for approval closer to construction time of infrastructure on the western side of the Bruce Highway (expected to commence post 2028 based on current planning). The proposed arrangements are in accordance with the requirements set out in Austroads GRD: Part 4A.

Figure 6.3: Site Access Concept Details – Eastern Access

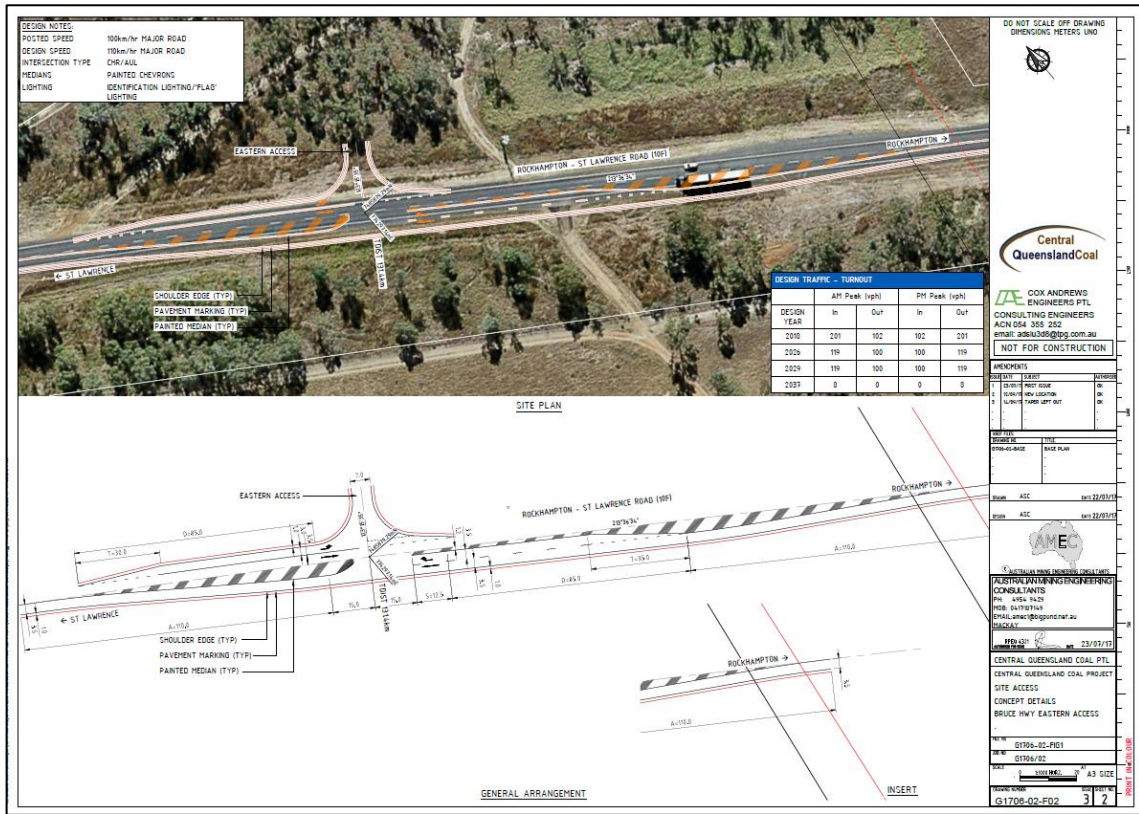
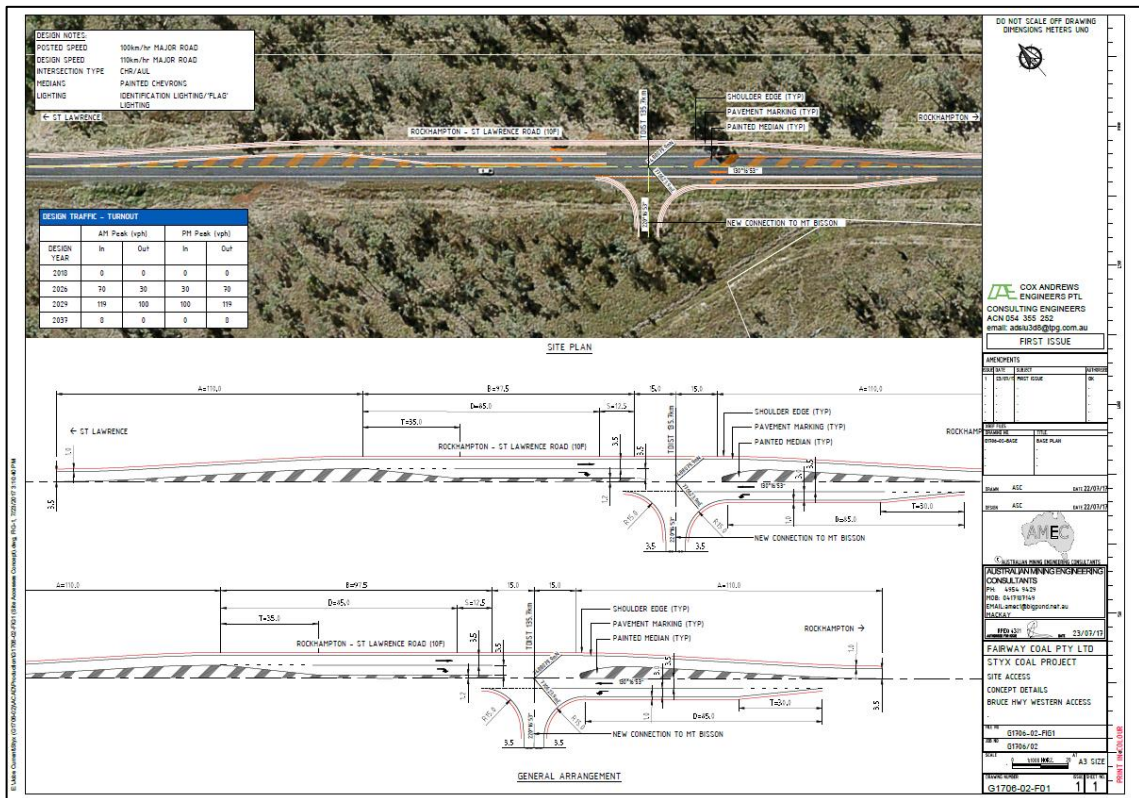


Figure 6.4: Site Access Concept Details – Western Access



7. Pavement Impact Assessment

Identification of pavement impacts to SCRs was undertaken for the Bruce Highway between Rockhampton and Mackay 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 F. Based on the calculated development ESAs, impacts of greater than 5% have not been identified for any section of the Bruce Highway between Rockhampton and Mackay. On this basis, assessment of contributions has not been undertaken, with the pavement impacts of the Project considered insignificant.

The pavement impact assessment has not been undertaken beyond Rockhampton and Mackay, given that impacts of greater than 5% have not been identified for any section of the Bruce Highway between Rockhampton and Mackay where Project traffic is expected to be highly concentrated (i.e. proximate to the site access). Furthermore, Project generated traffic is expected to disperse onto the surrounding network beyond Rockhampton and Mackay, with background traffic (AADT) along Bruce Highway also expected to increase closer to larger regional areas such as Brisbane. This increase in background traffic coupled with dispersion of Project generated traffic outside of Rockhampton and Mackay will further lessen the impact on SCR network beyond these regions.

8. Road Safety Risk Assessment

Safety on the SCR network is a key consideration for developments interacting with the SCR network. A safety assessment has been identified as necessary due to the following:

- Increase in traffic volumes as a result of the Project.
- The introduction of new infrastructure (i.e. new access intersections with the Bruce Highway).
- Increase in number of conflict points between vehicles and other vehicles (as a result of the new access intersections).
- Reduced road link capacity as a result of narrower road and shoulder widths along Bruce Highway (for impacted links).

In accordance with GTIA, "development should ensure that a road's safety is not significantly worsened as a result of the development and that any pre-existing or development-introduced unacceptable safety risk is addressed". GTIA defines significantly worsened as change in safety risk rating (i.e. medium to high). Traffic safety risks are scored based on the matrix shown in Figure 8.1.

Figure 8.1: Traffic Safety Risk Scoring Matrix

		Potential consequence				
		Property only (1)	Minor injury (2)	Medical treatment (3)	Hospitalisation (4)	Fatality (5)
Potential likelihood	Almost certain (5)	M	M	H	H	H
	Likely (4)	M	M	M	H	H
	Moderate (3)	L	M	M	M	H
	Unlikely (2)	L	L	M	M	M
	Rare (1)	L	L	L	M	M

L: Low risk
M: Medium risk
H: High risk

Source: GTIA

Potential safety risks resulting from the Project have been identified and rated as presented in Figure 8.2. All risks are expected to be within a medium level with the development (and mitigation measures where needed) as summarised in Figure 8.2. Mitigation measures detailed in Figure 8.2 are to be included in the RMP. Furthermore, as noted in GTIA a road safety audit is required for major developments with AADT's larger than 8,000 on roads with speeds exceeding 80 km/hr. As such, it is recommended that the RMP details the need to undertake a road safety audit on impacted SCR road links at the detailed design stage of the Project, particularly the detailed design and approval stage for each of the Project's site accesses with the Bruce Highway.

Figure 8.2: Project Related Road Safety Risk Assessment

Risk Item	Without Development			With Development			Mitigation Measures	With Development & Mitigation		
	Likelihood	Consequence	Risk Rating	Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Increased through traffic along SCR network resulting in congestion and potential for vehicle collision	1	2	L	2	2	L	No Action			
Introducing of a new access intersection resulting in vehicles slowing down to turn in a high speed environment	1	1	L	4	3	M	Ensure access intersections are designed appropriately to meet the turn warrant requirements detailed in section 6.2 of the RIA.	2	2	L
Increased risk of vehicle collision due to driver fatigue	3	5	H	4	4	H	Monitoring of workforce hours and driver behaviours to be incorporated into the RMP to address this risk	2	5	M
Closure of parts of Bruce Highway associated with the construction of the access intersection interrupting traffic flow in a high speed environment	1	1	L	4	3	M	Ensure an approved Traffic Management Plan is in place to accommodate safe vehicle movements during closures	2	2	L
Debris/Construction material on roads during the construction phase of the project	2	2	L	4	1	M	Ensure a construction management plan is in place to address impacts on SCR's as a result of project generated debris and construction materials	2	2	L
Undertaking construction and/or mining works during night time where visibility might be limited due to poor lighting	1	2	L	3	5	H	Ensure a construction management plan is in place to addressing construction works during night time	2	2	L
Driving to/from the development at night time where visibility might be limited due to poor lighting	4	5	H	5	5	H	Ensure appropriate lighting is provided along the SCR network to and from the site, with special consideration proximate to the site accesses.	2	5	M
Operational impacts on 150m North Terra Nova Dr road link as a result of Project generated traffic	2	2	L	4	3	M	Stagger the arrival times of Project traffic such that it does not coincide with the network peak to mitigate potential capacity issues	2	2	L

Analysis of road crash data for the Bruce Highway was undertaken to assess current levels of road safety. Road crash data for the Bruce Highway was sourced from TMR (obtained 16 October 2018) 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 five-year period; however, this was greater than 5km from the Project site.
- 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.

9. Additional Impact Considerations

9.1 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.

9.2 School Bus Routes

There are no school bus routes which utilise the Bruce Highway in the vicinity of either access point into the mine.

The Marlborough State Primary School provides a local bus service which operates along the Bruce Highway between Kooltandra Road and Princhester Siding Road before returning to Marlborough to drop off students (Figure 9-1). This service operates between approximately 7:40 am and 9:00 am and 3:00 pm and 4:00 pm on school days. All pick-up points are on the highway near individual property accesses or near local road intersections.

Regional school bus services operate from Marlborough through to Rockhampton (Figure 9-2) for students attending secondary school at Rockhampton and to the north of the Project, from Clairview to Chelona (Figure 9-3).

Figure 9-1 School Bus Route – Marlborough State School

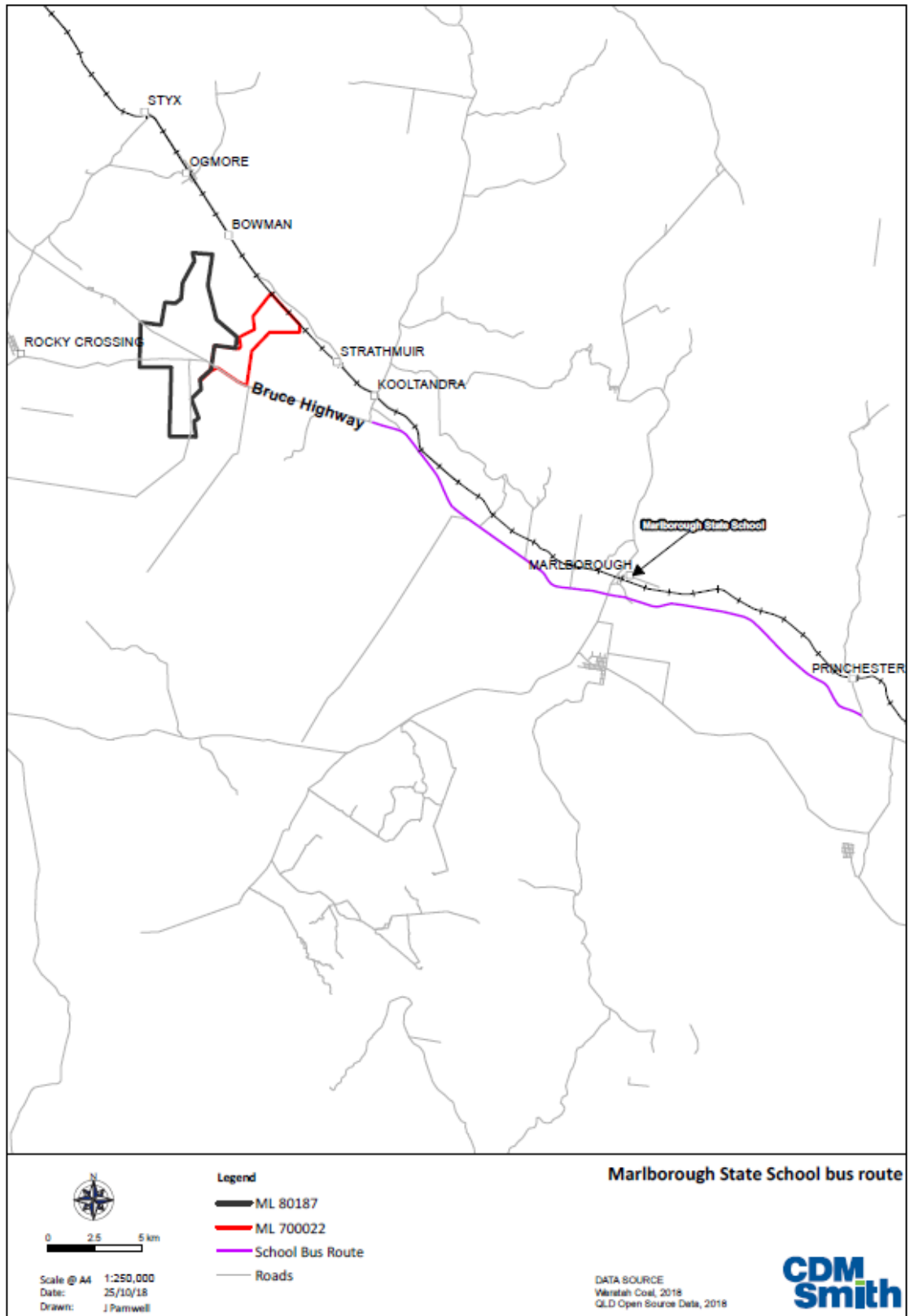


Figure 9-2 School Bus Route – South between Marlborough and Rockhampton

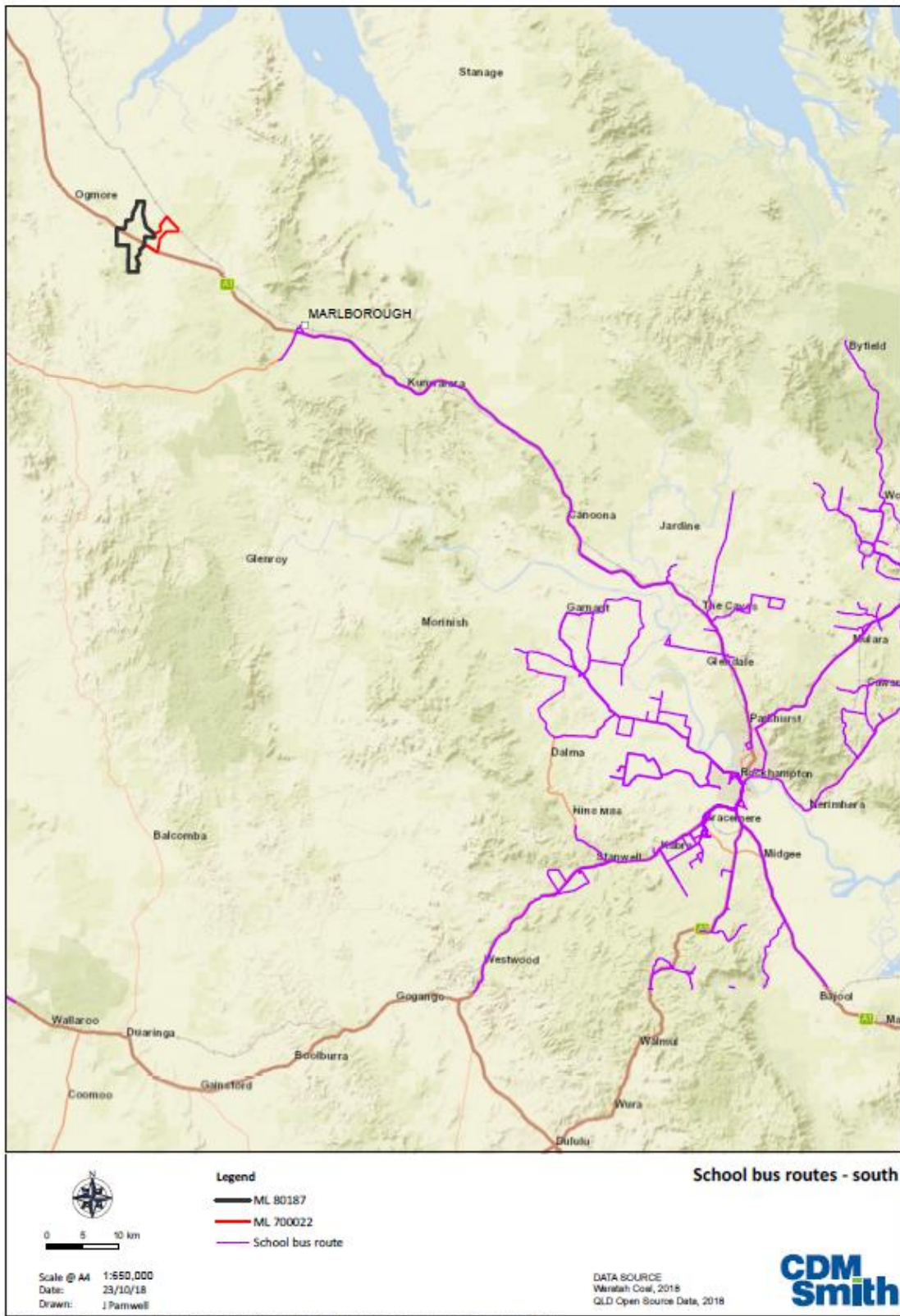
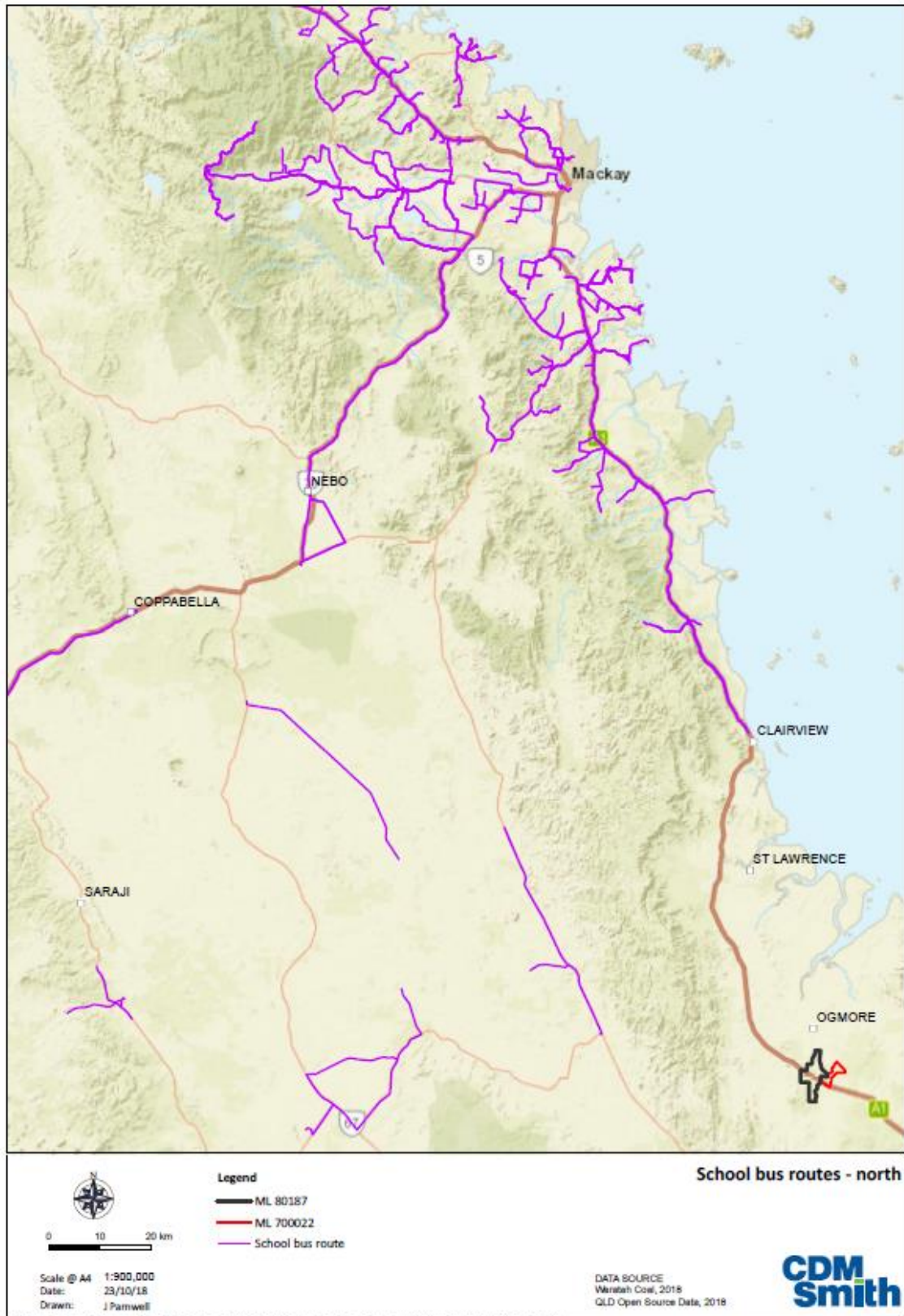


Figure 9-3 School Bus Route – North between Clairview and Chelona



9.3 Rail Level Crossings

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

9.4 Road Use Management Plan

The preparation of an RMP will be required as the Project progresses. 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 include:

- 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 periods
- Policies focussing on driver behaviour and fatigue management.

10. Conclusion

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

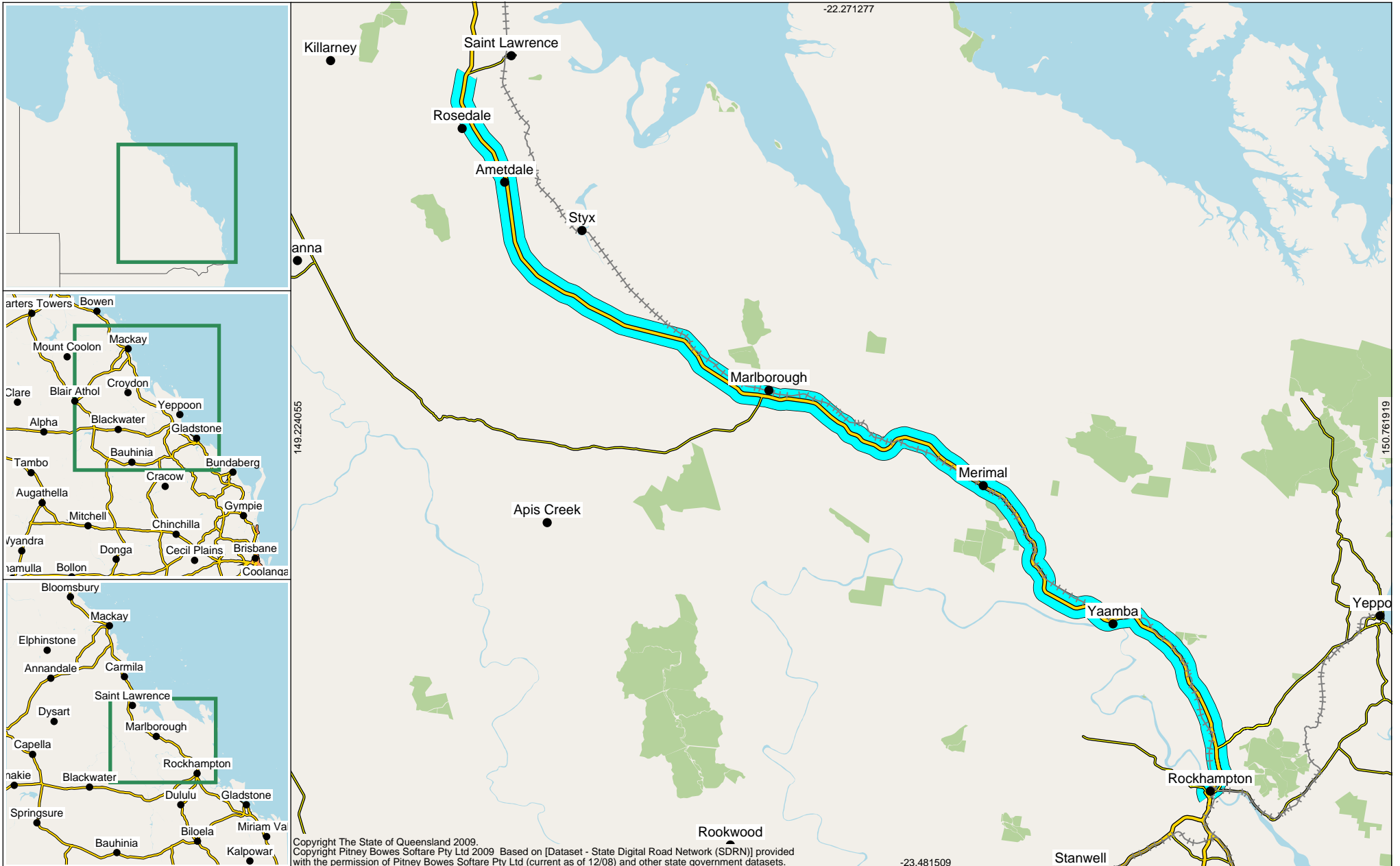
- Worst case traffic demands for the Project are expected to occur in:
 - 2020 (Project Year 2): Peak of construction phase
 - 2028 (Project Year 10): Construction of western MIA and continued operation of eastern MIA
 - 2030 (Project Year 12): Peak of operational phase
 - 2038 (Project Year 20): Decommissioning/rehabilitation and 20-year design horizon.
- A total of six road links on the Bruce Highway are expected to have Project traffic volumes which have greater than 5% of baseline traffic volumes. Road link 150m North Terra Nova Drive is expected to operate marginally over theoretical capacity as a result of Project generated traffic, however the operational capacity of this road link is expected to be higher as overtaking lanes are present at this link. Nonetheless, 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 potential impacts on this road link.
- A turn warrant assessment indicates that the proposed site accesses should provide AUL 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.
- Based on the Road Safety Risk Assessment all identified risks associated with the Project are expected to be within a medium level.

It should also be noted that the assessment undertaken within this RIA is of a conservative nature based on the following:

- Although origin/destination movements have been disaggregated into 'local', 'regional' and 'state', the RIA has assumed that these movements will impact haul roads (i.e. the Bruce Highway) for all sections between Rockhampton and Mackay. Though unlikely to occur (as local destinations will have a more localised impact).
- A conservative growth rate of 2% per annum (linear) has been adopted despite AADT reports indicating negative growth for various sections the Bruce Highway over the past five to 10 years.
- Adopting lower vehicle occupancy rates compared to other RIA's conducted for EIS projects of a similar nature therefore resulting in higher Project generated traffic.
- Assuming heavy vehicle traffic generation to be ten vehicle movements per hour for a conservative approach, as the actual Project generated heavy vehicle movements result in less than three vehicle movements per hour.

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

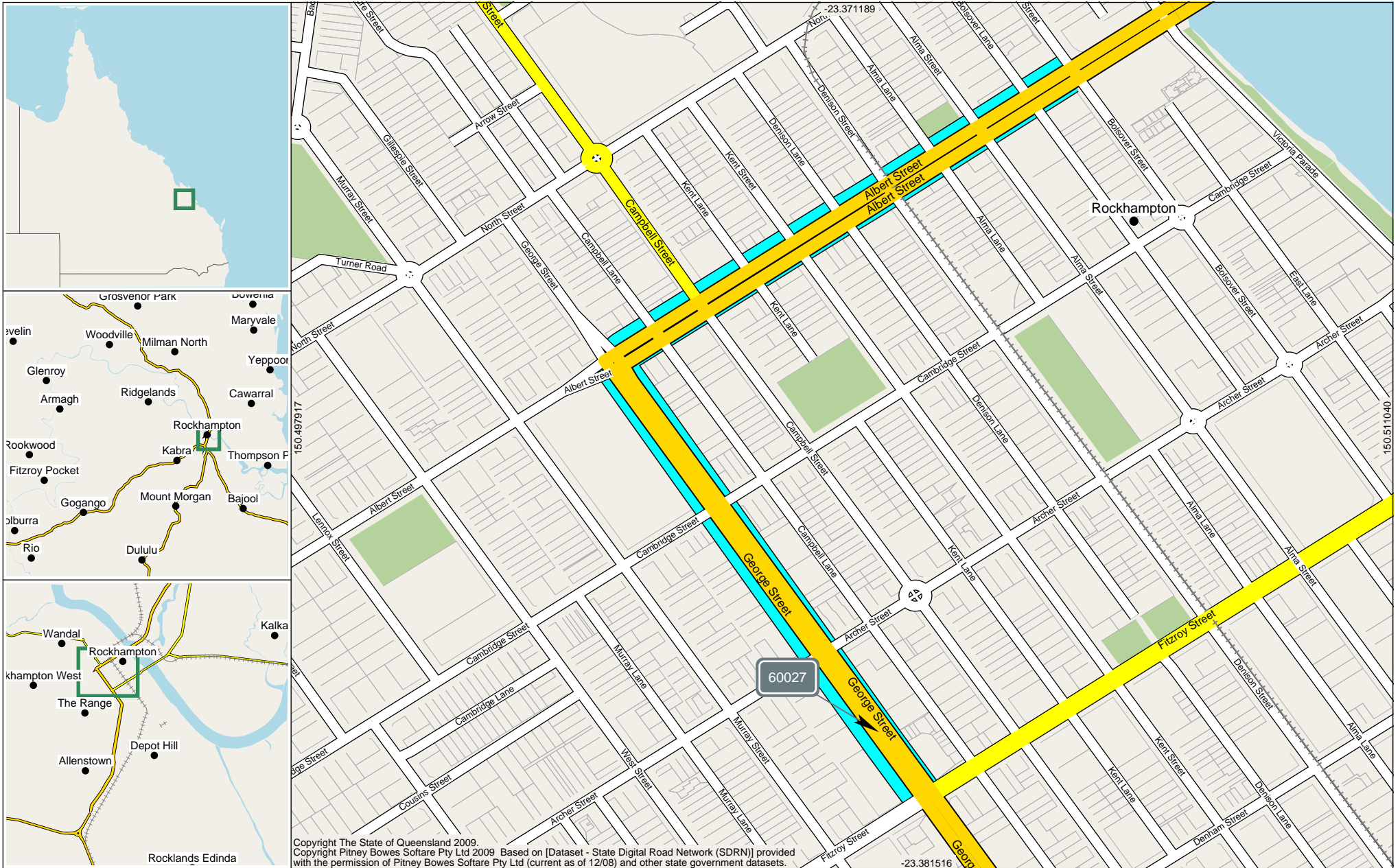
Road Segments Summary - All Vehicles

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		G	A	B		
						AADT	HV %	AADT	HV %	AADT	HV %					
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.

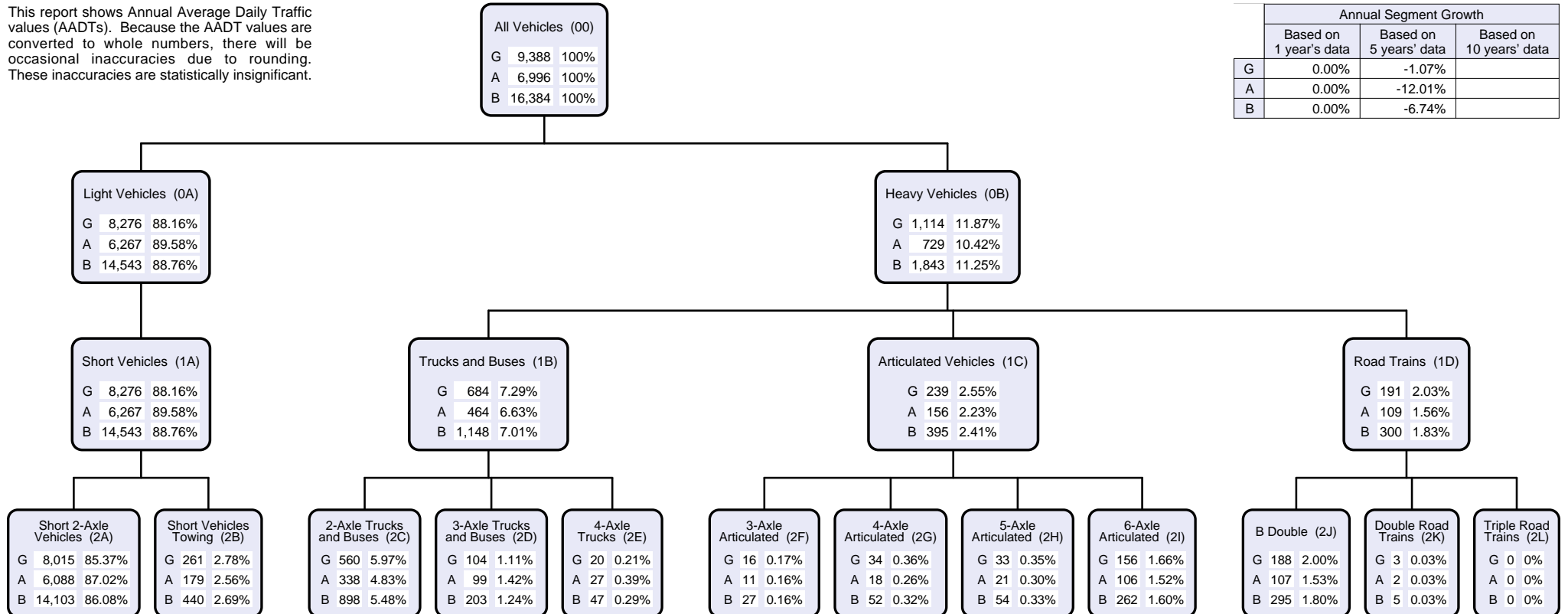
0.10 km

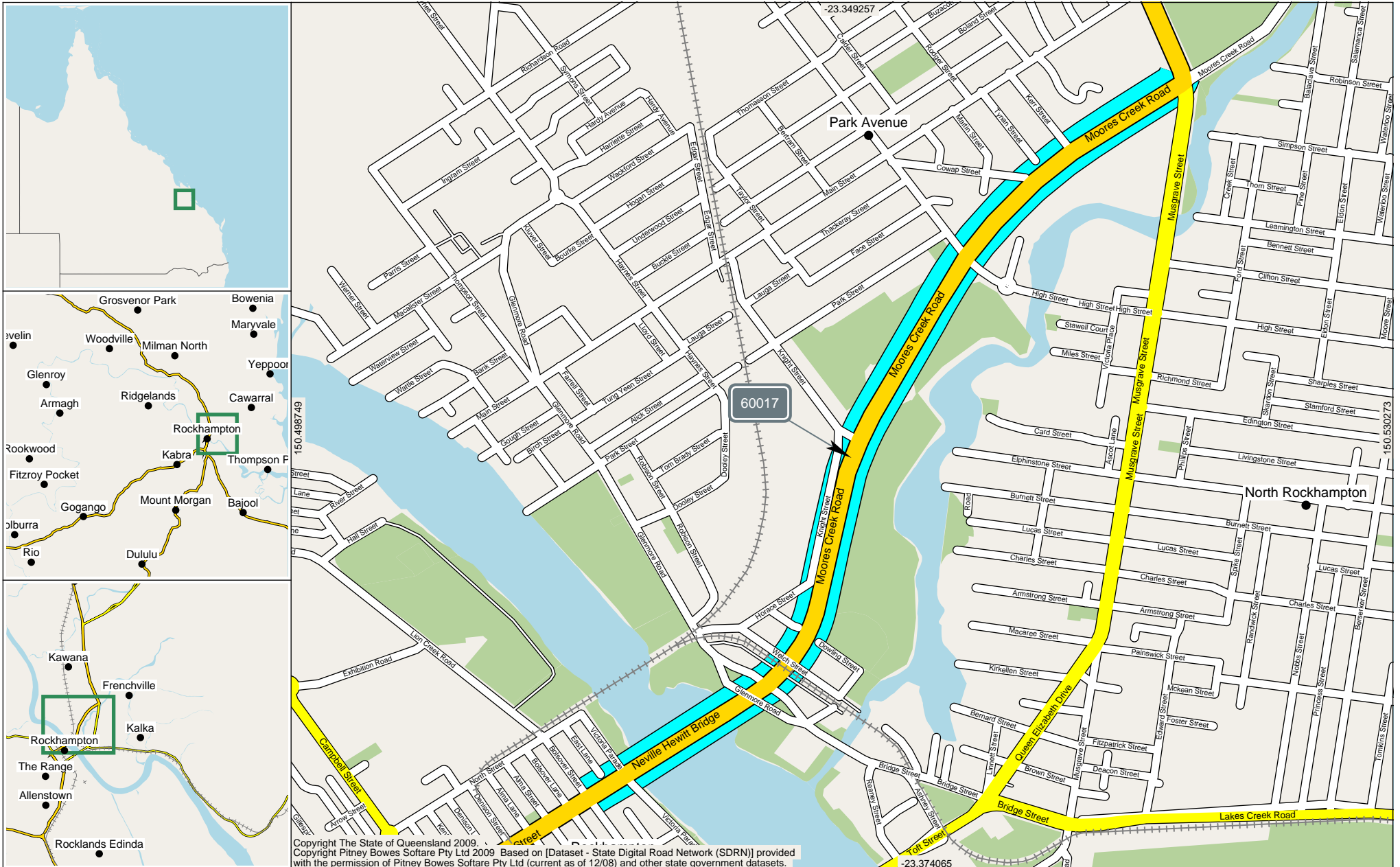
The width of each Road Segment is proportional to its AADT.



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%	





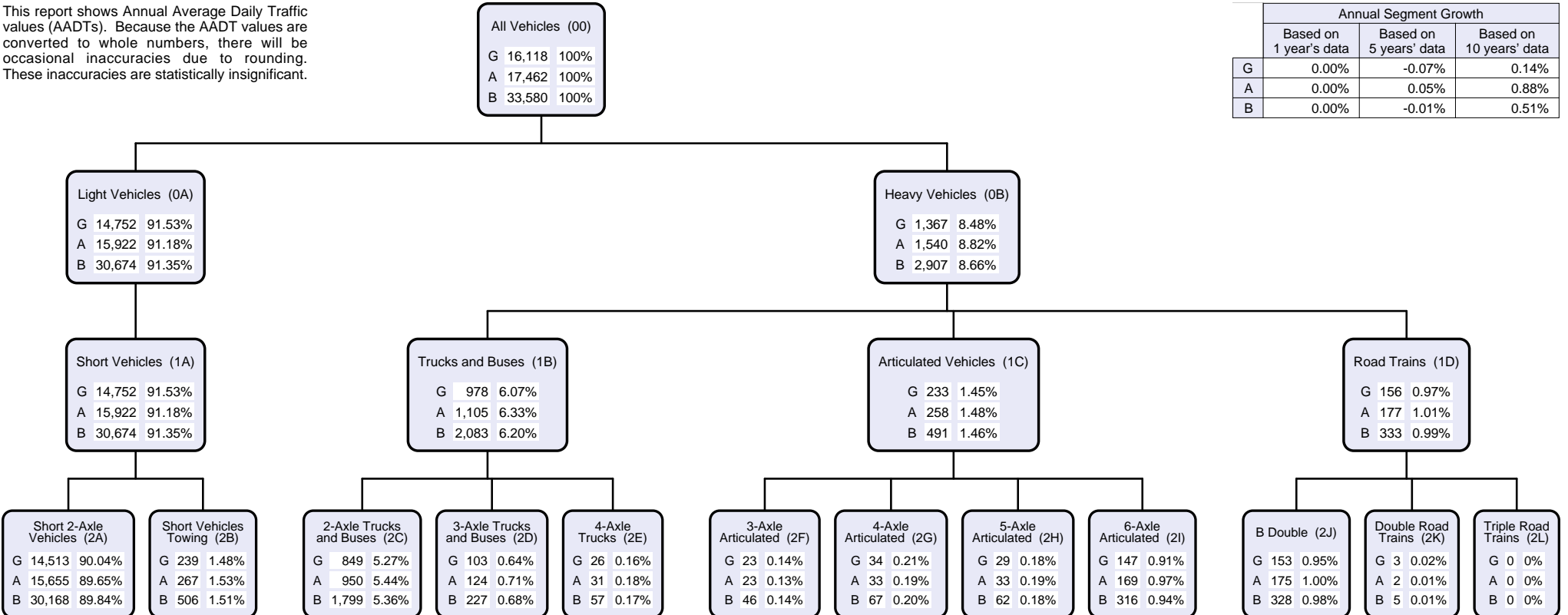
Site 60017. Point 260000035.
 Bruce Hwy 100m Sth Knight St.
 2.77 km

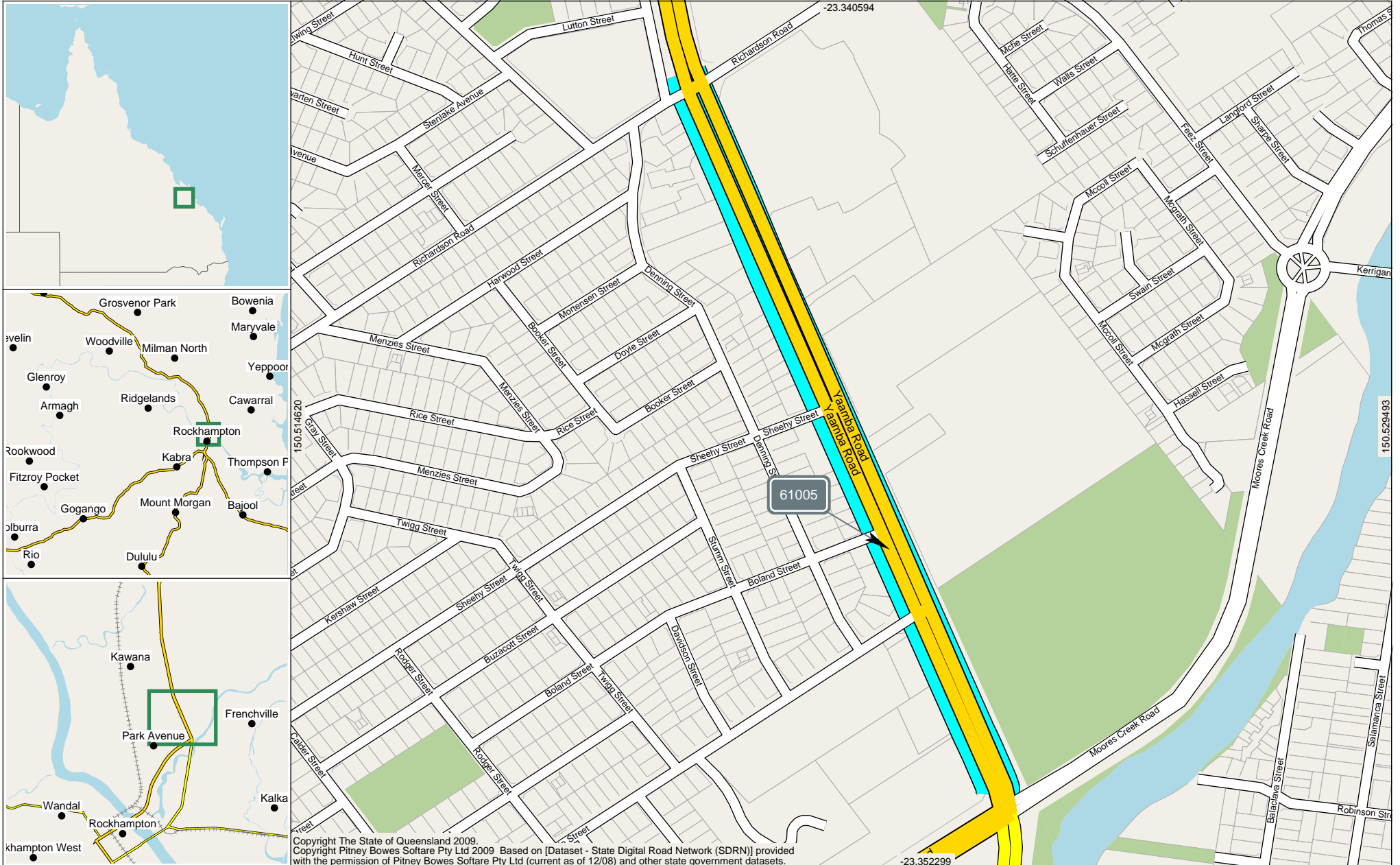
The width of each Road Segment is proportional to its AADT.



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%





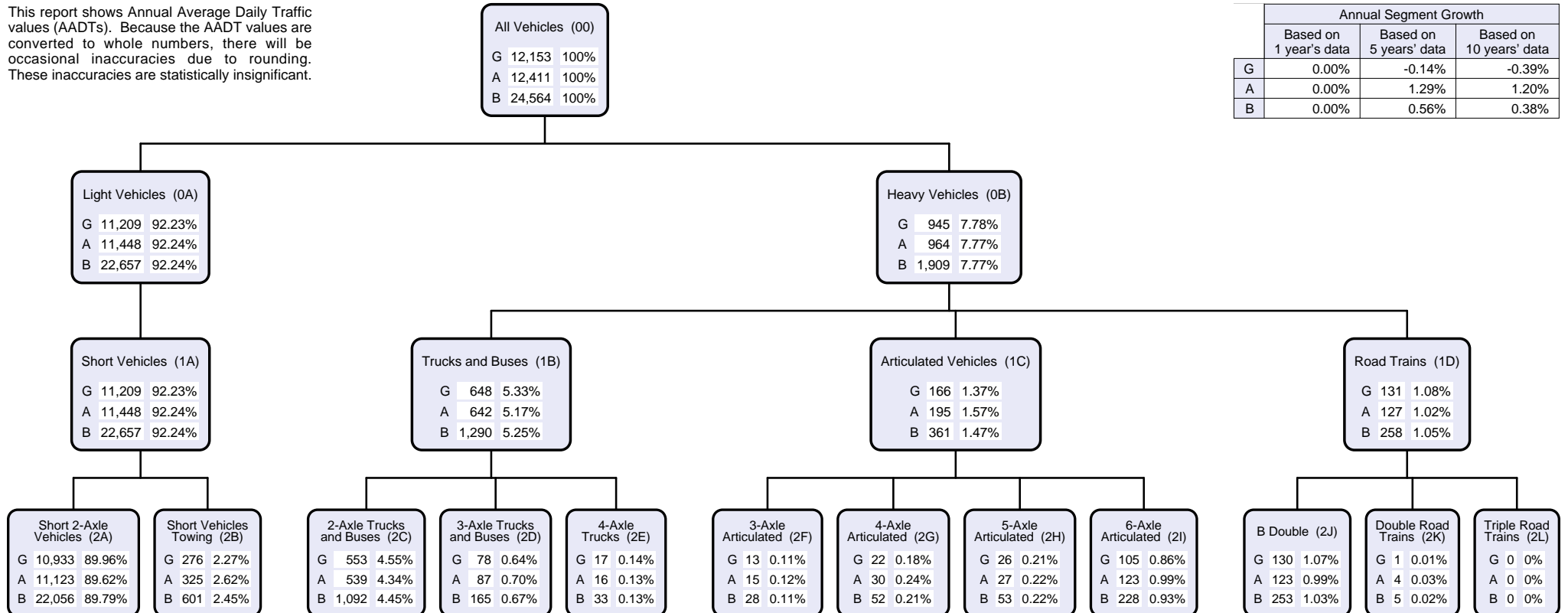
Site 61005. Point 260000731.
 Bruce Hwy Boland St Ped Crossing.
 4.75 km

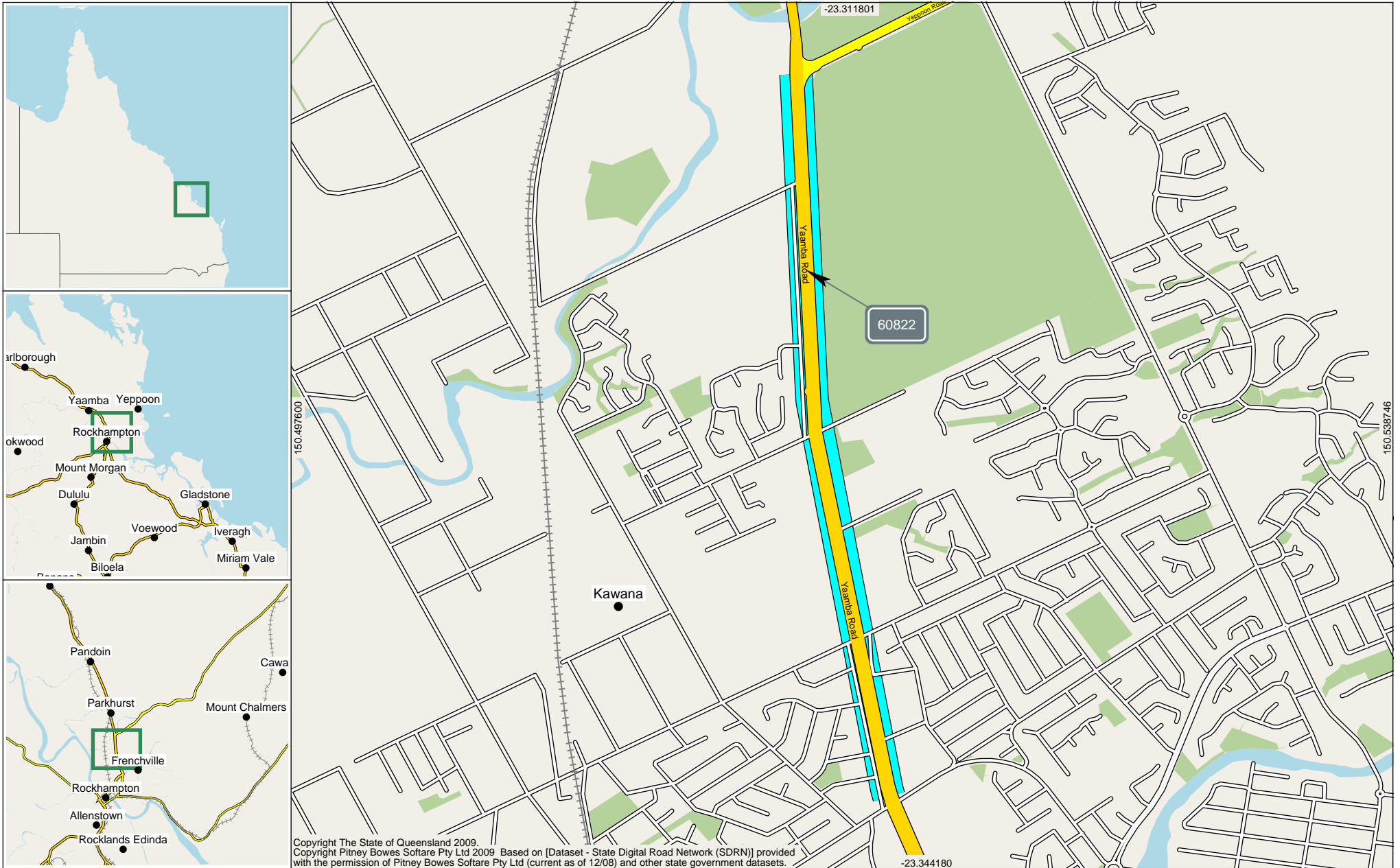
The width of each Road Segment is proportional to its AADT.



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%





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

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

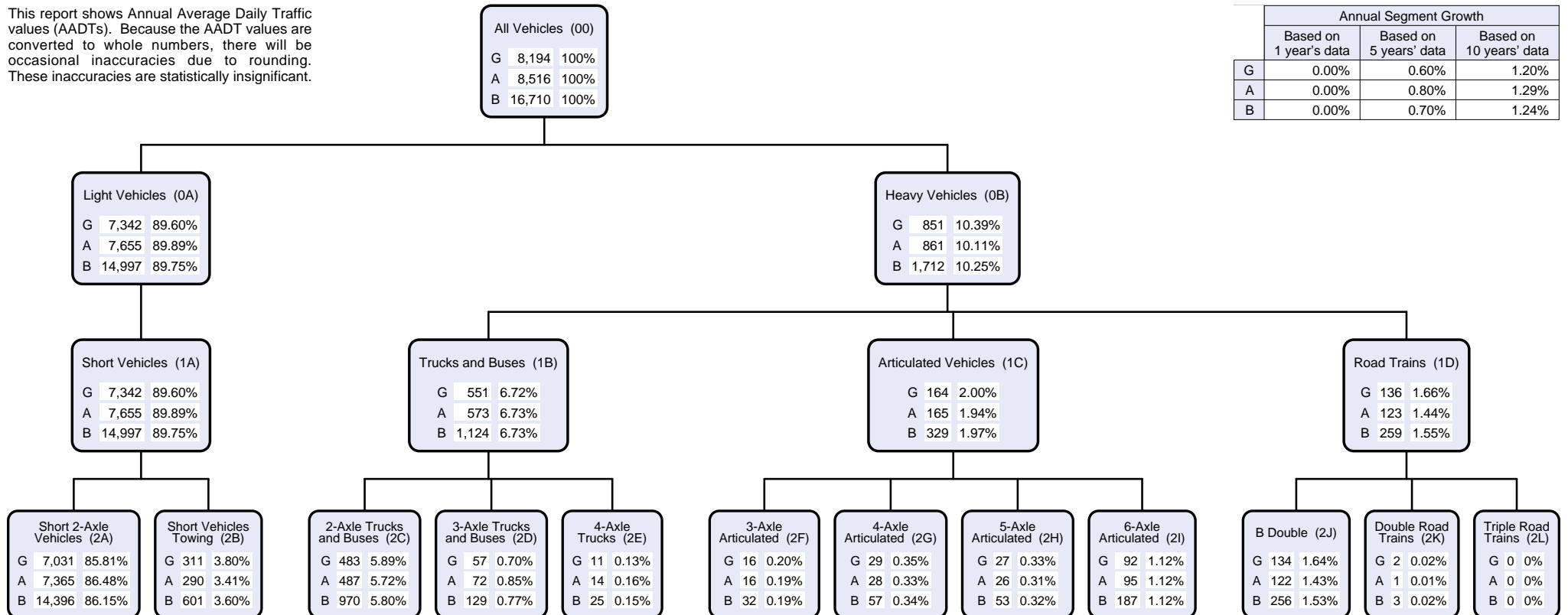


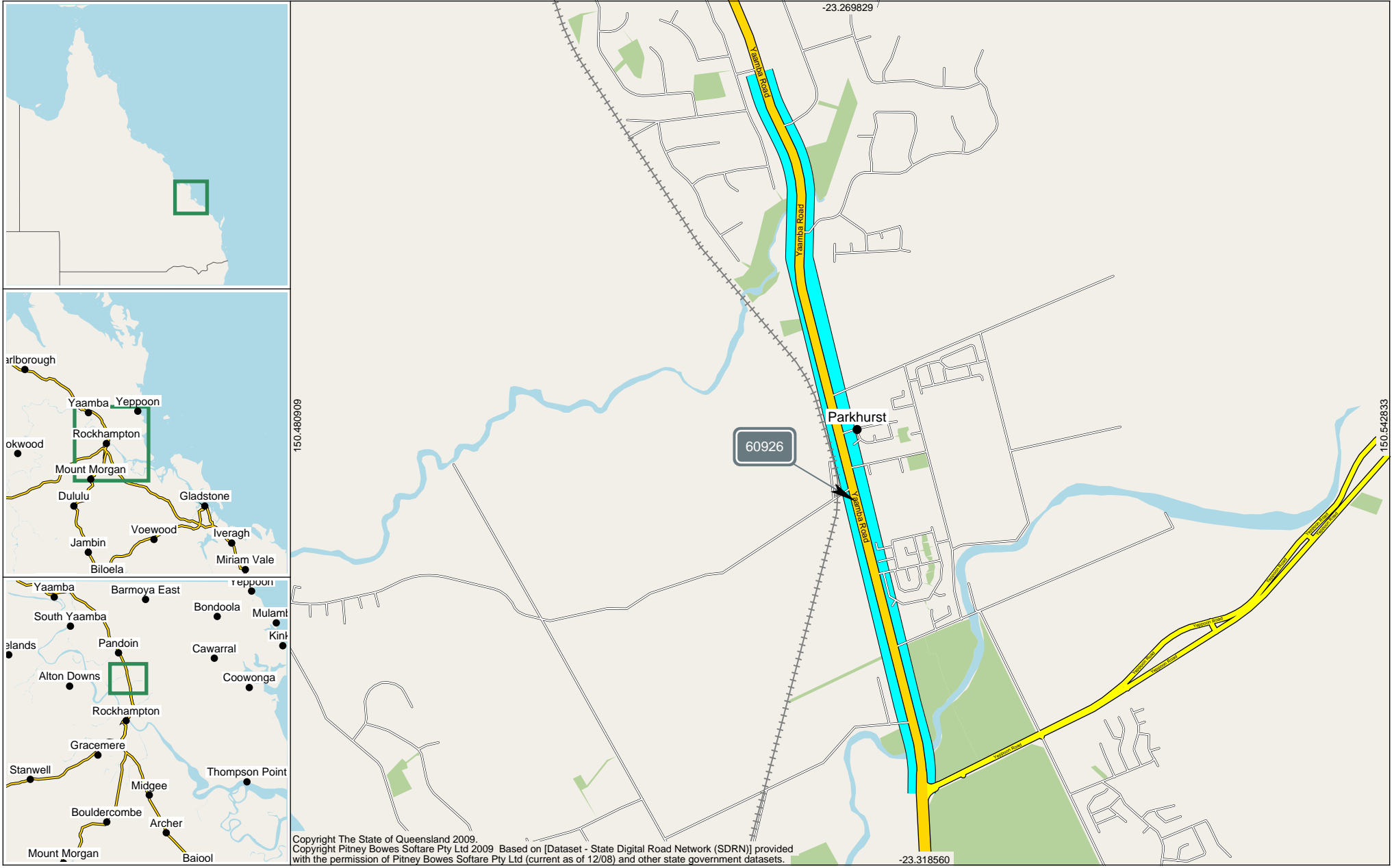
5.52 km
 Start Point 260000422. Yaamba Rd to city @ Richardson Rd.

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

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%





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.

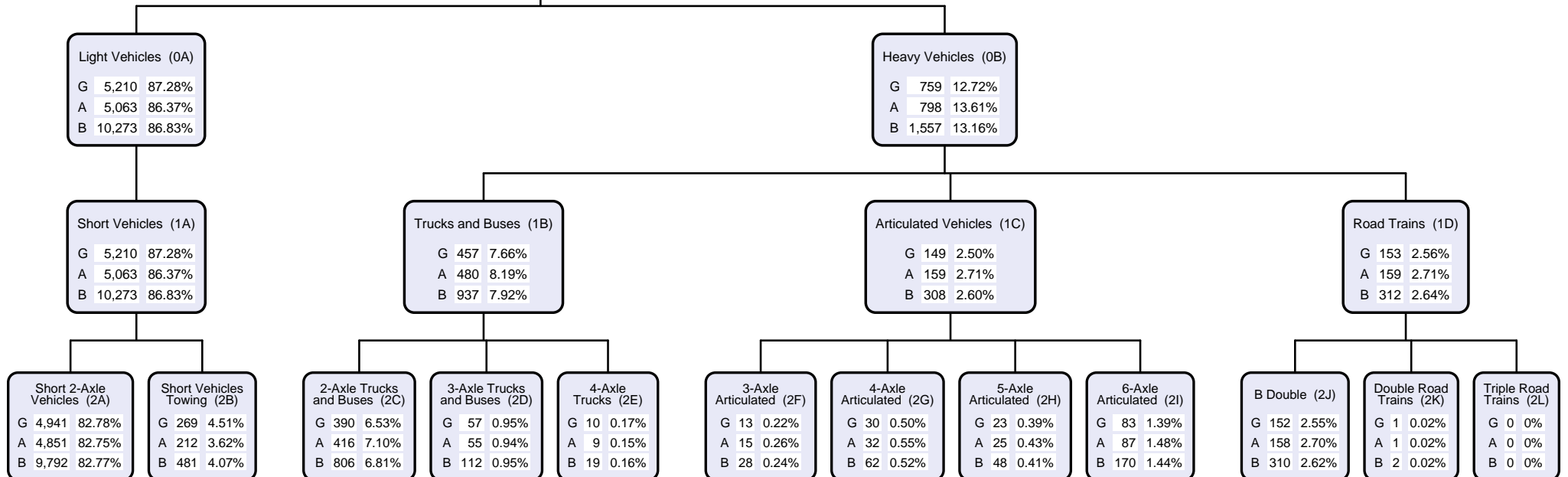
13.18 km

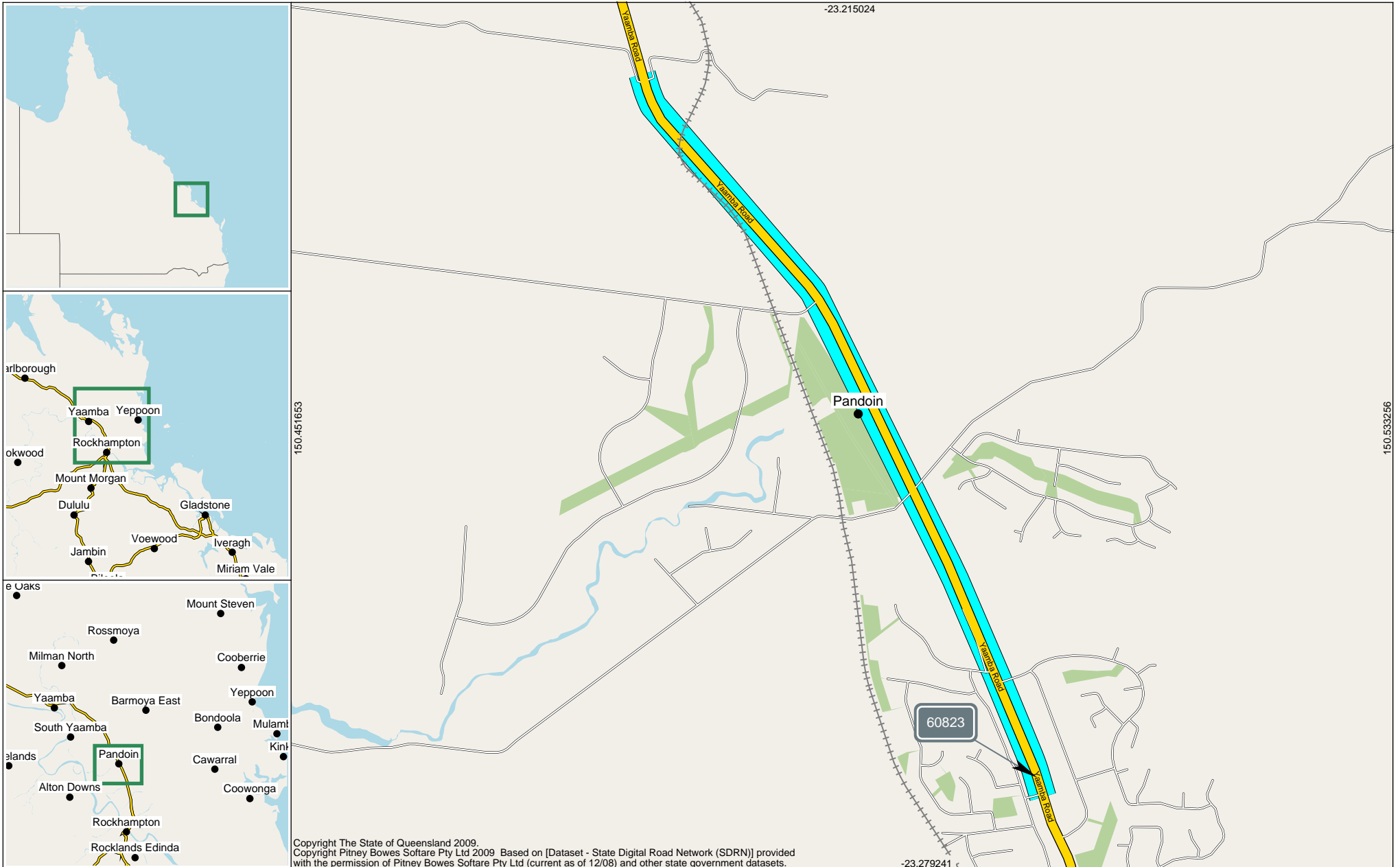
End Point 260000531. Bruce Hwy to Rockhampton @ Terra Nova Dr.

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%

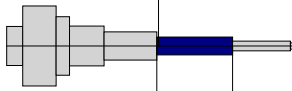
All Vehicles (00)		
G	5,969	100%
A	5,862	100%
B	11,831	100%





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

13.33 km



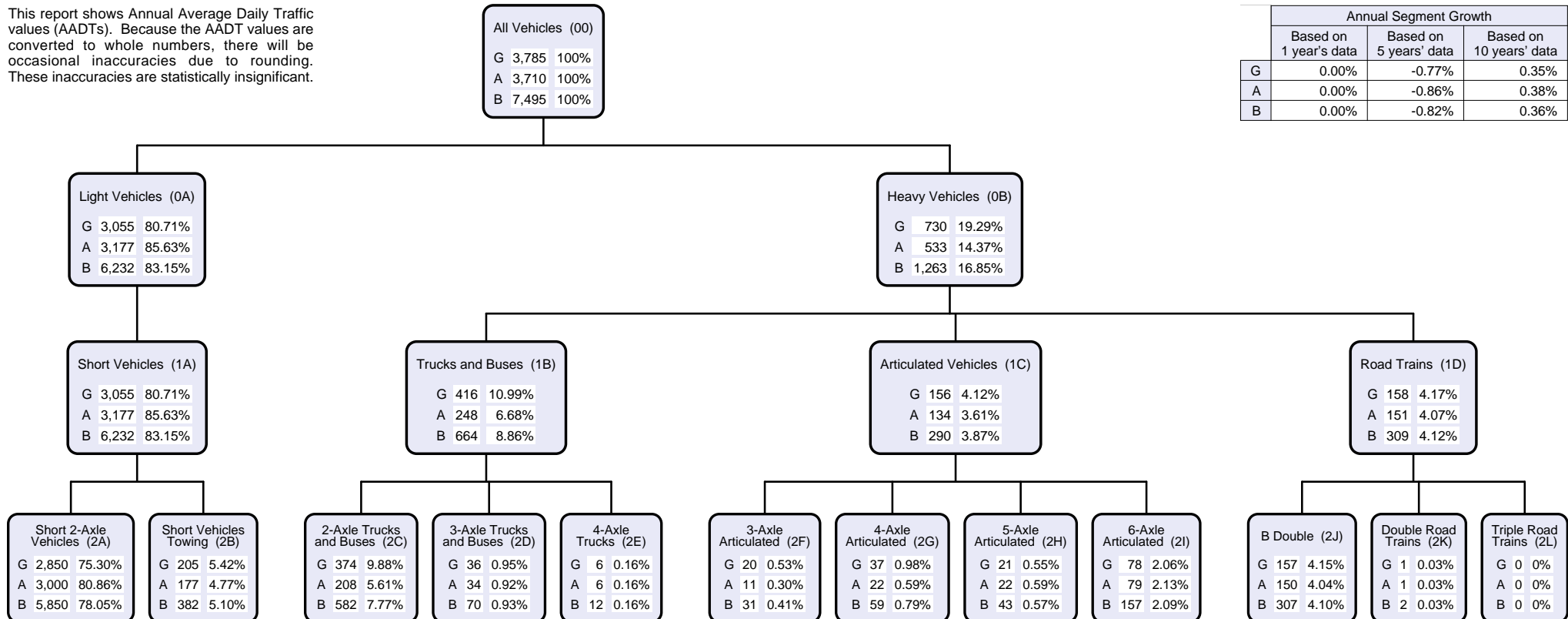
13.18 km
 Start Point 260000531. Bruce Hwy to Rockhampton @ Terra Nova Dr.

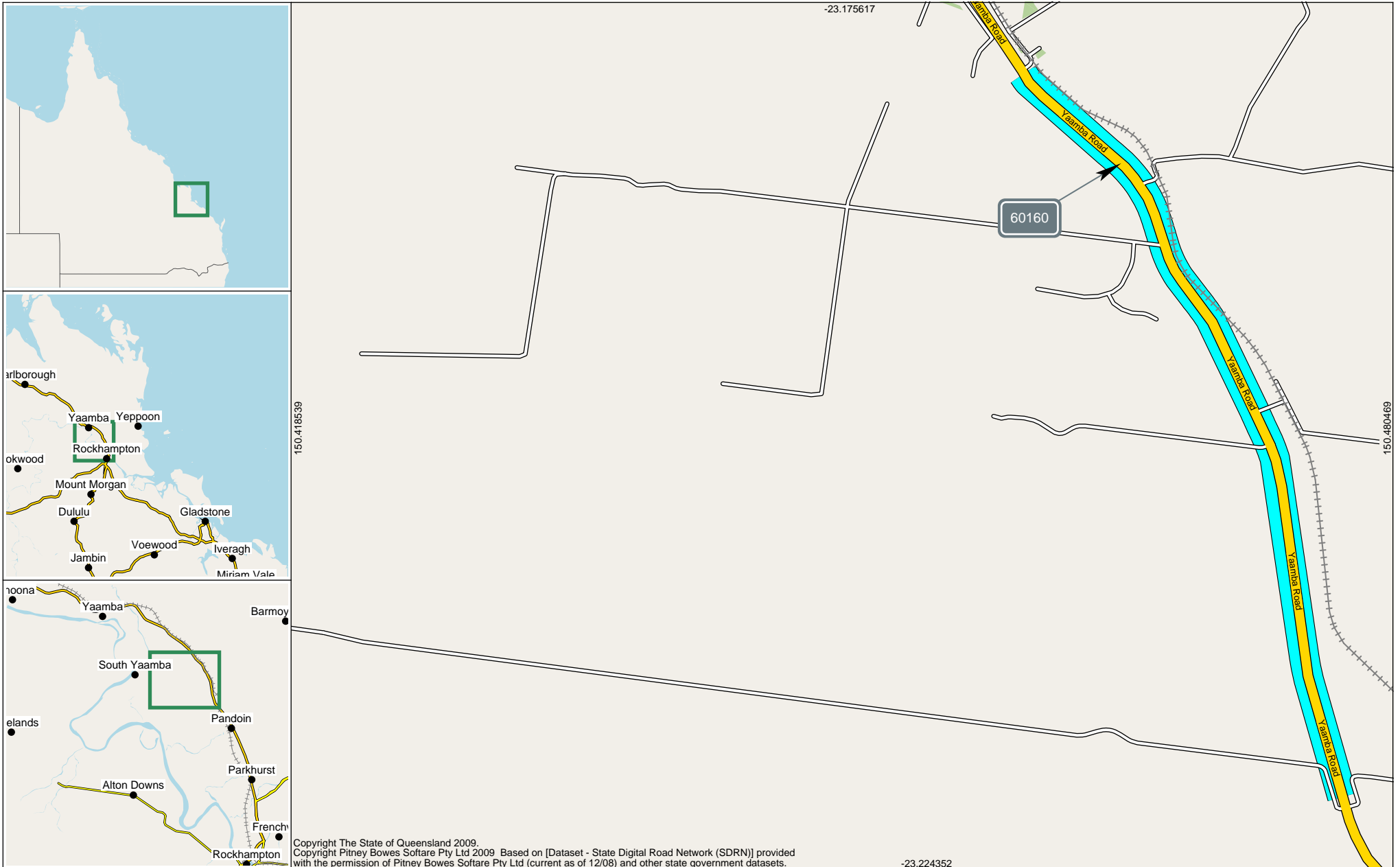
19.83 km
 End Point 260000239. Bruce Hwy to R'ton @ Vass Rd/Etna Ck Pri.

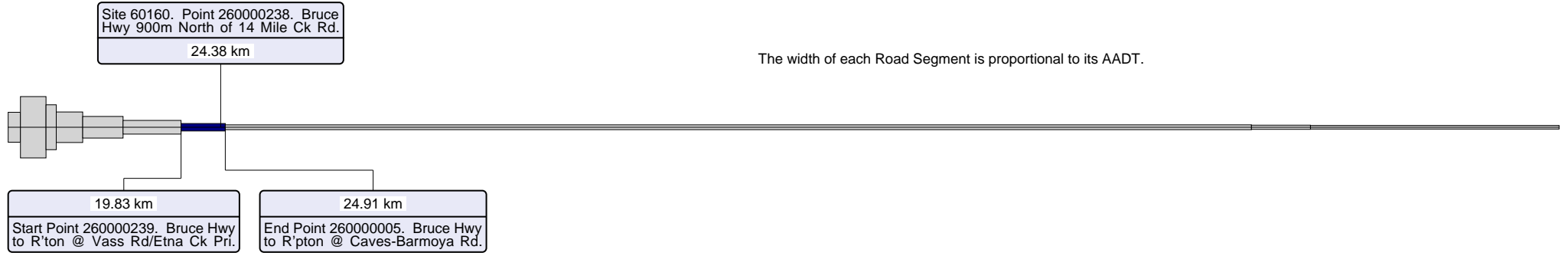
The width of each Road Segment is proportional to its AADT.

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%

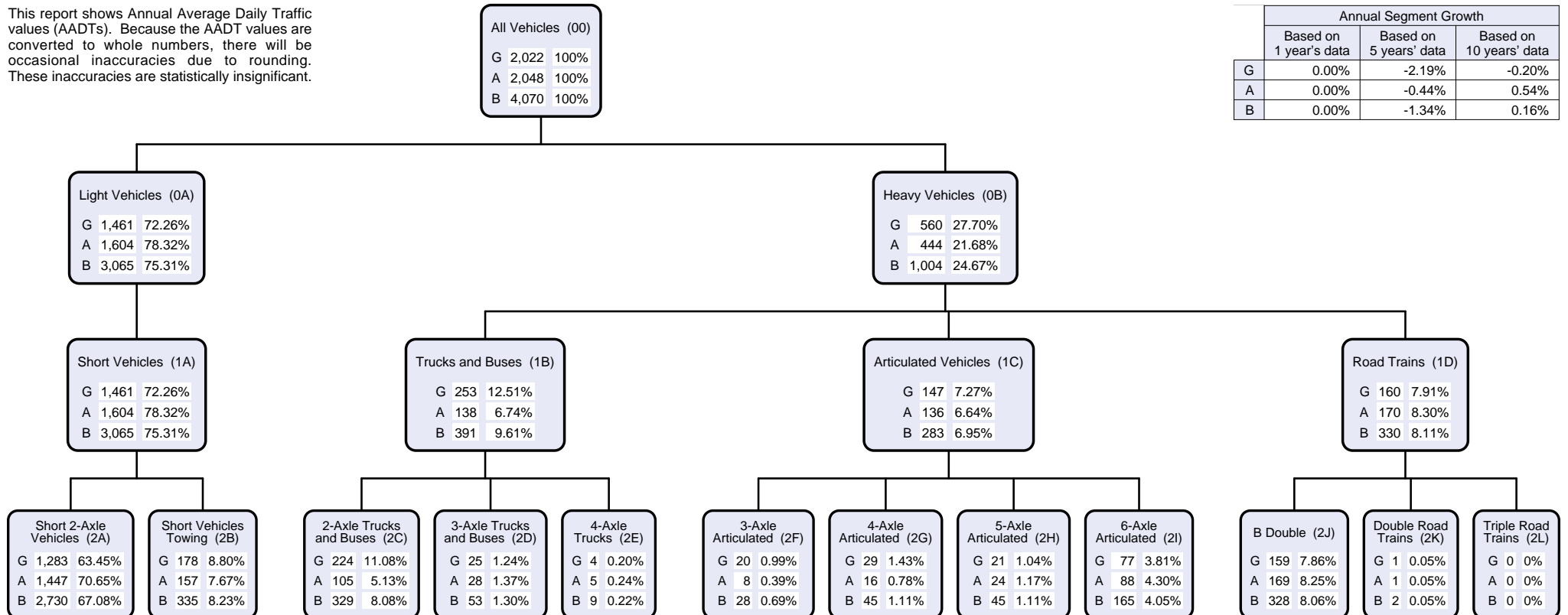


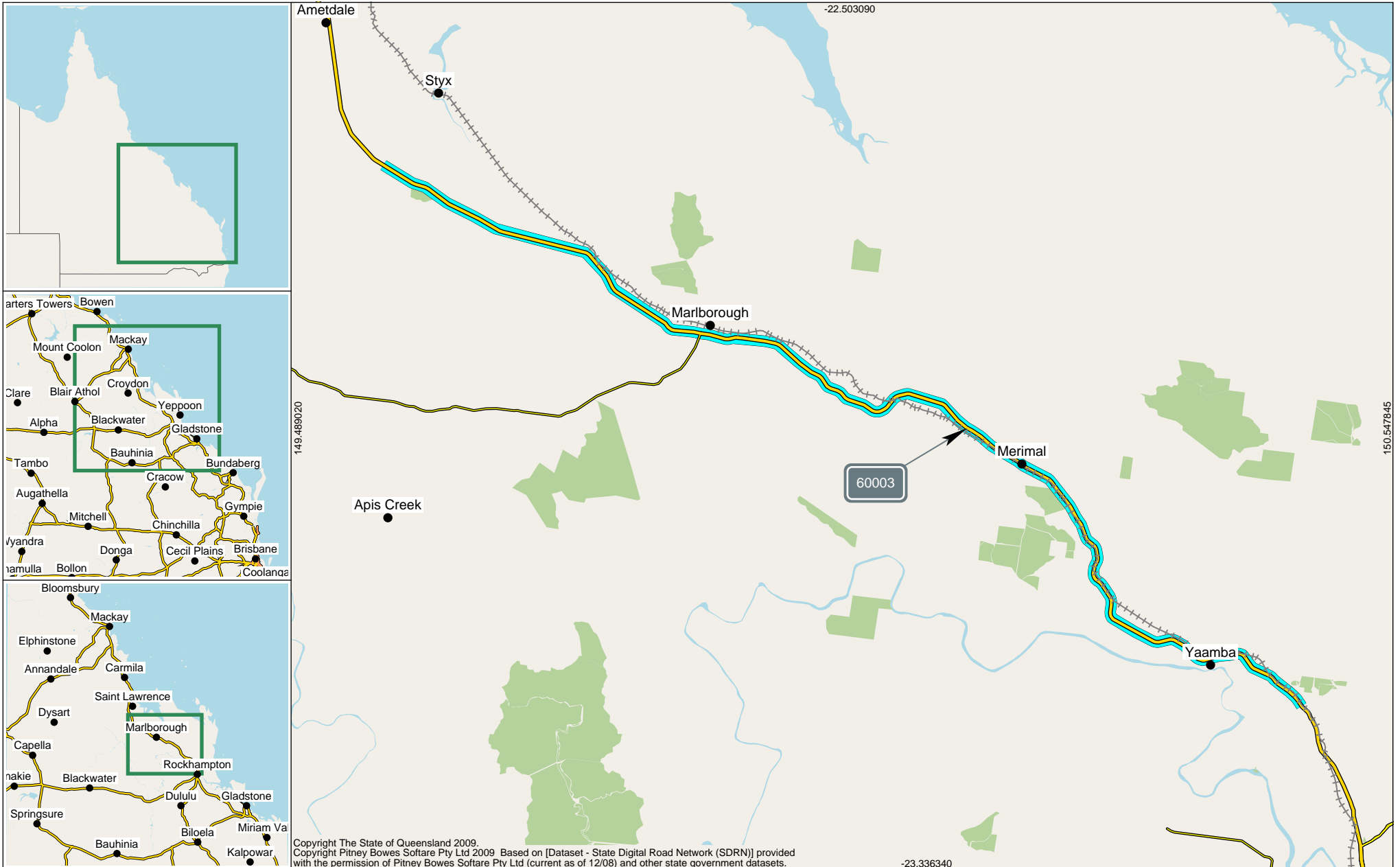


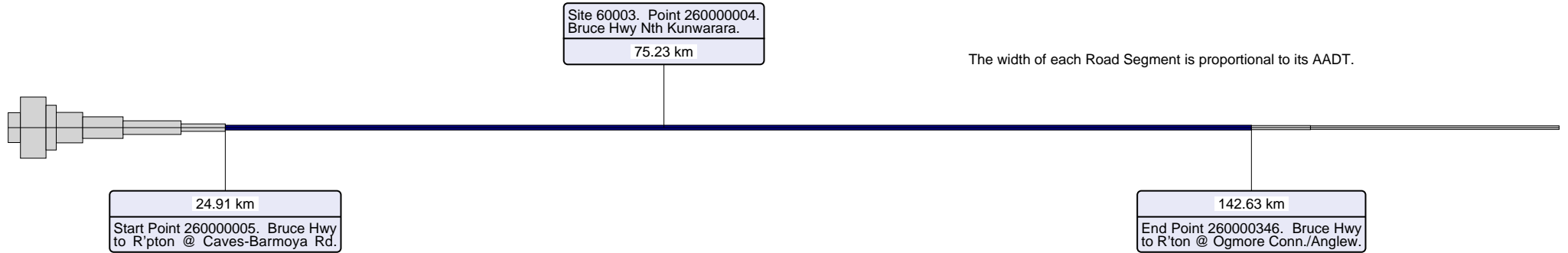


This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

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%

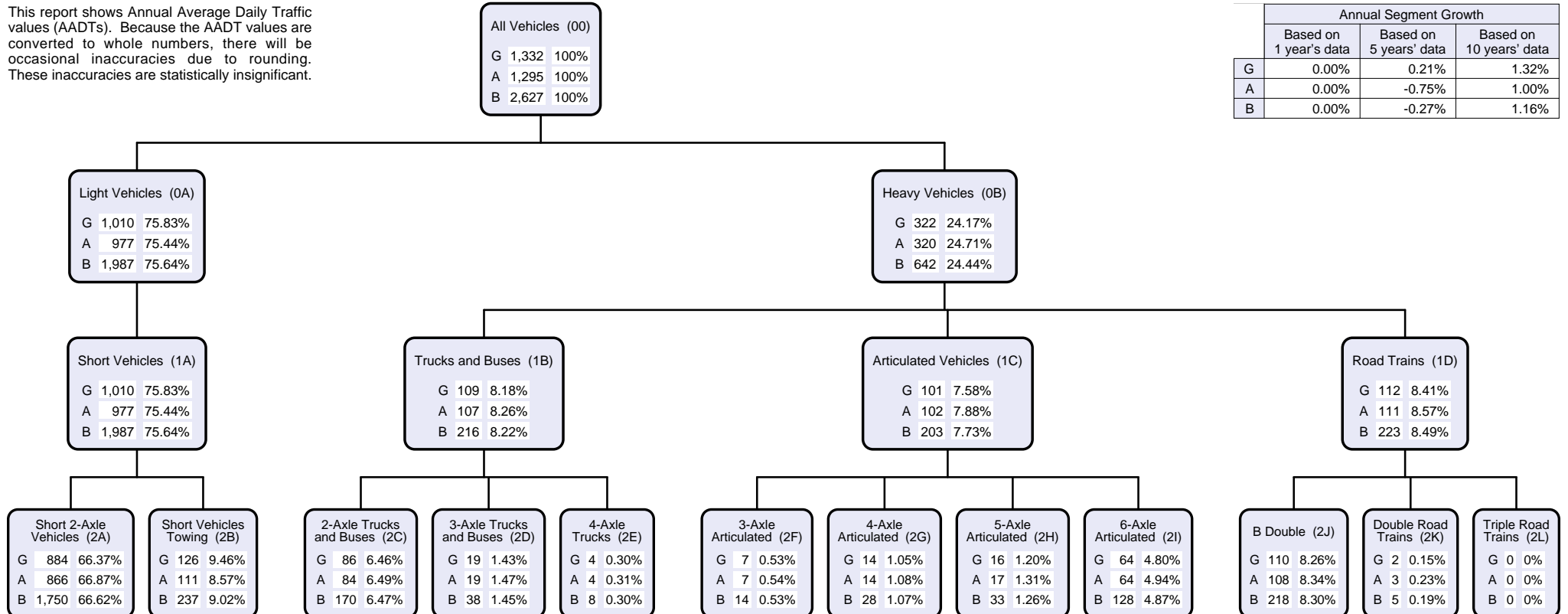


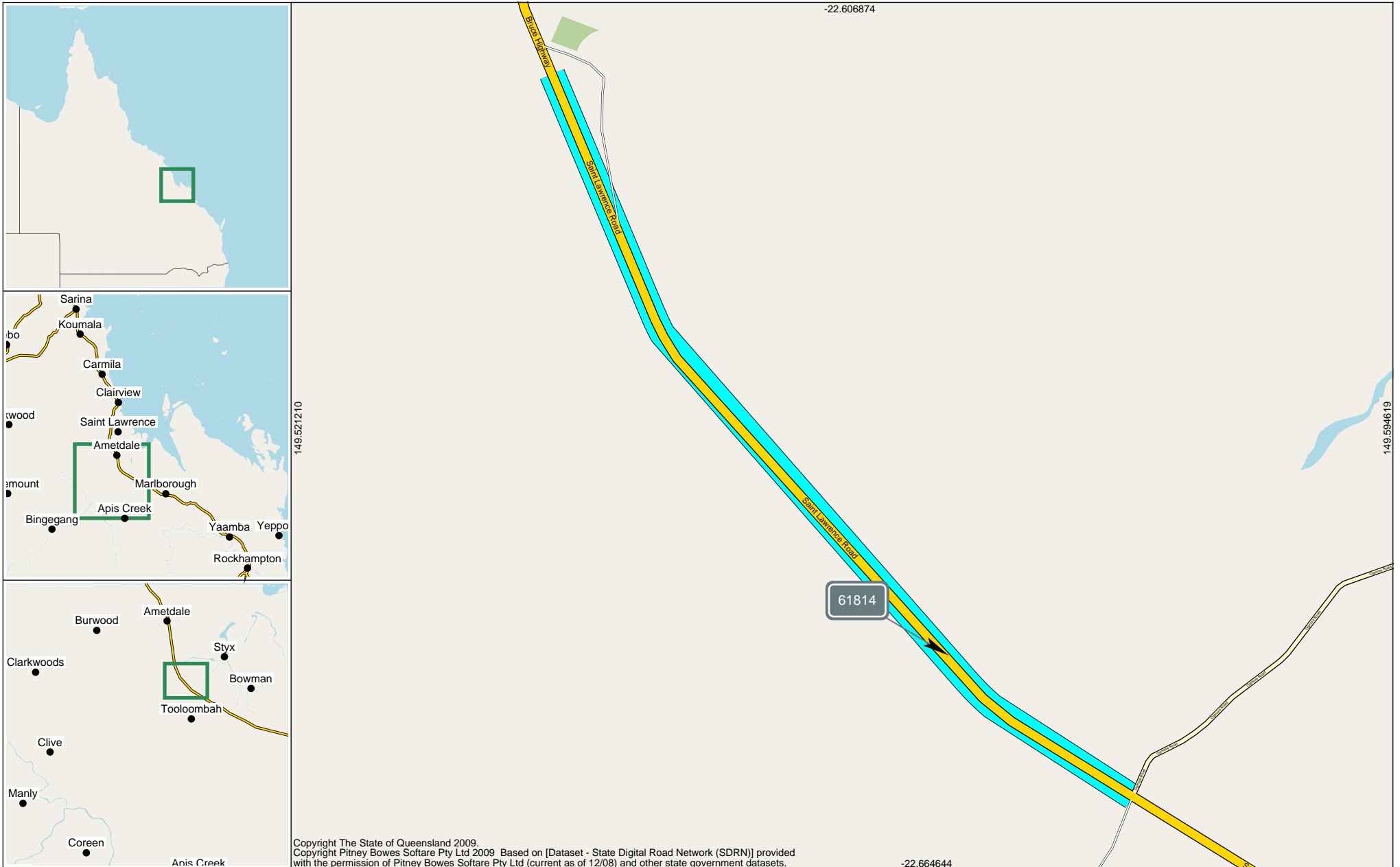




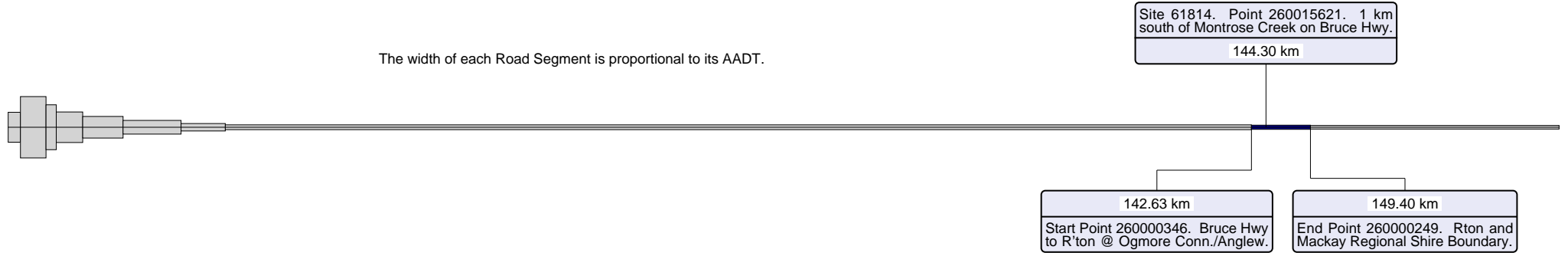
This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

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%



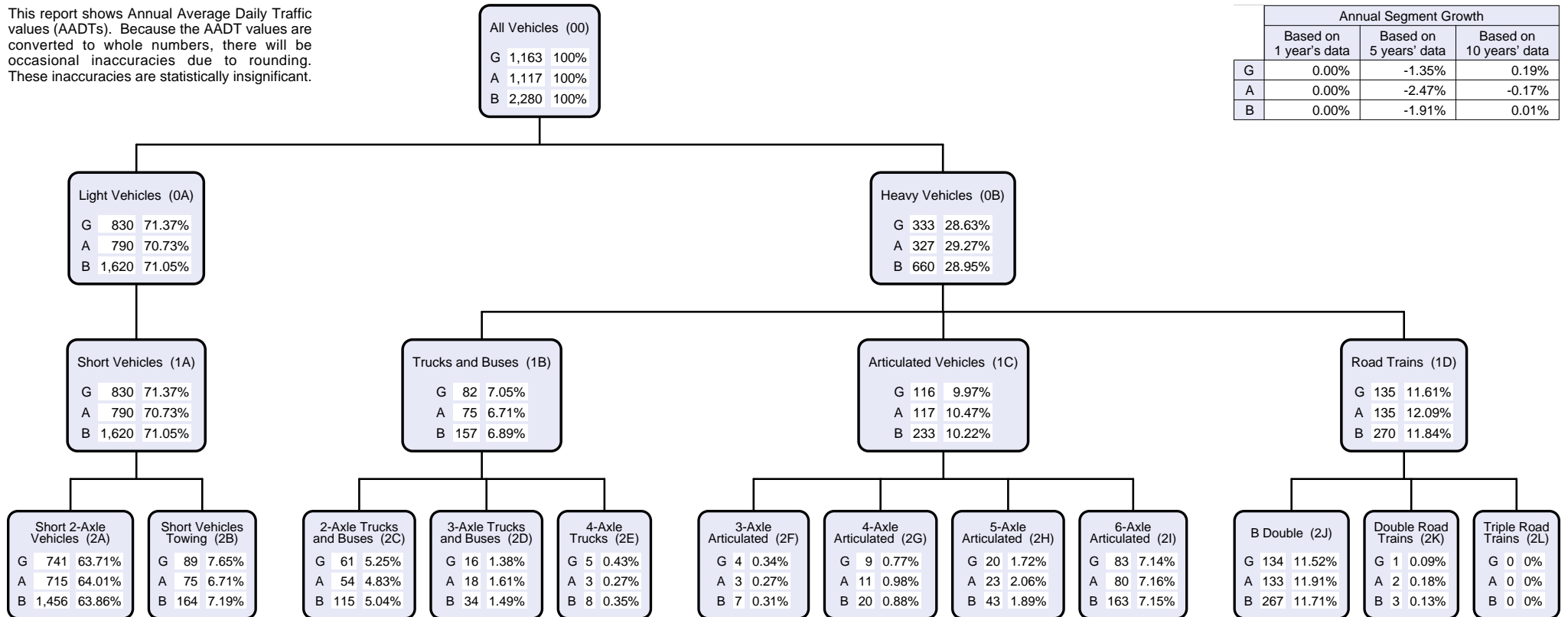


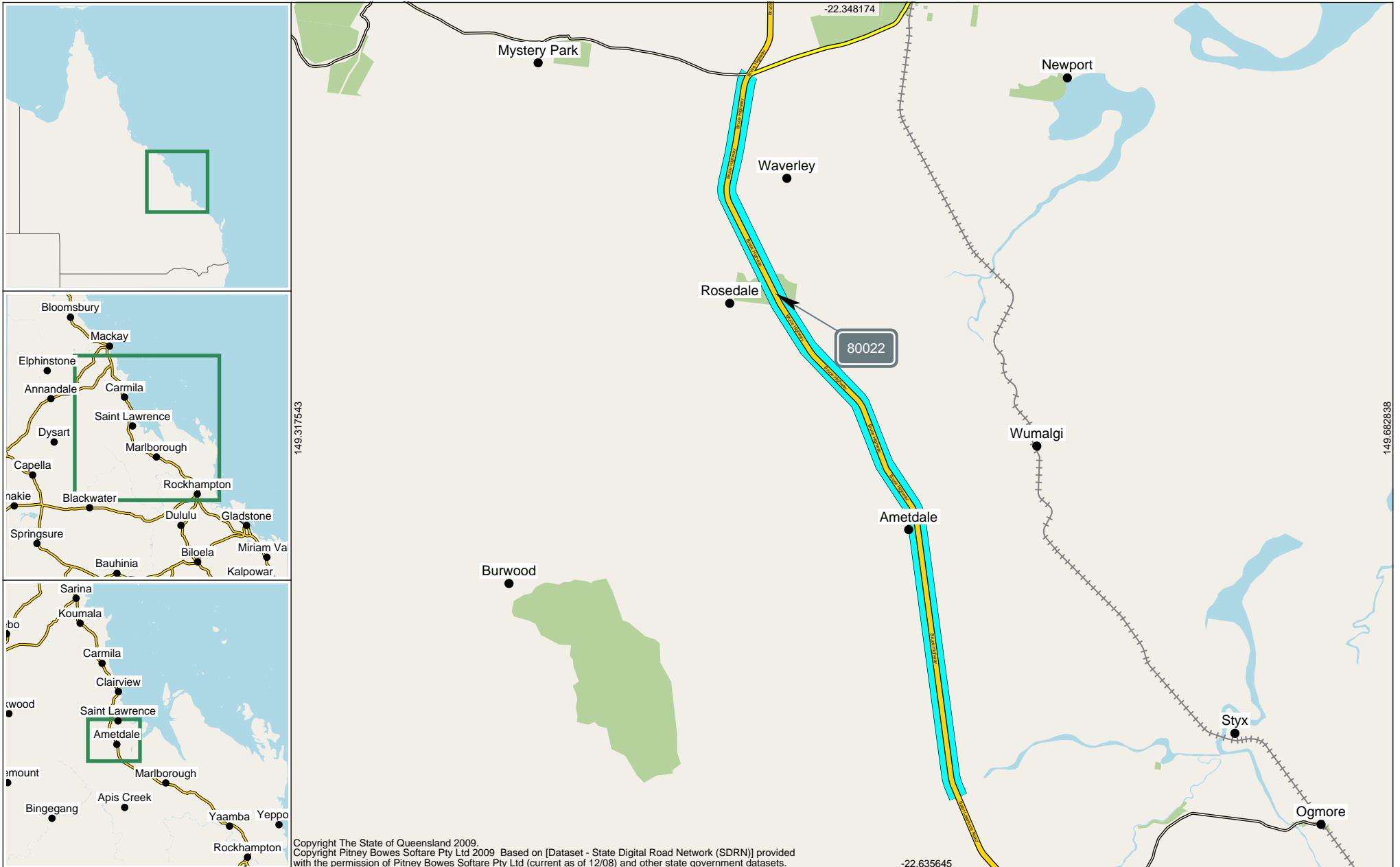
The width of each Road Segment is proportional to its AADT.



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%	-1.35%	0.19%
A	0.00%	-2.47%	-0.17%
B	0.00%	-1.91%	0.01%





AADT Segment Analysis Report (Complete)

Area 405 - Mackay/Whitsunday District Road Section 10F - BRUCE HIGHWAY (ROCKHAMPTON-ST LAWRENCE)
Traffic Year 2016 - Data Collection Year 2015

Site 80022. Point 280002088. South of Waverley Creek.

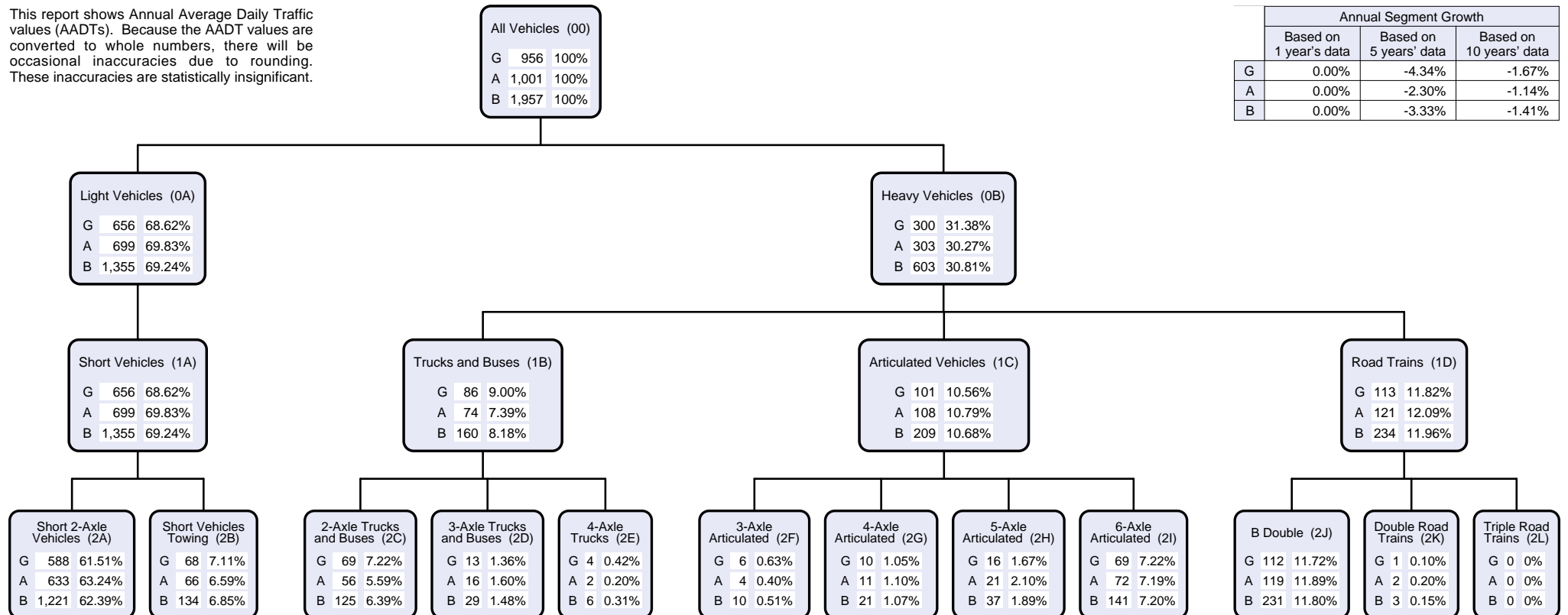
169.65 km

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%



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 its Start Point and End Point (or Start and End Through Distance (TDist)) within the Road Section. These distances are measured in kilometres from the beginning 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
Metropolitan 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.

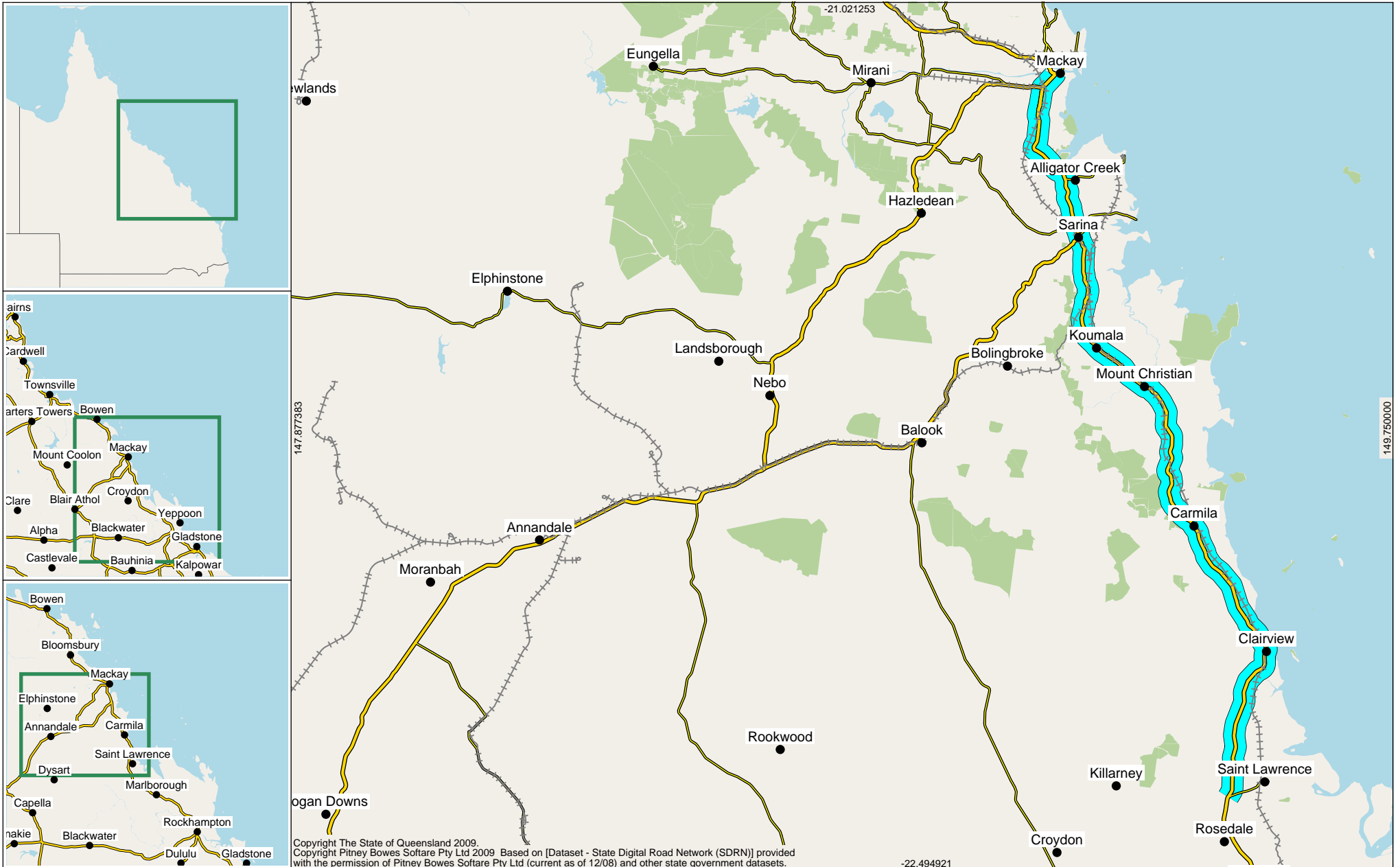
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Traffic Analysis and Reporting System
AADT Segment Analysis Report (Complete)
 Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
 Traffic Year 2016

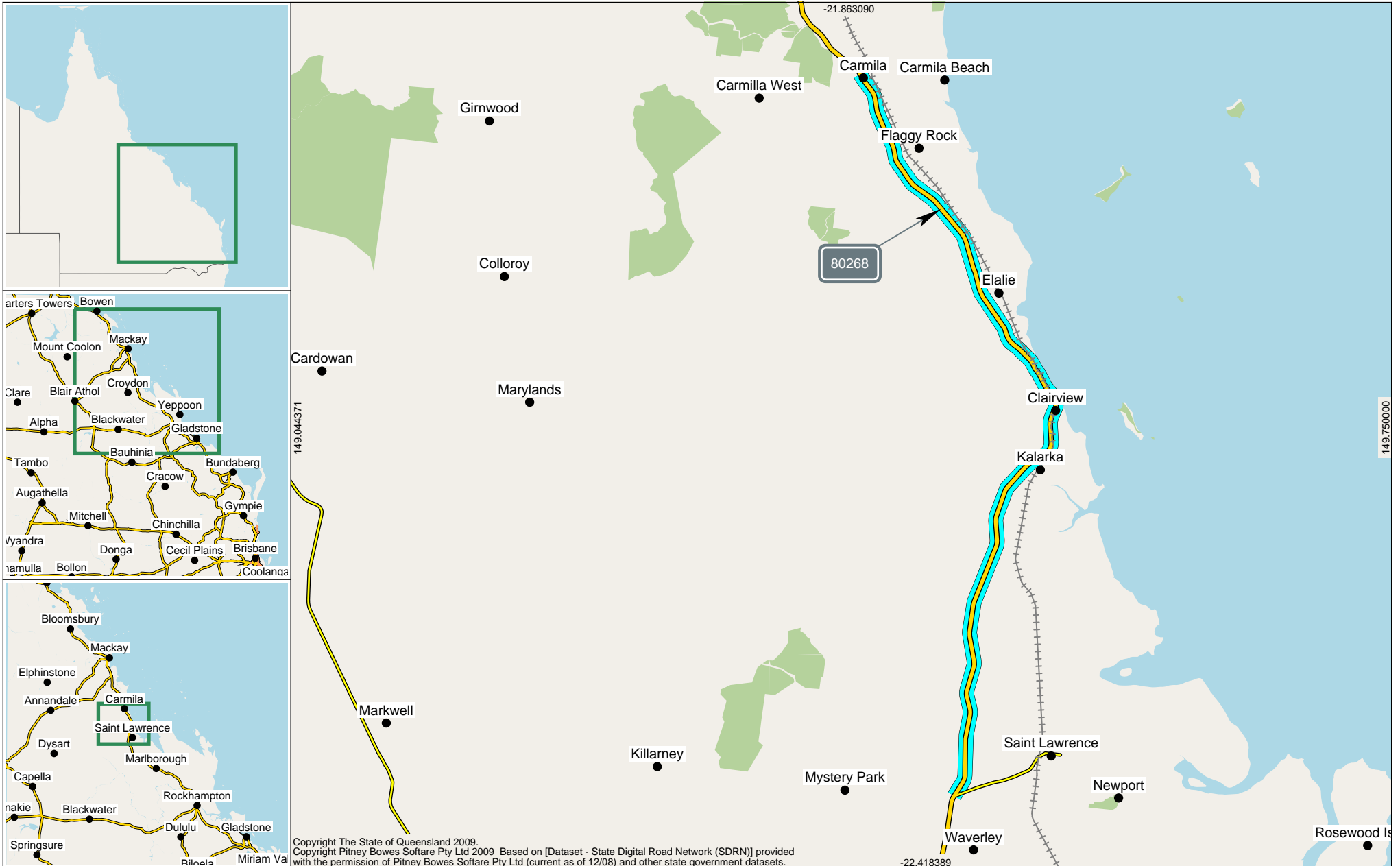
Road Segments Summary - All Vehicles

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		G	A	B		
						AADT	HV %	AADT	HV %	AADT	HV %					
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		



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

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

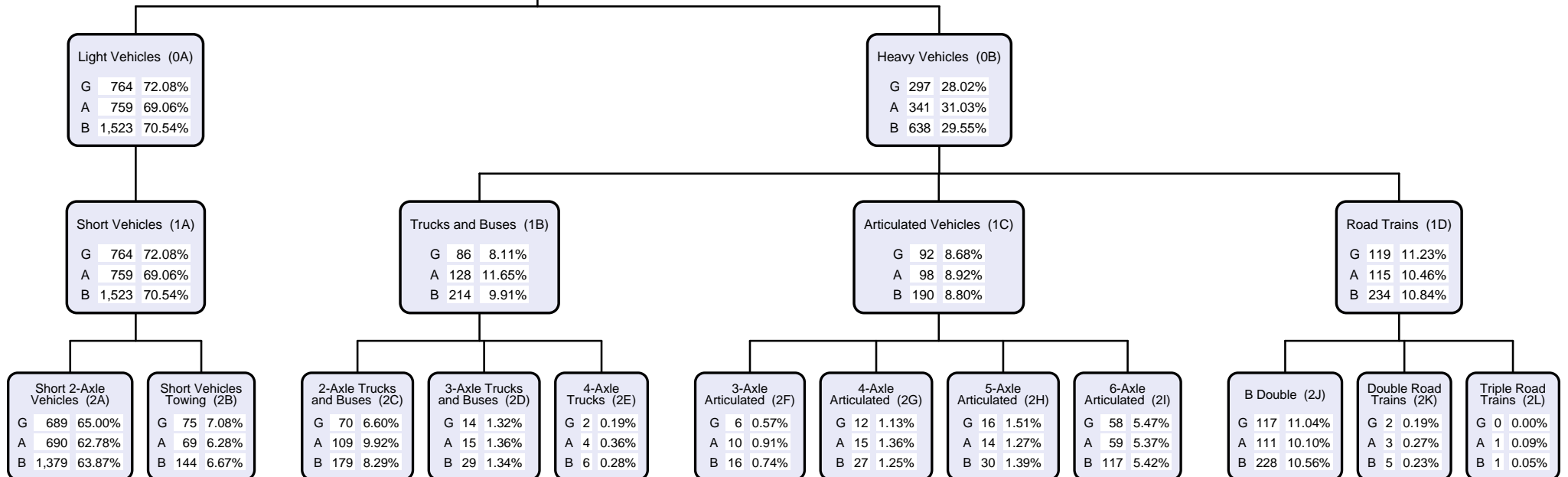
The width of each Road Segment is proportional to its AADT.

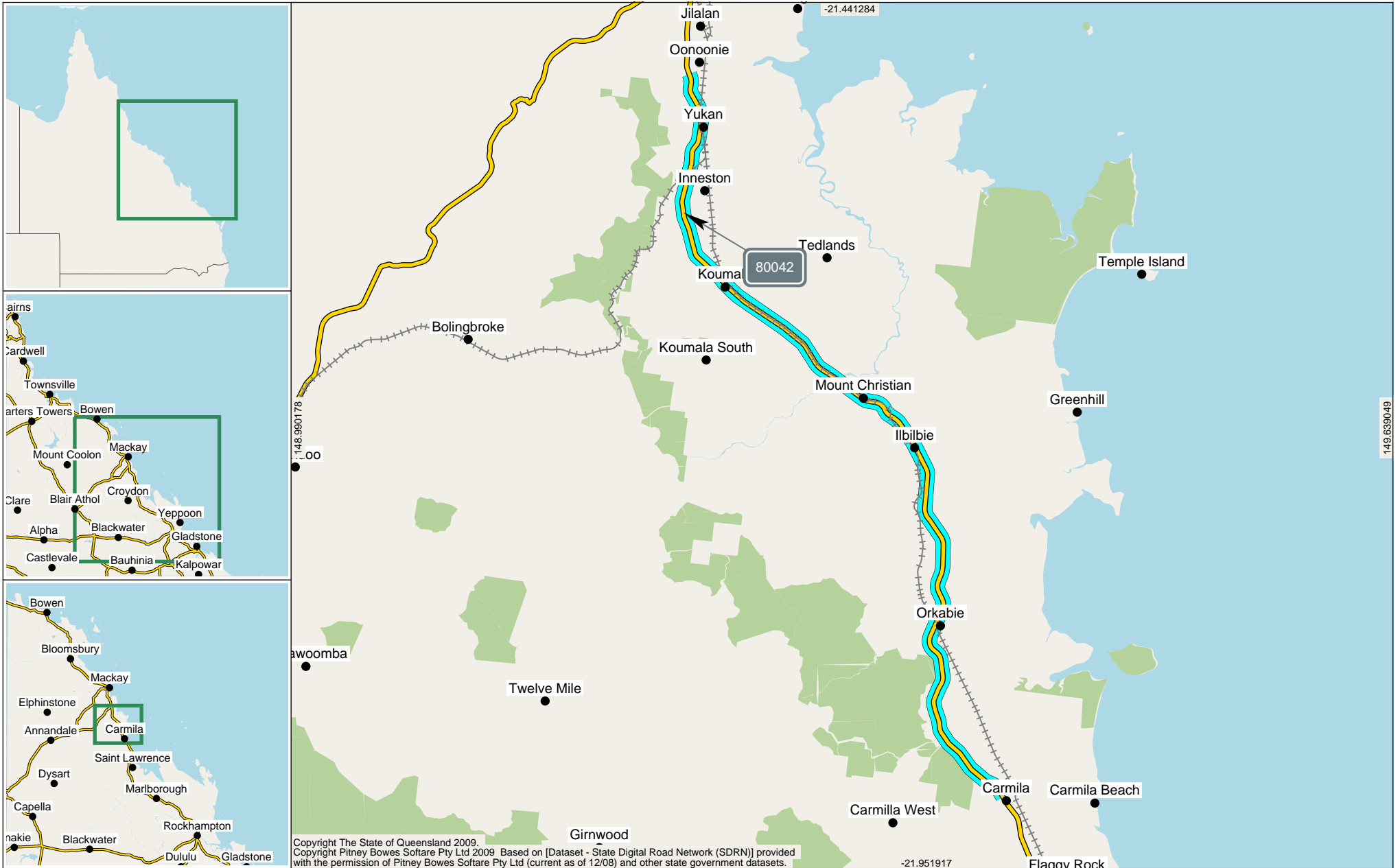


This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

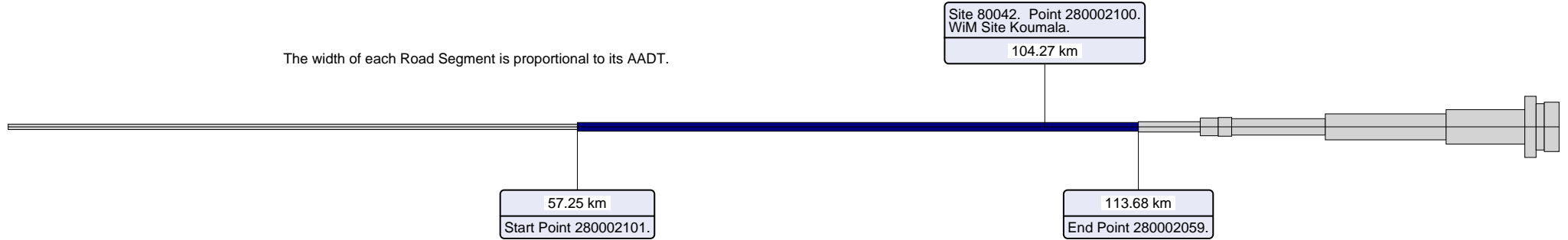
Annual Segment Growth			
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-0.19%	-3.25%	-1.23%
A	0.46%	-1.32%	-0.49%
B	0.14%	-2.30%	-0.86%

All Vehicles (00)
 G 1,060 100%
 A 1,099 100%
 B 2,159 100%



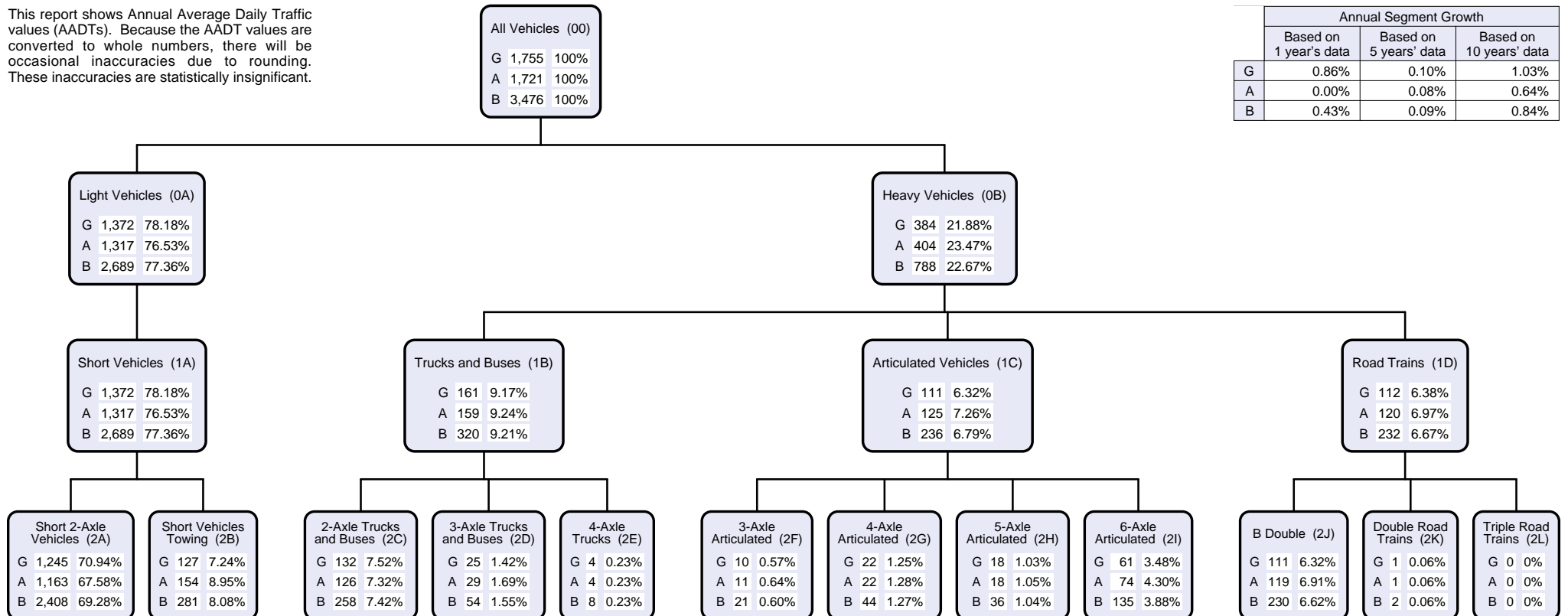


The width of each Road Segment is proportional to its AADT.



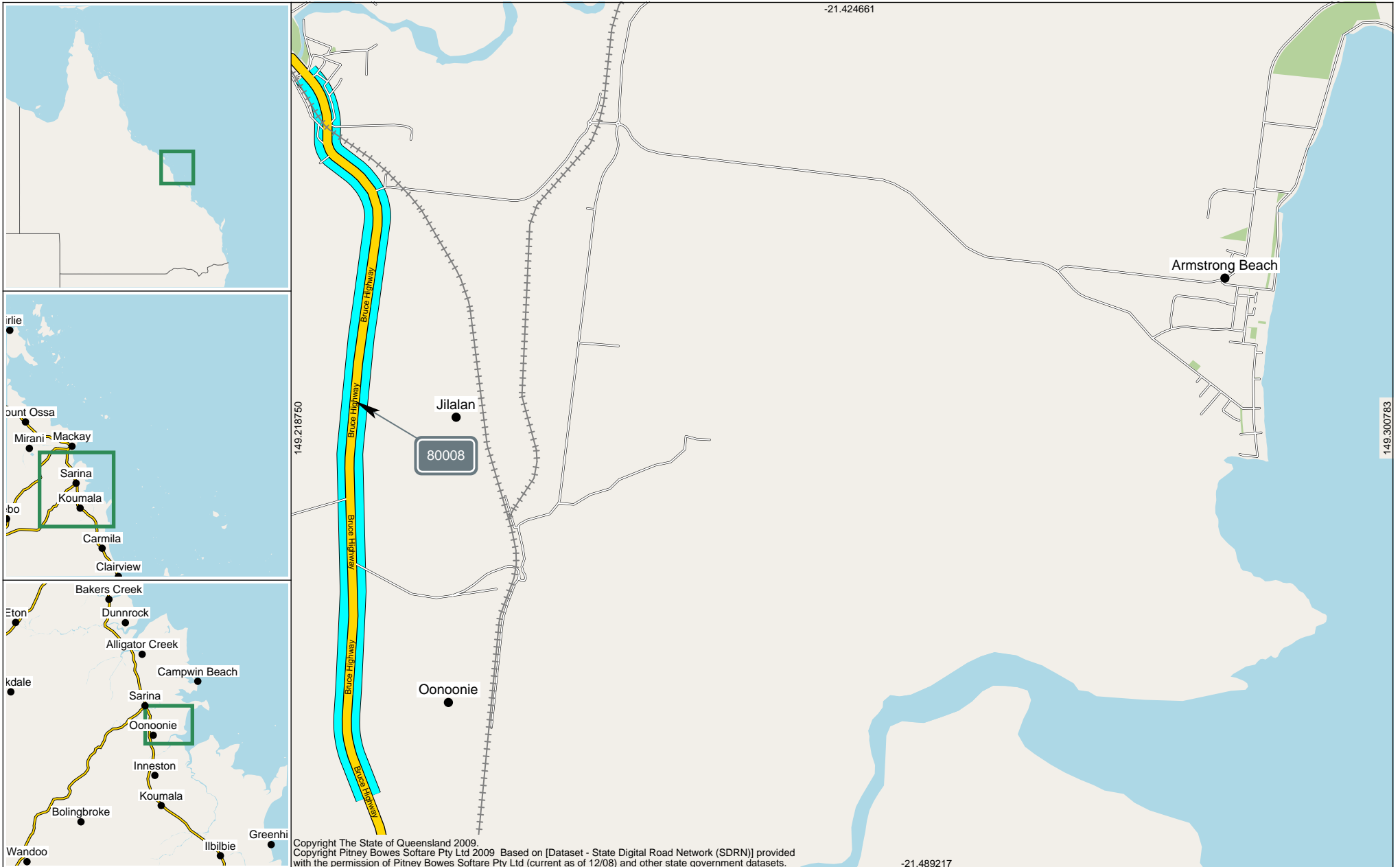
This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

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%

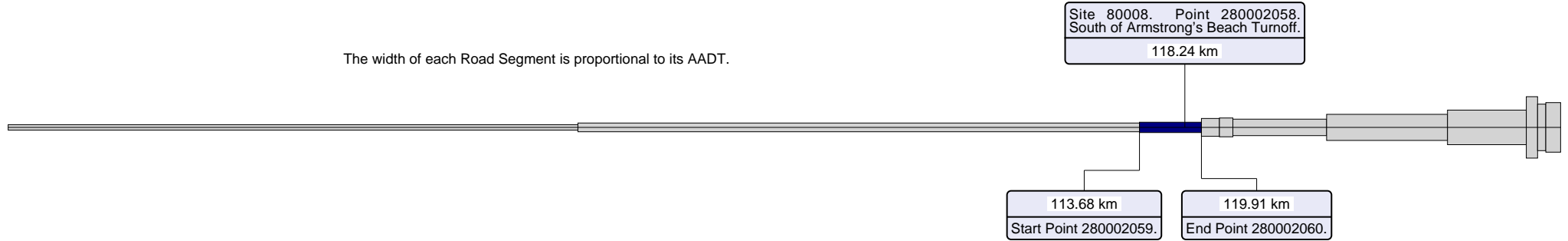


AADT Segment Analysis Report (Complete)

Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

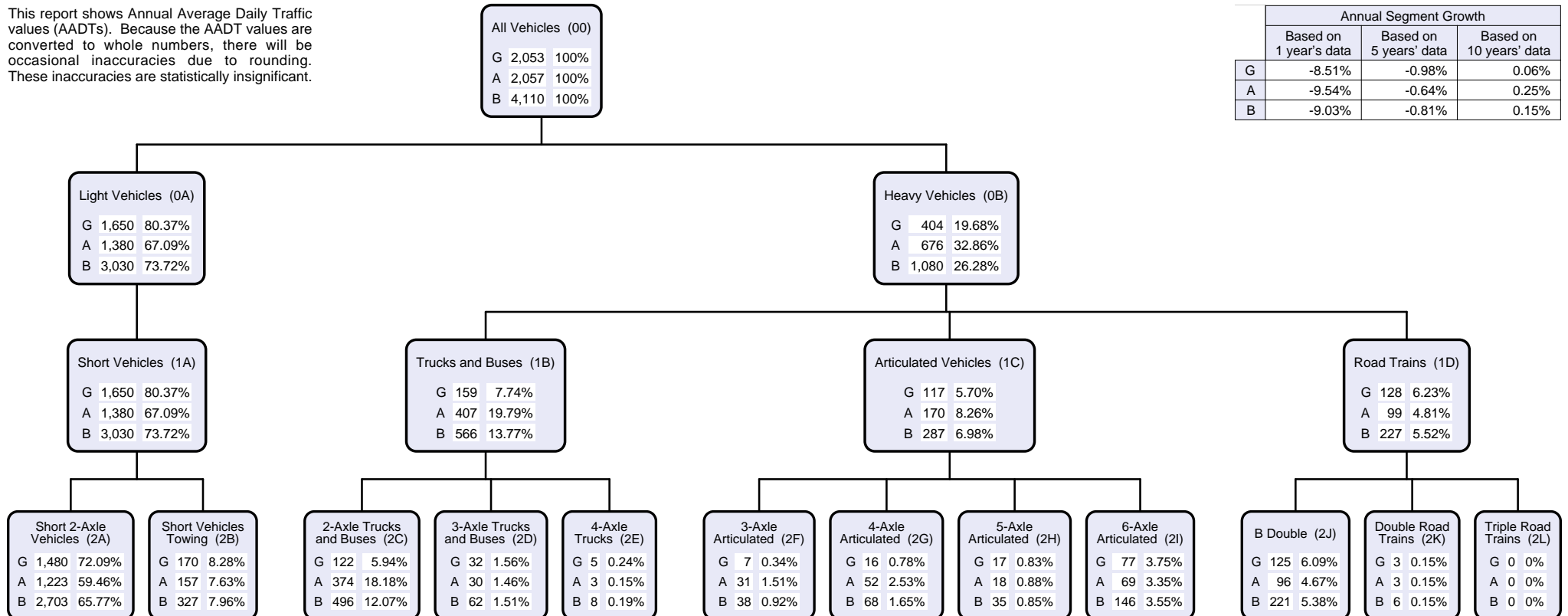


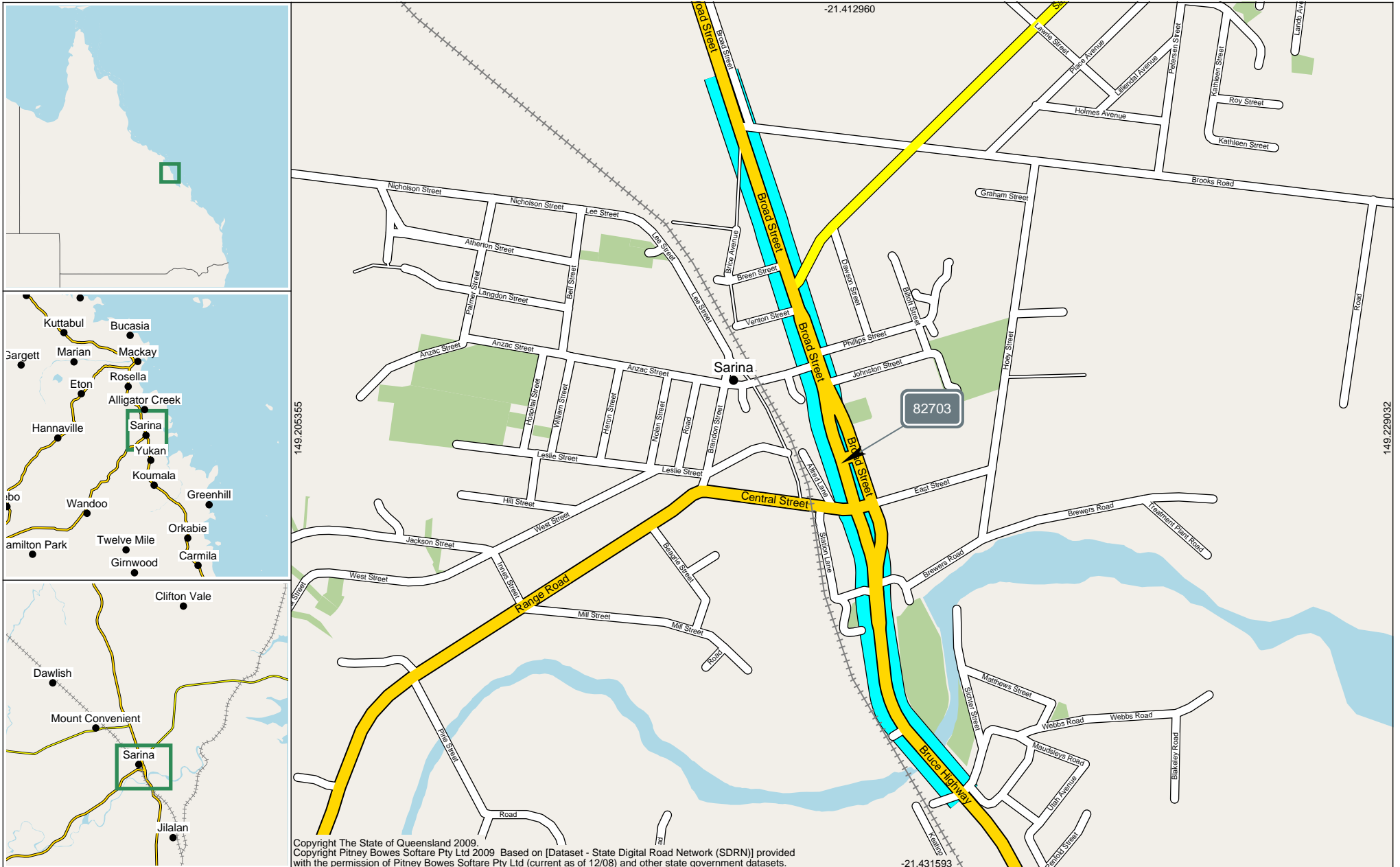
The width of each Road Segment is proportional to its AADT.



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%

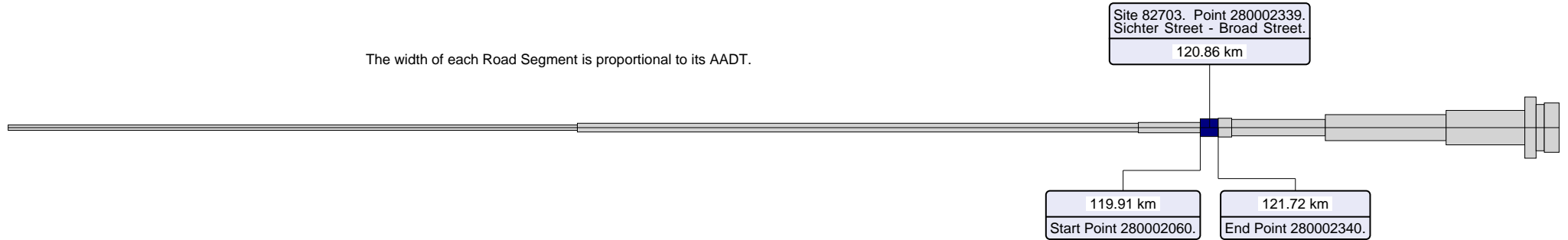




AADT Segment Analysis Report (Complete)

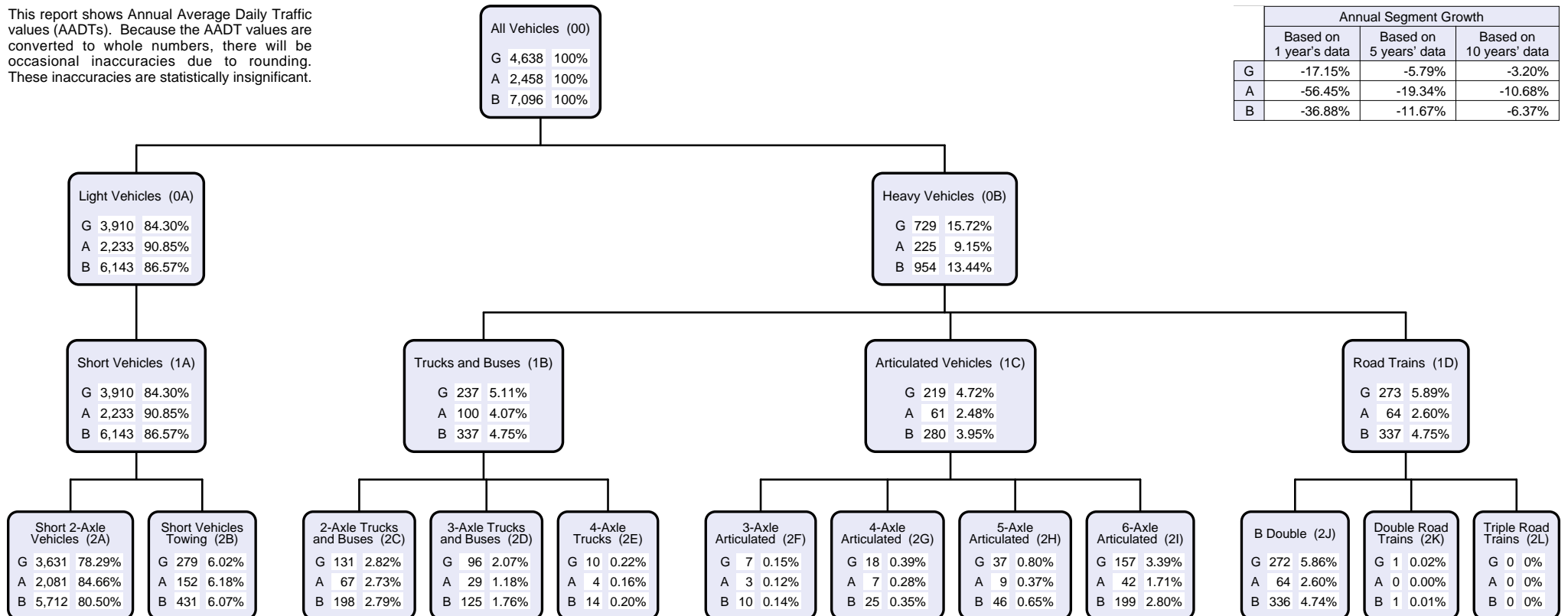
Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

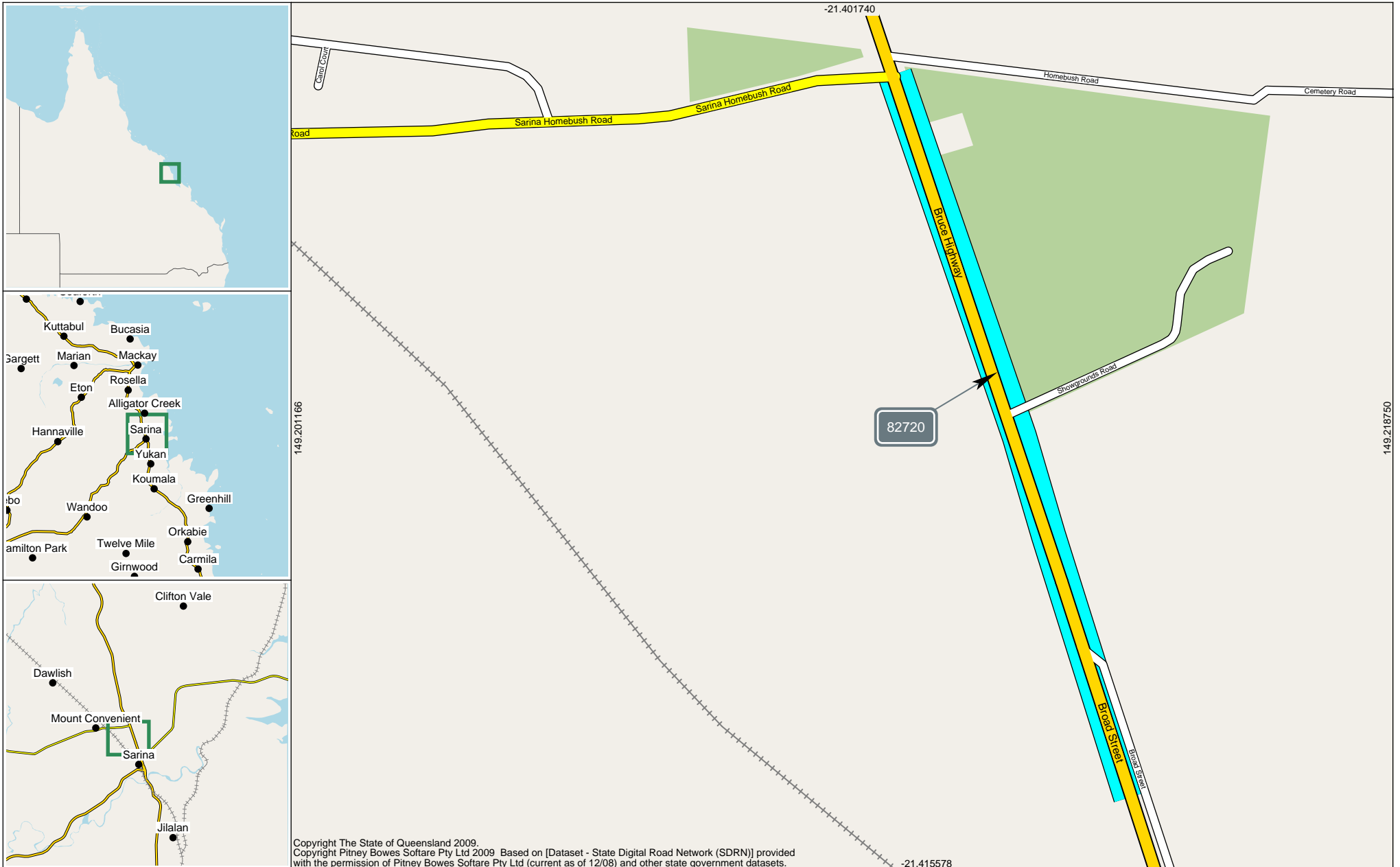
The width of each Road Segment is proportional to its AADT.



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%

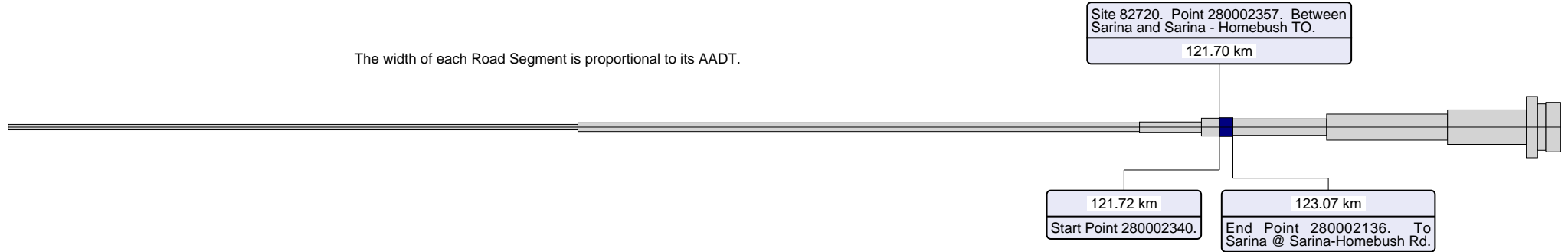




AADT Segment Analysis Report (Complete)

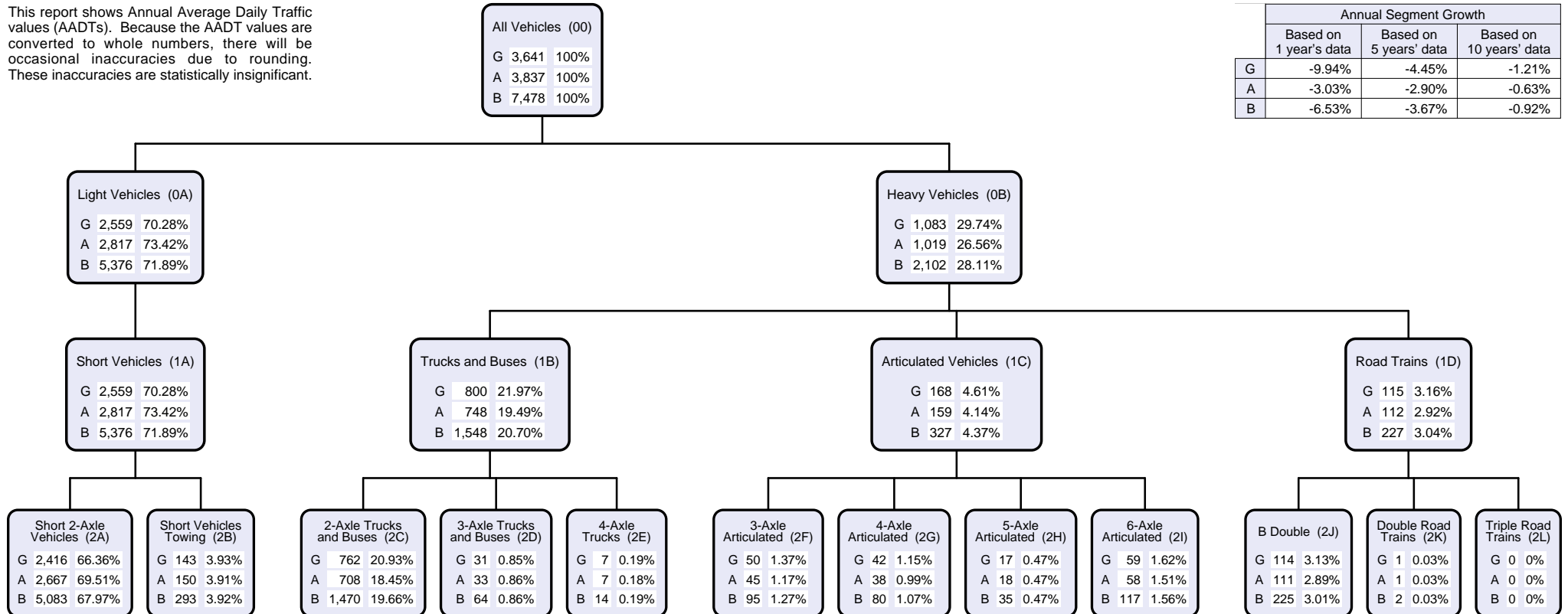
Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

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	-9.94%	-4.45%	-1.21%
A	-3.03%	-2.90%	-0.63%
B	-6.53%	-3.67%	-0.92%

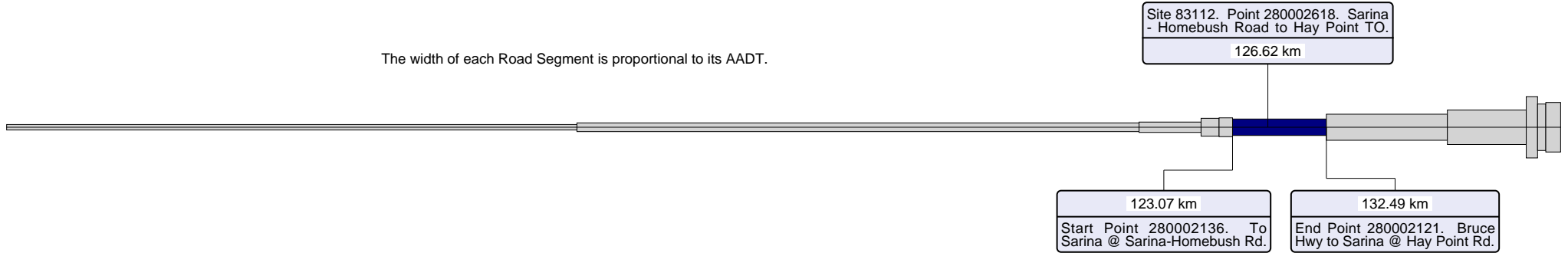




AADT Segment Analysis Report (Complete)

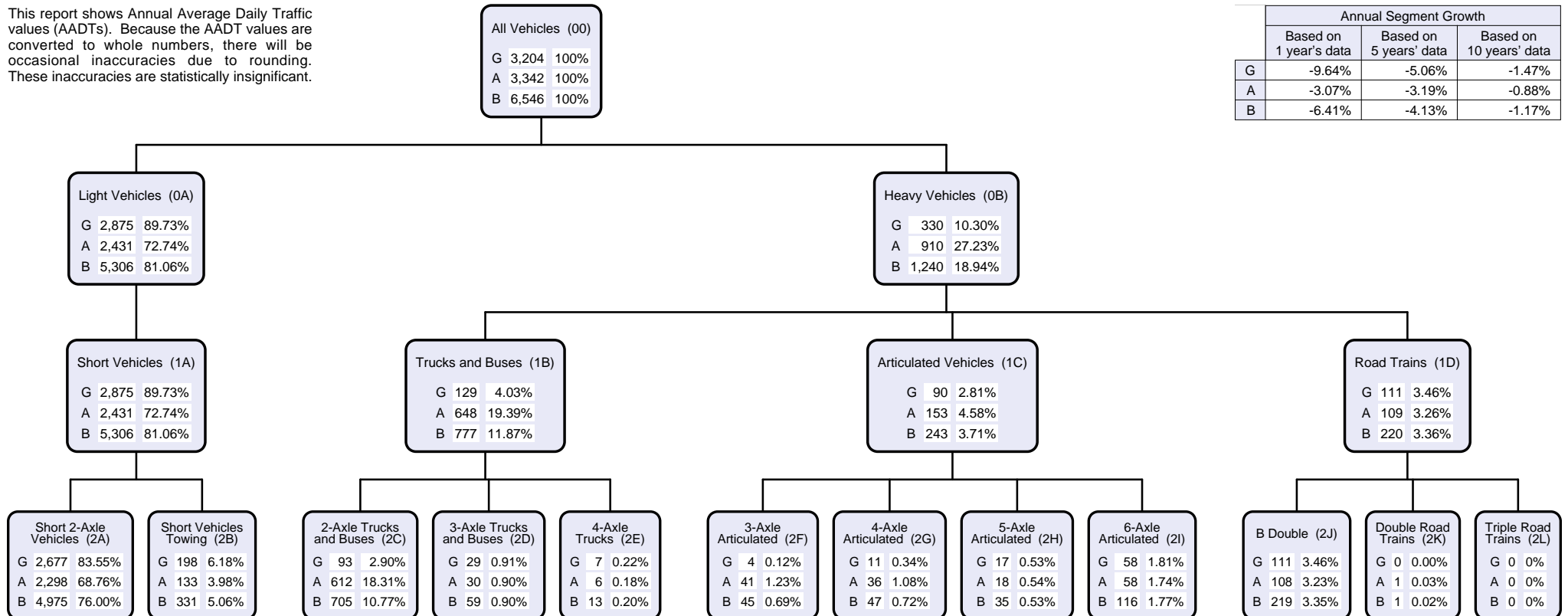
Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

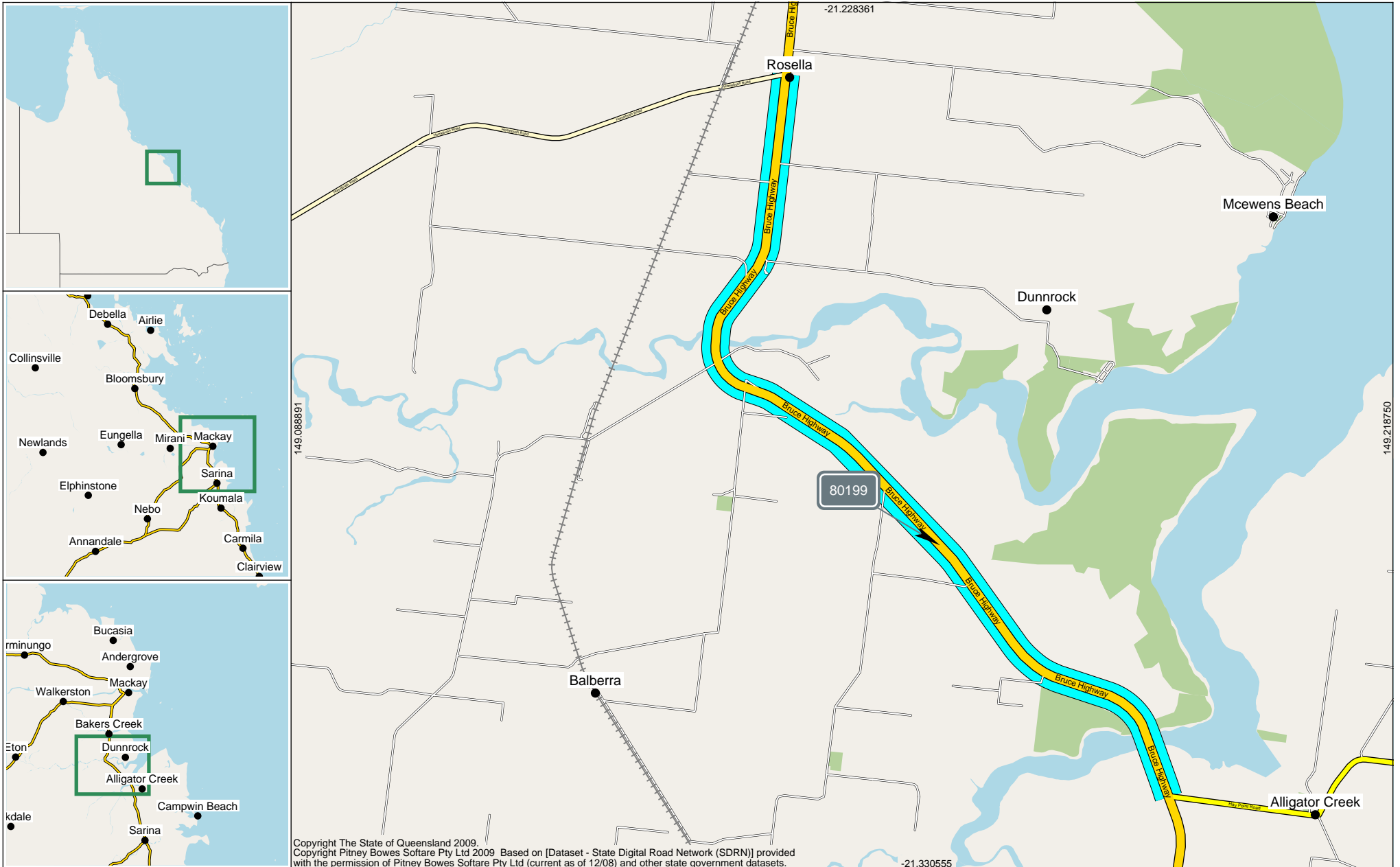
The width of each Road Segment is proportional to its AADT.



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	-9.64%	-5.06%	-1.47%
A	-3.07%	-3.19%	-0.88%
B	-6.41%	-4.13%	-1.17%

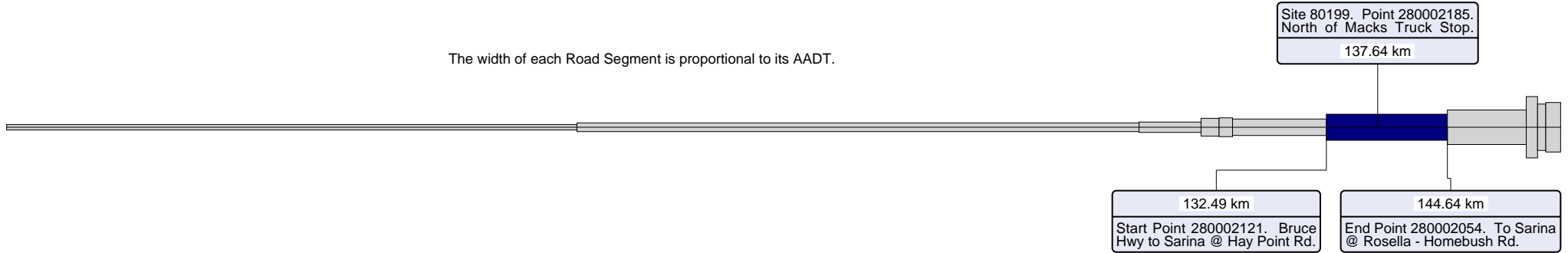




AADT Segment Analysis Report (Complete)

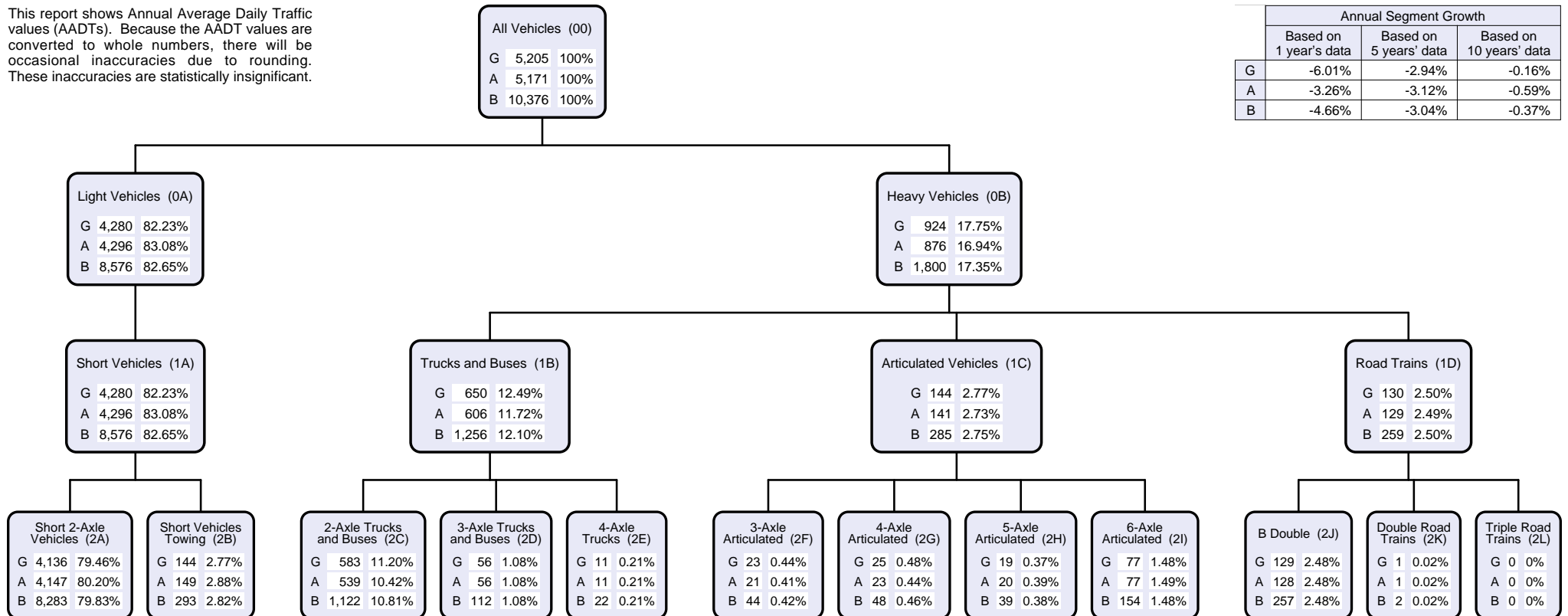
Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

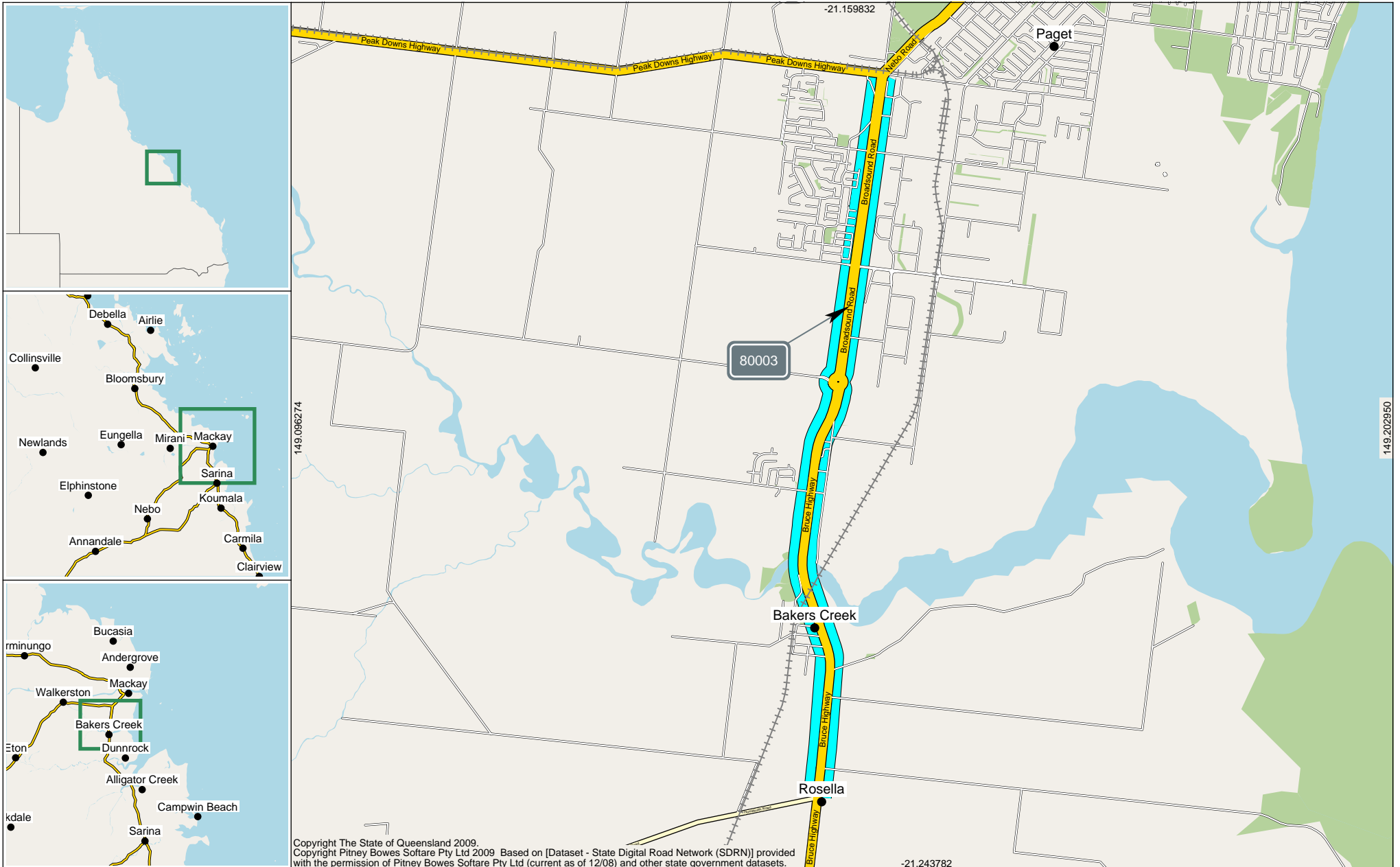
The width of each Road Segment is proportional to its AADT.



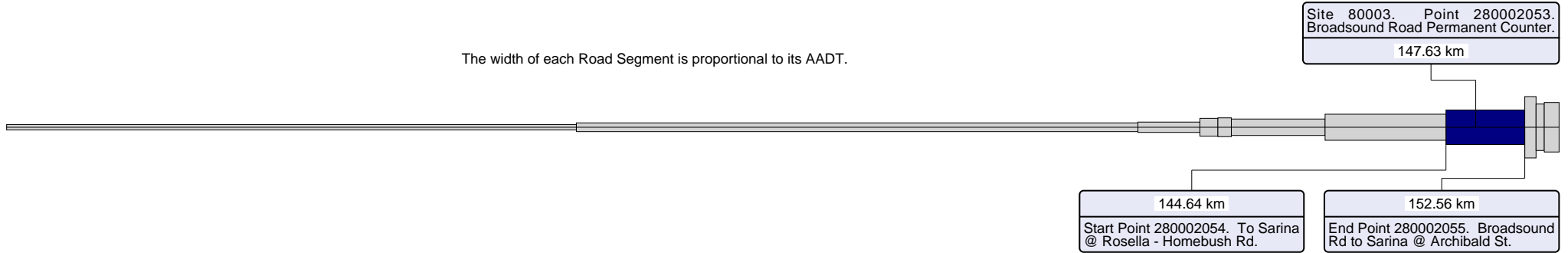
This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

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



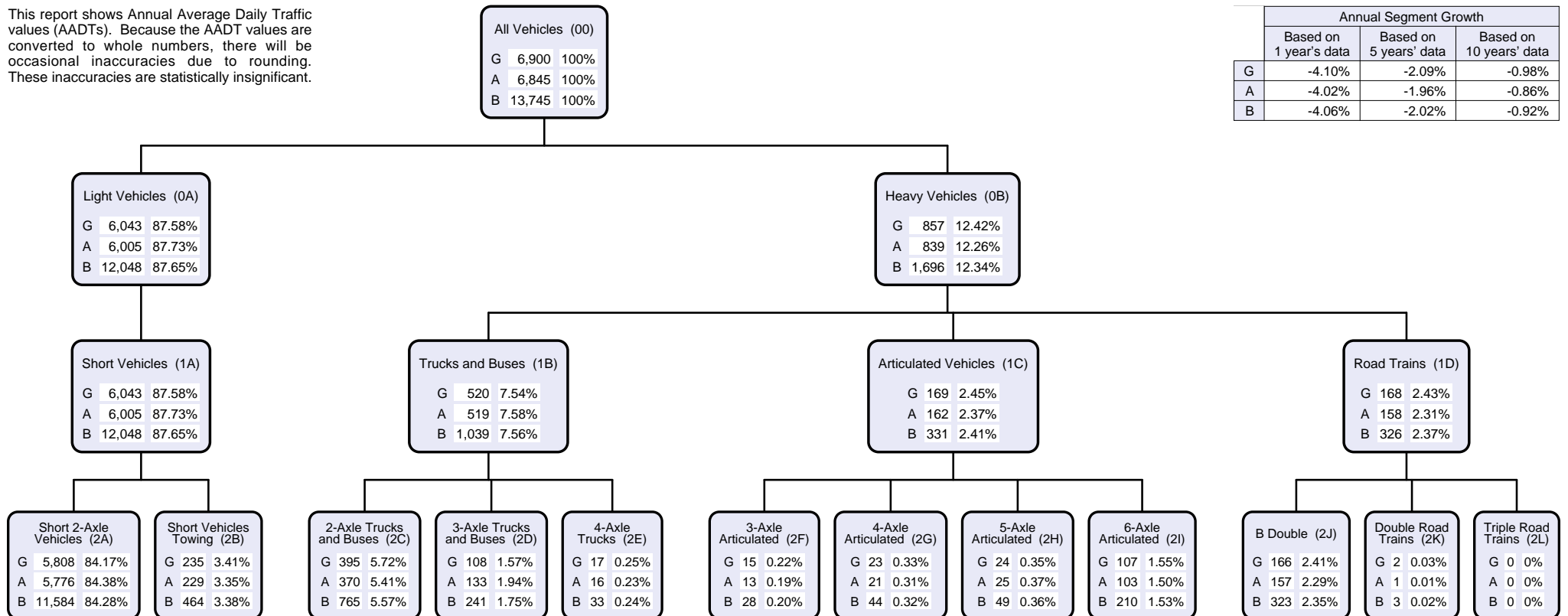


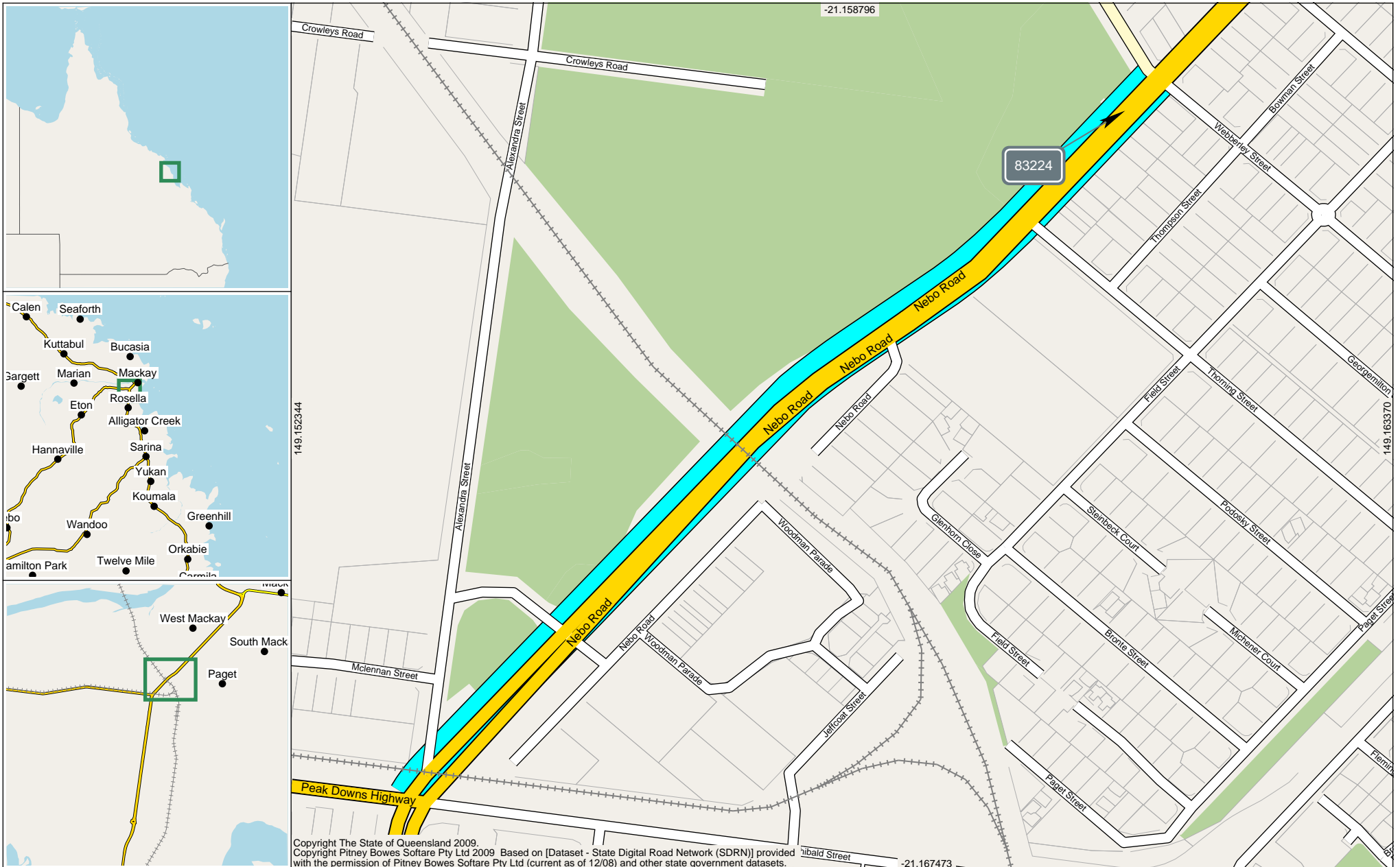
The width of each Road Segment is proportional to its AADT.



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.

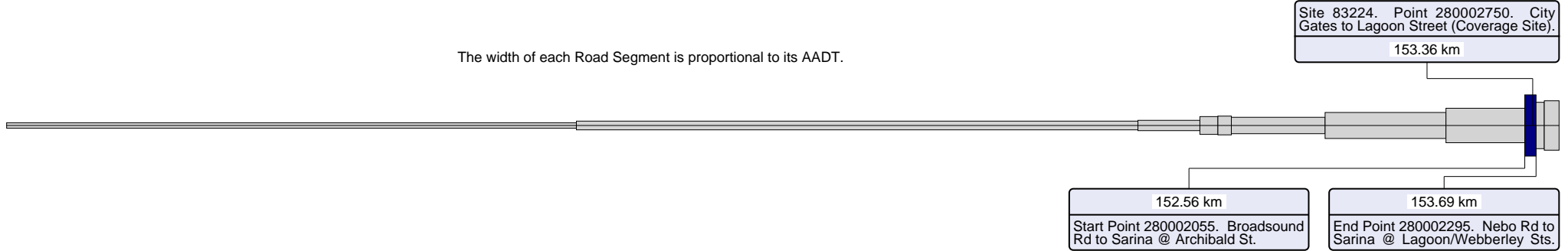
Annual Segment Growth			
	Based on 1 year's data	Based on 5 years' data	Based on 10 years' data
G	-4.10%	-2.09%	-0.98%
A	-4.02%	-1.96%	-0.86%
B	-4.06%	-2.02%	-0.92%





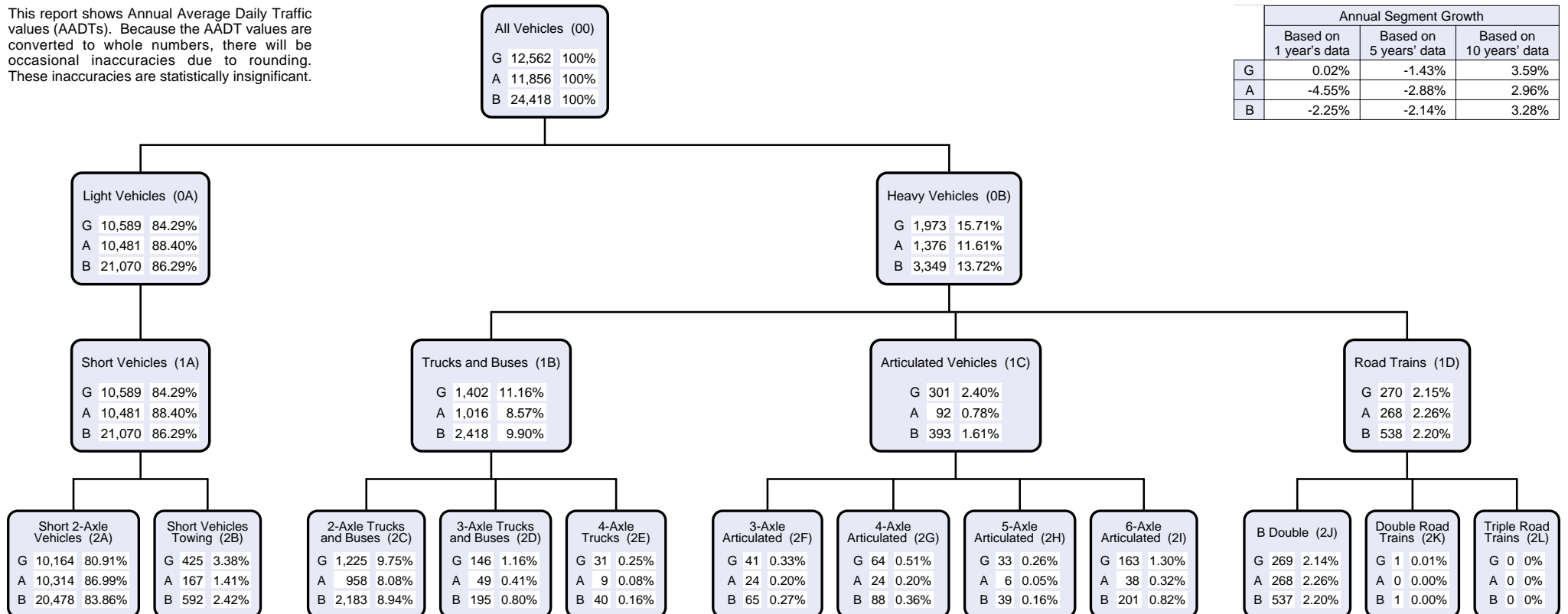
Site 83224. Point 280002750. City Gates to Lagoon Street (Coverage Site).

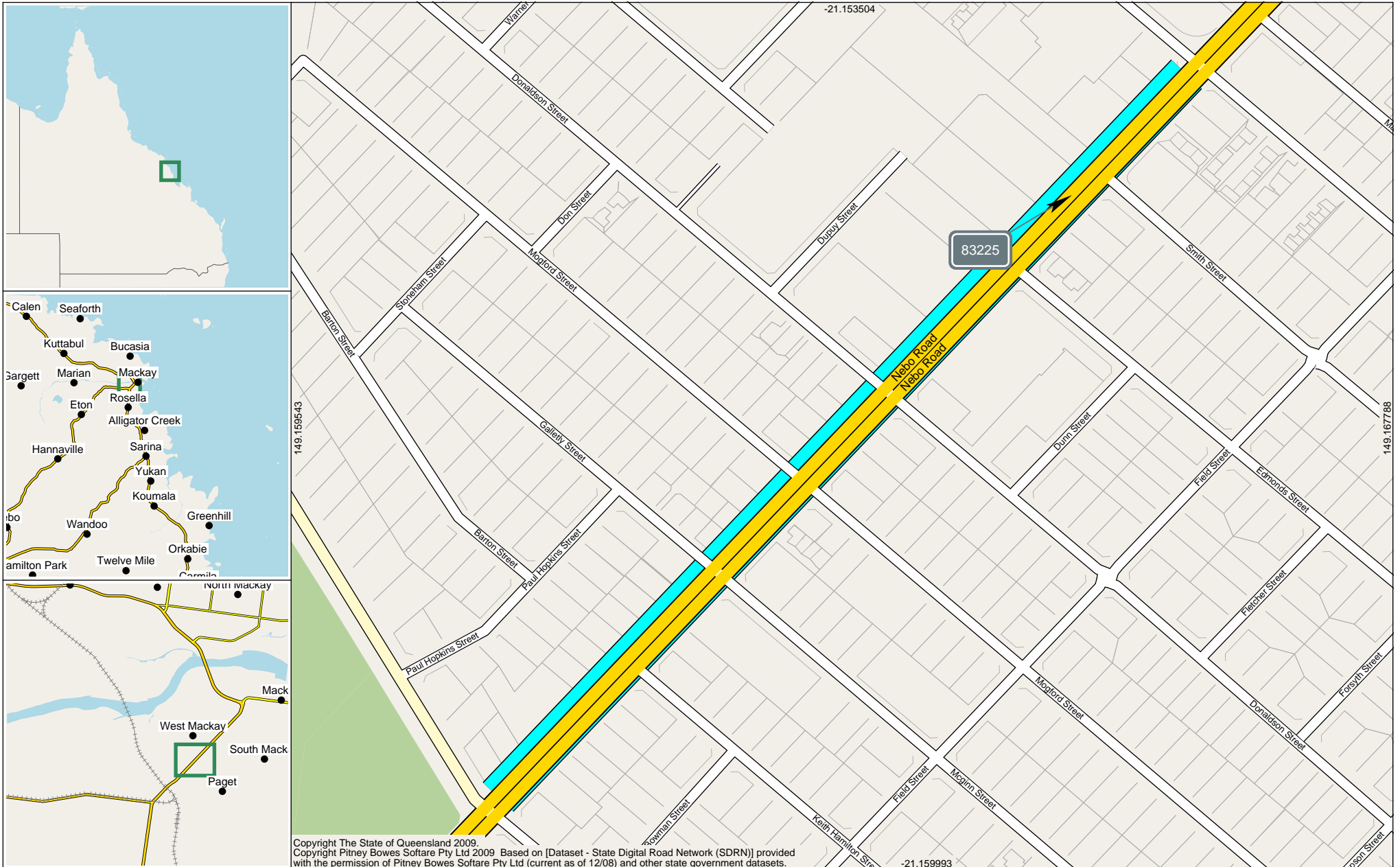
The width of each Road Segment is proportional to its AADT.



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	0.02%	-1.43%	3.59%
A	-4.55%	-2.88%	2.96%
B	-2.25%	-2.14%	3.28%

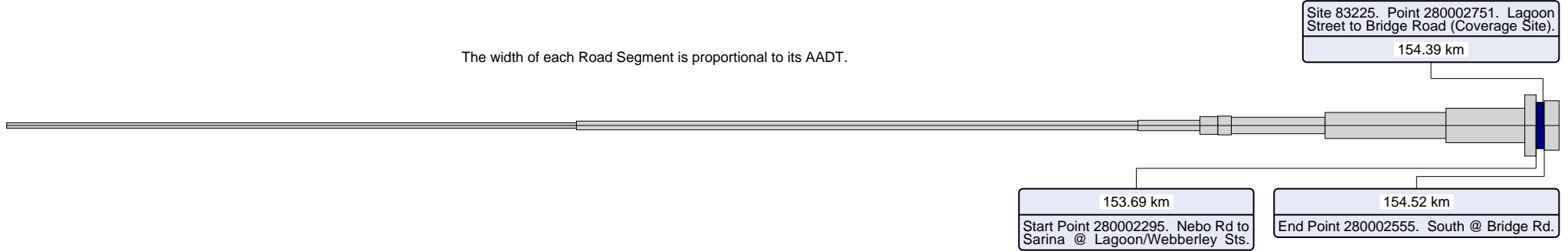




AADT Segment Analysis Report (Complete)

Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

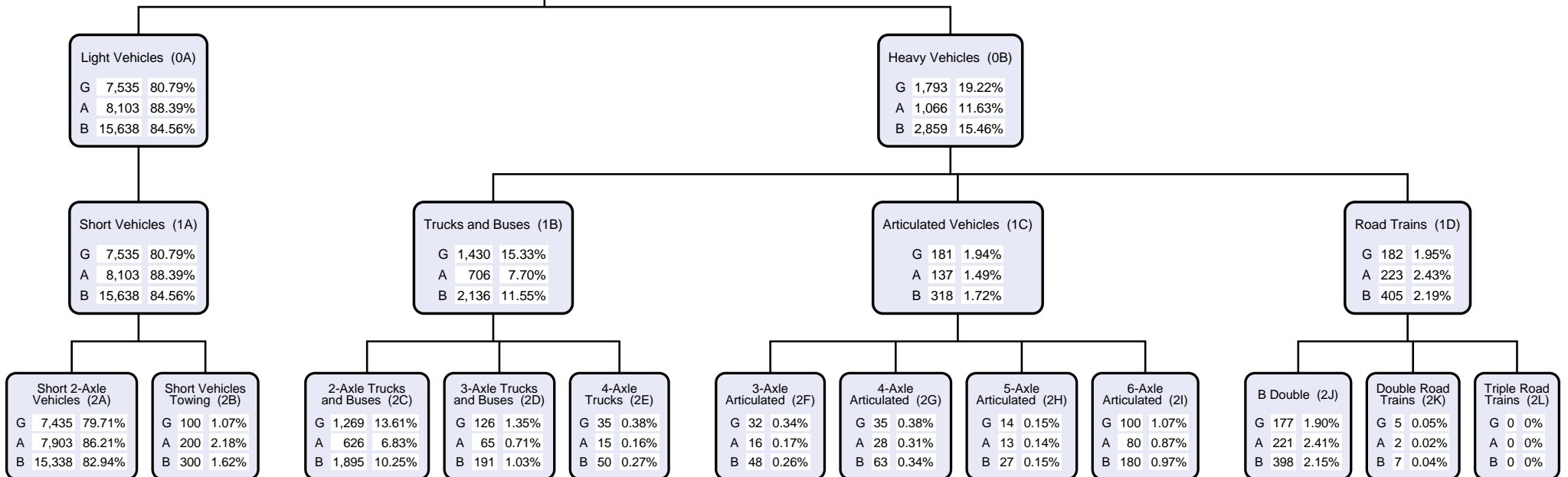
The width of each Road Segment is proportional to its AADT.

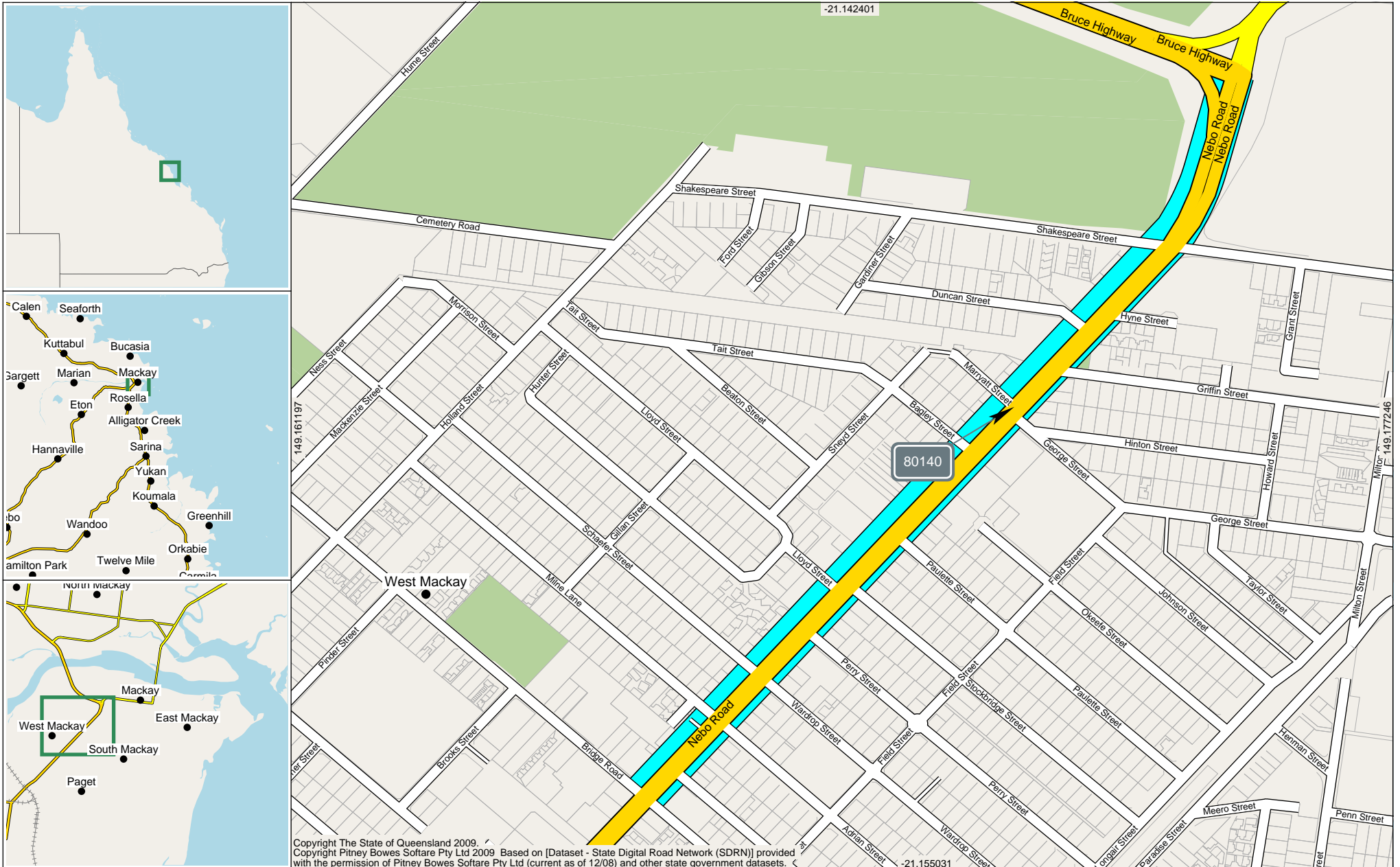


This report shows Annual Average Daily Traffic values (AADTs). Because the AADT values are converted to whole numbers, there will be occasional inaccuracies due to rounding. These inaccuracies are statistically insignificant.

All Vehicles (00)		
G	9,327	100%
A	9,167	100%
B	18,494	100%

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%





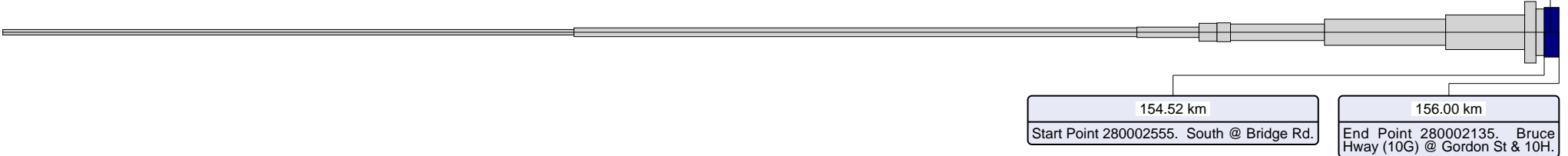
AADT Segment Analysis Report (Complete)

Area 405 - Mackay/Whitsunday District Road Section 10G - BRUCE HIGHWAY (ST. LAWRENCE - MACKAY)
Traffic Year 2016 - Data Collection Year 2016

Site 80140. Point 280002134.
George Street Pedestrian Crossing.

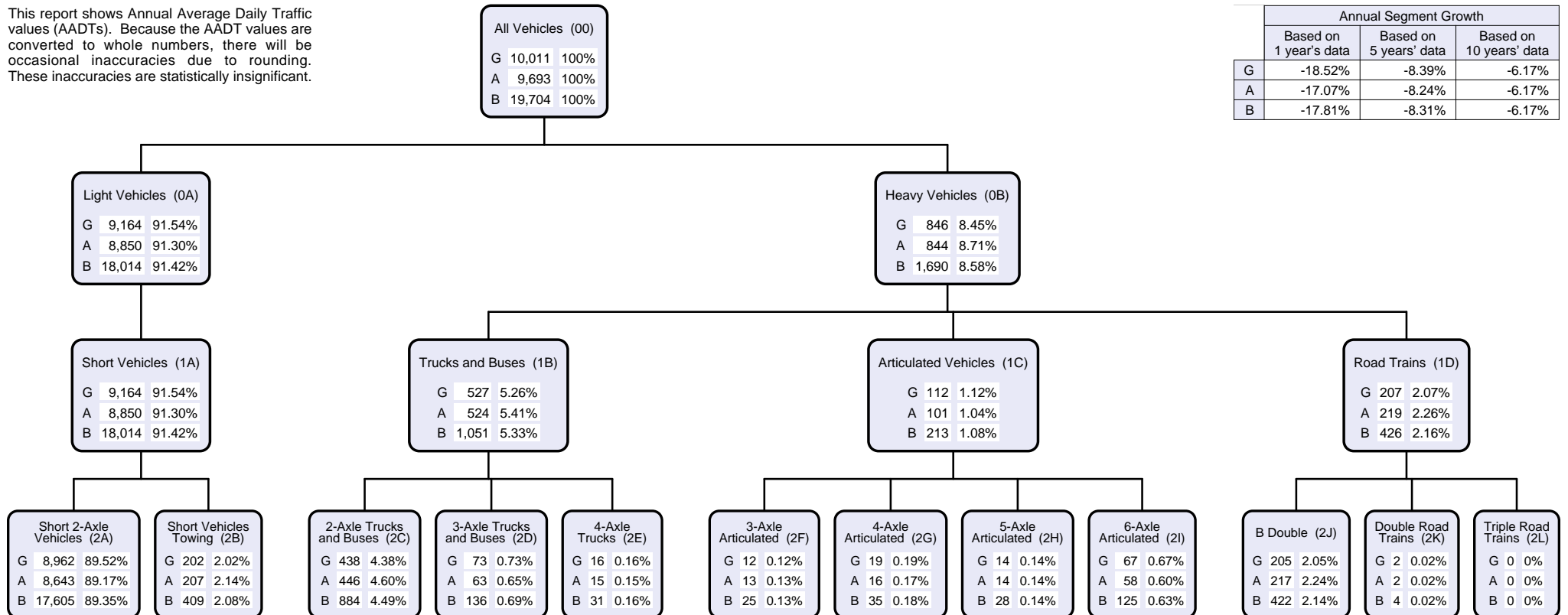
155.13 km

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	-18.52%	-8.39%	-6.17%
A	-17.07%	-8.24%	-6.17%
B	-17.81%	-8.31%	-6.17%



Appendix B

Peak Hour Traffic Flow Diagrams

2020 AM Peak			
Western Access	0 0	↑ ↓	0 214
	← →	↑ ↓	0 220
		↓ ←	214 72
	↑ ←	← ↓	40 60
	↑ ←	← ↓	220 109
			Bruce Hwy
			Eastern Access

2020 PM Peak			
Western Access	0 0	↑ ↓	0 214
	← →	↑ ↓	0 220
		↓ ←	214 40
	↑ ←	← ↓	72 109
	↑ ←	← ↓	220 60
			Bruce Hwy
			Eastern Access

2028 AM Peak			
Western Access	6 9	↑ ↓	58 270
	← →	↑ ↓	87 252
		↓ ←	245 26
	↑ ←	← ↓	22 33
	↑ ←	← ↓	339 38
			Bruce Hwy
			Eastern Access

2028 PM Peak			
Western Access	11 17	↑ ↓	6 267
	← →	↑ ↓	9 252
		↓ ←	245 22
	↑ ←	← ↓	26 38
	↑ ←	← ↓	261 33
			Bruce Hwy
			Eastern Access

2030 AM Peak			
Western Access	42 63	↑ ↓	50 302
	← →	↑ ↓	74 260
		↓ ←	253 50
	↑ ←	← ↓	42 63
	↑ ←	← ↓	334 74
			Bruce Hwy
			Eastern Access

2030 PM Peak			
Western Access	50 74	↑ ↓	42 295
	← →	↑ ↓	63 260
		↓ ←	253 42
	↑ ←	← ↓	50 74
	↑ ←	← ↓	323 63
			Bruce Hwy
			Eastern Access

2038 AM Peak			
Western Access	0 0	↑ ↓	4 289
	← →	↑ ↓	4 292
		↓ ←	284 4
	↑ ←	← ↓	0 0
	↑ ←	← ↓	300 4
			Bruce Hwy
			Eastern Access

2038 PM Peak			
Western Access	4 4	↑ ↓	0 286
	← →	↑ ↓	0 292
		↓ ←	284 0
	↑ ←	← ↓	4 4
	↑ ←	← ↓	295 0
			Bruce Hwy
			Eastern Access

Appendix C

Turn Warrant Assessment

2020 AM Peak			
Western Access	0 0	↑ ↓	0 214
	← →	↑ ↓	220 0
		↑ ↓	214 72
		← →	40 60
		↑ ↓	220 109
			Bruce Hwy
			Eastern Access

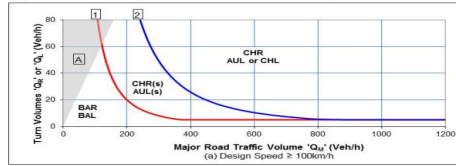
2020 PM Peak			
Western Access	0 0	↑ ↓	0 214
	← →	↑ ↓	220 0
		↑ ↓	214 40
		← →	72 109
		↑ ↓	220 60
			Bruce Hwy
			Eastern Access

2030 AM Peak			
Western Access	42 63	↑ ↓	50 302
	← →	↑ ↓	260 74
		↑ ↓	253 50
		← →	42 63
		↑ ↓	334 74
			Bruce Hwy
			Eastern Access

2030 PM Peak			
Western Access	50 74	↑ ↓	42 295
	← →	↑ ↓	260 63
		↑ ↓	253 42
		← →	50 74
		↑ ↓	323 63
			Bruce Hwy
			Eastern Access

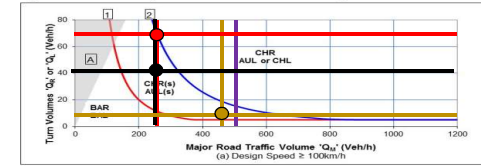
2019 / 2020 AM	Left onto Western Access	Right onto Western Access
Ql/r	0	0
Qm	220	433
Turn Treatment	NA	NA

2019 / 2020 PM	Left onto Western Access	Right onto Western Access
Ql/r	0	0
Qm	220	433
Turn Treatment	NA	NA



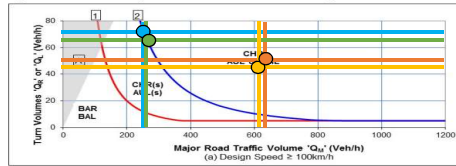
2019 / 2020 AM	Left onto Eastern Access	Right onto Eastern Access
Ql/r	72	109
Qm	214	506
Turn Treatment	AUL	CHR

2019 / 2020 PM	Left onto Eastern Access	Right onto Eastern Access
Ql/r	40	60
Qm	214	473
Turn Treatment	AUL (s)	CHR (s)



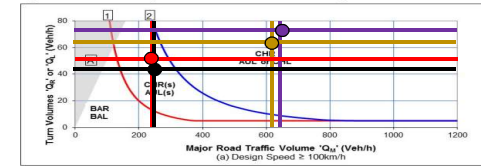
2030 AM	Left onto Western Access	Right onto Western Access
Ql/r	74	50
Qm	260	636
Turn Treatment	AUL	CHR

2030 PM	Left onto Western Access	Right onto Western Access
Ql/r	63	42
Qm	260	617
Turn Treatment	AUL	CHR



2030 AM	Left onto Eastern Access	Right onto Eastern Access
Ql/r	50	74
Qm	253	636
Turn Treatment	AUL (s)	CHR

2030 PM	Left onto Eastern Access	Right onto Eastern Access
Ql/r	42	63
Qm	253	617
Turn Treatment	AUL (s)	CHR



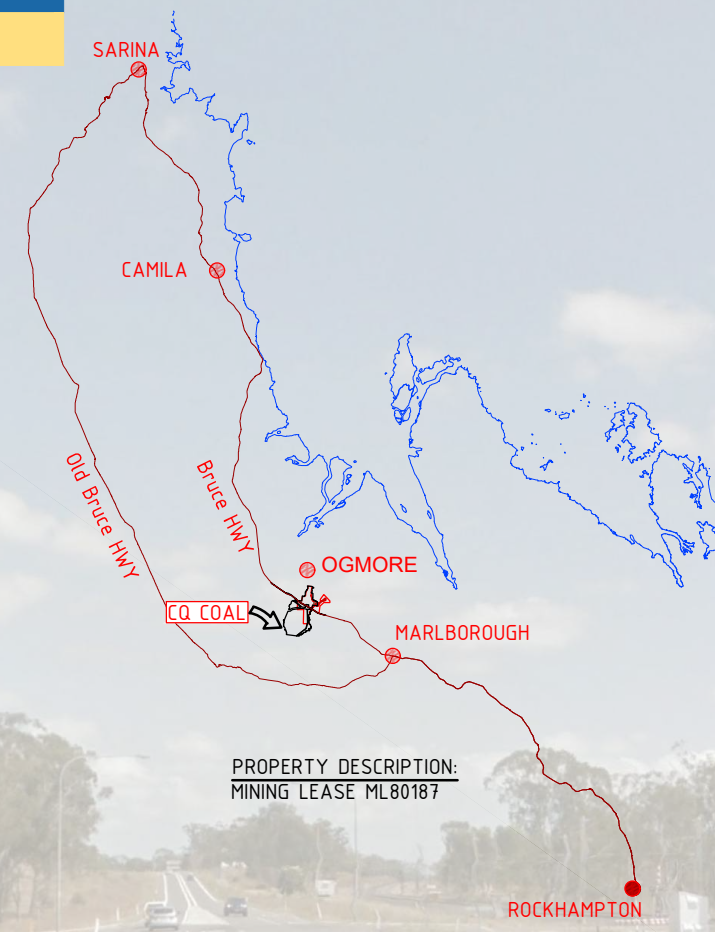
Appendix D

Concept Intersection Design of Eastern Access

CENTRAL QUEENSLAND COAL

DRAWING INDEX

SHEET	DWG NO.	REV	DESCRIPTION
CIVIL WORKS			
1	G1706-02-GA-1	2	SITE PLAN
BRUCE HIGHWAY INTERSECTION			
2	G1706-02-HWY-1	2	EXISTING FEATURES
3	G1706-02-HWY-2	3	GENERAL ARRANGEMENT
4	G1706-02-HWY-3	2	TYPE CROSS SECTION & DETAILS



IMPORTANT NOTICE

1. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH THE CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES UNLESS DIRECTED OTHERWISE. SPECIFICATIONS AND STANDARD DRAWINGS ARE AVAILABLE FROM <http://www.cmdg.com.au/>.
2. THE CONTRACTOR MUST AT ALL TIMES ADOPT 'SAFE' WORK PRACTICES, CONSTRUCTION TECHNIQUES & MUST ENSURE THAT THE SITE IS ALWAYS MANAGED IN A MANNER THAT ENSURES THE SAFETY & WELL BEING OF PROPERTY, ENVIRONMENT & PERSONNEL AND OTHERS ENTERING THE SITE & ADJACENT TO THE SITE. A 'ZERO HARM' POLICY IS REQUIRED TO BE ENFORCED AT ALL TIMES.
3. THESE DRAWINGS HAVE BEEN PREPARED FOR THE EXPRESS USE BY CENTRAL QUEENSLAND COAL FOR THE CONSTRUCTION OF THE CENTRAL QUEENSLAND COAL MINE CIVIL WORKS. THEY ARE NOT INTENDED TO BE USED FOR ANY OTHER PURPOSE WHATSOEVER.
4. AUSTRALIAN MINING ENGINEERING CONSULTANTS PTY LTD ACCEPTS NO RESPONSIBILITY WHATSOEVER FOR ANY LOSS OR DAMAGE SUFFERED HOWSOEVER ARISING TO ANY PERSON OR CORPORATION WHO MAY RELY ON OR USE THESE DRAWINGS IN CONTRAVENTION OF THE TERMS OF ANY NOTES SHOWN ON THIS SET OF DRAWINGS.
5. THESE NOTES FORM AN INTEGRAL PART OF THIS SET OF DRAWINGS.
6. SAFETY IN DESIGN INFORMATION. THE CONTRACTOR IS ADVISED THAT THERE MAY BE ADDITIONAL HAZARDS/RISKS NOT NORMALLY ASSOCIATED OR INFERRED WITH THE TYPE OF WORKS DETAILED ON THESE DRAWINGS.

EXISTING LEVELS AND SERVICES

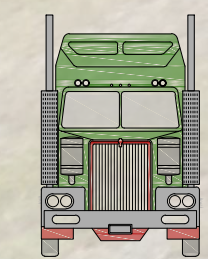
1. NO WORK IS TO BE STARTED WITHIN 3m OF EXISTING SERVICES PRIOR TO NOTIFYING THE RELEVANT SERVICE AUTHORITY. DETAILS OF EXISTING SERVICES INCLUDING LOCATIONS POSITION AND LEVEL THAT HAVE ALREADY BEEN DETERMINED ARE SHOWN ON THE DRAWINGS. PRIOR TO COMMENCING CONSTRUCTION WORKS THE CONTRACTOR SHALL OBTAIN THE NECESSARY SERVICE DETAILS FROM 'DIAL BEFORE YOU DIG' AND THE SERVICE AUTHORITY FOR ALL SERVICES SHOWN ON THE DRAWINGS AND ANY OTHERS STILL TO BE LOCATED. CONNECTION TO EXISTING SERVICES SHALL BE CARRIED OUT BY THE RELEVANT SERVICE AUTHORITY UNLESS AUTHORIZED OTHERWISE BY THE AUTHORITY. ANY WORKS WITHIN THE VICINITY OF EXISTING SERVICES INCLUDING ANY REQUIREMENTS FOR PROTECTION WORKS TO THE SERVICES SHALL BE CARRIED OUT IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS AND AS DIRECTED BY THE SERVICE AUTHORITY.
2. THE CONTRACTOR MUST VERIFY THAT THE EXISTING LEVELS AT POINTS WHERE CONNECTIONS TO EXISTING INFRASTRUCTURE ARE REQUIRED ARE AS PER THIS DESIGN. ANY DIFFERENCES TO BE NOTIFIED TO THE ENGINEER PRIOR TO ORDERING MATERIALS OR COMMENCING ANY WORKS.
3. PRIOR TO COMMENCING WORKS THE CONTRACTOR MUST VERIFY LOCATION AND DETAILS OF ALL EXISTING SERVICE CONNECTIONS TO NEW ALLOTMENTS PREVIOUSLY INSTALLED BY OTHERS

ENVIRONMENTAL MANAGEMENT

1. THE CONTRACTOR IS DEEMED TO BE FAMILIAR WITH THE CURRENT ENVIRONMENTAL LAWS AND HIS LEGAL RESPONSIBILITIES AND LIABILITIES UNDER THE LAWS.
2. THE CONTRACTOR IS DEEMED TO BE RESPONSIBLE FOR THE ENVIRONMENTAL MANAGEMENT OF THE SITE FOR THE DURATION OF THE CONTRACT AND IS RESPONSIBLE FOR ANY BREACHES TO THE LAWS.
3. THE CONTRACTOR MUST HAVE AND MAINTAIN IN FORCE AN ENVIRONMENTAL PLAN FOR THE DURATION OF THE CONTRACT WHICH SHALL INCORPORATE BUT NOT BE LIMITED TO ANY SEDIMENT AND EROSION CONTROL REQUIREMENTS INCLUDED IN THE CONTRACT DOCUMENTATION.
4. ENVIRONMENTAL LAW REQUIRES THE CONTRACTOR TO EXERCISE DUE DILIGENCE IN PREVENTING THE OPERATIONS OF HIS PERSONEL AND OTHERS WHO ENTER THE SITE WITH OR WITHOUT HIS PERMISSION FROM BREACHING ENVIRONMENTAL LAWS.
5. ANY BREACH TO THE LAWS MUST BE REPORTED TO THE APPROPRIATE AUTHORITIES AS SOON AS POSSIBLE.

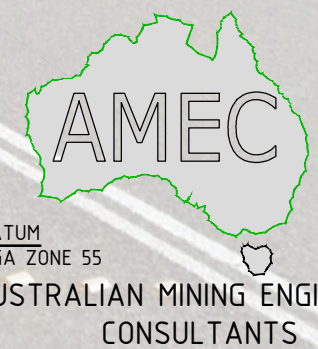
STANDARD DRAWINGS

1. UNLESS NOTED OTHERWISE REFERENCES TO STANDARD DRAWINGS "STD DWG" ARE CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES (CMDG) STANDARD DRAWINGS OR TRANSPORT MAIN ROADS (TMR) STANDARD DRAWINGS.



BRUCE HIGHWAY INTERSECTION

JOB NO. G1706/02



DATUM
MGA ZONE 55

AUSTRALIAN MINING ENGINEERING
CONSULTANTS

E:\Jobs Current\Styx (G1706-02)\ACAD\Production\G1706-02-HWY0 (HWY Intersection Cover).dwg, 00, 31/07/2018 12:32:16 PM

FIRST ISSUE 180720

FIRST ISSUE 180720

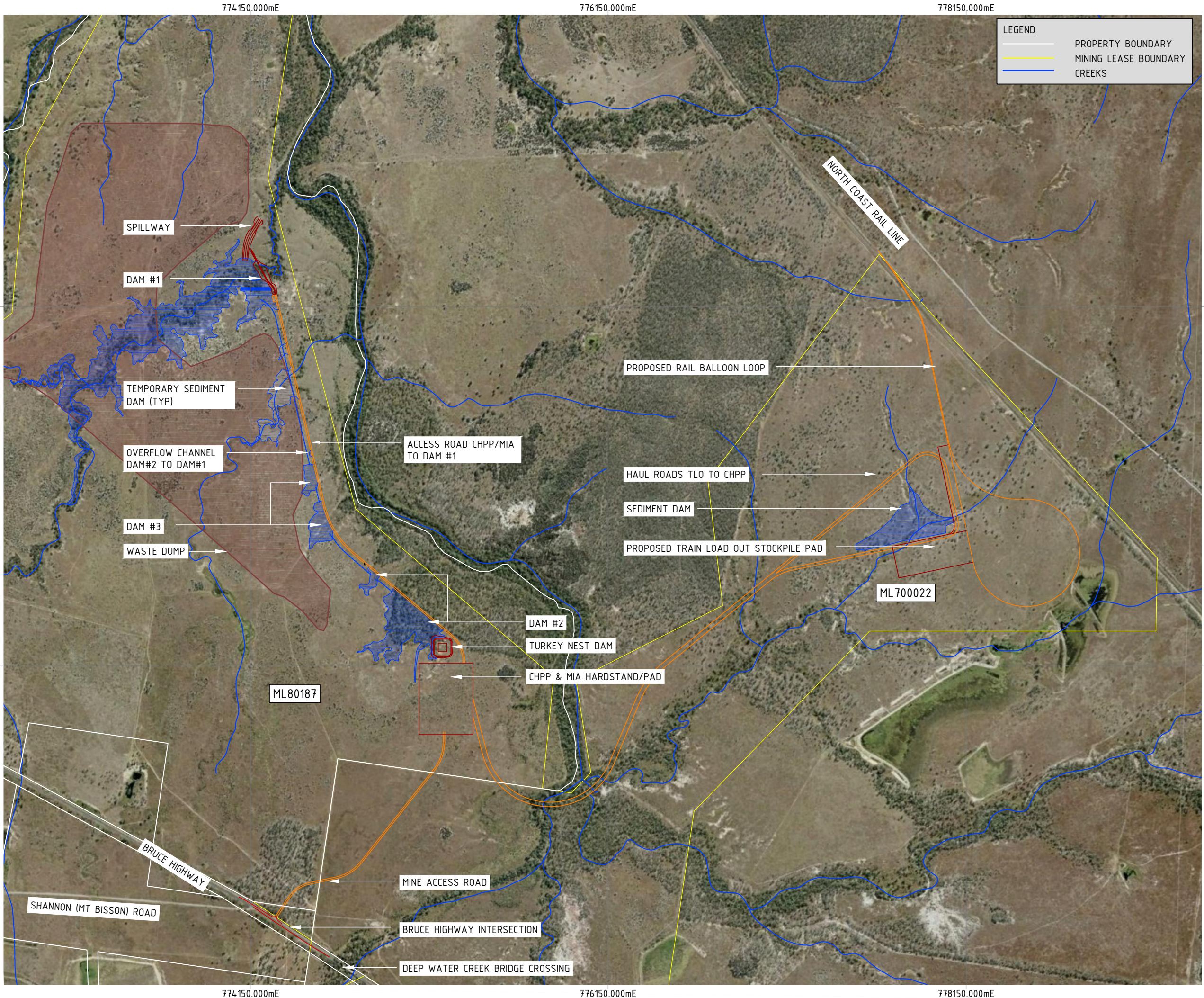
FIRST ISSUE 180720

FIRST ISSUE 180720

G1706-02-AR-0
FIRST ISSUE 180720

INDEX DRAWINGS

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DO NOT SCALE OFF DRAWING
DIMENSIONS METERS UNO



SURVEY DATUM MGA55



COX ANDREWS ENGINEERS PTL
CONSULTING ENGINEERS
ACN 054 355 252
email: adslu3d8@tpg.com.au

NOT FOR CONSTRUCTION

AMENDMENTS			
ISSUE	DATE	SUBJECT	AUTHORISED
1	19/04/18	FIRST ISSUE	GK
2	29/06/18	UPDATED POST TMR	GK

XREF FILES	
DRAWING NO.	TITLE
G1706-02-BASE	BASE PLAN

DRAWN ASC DATE 22/07/17

DESIGN ASC DATE 22/07/17



AUSTRALIAN MINING ENGINEERING CONSULTANTS
PH: 4954 9429
MOB: 0417187149
EMAIL: amec1@bigpond.net.au
MACKAY

RPEQ 4321 AUTHORIZED FOR ISSUE DATE 23/07/17

CENTRAL QUEENSLAND COAL PTL
CENTRAL QUEENSLAND COAL PROJECT
CIVIL WORKS
SITE PLAN

FILE NO G1706-02-GA1.DWG

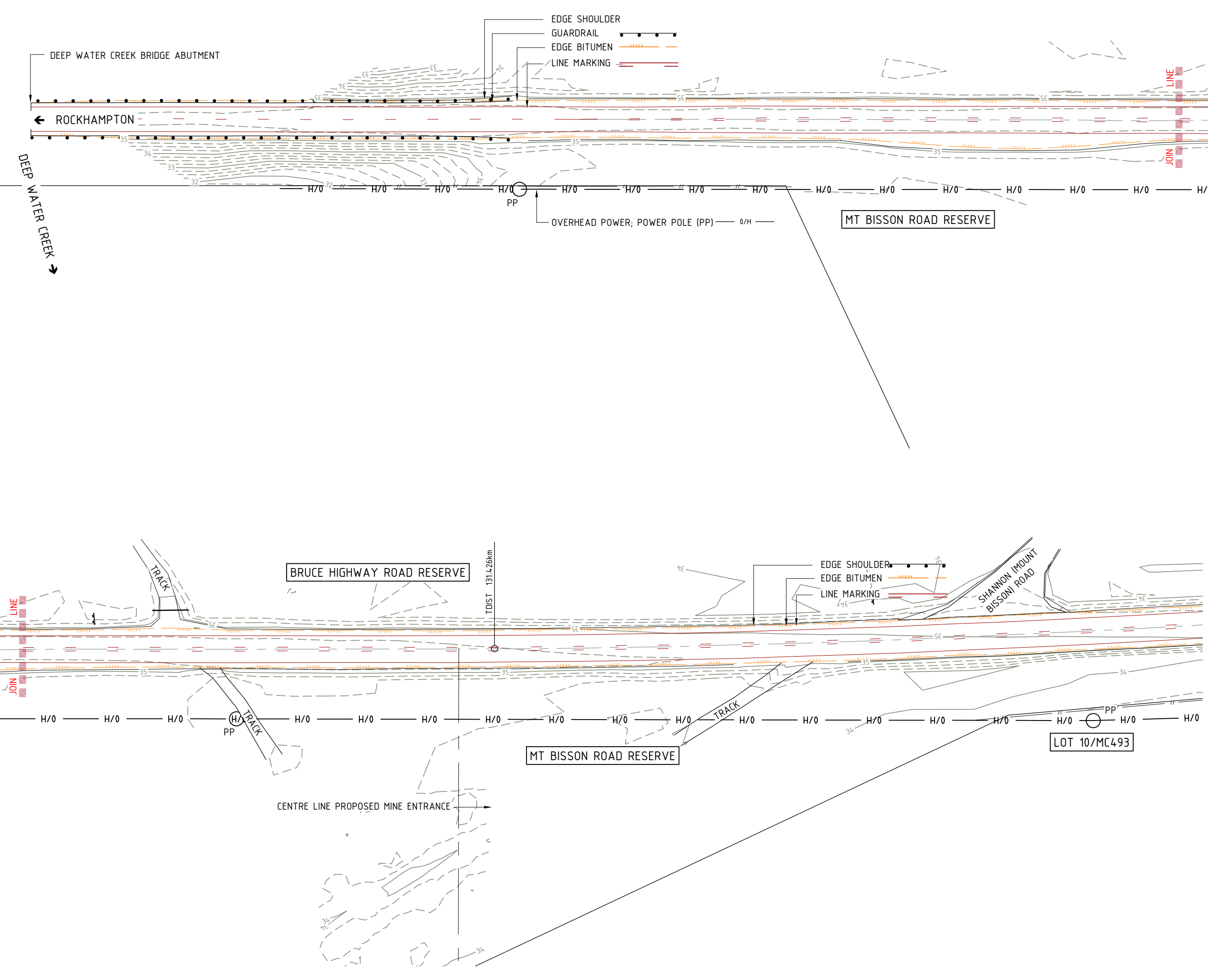
JOB NO G1706/02

SCALE 0 1:20000 HORZ. 400 AT A3 SIZE

DRAWING NUMBER G1706-02-GA-1 ISSUE SHEET NO 2 1

PRINT IN COLOUR

E:\Jobs Current\Six (G1706-02)\ACAD\Production\G1706-02-HWY1 (HWY Intersection Exist Features).dwg, HWY1-2, 31/07/2018 12:32:22 PM



DO NOT SCALE OFF DRAWING
DIMENSIONS METERS UNO



CSG

capricorn survey group (cq)
capricorn survey group (cq) pit
250 quay street, rockhampton
ph: 0749275199
email: reception@csqcq.com.au
SURVEY ON MGA ZONE 55
(GROUND) VIDE PSM134485;
CONTOURS 0.25m EXIST.
SURFACE



COX ANDREWS ENGINEERS PTL
CONSULTING ENGINEERS
ACN 054 355 252
email: adslu3d8@tpg.com.au

FIRST ISSUE

AMENDMENTS		
ISSUE	DATE	SUBJECT
1	16/05/18	FIRST ISSUE
2	29/06/18	UPDATED POST TMR

XREF FILES	
DRAWING NO.	TITLE
G1706-02-BASE	BASE PLAN

DRAWN ASC DATE 22/07/17
DESIGN ASC DATE 22/07/17



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AUSTRALIAN MINING ENGINEERING CONSULTANTS
PH: 4954 9429
MOB: 0417187149
EMAIL: amec1@bigpond.net.au
MACKAY

RPEQ 4321 AUTHORIZED FOR ISSUE DATE 23/07/17

CENTRAL QUEENSLAND COAL PTL
CENTRAL QUEENSLAND COAL PROJECT
CIVIL WORKS
BRUCE HIGHWAY INTERSECTION
EXISTING FEATURES

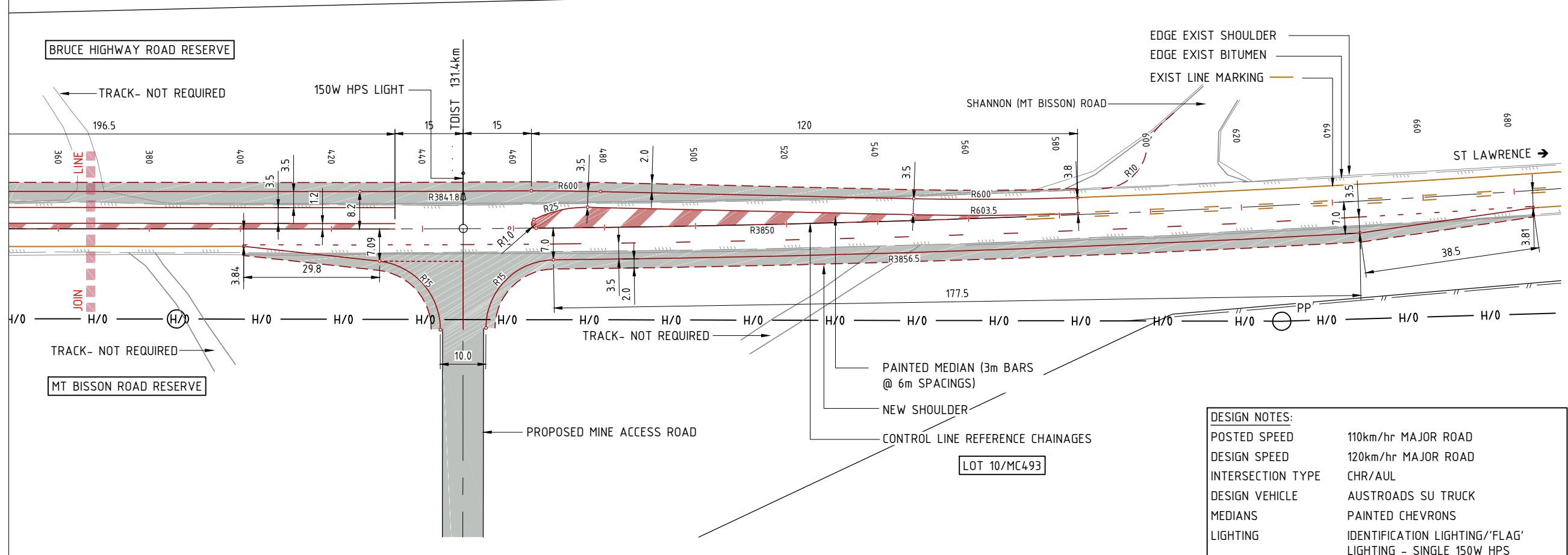
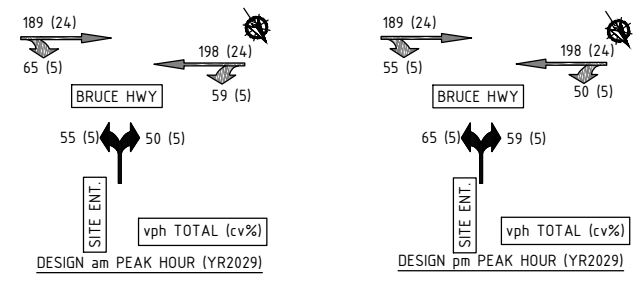
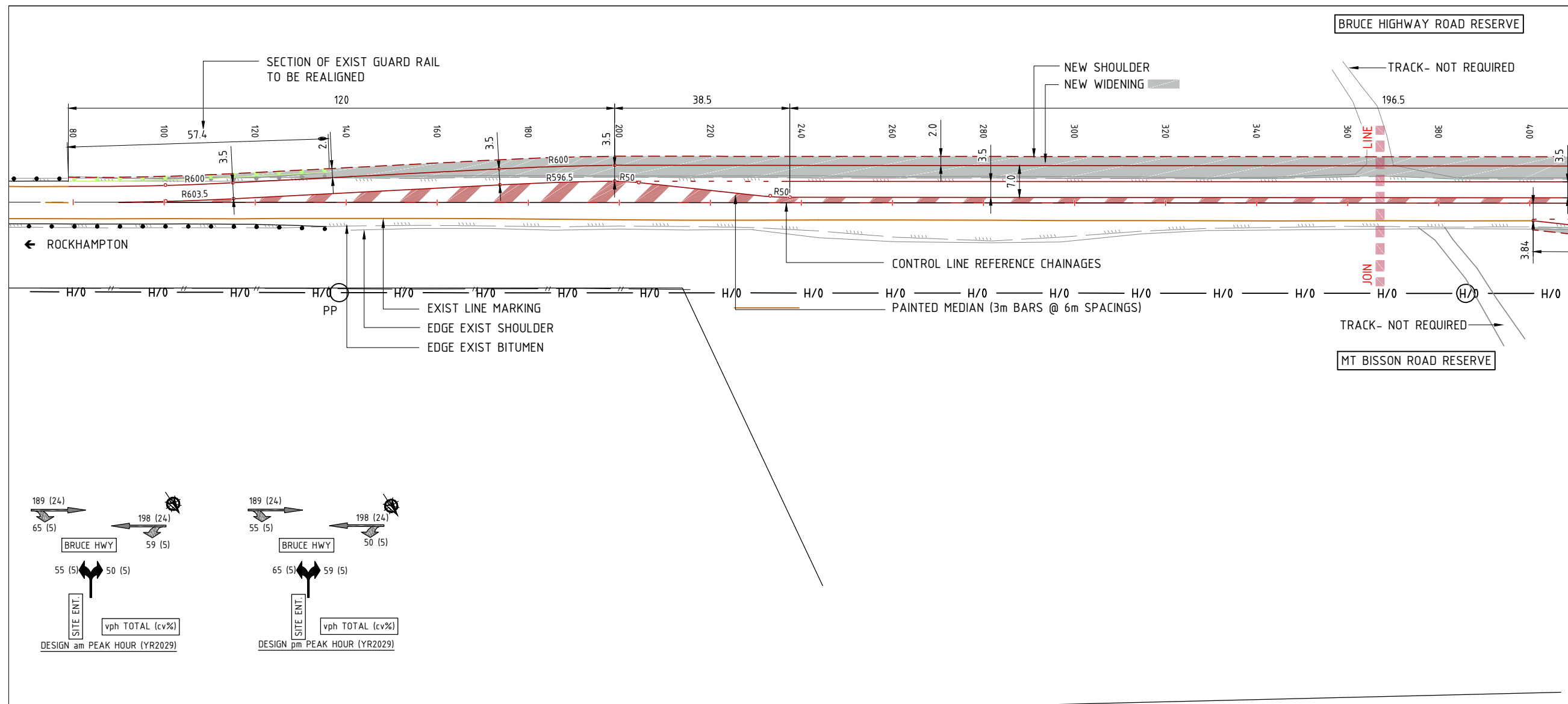
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DRAWING NUMBER G1706-02-HWY-1 ISSUE SHEET NO 2 2

PRINT IN COLOUR

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DESIGN NOTES:

POSTED SPEED	110km/hr MAJOR ROAD
DESIGN SPEED	120km/hr MAJOR ROAD
INTERSECTION TYPE	CHR/AUL
DESIGN VEHICLE	AUSTROADS SU TRUCK
MEDIANS	PAINTED CHEVRONS
LIGHTING	IDENTIFICATION LIGHTING/'FLAG' LIGHTING - SINGLE 150W HPS

DO NOT SCALE OFF DRAWING
DIMENSIONS METERS UNO

CSG
capricorn survey group (cq)
capricorn survey group (cq) pit
250 quay street, rockhampton
ph: 0749275199
email: reception@csgcq.com.au

SURVEY ON MGA ZONE 55
(GROUND) VIDE PSM134485;
CONTOURS 0.25m EXIST.
SURFACE

COX ANDREWS ENGINEERS PTL
CONSULTING ENGINEERS
ACN 054 355 252
email: adslu3d8@tpg.com.au

FIRST ISSUE

AMENDMENTS

ISSUE	DATE	SUBJECT	AUTHORISED
1	16/05/18	FIRST ISSUE	GK
2	29/06/18	UPDATED POST TMR	GK
3	11/07/18	UPDATED FOR 120kph DESIGN	GK

XREF FILES

DRAWING NO.	TITLE
G1706-02-BASE	BASE PLAN

DRAWN	ASC	DATE	22/07/17
DESIGN	ASC	DATE	22/07/17

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AUSTRALIAN MINING ENGINEERING CONSULTANTS
PH: 4954 9429
MOB: 0417187149
EMAIL: amec1@bigpond.net.au
MACKAY

RPEQ 4321
AUTHORISED FOR ISSUE

DATE 23/07/17

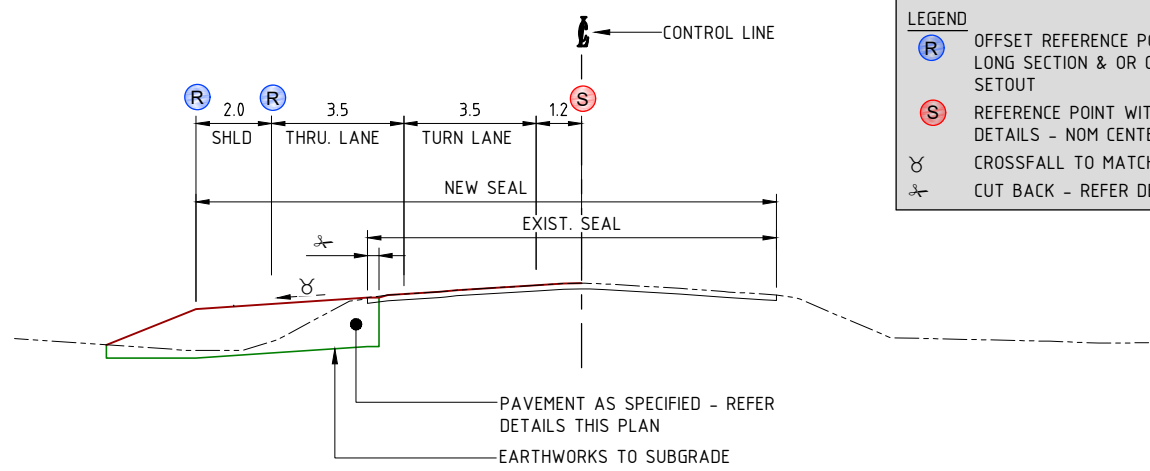
CENTRAL QUEENSLAND COAL PTL
CENTRAL QUEENSLAND COAL PROJECT
CIVIL WORKS
BRUCE HIGHWAY INTERSECTION
GENERAL ARRANGEMENT

FILE NO	G1706-02-HWY2.DWG
JOB NO	G1706/02
SCALE	0 1:1000 HORZ. 20 AT A3 SIZE
DRAWING NUMBER	G1706-02-HWY-2
ISSUE SHEET NO	3 3

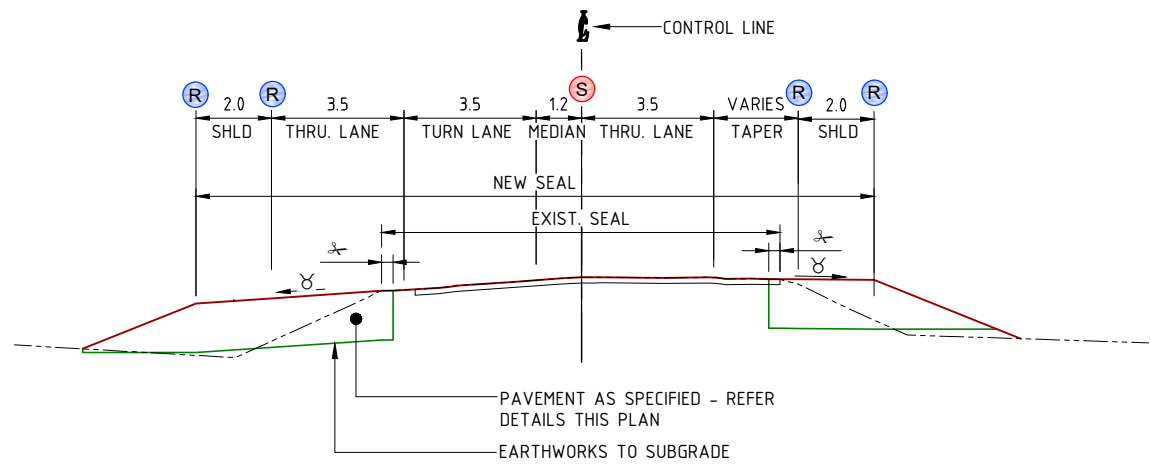
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LEGEND

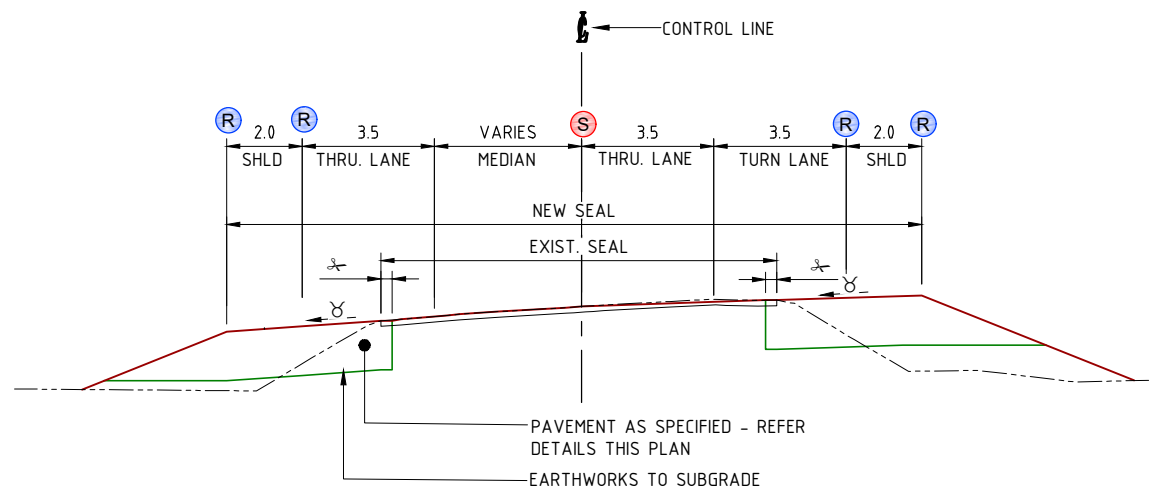
- R OFFSET REFERENCE POINT INCLUDED WITH LONG SECTION & OR CROSS SECTION DATA SETOUT
- S REFERENCE POINT WITH ALIGNMENT SETOUT DETAILS - NOM CENTER LINE
- γ CROSSFALL TO MATCH EXIST
- \times CUT BACK - REFER DETAIL THIS PLAN



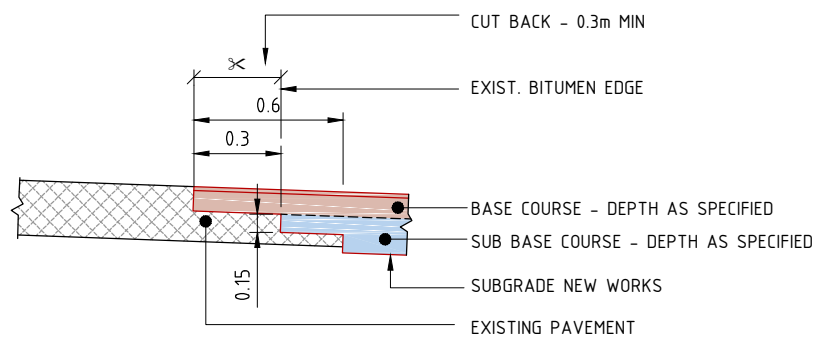
TYPICAL ROAD CROSS SECTION CH200



TYPICAL ROAD CROSS SECTION CH270



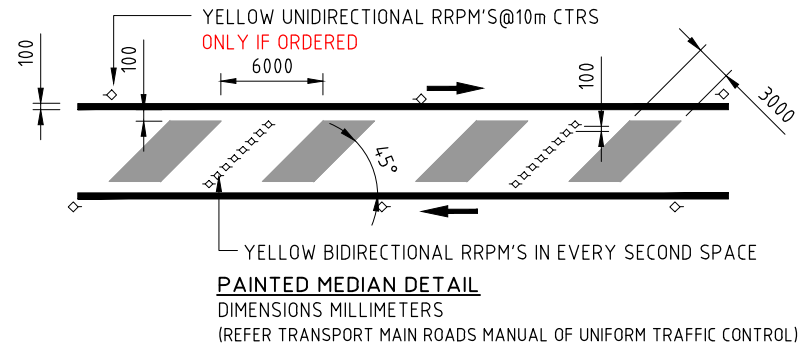
TYPICAL ROAD CROSS SECTION CH340



TYPICAL PAVEMENT CUTBACK & JOINT DETAILS

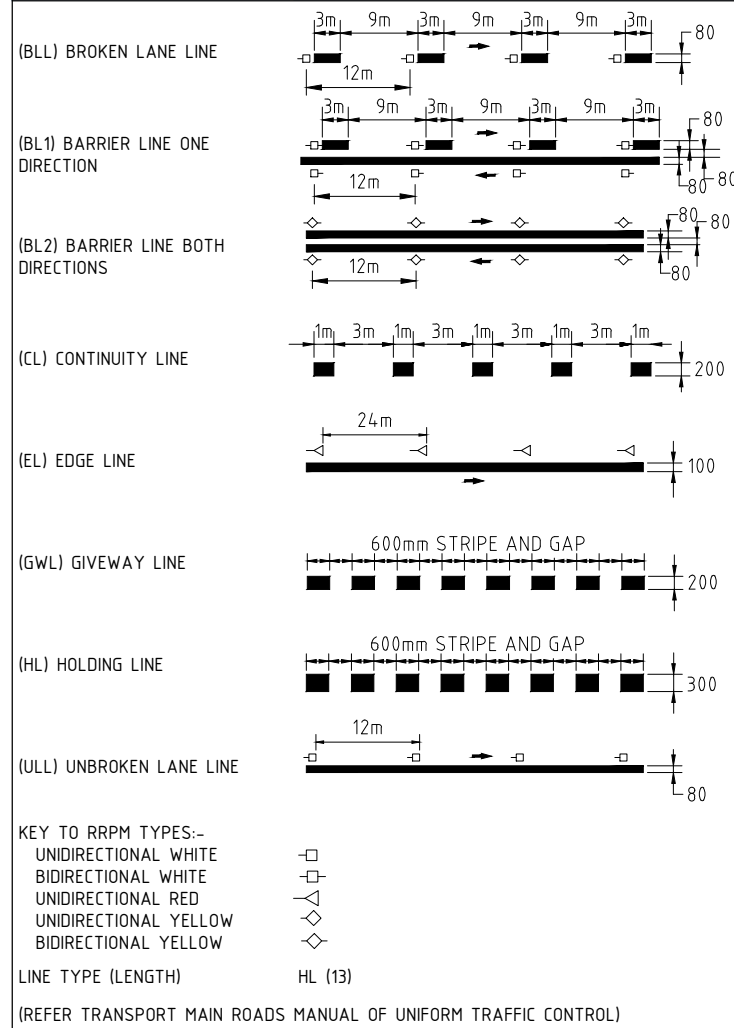
PAVEMENT DETAILS:

DESIGN SUBGRADE STRENGTH 3%
 DESIGN TRAFFIC 1×10^7 ESA
 2-COAT BITUMEN SEAL
 BASE COURSE 160mm COMPACTED DEPTH TYPE 2.1 GRAVEL;
 SUB-BASE(1) COURSE 240mm COMPACTED DEPTH TYPE 2.3 GRAVEL;
 SUB-BASE(2) COURSE 250mm COMPACTED DEPTH TYPE 2.5 GRAVEL CBR 15%
 INITIALLY BOX OUT 650mm TOTAL DEPTH



PAINTED MEDIAN DETAIL
 DIMENSIONS MILLIMETERS
 (REFER TRANSPORT MAIN ROADS MANUAL OF UNIFORM TRAFFIC CONTROL)

LINE MARKING DETAILS



DO NOT SCALE OFF DRAWING
 DIMENSIONS METERS UNO

CSG

capricorn survey group (cq)
 capricorn survey group (cq) pit
 250 quay street, rockhampton
 ph: 0749275199
 email: reception@csgcq.com.au
 SURVEY ON MGA ZONE 55
 (GROUND) VIDE PSM134485



COX ANDREWS
 ENGINEERS PTL
 CONSULTING ENGINEERS
 ACN 054 355 252
 email: adslu3d8@tpg.com.au

FIRST ISSUE

AMENDMENTS

ISSUE	DATE	SUBJECT	AUTHORISED
1	16/05/18	FIRST ISSUE	GK
2	29/06/18	UPDATED POST TMR	GA

XREF FILES

DRAWING NO.	TITLE

DRAWN ASC DATE 22/07/17

DESIGN ASC DATE 22/07/17



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AUSTRALIAN MINING ENGINEERING CONSULTANTS
 PH: 4954 9429
 MOB: 0417187149
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 MACKAY

RPEQ 4321 AUTHORIZED FOR ISSUE DATE 23/07/17

CENTRAL QUEENSLAND COAL PTL

CENTRAL QUEENSLAND COAL PROJECT

CIVIL WORKS

BRUCE HIGHWAY INTERSECTION

TYPE CROSS SECTIONS AND

DETAILS

FILE NO G1706-02-HWY3.DWG

JOB NO G1706/02

SCALE NOT TO SCALE AT A3 SIZE

DRAWING NUMBER ISSUE SHEET NO

G1706-02-HWY-3 2 4

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
				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
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
				2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	
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%	

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