

CORRIMAL COKE WORKS STAGE 2A BUILT FORM

Transport Impact Assessment



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EXECUTIVE SUMMARY

This Corrimal Coke Works Stage 2A SSDA Transport Impact Assessment has been prepared by Bitzios Consulting to accompany a State Significant Development Application (SSDA). The SSDA is seeking development consent for the construction of four (4) residential flat buildings, providing a total of 206 residential apartments (including 57 affordable housing apartments).

The SSDA is referred to as the *Stage 2a Built Form SSDA* (SSD-83789711) and is the second built form stage of the urban renewal of the former Corrimal Coke Works site. This Stage 2a Built Form SSDA was declared as State Significant Development (SSD) in the State Significant Development Declaration Ministerial Order (No 10) 2025 (dated 30 June 2025) at Clause 5(1)(n) in Schedule 1 (Amendment SSD Declaration Order 2025 (No 5)).

The intent of the project is to *'deliver vibrant and contemporary residential-led urban renewal, which celebrates the site's industrial history and leverages its highly accessible and strategic location in proximity to Corrimal town centre and local amenities and services. The proposal will deliver high amenity residential dwellings of various sizes and typologies, including a dedicated affordable housing building'*.

The Stage 2a Built Form SSDA is being submitted concurrently with a separate (but interrelated) Stage 2-4 civil works SSDA (SSD-86131212), which is for the construction of the Central Park, the Southern Park, and roads, drainage and stormwater infrastructure, and paper subdivision.

This Corrimal Coke Works Stage 2A SSDA Transport Impact Assessment has been prepared to address the requirements of SEARS 9 – Transport. Key conclusions from the assessment are:

- The proposed residential parking complies with the relevant DCP / SEPP parking provision requirements
- The visitor, motorcycle, resident bicycle, and visitor bicycle parking provision for each building complies with the requirements in the relevant sections of Council's DCP
- The parking layout and geometry are compliant with AS2890.1
- Swept path analysis have been undertaken which indicated a B85 can pass a B99 at the top of bottom of all basement access ramps
- The proposed servicing areas are compliant with AS2890.2. Service vehicle movements have been verified using swept path analysis
- A preliminary CTMP has been prepared which has determined that minimal impacts to the surrounding road network is expected during the construction of Stage 2a
- The cumulative assessment modelling and impacts assessment for the 850 unit development proposal for the entire site has shown that the roundabout access at Railway Street / Harbinger Street / Site Access will operate effectively to at least 2036. The assessment has also shown that the upgrades proposed as part of the previous Planning Approval at the Memorial Drive / Railway Street signalised remain sufficient to accommodate the 850 dwelling proposal's traffic impacts.

On the basis of the above, the SEARS -Transport requirements have been assessed and addressed and there are no traffic or transport impacts of significance for the Stage 2a proposal.

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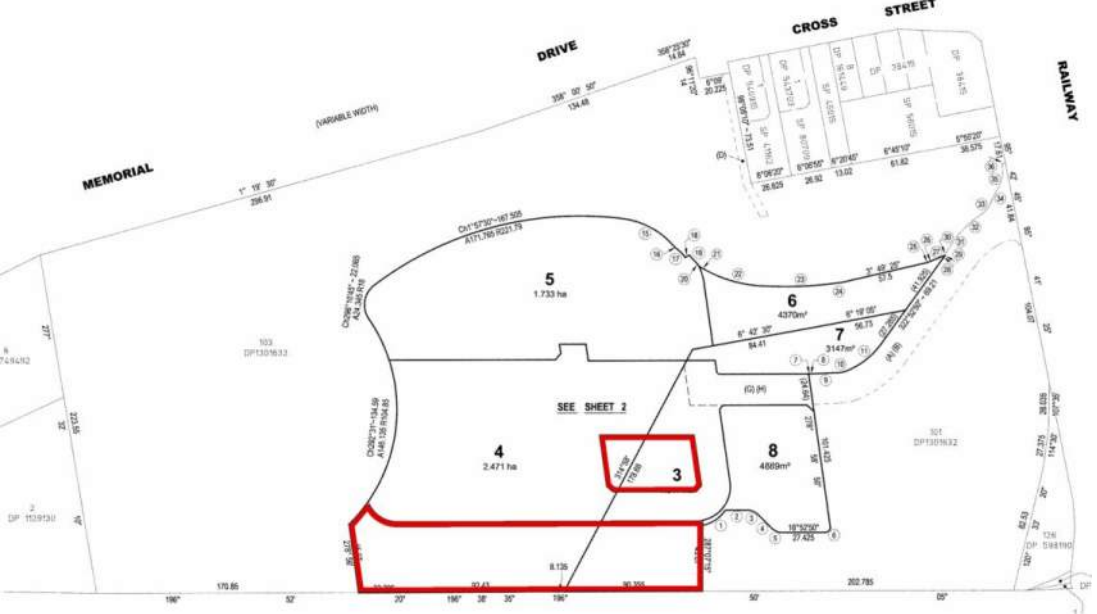
1. INTRODUCTION

1.1 Project and Site Details

Bitzios Consulting has been engaged by Legpro 70 Pty Ltd ATF Legpro 70 Unit Trust (Legacy) to prepare a Transport Impact Assessment (TIA) for the Corrimal Coke Works Stage 2A Built Form. The subject site is bound by Railway Street to the north, Corrimal Train Station to the east, Towradgi Creek to the south and Memorial Drive to the west. The site is accessed from Railway Street, East Corrimal. The project and site details are shown in Table 1.1.

Table 1.1: Project and Site Details

Descriptor	Site Details
Proponent / Applicant	Legpro 70 Pty Ltd ATF Legpro 70 Unit Trust (Legacy)
Site Ownership	Illawarra Coke Company
SSD Reference	SSD-83789711 [SEARs issued 12 May 2025]
Project Name	Corrimal Coke Works - Stage 2A – Built Form
Street Address	Corrimal Coke Works, 27 Railway Street, Corrimal
Country	Dharawal Country
Project Description	The Stage 2a Built Form SSDA seeks consent for the following: ■ Construction of four (4) residential flat buildings, providing a total of 206 x residential apartments (including 57 x affordable housing units). The unit typologies, per residential flat building, are as follows: - Building 2.1 - 31x apartments (8 x one-bedroom, 17 x two-bedroom, and 6 x three-bedroom units) - Building 2.2 - 57 x affordable housing apartments (3 x studio, 26 x one-bedroom, and 28 x two-bedroom units) - Building 2.3 - 59 x apartments (16 x one-bedroom, 31 x two-bedroom, and 12 x three-bedroom units) - Building 2.4 - 60 x apartments (12 x one-bedroom, 32 x two-bedroom, and 16 x three-bedroom units). ■ Construction of three (3) separate single-level basements as follows: - Basement 01 (to service Building 2.1) ■ 34 x residential car parking spaces ■ 6 x visitor car parking spaces ■ Bicycle parking spaces ■ Motorcycle parking spaces ■ Waste and recycling storage areas. - Basement 02 (to service Building 2.2) ■ 24 x residential car parking spaces ■ 11 x visitor car parking spaces ■ Bicycle parking spaces ■ Motorcycle parking spaces ■ Waste and recycling storage areas. - Basement 03 (to service Building 2.3 and Building 2.4) ■ 152 x residential car parking spaces ■ 24 x visitor car parking spaces ■ Bicycle parking spaces ■ Motorcycle parking spaces ■ Waste and recycling storage areas. ■ Creation of a series of deep soil areas and communal open space areas (including lawns and play areas, BBQ areas, and seating spaces) and accessible open space areas within Stage 2a.

Descriptor	Site Details
Existing Legal Description	The existing legal property description of the former Corrimal Coke Works site is Lot 101 DP1301632, Lot 201 DP1308649, Lot 202 DP1308649, and Lot 103 DP1301632 (registered titles). The former Corrimal Coke Works site boundary extent is identified in blue below. The proposed works associated with the Stage 2a Built Form SSDA extend across Lot 201 DP1308649 (part) and Lot 202 DP1308649 (part). The land to which the Stage 2a Built Form SSDA relates is identified in red.  Note. On 1 December 2025, Wollongong City Council approved a development application for the paper subdivision of the former Corrimal Coke Works site to create eight (8) new Torrens Title lots (DA-2025/388). The new lots are described as Lot 1 – Lot 8 in DP1313981. The new lots have not yet been registered with the NSW Land Registry Services. However, it is anticipated that formal registration will occur prior to the determination of the subject SSDA. For information only, the below identifies in red the land to which the Stage 2a built form SSDA will relate at the point the newly created lots (approved by DA-2025/388) are formally registered. 

Descriptor	Site Details
Site Area	The area of the land to which the Stage 2a Built Form SSDA relates is 10,597 sqm. This land is identified in the image above in red. Note. For the purposes of assessing the proposed development to which the subject Stage 2a Built Form SSDA against the numerical development standards and planning controls in the relevant environmental planning instruments, the site area is 12,905 sqm. This comprises the combined area of the three proposed residential lots which will be created by the Torrens subdivision in the concurrent Stage 2-4 Civil Works SSDA, being: - Proposed Lot 201 (Building 2.1) - 2,312 sqm - Proposed Lot 203 (Building 2.2) - 2,589 sqm - Proposed Lot 204 (Buildings 2.3 and 2.4) - 8,004 sqm. More broadly, the area of the Corrimal Coke Works site is 18.2 hectares.
Existing Development	Existing features across the Corrimal Coke Works site are as follow: - Structures and infrastructure associated with the former coke work production have been demolished under the Demolition DA (DA-2022/1249) - Towradgi Creek forms the southern boundary of the site and drains in a west to east direction. A tributary of the Creek traverses the site. The western portion of the site is occupied by scattered bush and stockpiling areas. Separate development applications (DAs) have been lodged to Wollongong City Council, and either have been determined or are under assessment. These DAs propose works relating to subdivision, built form (apartment buildings), bulk earthworks, and vegetation management.
Heritage	The site, in part, is subject to the following heritage listings: - Local heritage listing in the Wollongong LEP 2009 (ID 6607); and - State heritage listing on the State Heritage Register in the NSW Heritage Act 1977 ('Corrimal Coke Works Site', Item No. 02061).
Local Context	The site has an irregular rectangular configuration and is bounded by: - East boundary: main southern railway line (Corrimal Train Station) - West boundary: dual carriageway (Memorial Drive) - North boundary: Railway Street - South boundary: Towradgi Creek.
Regional Context	The site is approximately 1km to the east of the Corrimal Town Centre. Corrimal is approximately 6.5 kilometres north of Wollongong City Centre. The site is located within close proximity to education and recreation facilities, including the Corrimal High School, Corrimal East Public School, Robert Ziems Park, Corrimal Memorial Park, Towradgi Beach Park, and Bowls and Recreation Club.

1.2 SEARS Requirements

The SEARS requirements this report addresses are those in SEARS Point 9 – Transport. The requirements are shown in Table 1.2.

Table 1.2: SEARS Requirement 9 – Transport

SEARS Requirement	How Addressed / Report Section
Provide a Transport Impact Assessment (TIA) in accordance with the processes and methodology recommended in the Guide to Transport Impact Assessment (GITA) published by TfNSW.	Chapter 1 to Chapter 5 of this report address this the SEARS requirement relating to impacts within the site Chapter 6 provides the inputs into the ALCAM level crossing assessment as required by TfNSW. Impacts external to the site including cumulative impacts from the full development's 850 dwelling yield is provided in separate reports in the following appendices: ▪ Appendix C: Modelling Methodology Report ▪ Appendix D: Calibration / Validation Report ▪ Appendix E: 850 dwelling Traffic Impacts Assessment Report.
If the construction of the development would cause interruptions to regular pedestrian and transport routes (including public transport, active transport or general traffic), a preliminary Construction Traffic (or Transport) Management Plan (CTMP) should be prepared as part of the TIA to mitigate any such impacts.	Refer to Chapter 7

1.3 Report Scope

The body of this report focuses on the internal built form aspects of the development and includes:

- A review of the existing road network and traffic conditions surrounding the subject site
- An assessment of the internal road network for compliance with AS2890 and DCP requirements
- An assessment of the development's parking provision, parking layout, and vehicle access in accordance with relevant Australian Standards and Wollongong City Council (Council) Development Control Plan (DCP)
- A preliminary Construction Traffic Management Plan (CTMP)
- Data and information required for input into TfNSW's ALCAM Assessment.

Microsimulation traffic modelling using VISSIM was undertaken to assess the impacts of the entire Corrimal development based on its expected yield of 850 dwellings. The methodology, process, and outcomes of this assessment are available in separate reports in the following appendices:

- **Appendix C:** Modelling Methodology Report
- **Appendix D:** Calibration / Validation Report
- **Appendix E:** Modelling Summary Report.

2. EXISTING CONDITIONS

2.1 Road Network

The road Network Surrounding the subject site is summarised in Table 2.1 and speed limits are shown in Figure 2.1

Table 2.1: Road Network Summary

Section	Classification	Speed Limit	Features
Memorial Drive	State Road	80 km/h	- Two travel lanes in each direction - Signalised intersection at Railway Street
Railway Street	Local Road	50 km/h	- One travel lane and parking lane in each direction - Signalised intersection at Memorial Drive - Level crossing between Ruddock Street and Duff Parade
Duff Parade	Local Road	50 km/h	- One travel lane and parking lane in each direction - School Zone
Princes Highway	Local Road	60 km/h	- One travel lane and parking lane in each direction - Signalised intersection at Railway Street and Short Street

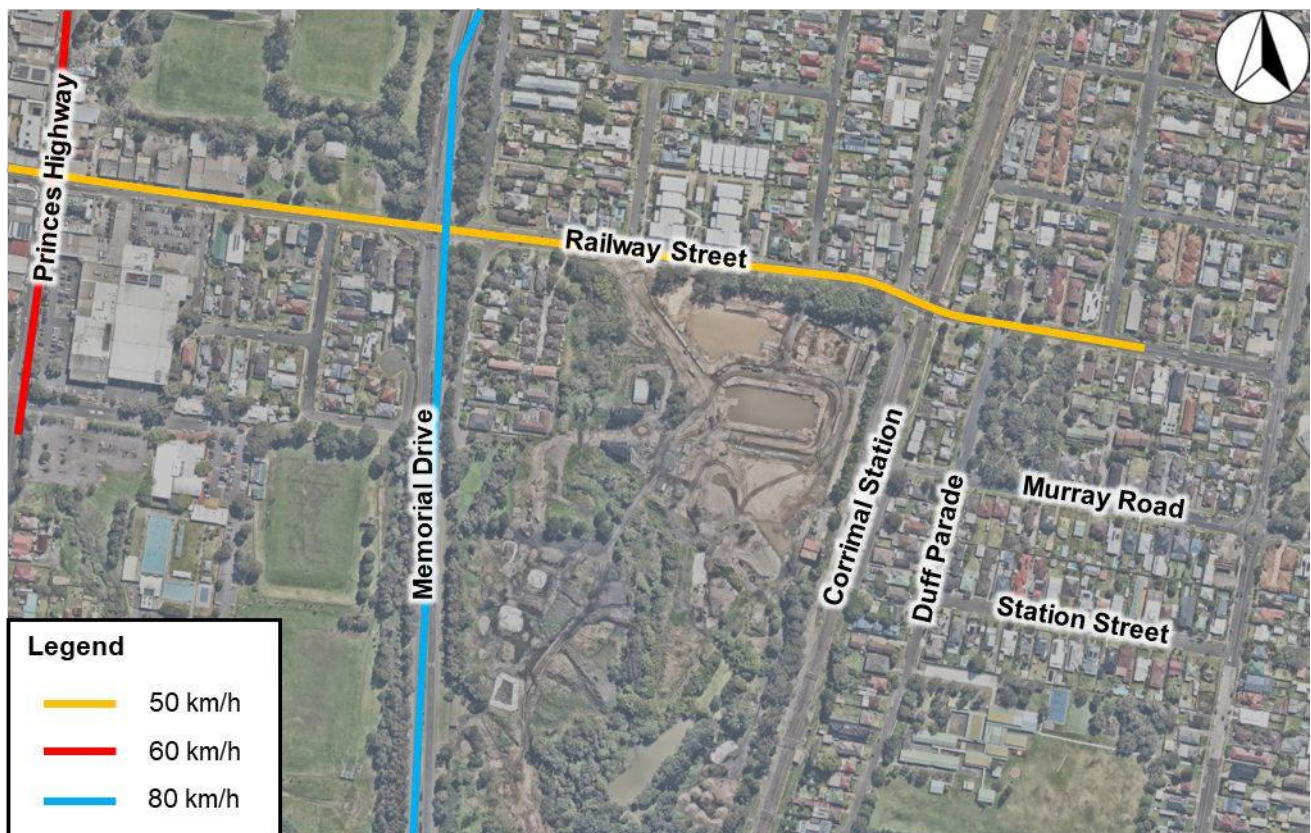


Figure 2.1: Road Network and Speed Limits

2.2 Public Transport

This site is served by one train line (and Corrimal Station), 7 public bus routes, and 12 school bus routes listed in Table 2.2. The locations of the train line and public bus routes is in Figure 2.2.

Table 2.2: Public Transport Routes

Line / Route	Line/Route Description	Service Frequency
Train		
SCO	South Coast Line	20 - 60 mins (weekdays), 60 mins (weekends)
Bus		
2	Stanwell Park to Wollongong via Thirroul	10 - 30 minutes (weekdays), 60 minutes (weekends)
3	Wollongong to Bellambi via Towradgi (Loop Service)	10 - 30 minutes (weekdays), 60 minutes (Saturday), 120 minutes (Sunday & Public Holidays)
7	Wollongong to Bellambi (Loop Service)	60 minutes (Saturday & Weekdays), (Sunday & Public Holidays)
8	Wollongong to Bellambi via Balgownie (Loop Service)	30 - 60 minutes (weekdays), 60 minutes (Saturday) 120 minutes (Sunday & Public Holidays)
90	Austinmer Station to Wollongong	20 - 30 minutes (weekdays), 30 minutes (Saturday) 60 minutes (Sunday & Public Holidays)
91	Austinmer Station to University of Wollongong	Weekday AM: 2 Services, Weekday PM: 3 Services
92	Wollongong to Bulli	Weekday AM: 3 Services, Weekday PM: 4 Services 60 minutes (Saturday), 120 minutes (Sunday & Public Holidays)
93	Bulli to University of Wollongong	60 - 90 minutes (Weekdays)
School Bus		
S097	Corrimal PS to Edmund Rice College	Weekday AM: 1 service, Weekday PM: 1 service
S111	McGrath St af Princes Hwy to Holy Spirit College	Weekday AM: 1 service, Weekday PM: 1 service
S112	Dunfries Ave bf Gaynor Ave to Holy Spirit College	Weekday AM: 1 service, Weekday PM: 1 service
S403	Austinmer Station to Cedars Christian College	Weekday AM: 1 service, Weekday PM: 1 service
S405	Bellambi to Keira High and Wollongong High	Weekday AM: 1 service, Weekday PM: 1 service
S406	Keira High to Austinmer Station	Weekday PM: 4 service
S411	Woonona High to Corrimal	Weekday AM: 1 service, Weekday PM: 2 service
S412	North Wollongong to Woonona High School	Weekday AM: 1 service, Weekday PM: 3 service
S413	Woonona to Smiths Hill High	Weekday AM: 1 service, Weekday PM: 2 service
S414	Bulli to St Mary Star of the Sea College	Weekday AM: 1 service, Weekday PM: 1 service
S415	Austinmer Primary to Fairy Meadow Primary	Weekday PM: 4 service
S419	Bulli to Edmund Rice College via Bulli Beach & Woonona	Weekday AM: 1 service, Weekday PM: 1 service

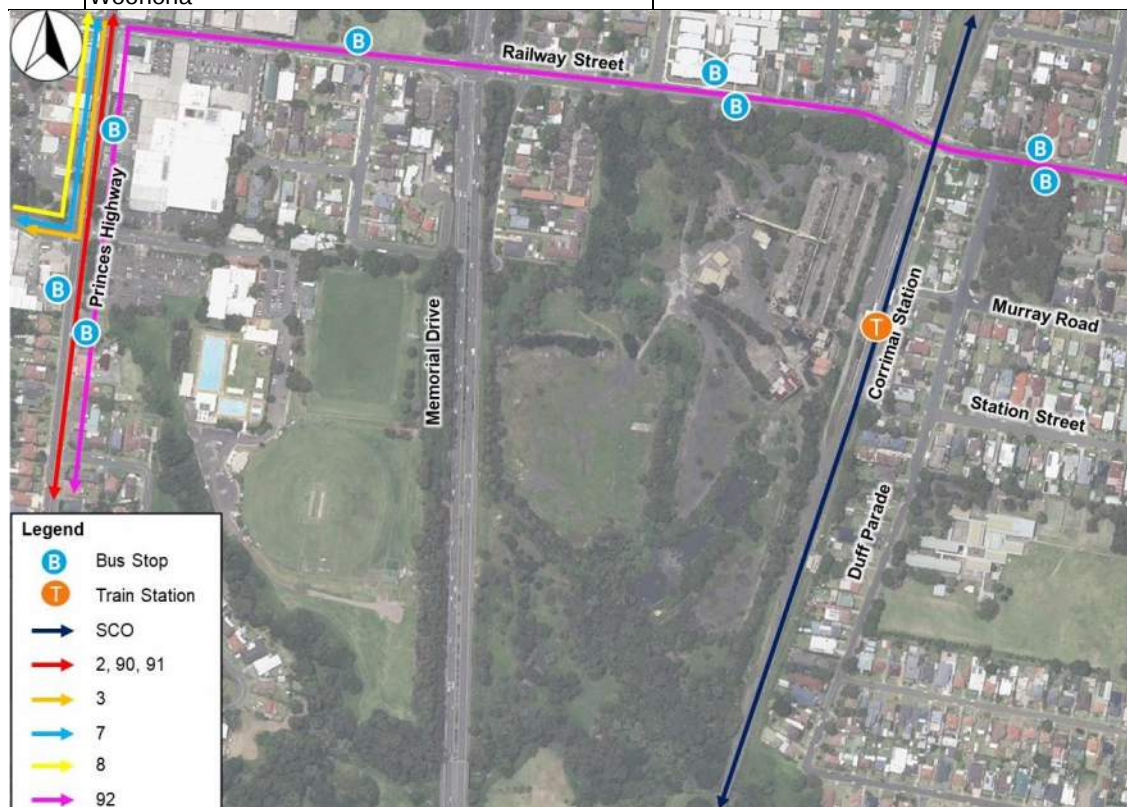


Figure 2.2: Public Transport Routes

2.3 Active Transport

Footpaths are present along both sides of Railway Street, and on some side streets.

There are currently no direct cycle links to the site. Near the site, the following cycle infrastructure exists:

- An on-road cycle lane is present along the shoulders of Memorial Drive and Pioneer Road
- A shared path follows the coastline between Thirroul via Corrimal Beach to Wollongong. The closest access point to this from the site is around 1.2km along local streets

The active transport links are shown in Figure 2.3.



Figure 2.3: Active Transport Links

3. PROPOSED DEVELOPMENT

3.1 Overview

Stage 2a is comprised of 4 residential flat buildings totalling 207 residential units (including 57 x affordable housing units) across four buildings, divided as follows:

- **Building 2.1:** 31 units
 - 8x one-bedroom
 - 17x two-bedroom
 - 6x three-bedroom
- **Building 2.2:** 57 affordable housing units
 - 3x studios
 - 26x one-bedroom
 - 28x two-bedroom
- **Building 2.3:** 59 units
 - 16x one-bedroom
 - 31x two-bedroom
 - 12x three-bedroom
- **Building 2.4:** 60 units
 - 12x one-bedroom
 - 32x two-bedroom
 - 16x three-bedroom.

Buildings 2.1 and 2.2 each have their own separate single-level basements (Basements 1 and 2 respectively). Buildings 2.3 and 2.4 are both serviced by Basement 3.

Stage 2a occupies the south-east corner of the site, shown in Figure 3.1.



Figure 3.1: Stage 2a Building Locations and Layouts

3.2 Site Access

Stage 2a will use the overall site access at the intersection of the site access road and Railway Street which is being constructed during Stage 1 of the development.

A two-way internal roadway connects Stage 2a to Railway Street, through the approved and under-construction Stage 1 area.



Figure 3.2: Stage 2a Extent and Access

4. PARKING ASSESSMENT

4.1 Parking Requirements and Provision

Wollongong City Council's Development Control Plan (DCP) provides the required parking rates for the development.

4.2 Building 2.1

Building 2.1 consists of a total of 31 units, being 8x one-bedroom, 17x two-bedroom, and 6x three-bedroom units. It is serviced by Basement 1.

The parking rates in DCP Chapter E3 have been adopted for this building and are presented in Table 4.1.

Table 4.1: Parking Requirements – Building 2.1

DCP Entry	Type	Quantity	Parking Rate	Parking Required		Parking Provision
Residential Flat Building, and shop top housing	< 70m²	8	0.5 space per dwelling	3	29	34
	70-110m²	17	1 space per dwelling	19		
	>110m²	6	1.25 spaces per dwelling	7		
	Visitor	33	0.2 per dwelling	6		6
	Total (car parking)			35 Spaces		40 Spaces
	Motorcycle	30	1 per 15 dwellings	2		3
	Bicycle	30	1 per 3 dwellings (residential)	10		10
			1 per 12 (visitor)	3		3

Also, it is noted that within the Building 2.1 car park:

- The visitor parking spaces have been located near the car park access point
- Accessible spaces have been located nearby lifts for ease of access
- Swept path analysis within the car park has determined that a B99 and B85 can successfully complete simultaneous movements at the top and bottom of the basement ramp.

The parking provisions for Building 2.1 has been achieved in accordance with DCP Chapter E3.

4.3 Building 2.2

Building 2.2 consists of a total of 57 units, being 3x studio, 26x one-bedroom, and 28x two-bedroom, all of which are affordable housing. It is serviced by Basement 2.

The parking rates from have been adopted from State Environmental Planning Policy (Housing) 2021, Part 2, Division 1, Section 19, point 2(e) have been adopted for this car park. These rates have been used because of the affordable housing component in this building.

The parking requirements for building 2.2 are outlined in Table 4.2.

Table 4.2: Parking Requirements – Building 2.2

DCP Entry	Type	Quantity	Parking Rate	Parking Required	Parking Provision
Residential Flat Building, and shop top housing	Studio	3	0	0	24
	1-bedroom	26	0.4 spaces per dwelling	10	
	2-bedroom	28	0.5 space per dwelling	14	
	3-bedroom	0	1.0 spaces per dwelling	0	
	Visitor	57	0.2 per dwelling	11	11
	Total (car parking)			35 Spaces	35 Spaces
	Motorcycle	57	1 per 15 dwellings	4	4
	Bicycle	57	1 per 3 dwellings (residential)	19	24
			1 per 12 (visitor)	5	5

Also, it is noted that within the Building 2.2 car park:

- The visitor parking spaces have been located near the car park access point
- Accessible spaces have been located nearby lifts for ease of access
- Swept path analysis within the car park has determined that a B99 and B85 can successfully complete simultaneous movements at the top and bottom of the basement ramp.

The parking provision for Building 2.2 has been achieved in accordance with State Environmental Planning Policy (Housing) 2021.

4.4 Buildings 2.3 and 2.4

Building 2.3 consists of a total of 59 units, being 16x one-bedroom, 31x two-bedroom, and 12x three-bedroom units.

Building 2.4 consists of a total of 60 units, being 12x one-bedroom, 32x two-bedroom, and 16x three-bedroom units.

Both buildings are serviced by Basement 3.

The parking rates from in DCP Chapter D19 have been adopted for this building.

The parking requirements for Buildings 2.3 and 2.4 are presented in Table 4.3

Table 4.3: Parking Requirements – Buildings 2.3 and 2.4

DCP Entry	Type	Quantity	Parking Rate	Parking Required		Parking Provision
Residential Flat Building, and shop top housing	< 70m²	28	1.0 space per dwelling	28	152	152
	70-110m²	63	1.2 space per dwelling	76		
	>110m²	28	1.7 spaces per dwelling	48		
	Visitor	119	0.2 per dwelling	24		24
	Total (car parking)			176 Spaces		176 Spaces
	Motorcycle	119	1 per 15 dwellings	8		8
	Bicycle	119	1 per 3 dwellings (residential)	40		40
			1 per 12 (visitor)	10		10

Also, it is noted that within the Buildings 2.3 / 2.4 car park:

- The visitor parking spaces have been located near the car park access point
- Accessible spaces have been located nearby lifts for ease of access
- Swept path analysis within the car park has determined that a B99 and B85 can successfully complete simultaneous movements at the top and bottom of the basement ramp.

The parking provision for the shared car park for Buildings 2.3 / 2.4 has been achieved in accordance with DCP Chapter D19.

4.5 Parking Geometry

The proposed parking arrangements in the three basement car parks was assessed against requirements set out AS2890. The assessment adopts the parking dimensions based on AS2890.1 User Class 1/1A (residential parking).

The findings of the assessment are summarised in Table 4.4.

Table 4.4: Parking Geometry Assessment

Item	Requirement (mm)	Provision (mm)	Compliance
Parking Space Dimensions			
Car Parking Spaces	2400 x 5400	2400 x 5400	Compliant
PWD Parking Space	2400 x 5400	2400 x 5400	Compliant
PWD Shared Area	2400 x 5400	2400 x 5400	Compliant
Motorcycle Spaces	1200 x 2500	1200 x 2500	Compliant
Horizontal Clearance			
Clearance to columns	Design Envelope as per AS2890.1 Figure 5.2	Envelope Clear	Compliant
Clearance to walls	300	300	Compliant
Blind Aisle Extension			
Extension Length	1000	1000	Compliant
Aisle Width			
Parking Aisle	5800	5800	Compliant
Access & Egress Driveway			
Width	>39000	6400	Compliant
Ramp			
Width	>3900	6400	Compliant
Gradient	Max 1:4 (25%)	25%	Compliant
Grade Transitions	1:8	1:8	Compliant
Bicycle Security			
Security	Security Level B (residential)	Sufficient security provided at basement	Compliant

The internal dimensions of the car parking areas in the plans assessed are deemed to be compliant to AS2890.

Swept paths analyses are available in **Appendix A**.

5. SERVICING

Waste collection is undertaken on the ground level within the site via loading docks, where waste vehicles reverse into each bay. Swept paths indicated that a 10.2m waste vehicle could successfully reverse into the servicing areas and drive out in forward gear. The swept path analysis informed the widening of driveway splays in the design refinement process in order to accommodate the vehicle movements.

The compliance of each bay to AS2890.2 was assessed and the findings are shown in Table 5.1.

Table 5.1: Servicing Area Geometry Assessment

Item	Requirement	Provision	Compliance
Service Bay Width	3500mm	>3500mm	Compliant
Service Bay Length	>10.2m	>10.2m	Compliant
Vertical Clearance	4500mm	>5000mm	Compliant
Grade	Maximum 1:16	1:25	Compliant

Swept paths are provided in **Appendix A**.

The servicing arrangement in the plans assessed are considered satisfactory.

6. LEVEL CROSSING ALCAM ASSESSMENT

6.1 Level Crossing Traffic Volumes

The Railway Street Level Crossing is located immediately to the north-east of the entire site. Full development of Corrimal Coke Works site includes an estimated 850 dwellings under the following dwelling configuration:

- 1-bedroom: 108 units
- 2-bedroom: 309 units
- 3/4-bedroom: 433 units
- Affordable housing: 57 units.

Classified intersection count data was collected by Matrix Traffic and Transport Data on Thursday 7 December 2023. The data recorded vehicle and pedestrian movements across level crossing. The 2023 traffic data was used to calculate 2025 base, 2036 base, and 2036 'with full development' movement at the level crossing as summarised in Table 6.1 - Table 6.3.

Table 6.1: Daily Traffic and Pedestrian Volumes at the Level Crossing

Scenario	Light Vehicles	Heavy Vehicles	Pedestrians (Northern Side)	Pedestrians (Southern Side)
2023 (count data)	6,710	140 (2.1% LV)	249	513
2025 Base (forecast)	6,753	141 (2.1% LV)	257	525
2036 Base (forecast)	6,835	220 (3.2% LV)	301	590
2036 Base + Full Dev	7,645	200 (2.6% LV)	301	1,039

Note: The 2023 daily volumes presented are a 3-day average of the year 2023 traffic surveys.

Table 6.2: AM Peak Hourly Traffic and Pedestrian Volumes at the Level Crossing

Scenario	Light Vehicles	Heavy Vehicles	Pedestrians (Northern Side)	Pedestrians (Southern Side)
2023 (count data)	720	15 (1.9% LV)	40	120
2025 Base (forecast)	722	15 (1.9% LV)	40	122
2036 Base (forecast)	731	27 (3.7% LV)	40	146
2036 Base + Full Dev	822	29 (3.5% LV)	40	204

Table 6.3: PM Peak Hourly Traffic and Pedestrian Volumes at the Level Crossing

Scenario	Light Vehicles	Heavy Vehicles	Pedestrians (Northern Side)	Pedestrians (Southern Side)
2023 (count data)	622	13 (1.9% LV)	42	61
2025 Base (forecast)	624	13 (1.9% LV)	42	63
2036 Base (forecast)	636	17 (2.7% LV)	42	74
2036 Base + Full Dev	707	11 (1.6% LV)	42	106

The volumes show that a minor increase of traffic and pedestrian volumes across the level crossing is expected.

It should be highlighted that these volumes are for the ultimate, full/cumulative development scenario and that the 2036 Stage 2a scenario volumes (plus the approved Stage 1) would be much lower than the volumes shown.

These values have been input into the ALCAM checklist, which is provided in **Appendix B**.

6.2 Pedestrian Calculation Methodology

The pedestrian volumes generated by the development that would cross the level crossing were estimated by separately calculating train station access/egress and other walking trips. It is assumed that no pedestrians generated by the development would use the northern side of the crossing.

6.2.1 Train Station Access/Egress Trips

Using the public transport mode share of 5.0% (per TfNSW Data by LGA for Wollongong “TfNSW Data”), with a worst-case assumption where all public transport trips generated by the development are walking trips that use the level crossing at Corrimal Station. The pedestrian movements generated by the development that use public transport alone, that travel over level crossing are:

- Daily: 249 pedestrian movements
- AM Peak: 135 pedestrian movements
- PM Peak: 65 pedestrian movements.

6.2.2 Other Walking Trips

Walking trips were calculated by separately estimating *Social/Recreation* and *Education* trips from the TfNSW data. The methodology for the calculations used the following data points:

- Walking/cycling mode share of 17.9% (TfNSW Data)
- Social/recreational trips make up 31% of walking trips (TfNSW Data), of which assume 50% of these travel to the east and use the level crossing

Therefore, the total social/recreational walking trips generated by the 850-dwelling development over the level crossing is $17.6\% \times 31\% \times 50\% = 2.7\%$ of all total trips.

The pedestrian movements generated by the development by recreational walking which would use the level crossing are:

- Daily: 135 pedestrian movements
- AM Peak: 16 pedestrian movements
- PM Peak: 11 pedestrian movements.

Education trips walking trips make up 7.5% of walking trips in the Wollongong LGA (TfNSW data). It was determined that the development is expected to generate the following education-related walking trips over the level crossing:

- Daily: 65 pedestrian movements
- AM Peak: 13 pedestrian movement)
- PM Peak: 0 pedestrian movements.

6.3 Intersection Survey Footage Review

A review of the footage recorded during the 2023 traffic survey identified the following:

- Drivers consistently adhere to and obey the flashing lights at the level crossing and stop in front
- Pedestrians consistently stop at flashing lights and obey closed gates
- Vehicles were not observed to queue through the level crossing. No queues from nearby streets extended through the level crossing.

6.4 Summary

The requested data and information regarding pedestrian and vehicle movements over the level crossing generated by the full 850 dwelling development (cumulative impacts) has been provided in in Table 6.1-Table 6.3. It indicates that a relatively low number of vehicle and pedestrian movements over the crossing will be generated by the proposed development, compared to background movements.

The ALCAM checklist provided by TfNSW has been completed and is available in **Appendix B**.

7. PRELIMINARY CONSTRUCTION TRAFFIC MANAGEMENT PLAN

7.1 Overview

A preliminary construction traffic management plan (CTMP) has been prepared for the Corrimal Stage 2a development. The assessment and impacts are outlined in the following sections.

7.2 Construction Details

7.2.1 Construction Staging

The projected works programme suggests that different stages of the site will be undergoing construction activities simultaneously, and so some degree of cumulative impacts may be experienced. An indicative construction program is shown in Figure 7.1.

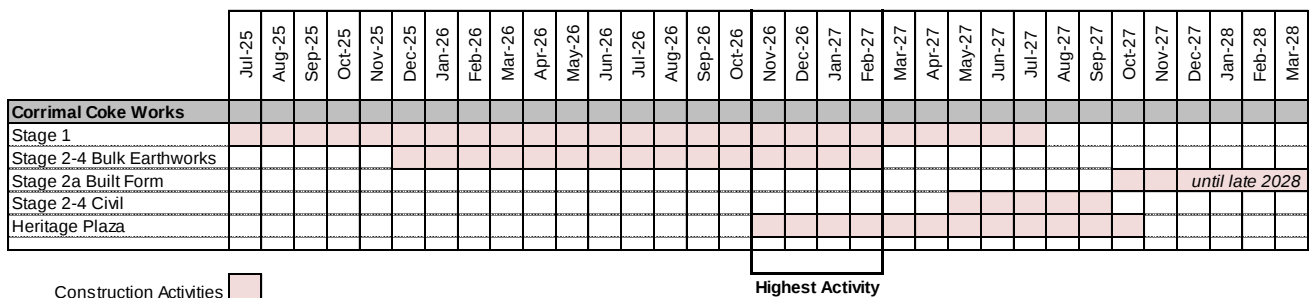


Figure 7.1: Current Construction Program

7.2.2 Construction Traffic Routes

All construction vehicle haulage is expected to be via Memorial Drive. All construction vehicles are expected to access the site from an access gate located on the southern side of Railway Street between Harbinger Street and High Street.

No construction vehicle movements or haulage routes either to or from the site will be travelling over the level crossing. There will be no increase in traffic movements over the level crossing resulting from the construction works. All workers will be instructed to travel to the site via Memorial Drive. The haulage routes are shown in Figure 7.2.



Figure 7.2: Construction Haulage Routes

7.2.3 Construction Traffic Volumes

The construction vehicle traffic generated by construction of each stage of the development is expected to be relatively low, a maximum of 20 heavy vehicles per day:

- 6-8 movements for articulated vehicles (up to 20m)
- 10-12 movements for truck and dog vehicles.

Traffic surveys undertaken in October 2023 recorded traffic volumes at intersections surrounding the site. Existing movements along Railway Street near the site access were surveyed as:

- **8:00 – 9:00 am (AM Peak):** 291 eastbound and 360 westbound trips
- **4:00 – 5:00 pm (PM Peak):** 284 eastbound and 272 westbound trips.

It is expected that no more than 5 truck movements will be undertaken during peak hours for Stage 2a, which represents a negligible increase in total vehicle movements along Railway Street and its intersection with Memorial Avenue.

The Stage 2a Built Form construction period is not expected to be commenced until all other construction is completed.

The highest period of construction activity is expected to be between November 2026 and February 2027, where Stage 1, Stage 2-4 Bulk Earthworks, and Heritage Plaza all may have active works. It is noted that Heritage Plaza is likely to have lower construction volumes than the other stages.

Even if these 3 sites had full construction volumes simultaneously, it would result in a total of:

- Maximum of 60 heavy vehicles per day
- 18-24 movements for articulated vehicles (up to 20m)
- 30-36 movements for truck and dog vehicles
- Maximum 15 movement per hour, avoiding peak periods.

This maximum still represents a minimal increase over existing traffic volumes. Therefore, a worst case, overly conservative estimate projects minimal increases in traffic compared relative to existing volumes.

7.3 Construction Impacts

7.3.1 Active Transport

Impacts to active transport routes and infrastructure are expected to be minimal. The construction works will be almost entirely contained within the site.

Existing footpath access is to be maintained throughout the construction works.

There is no cycling infrastructure surrounding the site and so no impacts to cyclists is expected.

7.3.2 Public Transport

Impacts to public transport routes and infrastructure are expected to be minimal. The construction works will be almost entirely contained within the site. Access to existing bus stops and Corrimal Station will be retained throughout the construction works.

7.3.3 Car Parking

Small quantities of on-street is located surrounding the site, and this is expected to be retained throughout the construction process. Parking for construction workers is to be provided within the site, given the sufficient available area, and this should be clearly communicated to all contractors.

Minimal impacts to parking are therefore expected.

7.3.4 Emergency Response

Construction actions are expected to be contained within the site. All traffic movements, including emergency vehicles, will be retained as existing throughout the construction process. No impacts to emergency services are expected.

7.4 Conclusion

The impacts due to construction activities from the Corrimal Development is expected to be minimal. Existing access to traffic, active transport, and public transport routes and infrastructure will be retained during construction. Cumulative impacts from multiple stages being constructed simultaneously are not expected to require further mitigation measures.

No construction traffic is expected to travel over the level crossing, and so no impacts to the level crossing is expected.

8. CONCLUSION

This transport impact assessment assessed the parking and access arrangements of Stage 2a of the proposed Corrimal Coke Works Site development.

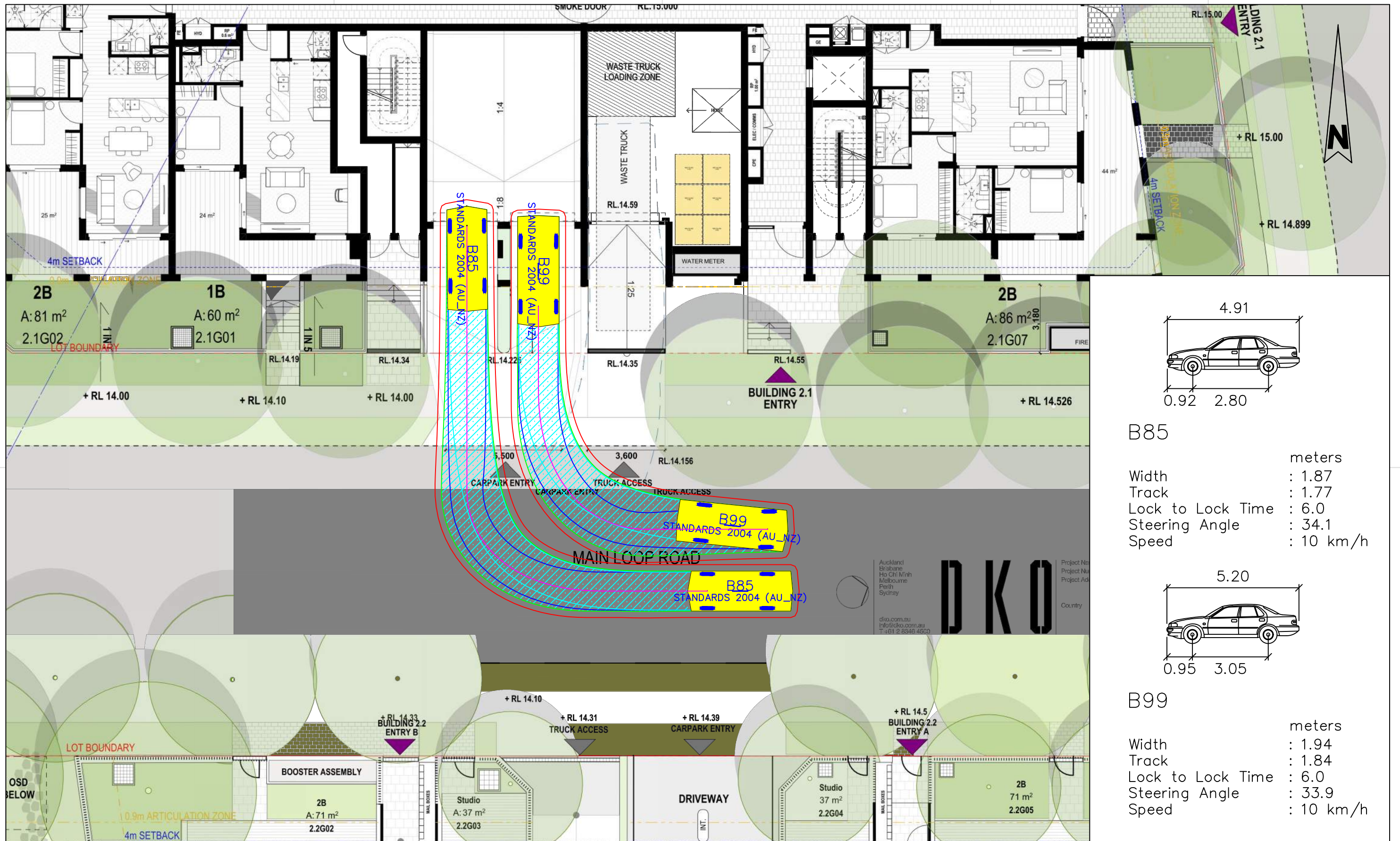
Key findings are as follows:

- The proposed Stage 2a development consists of 207 high-density residential dwellings
- There are good active transport links surrounding the site
- Public transport options are available in close proximity to the site, however, frequency any route options are limited
- The proposed residential parking complies with the relevant DCP / SEPP parking provision requirements
- The visitor, motorcycle, resident bicycle, and visitor bicycle parking provision for each building complies with the requirements in the relevant sections of Council's DCP
- The parking layout and geometry are compliant with AS2890.1
- Swept path analyses have been undertaken which indicated a B85 can pass a B99 at the top of bottom of all basement access ramps
- The proposed servicing areas are compliant with AS2890.2. Service vehicle movements have been verified using swept path analysis
- A preliminary CTMP has been prepared which has determined that minimal impacts to the surrounding road network is expected during the construction of Stage 2a
- The cumulative assessment modelling and impacts assessment for the 850 unit development proposal for the entire site has shown that the roundabout access at Railway Street / Harbinger Street / Site Access will operate effectively to at least 2036. The assessment has also shown that the upgrades proposed as part of the previous Planning Approval at the Memorial Drive / Railway Street signalised remain sufficient to accommodate the 850 dwelling proposal's traffic impacts.

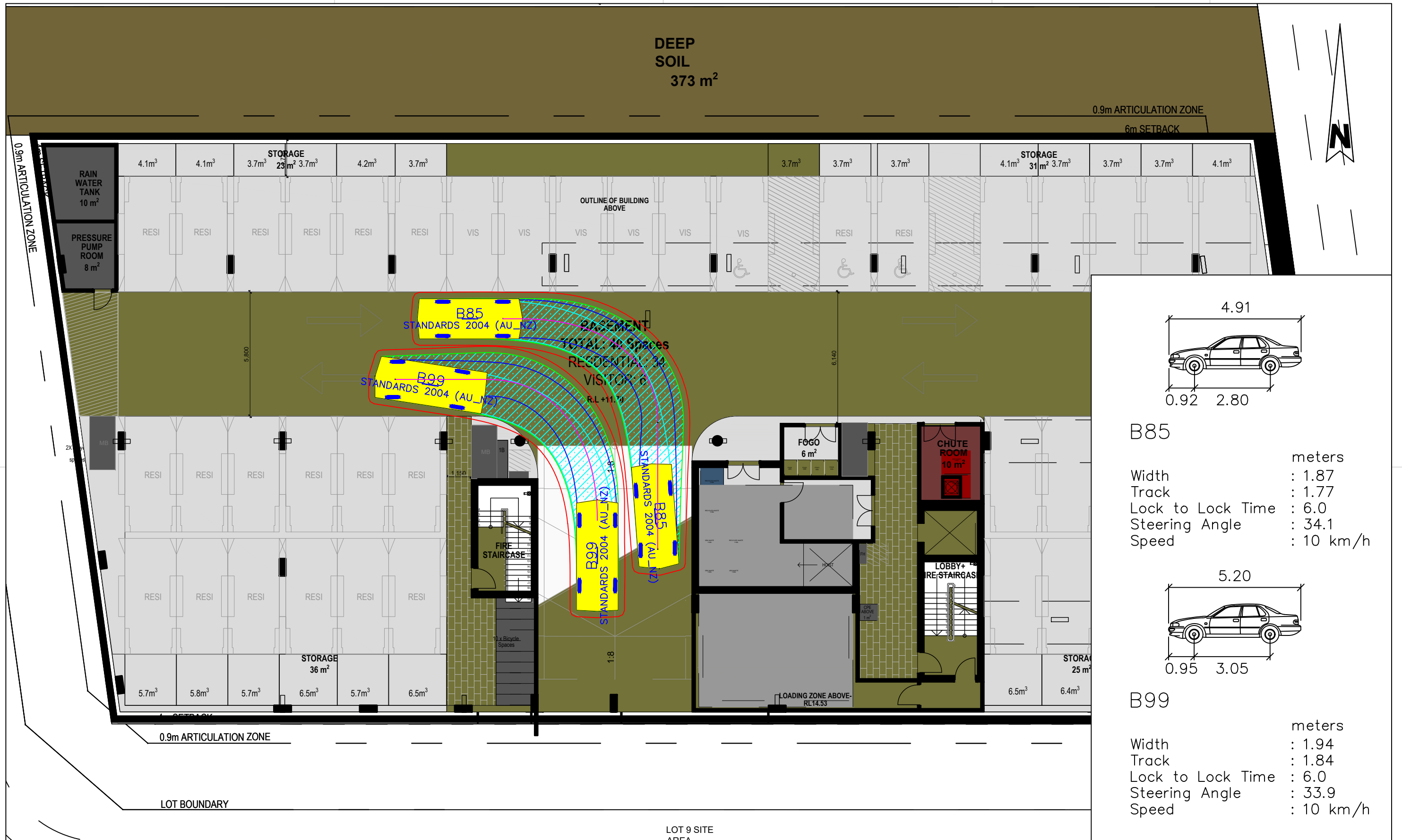
On the basis of the above, the SEARS -Transport requirements have been assessed and addressed and there are no traffic or transport impacts of significance for the Stage 2a proposal.

Appendix A: Swept Paths

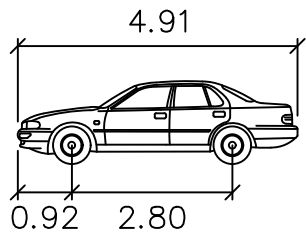
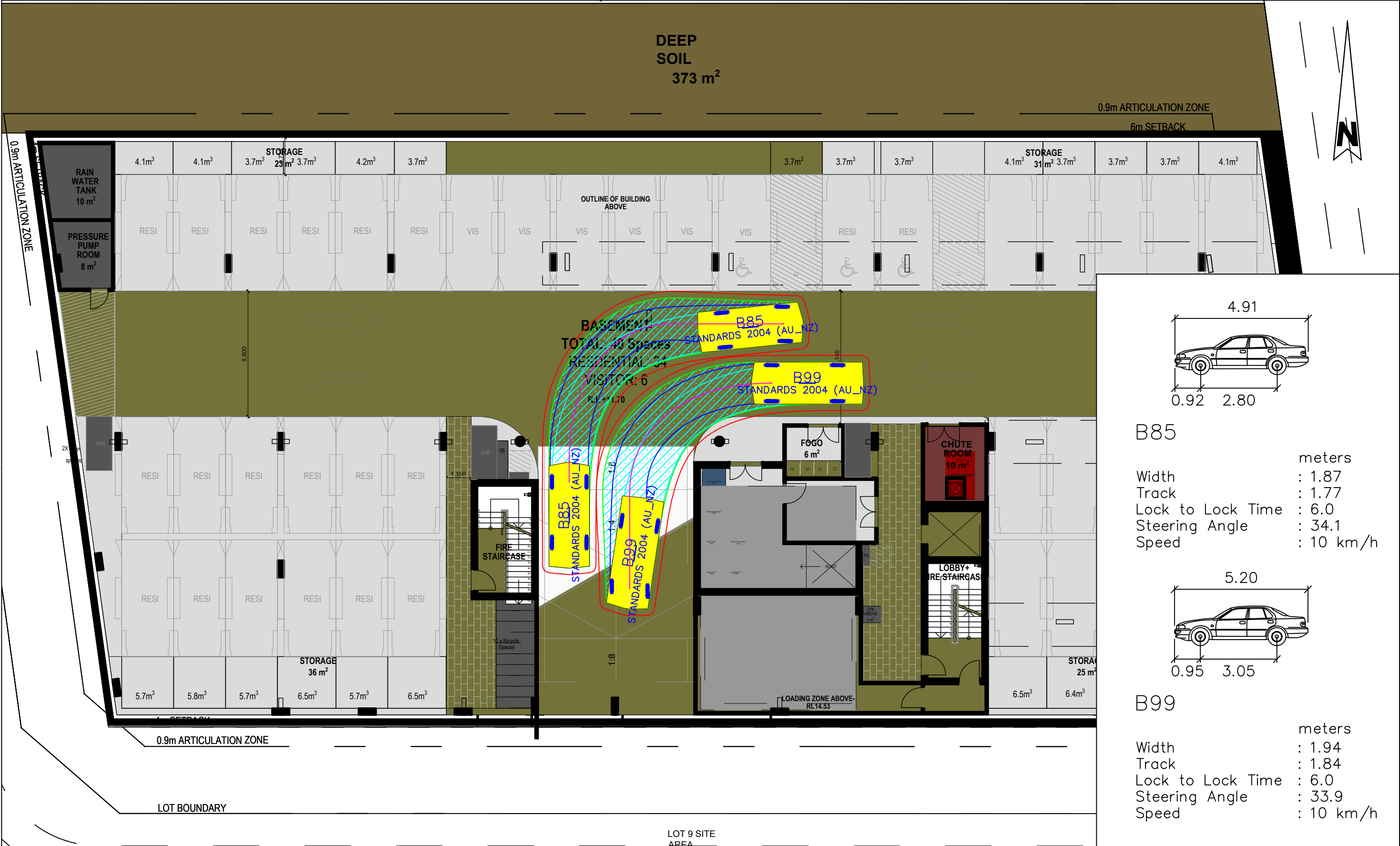




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		Project Number P7185	Sheet Number 1	Issue 003																																													

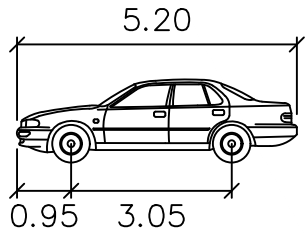


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		Revisions/Descriptions				Drawn	Date	CORRIMAL COKE WORKS STAGE 2A SSDA		J.W	J.W	M.H
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								P7185	2	003		



B85

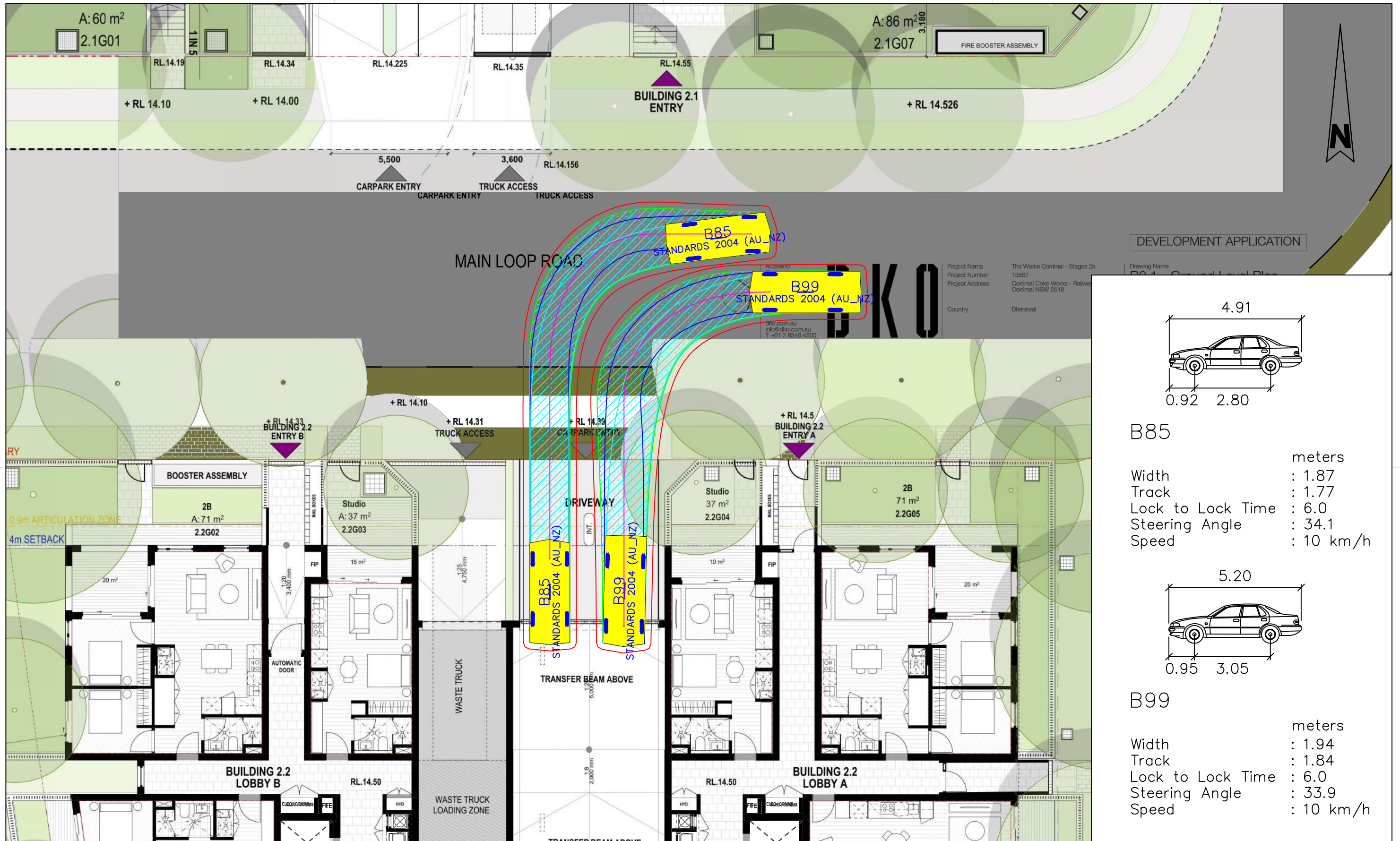
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Steering Angle : 34.1
Speed : 10 km/h



B99

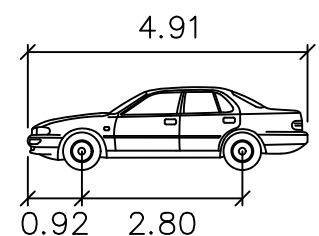
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Track : 1.84
Lock to Lock Time : 6.0
Steering Angle : 33.9
Speed : 10 km/h

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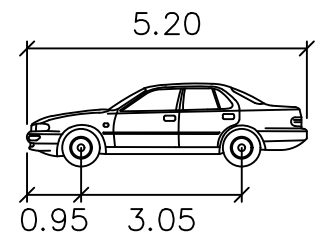


DEVELOPMENT APPLICATION

Project Name The Works Corimal - Stages 2a
Project Number 13867
Project Address Corimal Coke Works - Railway
Corimal NSW 2518
Country Dharawal



B85
Width : 1.87 meters
Track : 1.77
Lock to Lock Time : 6.0
Steering Angle : 34.1
Speed : 10 km/h



B99
Width : 1.94 meters
Track : 1.84
Lock to Lock Time : 6.0
Steering Angle : 33.9
Speed : 10 km/h



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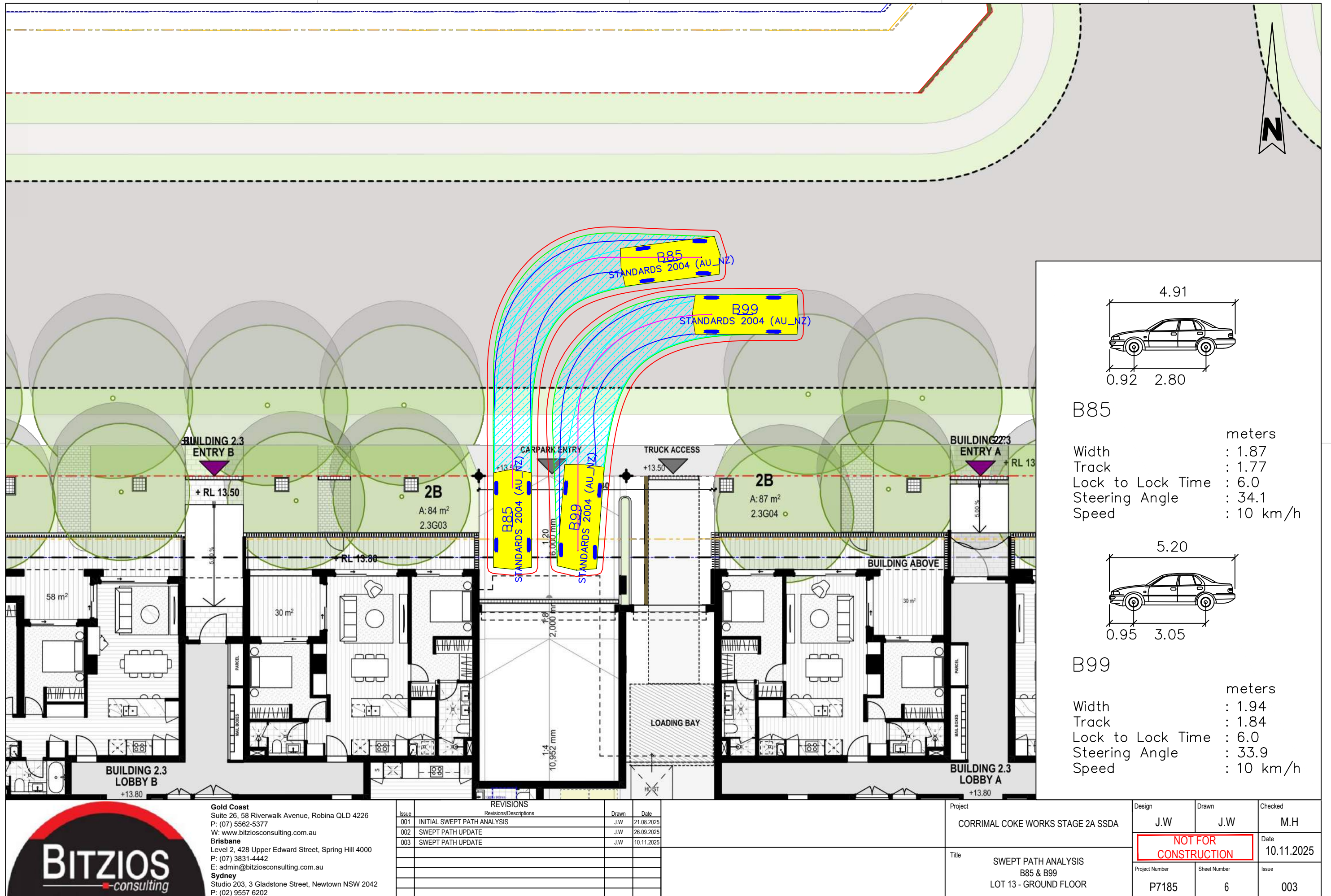
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003	SWEEP PATH UPDATE	J.W	10.11.2025

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CORIMAL COKE WORKS STAGE 2A SSDA	J.W	J.W	M.H

Title	Project Number	Sheet Number	Issue
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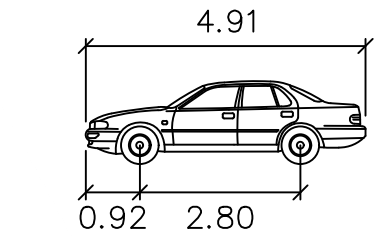
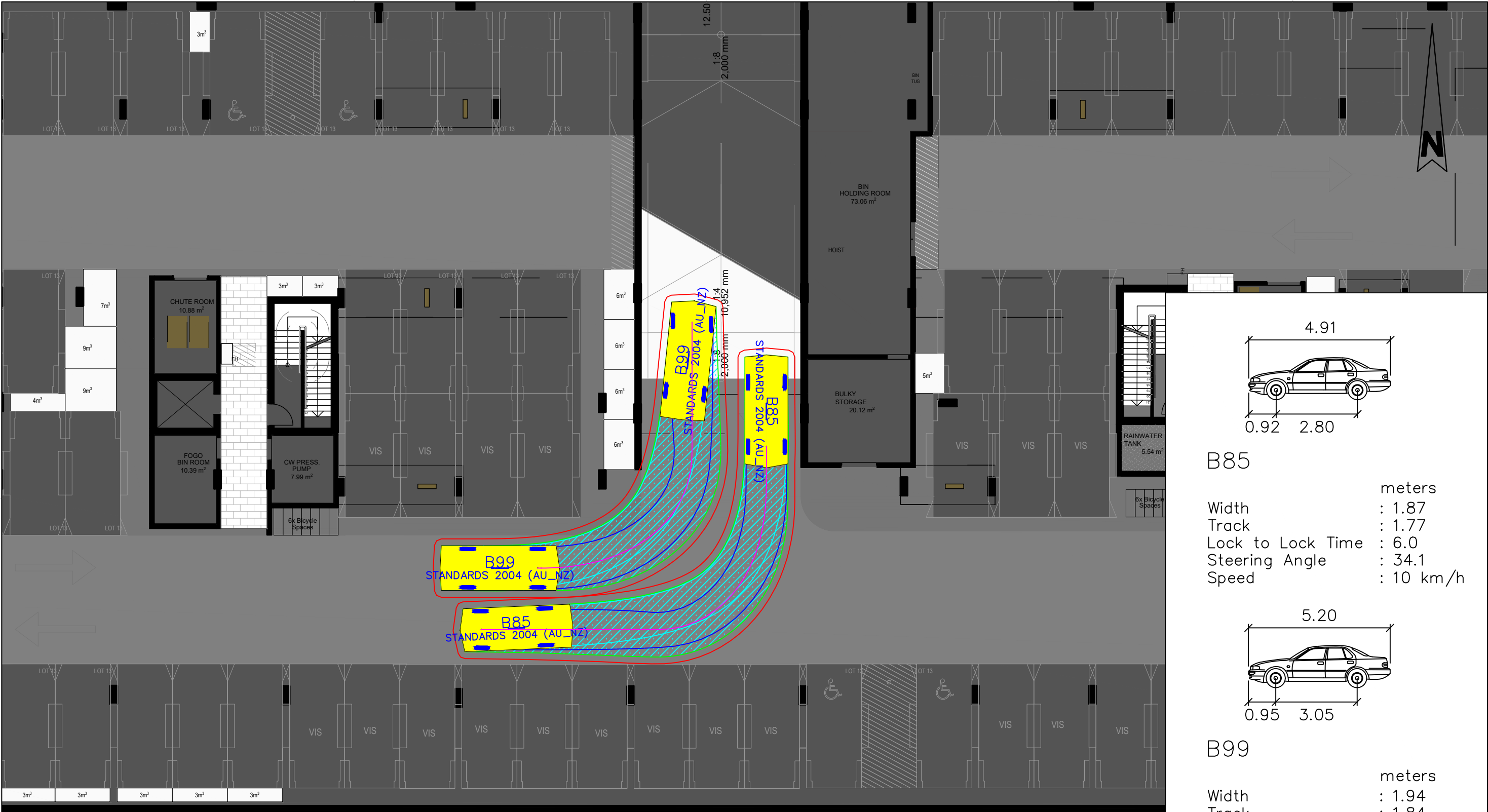
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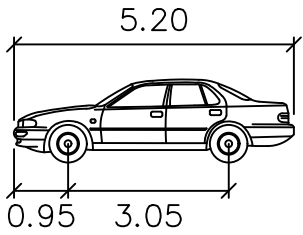


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					Title SWEEP PATH ANALYSIS B85 & B99 LOT 13 - BASEMENT LEVEL 1	Project Number P7185	Sheet Number 7	Issue 003																																							



B85

Width : 1.87 meters
Track : 1.77
Lock to Lock Time : 6.0
Steering Angle : 34.1
Speed : 10 km/h



B99

Width : 1.94 meters
Track : 1.84
Lock to Lock Time : 6.0
Steering Angle : 33.9
Speed : 10 km/h

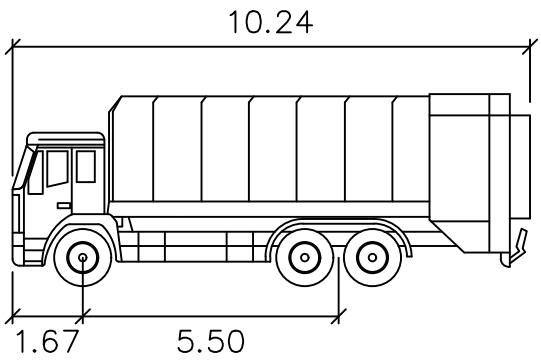
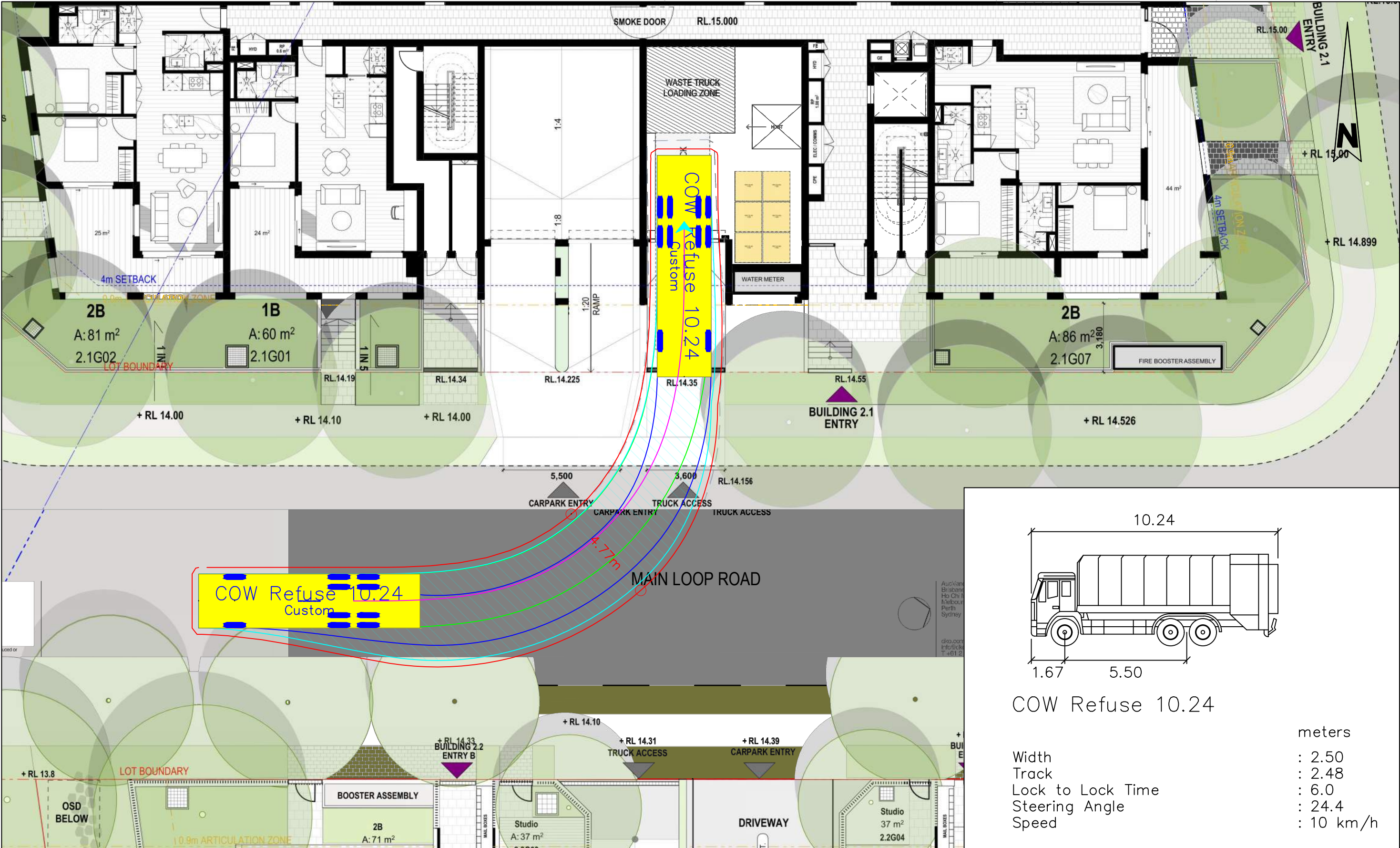


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003	SWEEP PATH UPDATE	J.W	10.11.2025

Project	
CORRIMAL COKE WORKS STAGE 2A SSDA	
Title	
SWEPT PATH ANALYSIS B85 & B99 LOT 13 - BASEMENT LEVEL 1	

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J.W	J.W	M.H
NOT FOR CONSTRUCTION		Date
Project Number		Issue
P7185		10.11.2025
Sheet Number		003
8		



COW Refuse 10.24

	meters
Width	: 2.50
Track	: 2.48
Lock to Lock Time	: 6.0
Steering Angle	: 24.4
Speed	: 10 km/h



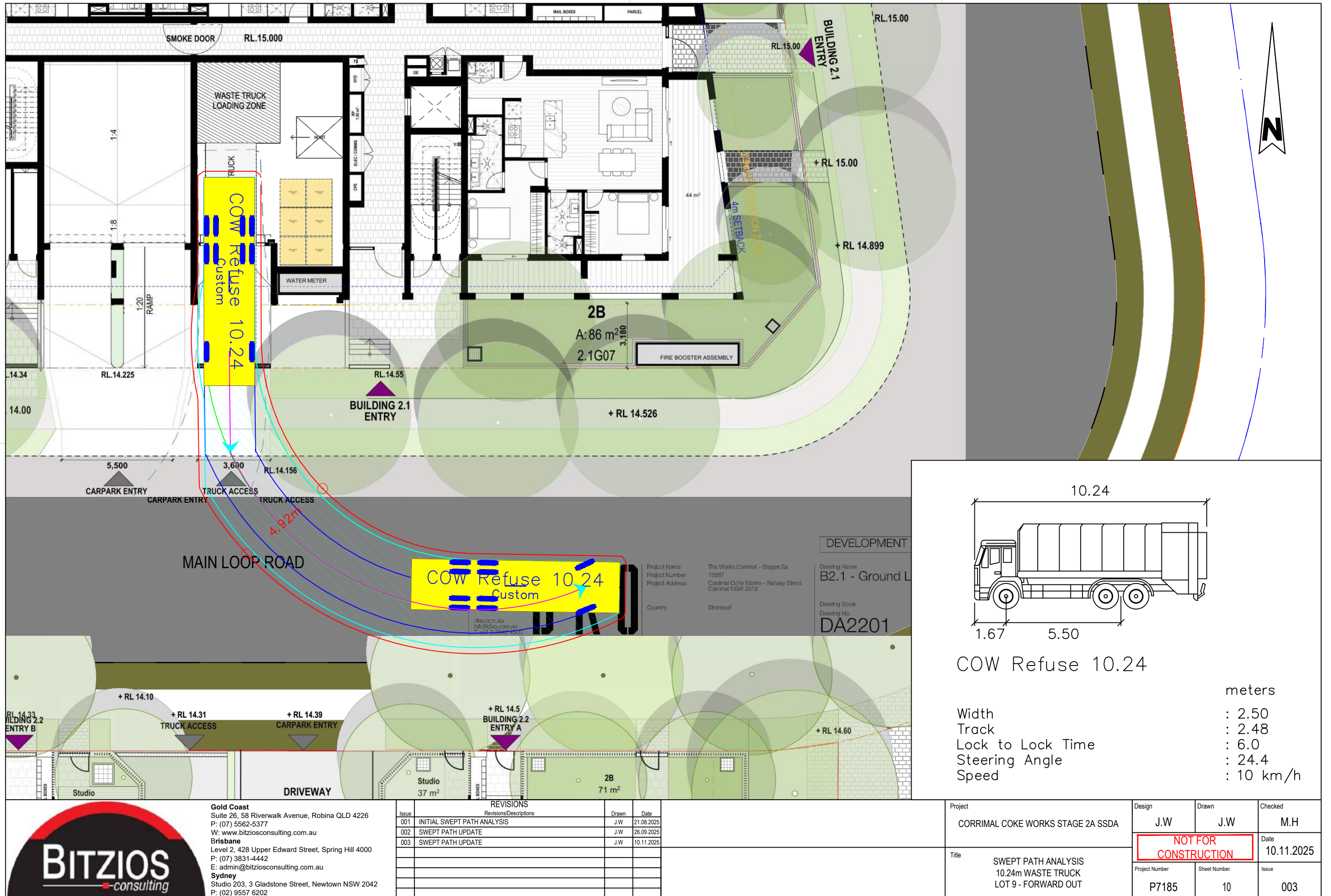
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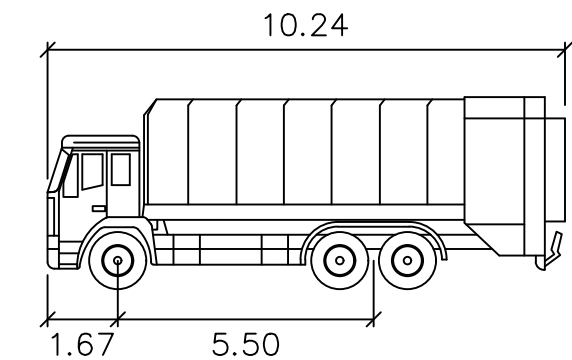
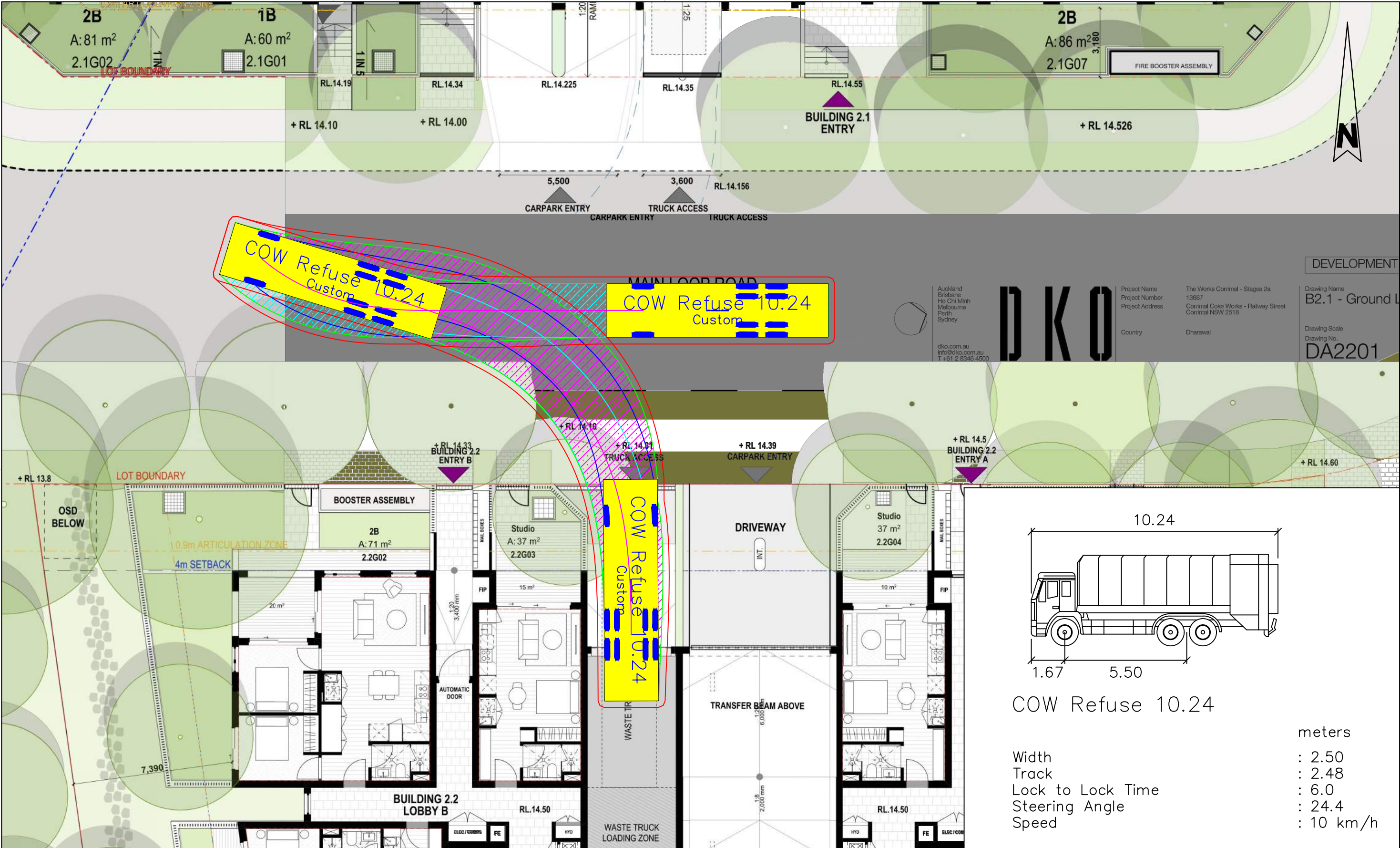
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Project	Design	Drawn	Checked
CORRIMAL COKE WORKS STAGE 2A SSDA	J.W	J.W	M.H
Title	NOT FOR CONSTRUCTION		
SWEPT PATH ANALYSIS 10.24m WASTE TRUCK LOT 9 - REVERSE IN	Project Number	Sheet Number	Date
	P7185	9	10.11.2025
			Issue
			003





COW Refuse 10.24

	10.24	
1.67	5.50	
COW Refuse 10.24		
meters		
Width	:	2.50
Track	:	2.48
Lock to Lock Time	:	6.0
Steering Angle	:	24.4
Speed	:	10 km/h



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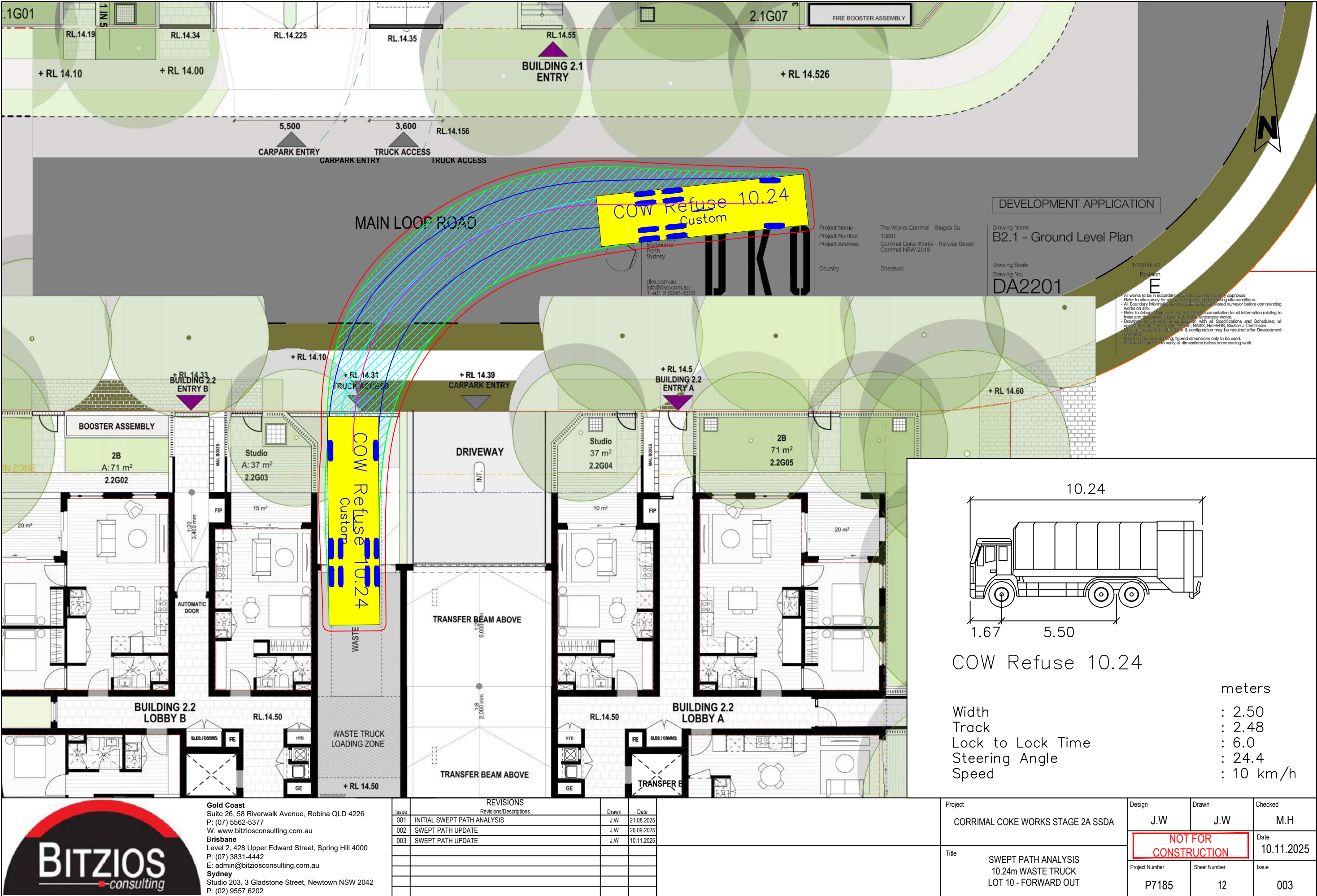
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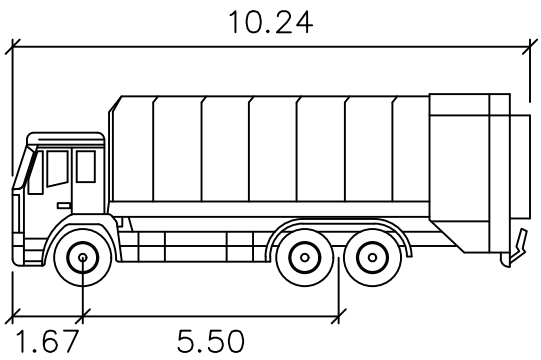
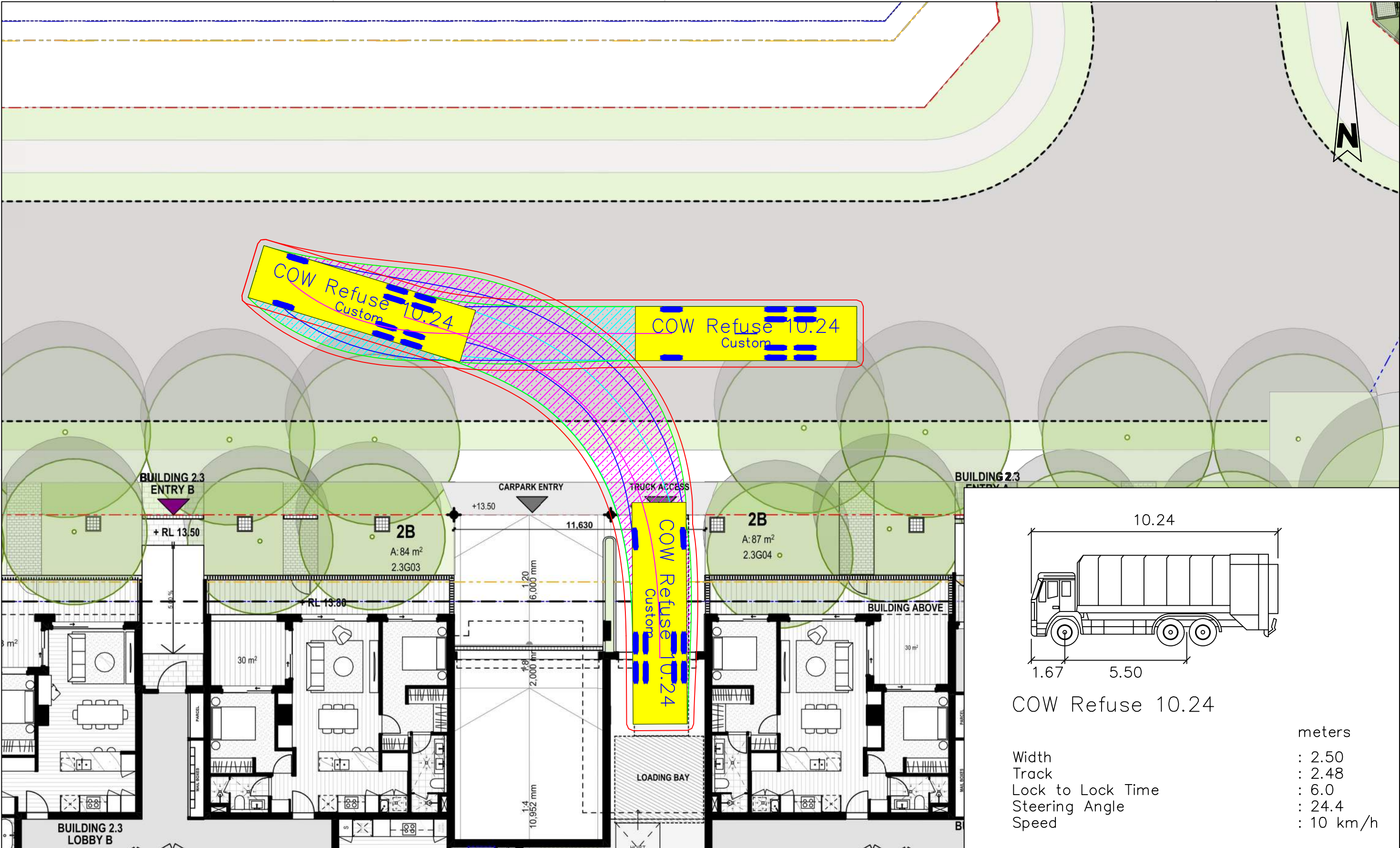
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Title	NOT FOR CONSTRUCTION		
	Project Number	Sheet Number	Issue
	P7185	11	003

SWEPT PATH ANALYSIS 10.24m WASTE TRUCK LOT 10 - REVERSE IN		Date
		10.11.2025





COW Refuse 10.24

Width : 2.50 meters
Track : 2.48
Lock to Lock Time : 6.0
Steering Angle : 24.4
Speed : 10 km/h



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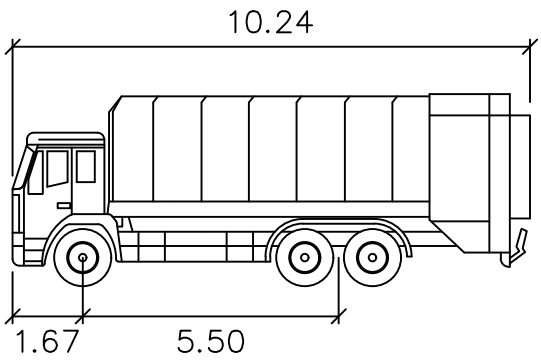
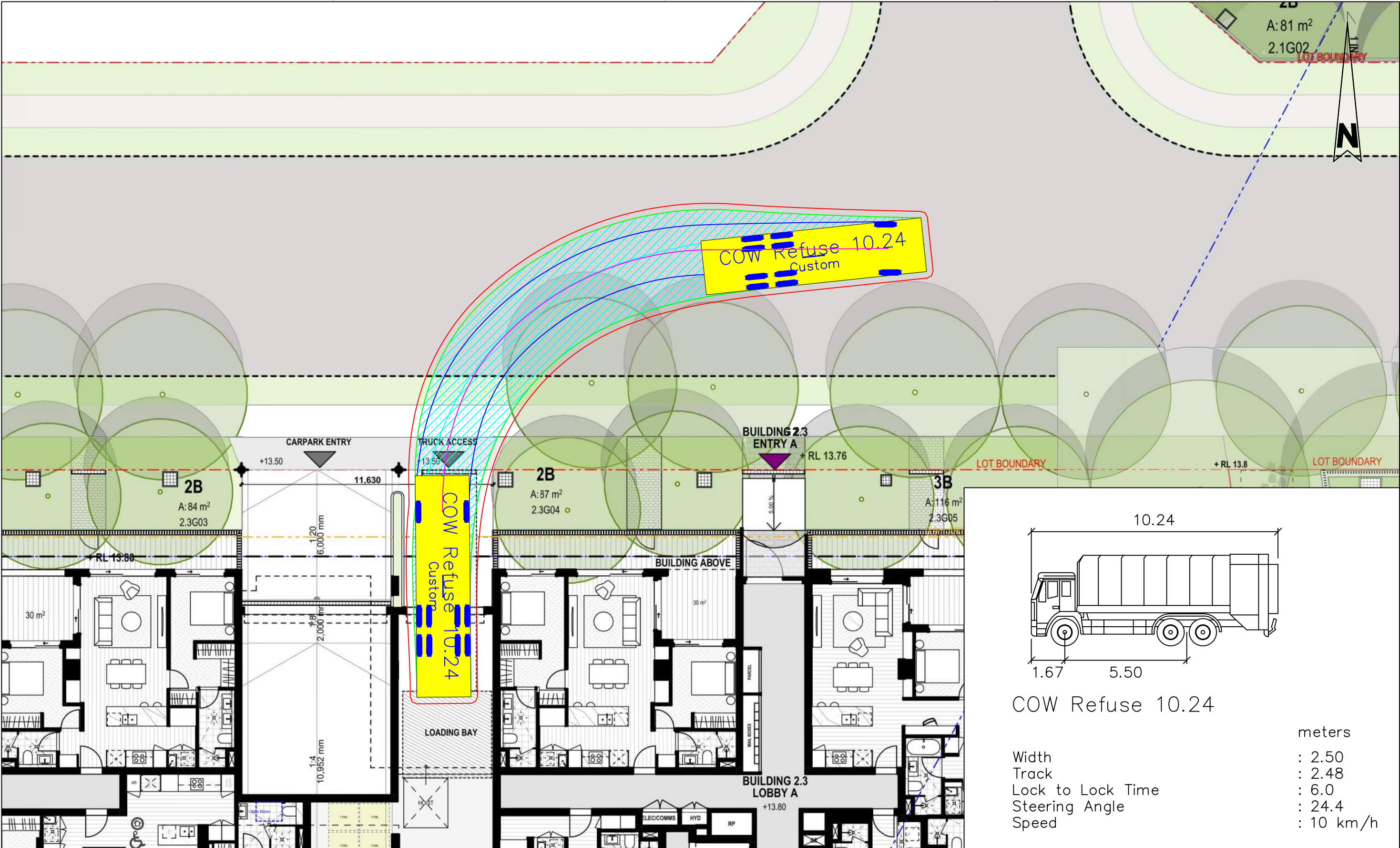
Sydney
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Issue	Revisions/Descriptions	Drawn	Date
001	INITIAL SWEEP PATH ANALYSIS	J.W	21.08.2025
002	SWEEP PATH UPDATE	J.W	26.09.2025
003	SWEEP PATH UPDATE	J.W	10.11.2025

Project	CORRIMAL COKE WORKS STAGE 2A SSDA		
Title	SWEPT PATH ANALYSIS 10.24m WASTE TRUCK LOT 13 - REVERSE IN		
Design	J.W	Drawn	J.W
Checked		M.H	
Project Number		Sheet Number	Issue
P7185		13	003

NOT FOR CONSTRUCTION

Date
10.11.2025



COW Refuse 10.24

	meters
Width	: 2.50
Track	: 2.48
Lock to Lock Time	: 6.0
Steering Angle	: 24.4
Speed	: 10 km/h



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Issue	Revisions/Descriptions	Drawn	Date
001	INITIAL SWEEP PATH ANALYSIS	J.W	21.08.2025
002	SWEEP PATH UPDATE	J.W	26.09.2025
003	SWEEP PATH UPDATE	J.W	10.11.2025

Project	Design	Drawn	Checked
CORRIMAL COKE WORKS STAGE 2A SSDA	J.W	J.W	M.H
Title	NOT FOR CONSTRUCTION		
SWEPT PATH ANALYSIS 10.24m WASTE TRUCK LOT 13 - FORWARD OUT	Project Number	Sheet Number	Issue
	P7185	14	003

Appendix B: ALCAM Checklist



Information required from developers for ALCAM assessment

Suburb:

Level crossing Road:

Data Item	Description	Response
1	Current ALCAM recorded Annual Average Daily vehicular Traffic (AADT) over the level crossing (provided by Sydney Trains)	
2	Current measured/estimated Annual Average Daily vehicular Traffic (AADT) over the level crossing (provided by developer)	6753 (projected 2025 AADT)
3	Forecasted Annual Average Daily vehicular Traffic (AADT) over the level crossing on completion of the proposed development	7645 (estimated 2036 AADT)
4	Current ALCAM recorded Percentage of heavy vehicles over the level crossing (provided by Sydney Trains)	
5	Current measured/estimated Percentage of heavy vehicles over the level crossing (provided by developer)	2.09%
6	Forecasted Percentage of heavy vehicles over the level crossing on completion of the proposed development	2.62%
7	Is queueing across the level crossing currently occurring? How often in a day?	Not observed
8	Is queueing across the level crossing forecasted to occur after completion of the proposed development? How often in a day?	Not expected
9	For <u>Active</u> crossings: Is the current sighting of level crossing controls (Flashing lights and booms) for motorists approaching the level crossing likely to be affected after completion of the development?	Development not expected to impact sighting the level crossing controls.
10	For <u>Passive</u> crossings: Is the sighting of trains for motorists approaching the level crossing likely to be affected after completion of the development?	N/A
11	Current ALCAM recorded annual average daily pedestrian volume using the pedestrian crossing (provided by Sydney Trains). Data to be provided for each pedestrian crossing if there is more than 1 pedestrian crossing.	
12	Current measured/estimated annual average daily pedestrian volume using the pedestrian crossing (provided by developer). Data to be provided for each pedestrian crossing if there is more than 1 pedestrian crossing.	257 (northern side) 525 (southern side) (3-day projected average volumes from surveys)
13	Forecasted Annual average daily pedestrian volume using the pedestrian crossing after completion of the proposed development. Data to be provided for each pedestrian crossing if there is more than 1 pedestrian crossing.	301 (northern side) 1,039 (southern side) (2036 projected)
14	Current ALCAM recorded peak hour pedestrian volume using the pedestrian crossing (provided by Sydney Trains)	
15	Current measured/estimated peak hour pedestrian volume using the pedestrian crossing (provided by developer)	40 (northern side) 122 (southern side) (2036 projected)
16	Forecasted Peak hour pedestrian volume using the pedestrian crossing after completion of the proposed development	40 (northern side) 204 (southern side) (2036 projected)
17	Will there be a need for an additional pedestrian crossing due to altered pedestrian desire lines resulting from the proposed development?	No

General Note: Developers should specify what standards or authority/regulatory guidelines were used in their data collection and forecasting

Information required from developers for ALCAM assessment

Development address:	27 RAILWAY STREET CORRIMAL		
Name of person (representing the Developer) providing requested data:	MATTHEW HEARNE		
Organisation:	BITZIOS CONSULTING		
Signature:		Date:	31/10/2025

Definition of terms or acronyms used in this document

Term/Acronym	Definition
AADT	Annual Average Daily vehicular traffic – The total volume of vehicular traffic passing over the level crossing over the period of a calendar year, divided by the number of days in that year
ALCAM	Australian Level Crossing Assessment Model
Percentage of Heavy Vehicles	Number of heavy vehicles (as defined in the Heavy Vehicle National Law) as a percentage of AADT
Queueing	Queueing occurs when vehicles are stationary across the level crossing due to traffic congestion
Active Level crossing	Railway level crossing controlled by red flashing lights with or without boom gates
Passive Level crossing	Railway level crossing where the movement of vehicular traffic is controlled by signs and devices (including “Give way” or “Stop” signs)
Pedestrians	Pedestrians also include cyclists
Altered pedestrian desire lines	A change in the way people access the level crossing or pass through the level crossing may change due to the development. E.g. development on the other side of the road from an existing pedestrian crossing etc.

Note:

Response for Data Items 1, 4, 11 and 14 will be provided by Sydney Trains prior to the issue of this data request document to the Developer or after receipt of the completed data request document from the Developer. Responses for all remaining Data Items are to be provided by the Developer.

Appendix C: Modelling Methodology Report



Corrimal Coke Works Site New Planning Proposal TIA

Modelling Methodology Report

Legacy Property

8 January 2024



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Document Issue History

Report File Name	Prepared	Reviewed	Issued	Date	Issued to
P6319.001R Corrimal Coke Works Updated Planning Proposal TIA Modelling Methodology Report	J. Hu R. Jain M. Shin	D. Bitzios	M. Hearne	8/1/2024	Steve Ball sball@legacyproperty.com.au

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1. INTRODUCTION

1.1 Background

In 2018, Bitzios Consulting was engaged by Legacy Property to prepare a Traffic and Transport Impact Assessment (TIA) for the Planning Proposal of a residential development on the former Corrimal Coke Works site at 27 Railway Street, Corrimal.

At its meeting of 1 November 2021, Wollongong City Council (WCC) resolved to finalise the Planning Proposal on the basis of a maximum of 550 dwellings. Amendment 50 of the Local Environment Plan (LEP) for the Corrimal Coke Works Site was then published by the NSW Department of Planning and Environment on 29 April 2022 and the site was rezoned. The eastern part of the site is now zoned R3 Medium Density Development to permit urban development and the western part is now RE1 Public Recreation.

The TIA included VISSIM traffic microsimulation network modelling and SIDRA intersection modelling. The modelling informed schemes for a roundabout at the development's access with Railway Street and incorporating Harbinger Street to the north. The modelling also informed potential upgrade works at the intersection of Memorial Drive / Railway Street (in consultation with TfNSW) and identified no significant queueing or delay impacts were likely at the rail level crossing in Railway Street.

Legacy Property intends to submit a new Planning Proposal for the Corrimal Coke Works site, increasing the approved residential yield from 550 dwellings to 730 dwellings. Bitzios Consulting was commissioned by Legacy Property to undertake a Traffic and Transport Impact Assessment (TIA) of the new Planning Proposal (the 'development').

1.2 Traffic Modelling Purpose

The VISSIM microsimulation traffic model created for the previous (approved) Planning Proposal is being modified and updated for the assessment of the development. The model will be used to:

- Evaluate existing and future traffic conditions across the study area without and with the traffic generated by the development
- Understand the traffic delay and queueing effects due to more traffic on Railway Street and on Memorial Drive because of the additional traffic generated by the development
- Identify what access works and intersection works are required to suitably mitigate the additional delay and queueing impacts of the development, considering the schemes prepared and approved as part of the previous Planning Proposal.

The VISSIM modelling will be supported by SIDRA intersection modelling where upgrade works have been identified as being needed with the primary purpose of the SIDRA modelling to confirm intersection geometry requirements or intersections proposed for access or mitigation works.

1.3 Traffic Modelling Scope

The traffic modelling scope for this project includes:

- Collection of current traffic data for key sites within the modelled area
- Updating the previous VISSIM model network geometry, traffic signal operations and other intersections details to reflect arrangements in late 2023
- Liaising with TfNSW to acquire 2021, 2026, 2036 and 2046 from its Strategic Traffic Forecasting Model (STFM) for the creation of base year and assessment year(s) traffic demands
- Calibration and validation of the base year VISSIM model network

- Creation of year 2036 and 2046 Base Case VISSIM models with their demands based on STFM forecast background traffic growth
- Creation of year 2036 and 2046 Project Case (i.e. with development) VISSIM models assuming 730 dwellings within the Corrimal Coke Works development and using the same traffic generation rates as agreed in the TIA for the approved Planning proposal
- Determining the required upgrades to intersections to reasonably mitigate development traffic and in so doing, to create 2036 and 2046 Project Case Plus Upgrades VISSIM models.

1.4 Report Outline

This report describes the integrated modelling methodology used for strategic and microsimulation modelling to inform the study. It includes:

- **Introduction:** Details the study area, purpose of the modelling, modelling process and model scenarios to be created
- **Project Description:** Details of the Corrimal Coke Works New Planning Proposal and existing and proposed land uses with the study area.
- **Modelling Process and Hierarchy:** Details the 'levels' of modelling analysis that will be undertaken, provides an overview of the steps taken at each stage of the process and summarises some of the key models
- **Input Data and VISSIM Models:** Details the model inputs and data sources including the traffic survey intersection counts (used as the Real Data Set), travel times and SCATS traffic signal data to be used in the development of the models
- **Methodologies:** Details the methodologies for the development of the base and future year models for Strategic Modelling and VISSIM Microsimulation Models, including
 - Strategic Modelling
 - VISSIM Model
 - Calibration and Validation Criteria
 - Future STFM Modelling
 - Future Year VISSIM Models.

This report does not cover the calibration and validation of the SIDRA models as these models (if needed) will only be used to check/confirm geometrical requirements determined from the VISSIM modelling.

1.5 Reference Documents

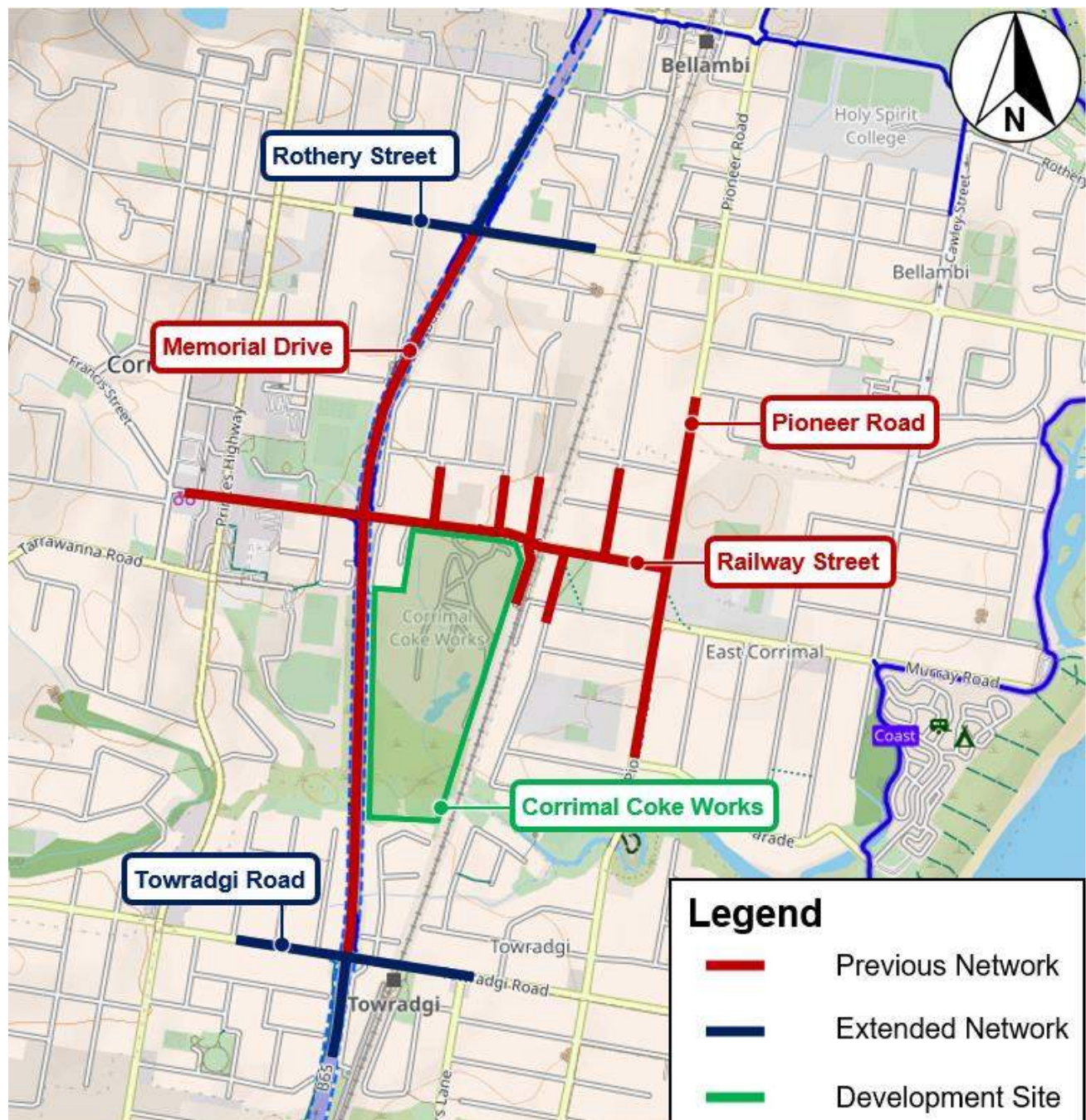
The following documents will be referred to as part of the ongoing traffic modelling activities:

- Transport for NSW Guide to Traffic Generating Developments (Transport, 2002)
- Transport for NSW Guide to Traffic Generating Developments, Updated Traffic Surveys TDT 2013/04 (Transport for NSW, 2013a)
- Transport for Traffic Modelling Guidelines (Transport NSW, 2013b)
- Transport for NSW TTD 2017/001 – Operational modelling report structure (Transport for NSW, 2017)
- Transport for NSW TTD 2018/002 – Traffic Signals in Microsimulation Modelling (Transport for NSW, 2018).

2. NETWORK DESCRIPTION

2.1 Study Area

The previous traffic modelling (based on 2018 data) was limited to intersections along Railway Street. In discussions during the previous TIA process, TfNSW raised questions about impacts at adjacent intersections along Memorial Drive at Rothery Street to the north and Towradgi Street to the south. In anticipation of the need to assess these intersections being raised again by TfNSW, the VISSIM model coverage have been extended to include these two intersections, as shown in Figure 2.1.

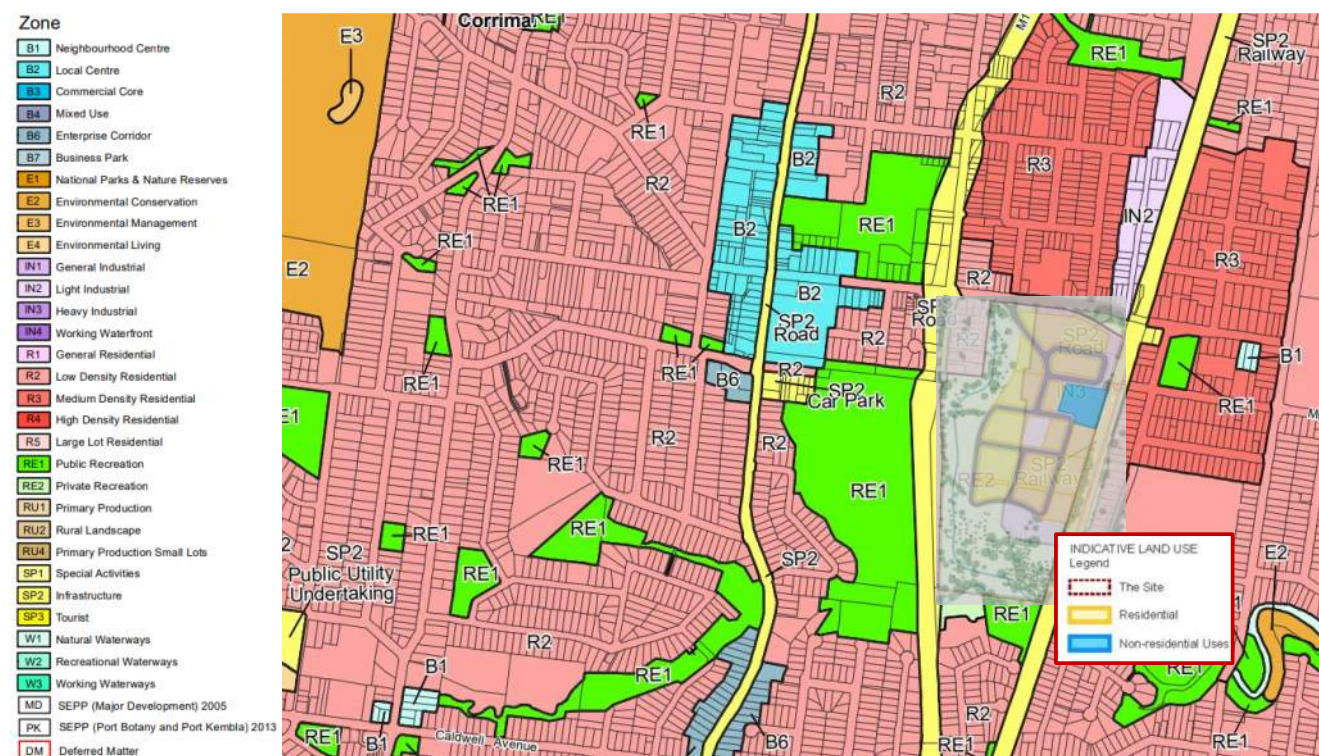


Adapted from OpenStreetMap

Figure 2.1: Proposed VISSIM Modelling Extents

2.2 Land Uses

The subject site is currently zoned IN3 Heavy Industrial, SP2 Roads and RE2 Private Recreation under the Wollongong Local Environmental Plan 2009. Surrounding land uses predominantly consist of residential, business and recreation as shown in Figure 2.2.



Source: Wollongong Local Environmental Plan 2009 Land Zoning Map No. 24

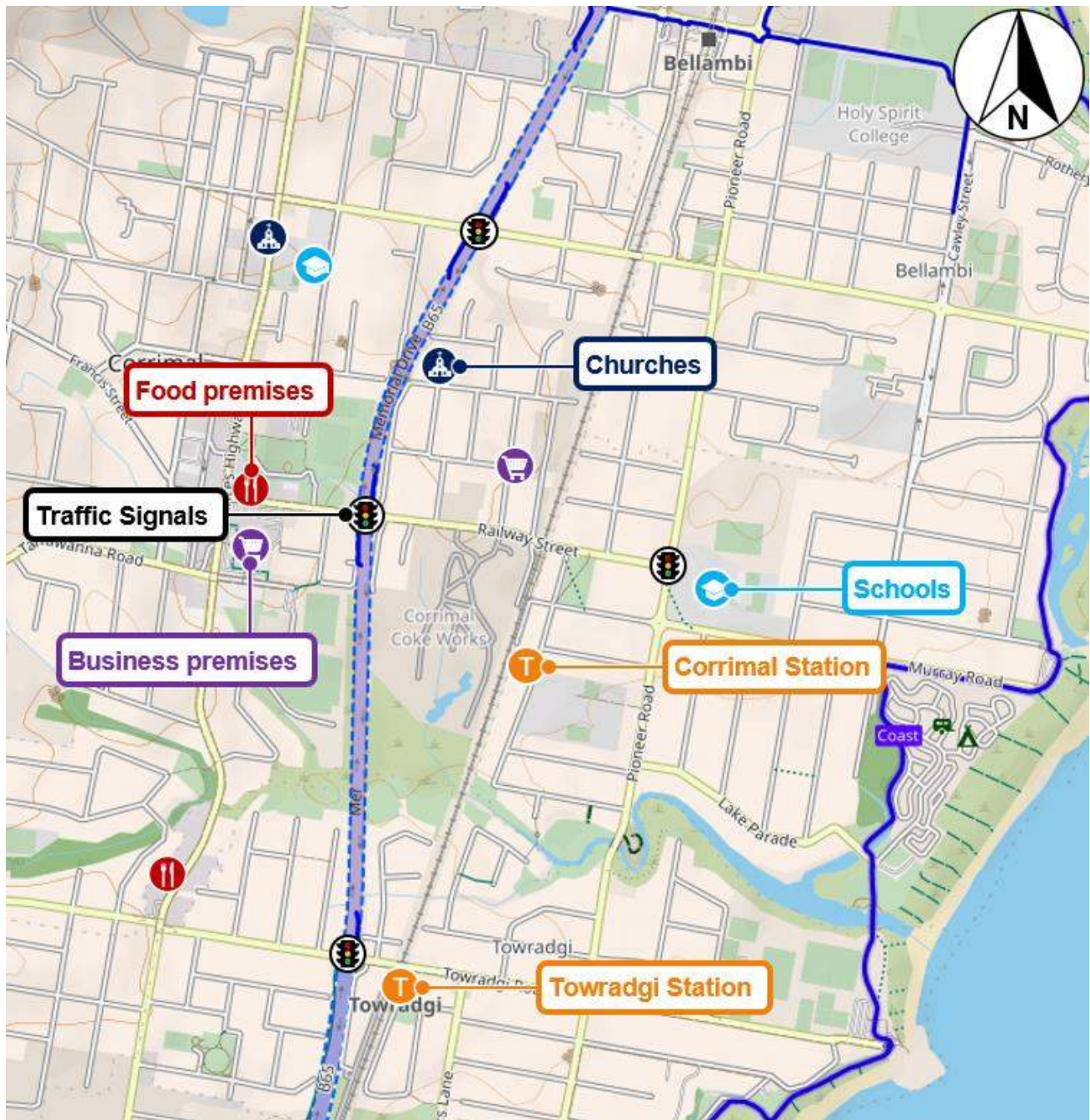
Wollongong City Wide Development Control Plan 2009 – Chapter D19 Former Corrima Coke Works Site, Version: 9 (09/08/2022)

Figure 2.2: Development Site and Surrounding Land Uses

2.3 Transport Infrastructure

2.3.1 Road Environment

The road environment and points of interest across the network are highlighted in Figure 2.3.



Adapted from OpenStreetMap

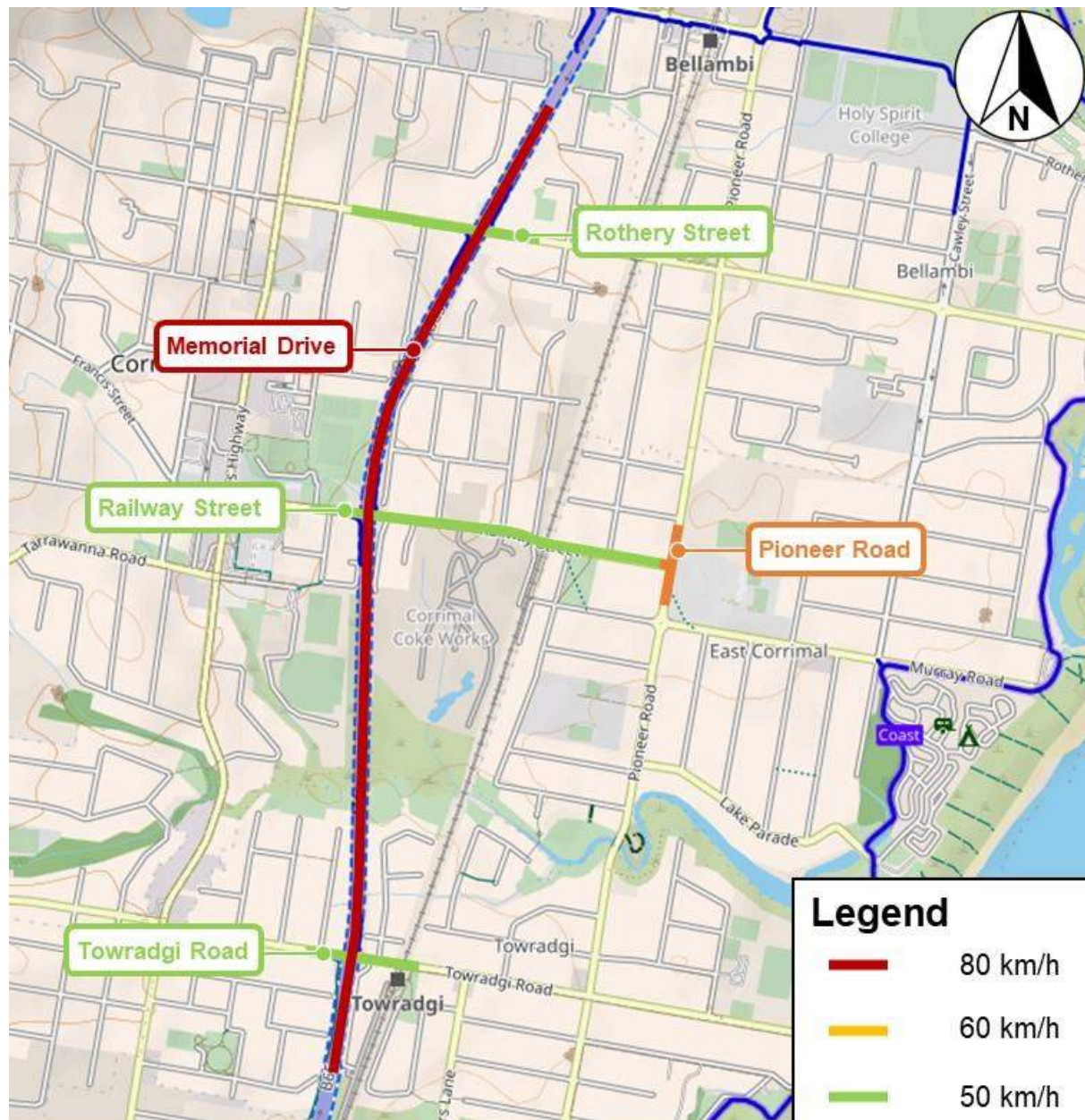
Figure 2.3: Current Road Environment

2.3.2 Speed Limits

The usual speed limits of the road network proposed to be modelled include:

- 80 km/h along Memorial Drive
- 60 km/h along Pioneer Road
- 50 km/h along Rothery Street, Railway Street and Towradgi Road

The notable speed limits of roads within the study area are shown in Figure 2.4.



Adapted from OpenStreetMap

Figure 2.4: Usual Speed Limits

2.3.3 School Zones

School zones with a reduced speed limit of 40 km/h are designated along parts of Rothery Street, Railway Street and Pioneer Road. School zones are operational between:

- 8:00AM and 9:30AM in the morning
- 2:30PM and 4:00PM in the afternoon.

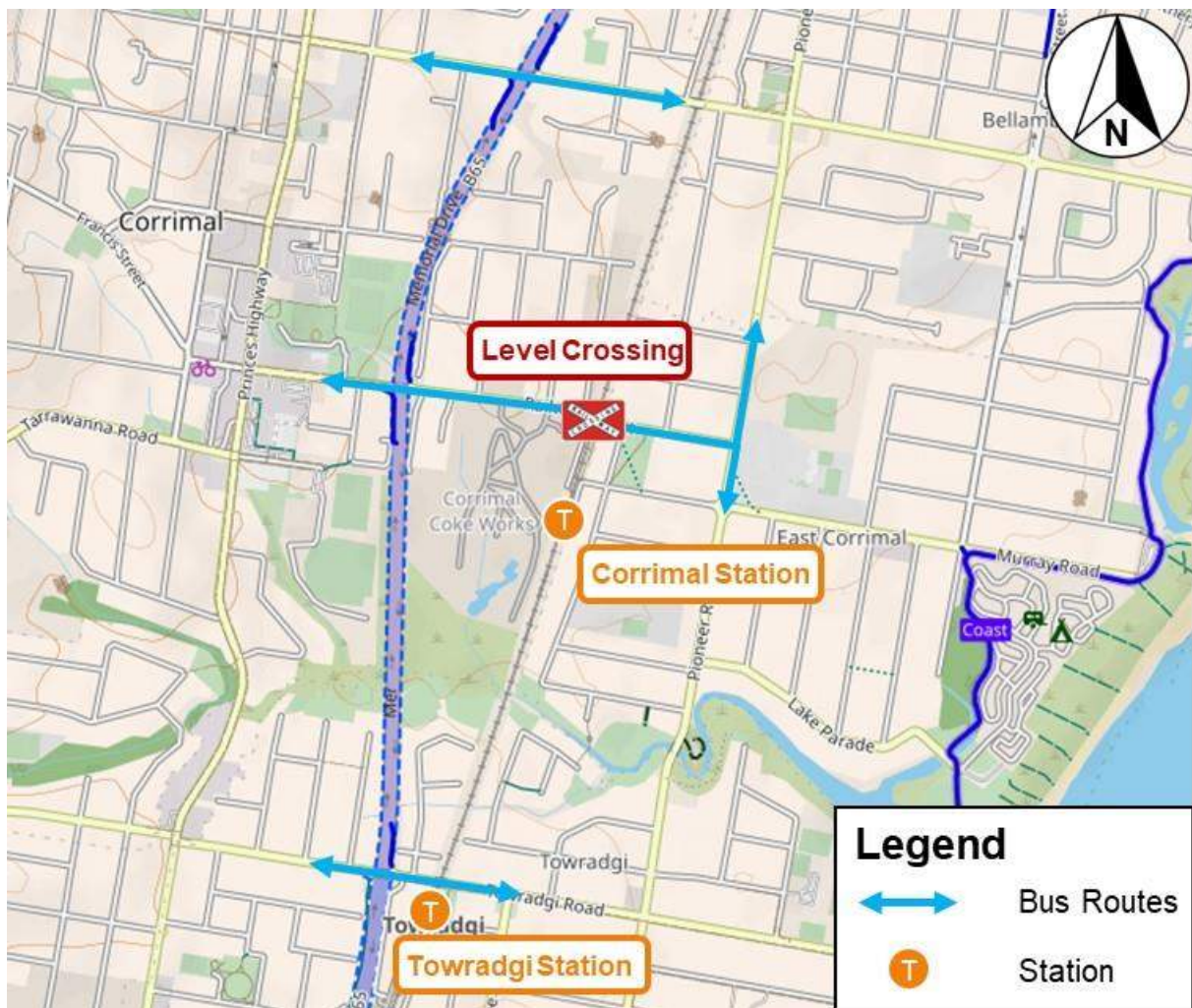
2.3.4 Public Transport

The road network carries several bus routes along Rothery Street, Railway Street, Pioneer Road and Towradgi Road, summarised in Table 2.1 and shown in Figure 2.5.

Table 2.1: Bus Routes in the Modelled Network

Route Number	Description
Route 3	Wollongong to Bellambi via Towradgi
Route 7	Wollongong to Bellambi
Route 8	Wollongong to Bellambi via Balgownie
Route 92	Bulli to Wollongong
Route 93	Bulli to University of Wollongong
Route 14SC	Dapto, then all stations to Thirroul and return

There are also two (2) train stations near the study area: Corrimal Station and Towradgi Station. A rail level crossing with boom gates and flashing lights is located on Railway Street for the Illawarra Railway Line which carries both passenger trains (all stop and express services) and freight trains.



Adapted from OpenStreetMap

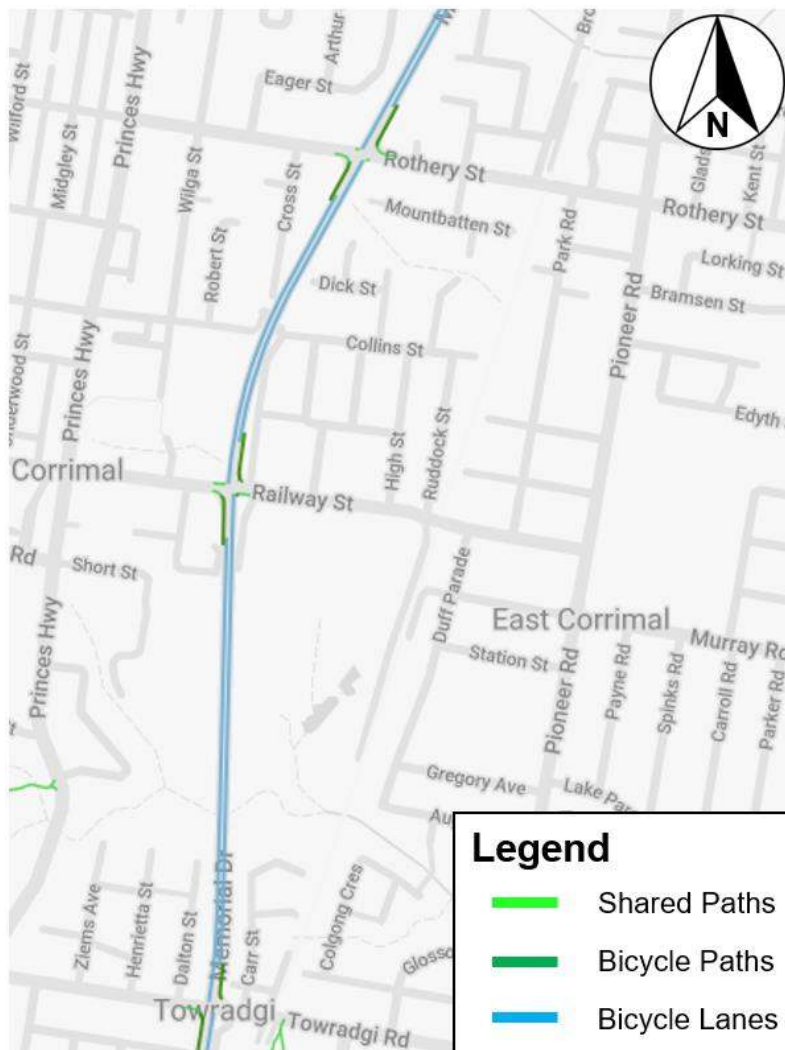
Figure 2.5: Public Transport Within and Surrounding the Network

2.3.5 Active Transport

Footpaths are provided on both sides of Rothery Street, Railway Street and Towradgi Road. As shown in Figure 2.6, shared paths or bike paths are available at the following intersections:

- Memorial Drive / Rothery Street
- Memorial Drive / Railway Street
- Memorial Drive / Towradgi Road.

Bicycle lanes are also provided along Memorial Drive.



Adapted from NSW Cycleway Finder

Figure 2.6: Active Transport Facilities Within the Network

2.4 Assessment Years and Time Periods

The VISSIM microsimulation traffic model will be for 2023 AM and PM peak traffic conditions. The AM and PM peak models will be calibrated and validated for each hour within the following time periods:

- 7:00 AM – 9:00 AM
- 4:00 PM – 6:00 PM

Also, 30-minute warm-up and 30-minute cool-down periods will be incorporated into the models.

The calibrated and validated 2023 base year traffic models will be used to develop future year 2036 and 2046 models as the horizon years for impacts assessment.

3. INPUT DATA

3.1 Traffic Surveys

3.1.1 Classified Intersection Counts

Classified intersection count data was collected by Matrix Traffic and Transport Data (*Matrix*) on Thursday 7th December 2023 at nine (9) key intersections within the study area, as shown in Figure 3.1 and listed in Table 3.1. The counts were classified into light vehicles, heavy vehicles, cyclists and pedestrians, and recorded in 15-minute intervals.

The time periods for the traffic surveys were:

- AM Peak: 7:00am to 9:00am
- PM Peak: 4:00pm and 6:00pm.

Queue lengths were also recorded as:

- Signalised intersections: 'Number of vehicles' at the start of each green phase
- Priority-controlled intersections: in 5-minute intervals.

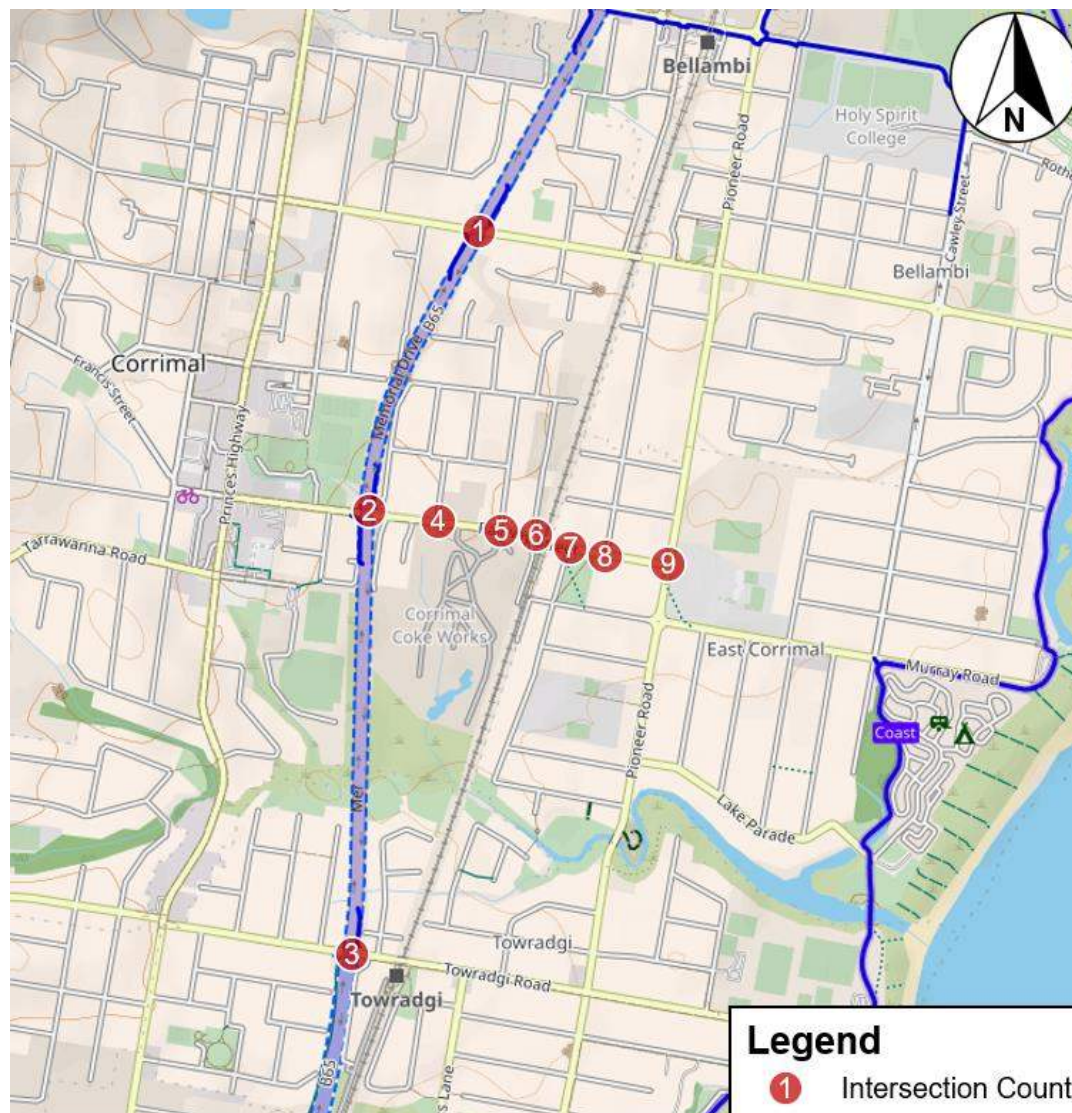


Figure 3.1: Intersection Count Locations

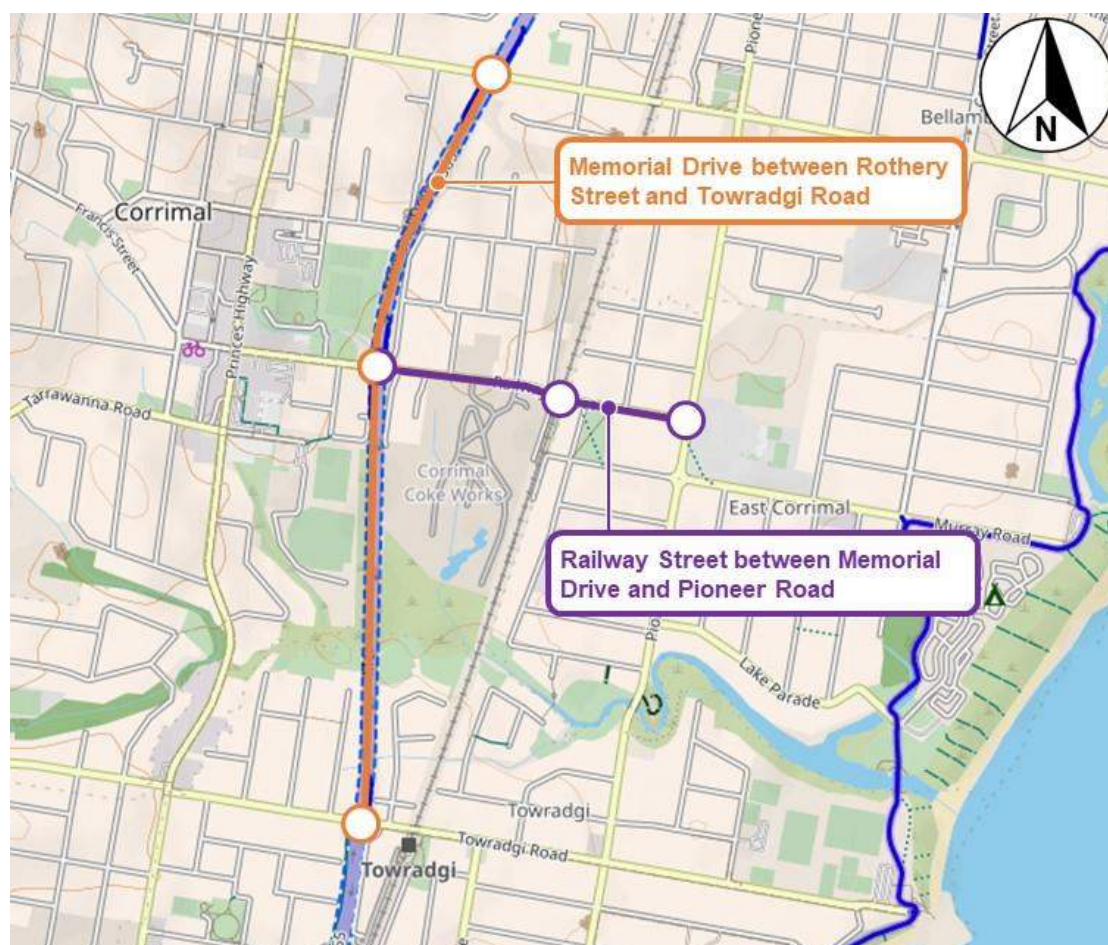
Table 3.1: Surveyed Intersections

ID	Intersection Description	Control Type
1	Memorial Drive / Rothery Street	Signalised
2	Memorial Drive / Railway Street	Signalised
3	Memorial Drive Towradgi Road	Signalised
4	Railway Street / Harbinger Street	Give Way
5	Railway Street / High Street	Stop
6	Railway Street / Ruddock Street / Level Crossing	Stop
7	Railway Street / Duff Parade	Give Way
8	Railway Street / Park Road	Give Way
9	Railway Street / Pioneer Road	Signalised

3.1.2 Travel Time Surveys

Travel time data was collected by Matrix using the ‘floating car’ method. The data was collected on Thursday 7th December 2023 along Memorial Drive and along Railway Street as shown in Figure 3.2, and in both directions. The surveys were undertaken from 7:00AM – 9:00AM and 4:00PM – 6:00PM. The frequency of the travel time records were:

- Memorial Drive between Rothery Street and Towradgi Road: 3-5 runs per hour in each direction
- Railway Street between Memorial Drive and Pioneer Road: 6-10 runs per hour in each direction



Adapted from OpenStreetMap

Figure 3.2: Travel Time Survey Routes

3.2 Strategic Model Inputs

3.2.1 Initial Traffic Demand Matrices for the Base Model

Initial demand (the '*prior matrices*') for the Base Model will be derived from a cordon area of the STFM by vehicle type, interpolated between 2021 and 2026 (for the 2023 base year) and 'furnished' with the classified intersection counts completed for the study area.

3.2.2 Future Traffic Demands

Future traffic demand matrices will be developed through comparison of the STFM cordon matrices from the interpolated 2023 cordon traffic demands and the 2036/2046 STFM cordon matrices.

3.3 SCATS Data

As listed in Table 3.1, there are four (4) signalised intersections within the study area.

SCATS history data for Thursday 7th December 2023, which includes the number of signal phases, phase sequences, cycle time and phase times will be sourced from TfNSW for input into the model. The corresponding LX file for the region will also be obtained for calculation of signal time offsets.

The TCS numbers of the signals are listed below:

- TCS 1595 – Pioneer Road / Railway Street
- TCS 2316 – Memorial Drive / Towradgi Road
- TCS 2317 – Memorial Drive / Railway Street
- TCS 2318 – Memorial Drive / Rothery Street

The signal times from the level crossing on Railway Street will be determined from observation of the intersection survey video data for each two hour peak period.

4. BASE MODEL DEVELOPMENT

4.1 Previous Traffic Modelling

Traffic modelling was completed as part of the TIA for the now-approved previous Planning Proposal. This modelling work included:

- Strategic modelling with TRACKS model outputs used to develop prior traffic demand matrices
- Development of a base and 2026 future-year microsimulation model in VISSIM including the entire section of Railway Street between Memorial Drive and Pioneer Road, as well as sections of Memorial Drive and Pioneer Road
- SIDRA modelling of the Memorial Drive / Railway Street and Pioneer Road / Railway Street for further assessment of findings from the 2026 future-year microsimulation VISSIM model.

4.2 Modelling Platform

All base and future models will be developed using VISSIM 23. SIDRA models will also be created for the main signalised intersections at Memorial Drive / Railway Street and Pioneer Road / Railway Street and possibly for the two other intersection on Memorial Drive if upgrade are identified as being warranted at these intersections from the VISSIM modelling.

The VISSIM models will be relied upon to identify any impacts and mitigation measures required at the level crossing, at other intersections along the Railway Street corridor and for access intersection requirements. The SIDRA models will primarily be used to confirm the geometry of any upgrade proposals for impact mitigation.

4.3 Network Elements

4.3.1 Road Types

Road types will be coded from the OpenStreetMap information and checked through site observations, including any considerations of reduced speed zones or other restrictions.

4.3.2 Traffic Signals

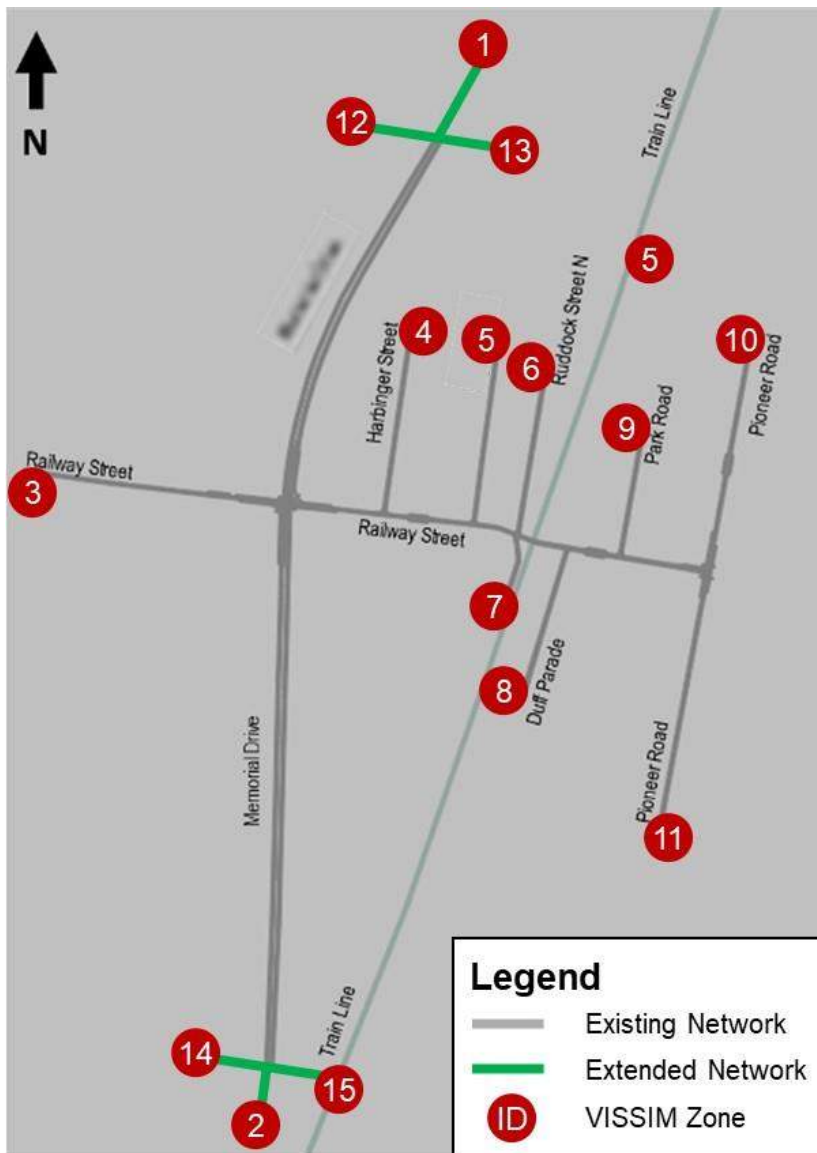
SCATS IDM data will be analysed to obtain average cycle and phase times for all signalised intersections within the study area. PTV VISSIM VisVAP module will be used to emulate 'actuated' signal strategy for each signalised intersection and pedestrian crossing. VisVAP will also be used to model the dynamic operation of the at grade railway crossing on Railway Street.

4.3.3 Zone System

As this is a corridor model, the zones will connect to/from roads and streets intersecting with Railway Street and Memorial Drive, as shown in Figure 4.1.

Compared to the previous 2018 zoning structure, additional zones will added to accommodate the model extensions along Memorial Drive.

The 2023 Base VISSIM models will have a total of 15 zones, and an additional zone will be added in the future year models to represent the proposed development.



Adapted from VISSIM

Figure 4.1: VISSIM Zone Structure – Base Model

4.3.4 Public Transport

Bus routes and timetables will be implemented based on current data from the Transport NSW website.

Train services will be included in the microsimulation model. Boom gate closure times and durations will be replicated based on data from the video surveys, coupled with train actuation logic information provided by Sydney Trains. This approach will allow the frequency and duration of closures to be accurately modelled in the future years as well.

4.3.5 User Defined Costs

As this is a corridor model with limited route choice, user-defined costs and route closures are not necessary for the development of the model.

4.4 Traffic Demands

4.4.1 Prior Matrix Traffic Demands

The traffic demand matrices from the previous (2018) traffic model will be used as the 'prior' matrices for each peak period. The matrices will be expanded to include the added zones along Memorial Drive, and traffic count data would be used to estimate the split of demands between the new zones.

The matrices will then be run through VISSIM model with manual adjustments made to achieve a satisfactory representation of base traffic patterns while achieving TfNSW calibration criteria for the observed versus modelled GEH statistics.

4.4.2 Vehicle Type Composition

The composition of the vehicles in the microsimulation model will be based on the vehicle classifications from the intersection count survey which comprise of:

- **Light vehicles (LV):** Representing light vehicles such as cars, light trucks, vans and motorcycles (Austroads Class 1-2)
- **Heavy vehicles (HV):** Representing heavy vehicles such as rigid and articulated trucks (Austroads Class 3-12).

4.4.3 Traffic Profile

The demand matrices will be profiled at 15-minute intervals based on the intersection counts to achieve disaggregated validation results in terms of travel time and queue lengths.

4.4.4 Pedestrian and Cyclists

Pedestrian and cyclist demands will be added to the intersections where the counts have identified crossing movements are present.

4.4.5 Driving Behaviours and Speed Profiles

Generally, the default mesoscopic/microscopic parameters within VISSIM will be adopted in the base model. However, at certain locations, it may be required to make slight changes to parameters to calibrate localised traffic behaviours. At this stage, it is proposed that it may be required to alter the following parameters to better reflect actual lane-changing behaviour in the network:

- look-ahead distance
- lane change cooperation
- gap acceptance at priority intersections
- reduced speed at turn movements.

Speed profiles will be adjusted from the VISSIM defaults to ± 5 km/h of the posted speed limit.

Any deviation of driving behaviours from the defaults will be documented in the Base Model Calibration and Validation Report.

4.5 Model Calibration and Validation

4.5.1 Assignment Type

The Equilibrium Assignment method in VISSIM is proposed. It is anticipated that the default VISSIM convergence parameters will be used for travel times along paths and volumes along edges but adjustments may be made to allow the model to converge. The final convergence parameters used in the model will be documented. As there is no route choice in the model, the choice of assignment type is of little consequence.

4.5.2 Calibration Criteria

The comparison between the modelled and observed traffic count data will be undertaken using the commonly used GEH statistic as well as the regression R-squared value, based on the wide area criteria outlined in the TfNSW Modelling Guidelines.

Calibration will be undertaken for each hour in each 2-hour peak period, as follows:

- **Weekday AM Peak AM Peak:** 07:00-08:00 and 08:00-09:00
- **Weekday PM Peak AM Peak:** 16:00-17:00 and 17:00-18:00.

Calibration will be achieved for light and heavy vehicles, meaning that 8 x 1-hour matrices will be estimated and calibrated in total.

The more stringent core area criteria outlined in the TfNSW modelling guidelines will be applied to the intersections that are critical to traffic behaviour along Railway Street, which are:

- Memorial Drive / Railway Street
- Ruddock Street / Railway Street / Level Crossing
- Pioneer Road / Railway Street

4.5.3 Validation Criteria

Travel times along the surveyed routes will be used to validate the model. In accordance with the TfNSW Modelling Guidelines, average modelled journey times are to be within 15% or one minute (whichever is greater) of average observed journey times for the full length of the route. The travel time route will also be split into a number of sections with the section average modelled journey times also to be within 15% of the average observed journey time.

Signal timing will also be used to validate the model in accordance with the TfNSW Modelling Guidelines which includes criteria related to average cycle times, total green times and actuation frequency.

Surveyed back-of-queue data will also be checked against the modelled queues in the validation process.

4.5.4 Model Stability

Model stability will be demonstrated for each of the scenarios by checking the variability of network performance measures between five different runs with five different seed values for both the AM and PM peaks. The set of network performance measures include the following:

- Cumulative travel time across all vehicles (vehicles – VHT)
- Total number of vehicles in the model.

5. FUTURE MODEL DEVELOPMENT

5.1 Scenario Testing

It is proposed to develop year 2036 and 2046 AM and PM peak period traffic models for the following scenarios:

- **2036/2046 Base Case:** this scenario will include background traffic growth from the STFM model and the increased number of boom gate closures based on train service growth provided by Sydney Trains. No committed upgrades have been identified within the model network
- **2036/2046 Base Case with proposed development:** as per the 2036/2046 Base Case but with the additional traffic volumes generated by the proposed development and including the internal road system of the development. This scenario will identify any changes in operating conditions compared to the 2036/2046 Base Case to identify the development's impacts as well as to confirm the suitable operation of the proposed access intersection roundabout
- **2036/2046 Base Case with proposed development and with upgrades:** based on the findings from the previous scenario, a set of network/intersection improvement measures will be identified to mitigate the impacts of the development on the transport network. This scenario will be optimised to generate an agreed set of traffic and transport mitigation items as part of a suite of integrated traffic and transport improvements for the TIA. It is important to note that some of the mitigation items may not be traffic infrastructure upgrades and instead may be mechanisms to reduce the development's traffic generation through modal shift.

5.2 Network Changes

5.2.1 Road Network

TfNSW and WCC have advised that there are no planned upgrades to the road network within the study area.

5.2.2 Traffic Signals

Traffic signals settings will be optimised where appropriate based on future changes in traffic demand patterns, as would be undertaken in the ordinary course of operational management of the signals over time. Cycle times will not be adjusted and minimal/no changes will be made to the 'A phase' phase time at the Memorial Drive intersections.

5.2.3 Train Demands and Level Crossing Closures

The growth in passenger trains (all stop + express) and freight trains in the peak traffic will be provided by Sydney Trains. The model will be set up to input these new timetables directly and the boom gate closure logic applied to determine boom gate closure frequencies and durations.

5.2.4 Bus Services and Stops

Given the limited number of services and the negligible impact of buses and bus stops on traffic operations, no change to bus services from those in 2023 are proposed in the 2036/2046 Base Case. The 2036/2046 Project Case will allow buses to be routed into the site to access the Corrimal Station western railway platform where a new bus stop will be located.

5.3 Traffic Demand

5.3.1 Background Traffic Growth

Traffic growth between 2023 and 2036/2046 will be estimated based on the absolute differences between the latest STFM model year and the 2036/2046 STFM scenarios. The difference matrices will be added to the calibrated year 2023 traffic demands to obtain the 2036/2046 traffic demands.

5.3.2 Development Traffic Generation

Whilst the final number of dwellings in the new proposal is still being finalised it is anticipated that the development will comprise a total of approximately 730 dwellings.

Consistent with the previous assessment, the 'conventional' traffic generation rates for the different land uses will be taken from the Guide to Traffic Generating Developments (GTTGD) (2002) and the Technical Direction Guide to Traffic Generating Developments Updated traffic surveys (TD13-04a). Accordingly, the proposed development traffic generation rates are:

- Townhouses: **0.65 trips per dwelling** per hour (TD13-04a)
- Apartments (regional rates): **AM peak = 0.21 trips per bedroom** per hour and PM peak **0.15 trips per bedroom** per hour (TD13-04a)
- Commercial/Retail (if included): will be based on the **GTTGD (2002)** and more recent data where relevant. Specific rates to be confirmed once Legacy Property confirm the proposed mix of commercial and retail areas
- Housing for Seniors (if included): **0.4 trips per dwelling** per hour (TD13-04a).

It is important to note that the above rates are 'draft' or 'starting' rates and may be reviewed as part of considering mitigation options specifically those with reduced development parking provisions. Also, stakeholders have previously identified that it may be preferable to focus the investment in impact mitigation on measures that facilitate increased public transport and active transport use which would lead to lower trip generation rather than 'over-investing' in major intersection upgrades given the broader capacity issues on Memorial Drive.

5.3.3 Development Traffic Distribution

Year 2021 Australian Bureau of Statistics Census Journey to Work data will be used to estimate the percentage of traffic travelling to and from the proposed site in peak hours from the north, south, west, north-east and southeast.

Conventional IN v OUT splits of 20% IN / 80% OUT (AM peak) and 80% IN / 20% OUT (PM peak) are also proposed for the residential component of development traffic, while a 50/50 split will be assumed for any retail component.

The proposed traffic distribution will be checked against the intersection count data to ensure that proposed traffic distribution is reasonably similar to the existing traffic patterns.

5.3.4 Traffic Profile

All 2036/2046 future scenarios are proposed to use the same 15-minute traffic profile used in the 2023 Base models for both background traffic and development traffic.

5.4 Traffic Assignment

There is no route choice in the network. In any case, the same Equilibrium Assignment methods/parameters used in the Base year will be re-run for the future year scenarios.

6. NEXT STEPS

The assumptions and methodologies presented in this report will be reviewed by the project stakeholders. Following approval of this report by all relevant parties, the development of the 2023 base model scenarios will commence in accordance with the assumptions and methodologies presented in this report.



Appendix D: Calibration/Validation Report





Corrimal Coke Works Site New Planning Proposal TIA

Base Year Model Report

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4 March 2024

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1. INTRODUCTION

1.1 Background

In 2018, Bitzios Consulting was engaged by Legacy Property to prepare a Traffic and Transport Impact Assessment (TIA) for the Planning Proposal of a residential development on the former Corrimal Coke Works site at 27 Railway Street, Corrimal. At the time, the Planning Proposal had approved a maximum yield of 550 dwellings. The TIA included VISSIM traffic microsimulation network modelling and SIDRA intersection modelling.

The modelling informed schemes for a roundabout at the development's access with Railway Street and incorporating Harbinger Street to the north. The modelling also informed potential upgrade works at the intersection of Memorial Drive / Railway Street (in consultation with TfNSW) and identified no significant queueing or delay impacts were likely at the rail level crossing in Railway Street.

On 29 April 2022, NSW Department of Planning and Environment published Amendment 50 of the Local Environment Plan (LEP) for the Corrimal Coke Works site which rezoned the site. The eastern part of the site is now zoned R3 Medium Density Development to permit urban development and the western part is now RE1 Public Recreation.

Legacy Property intends to submit a new Planning Proposal for the Corrimal Coke Works site, increasing the approved residential yield from 550 dwellings to 730 dwellings. Bitzios Consulting was commissioned by Legacy Property to update the modelling and TIA to reflect the new Planning Proposal.

1.2 Project Objective

The objective of this project is to provide an updated TIA and traffic model reflecting the new Planning Proposal and more recent traffic patterns and data. VISSIM microsimulation traffic modelling will be used to assist with the assessment of the Corrimal Coke Works site by:

- Evaluating existing and future traffic conditions in the study area with and without development
- Identifying potential future traffic-related issues on Railway Street and Memorial Avenue due to additional traffic generated by the development
- Identifying potential future access road and intersection upgrade works to mitigate the identified traffic-related issues, considering the schemes prepared and approved as part of the previous Planning Proposal.

The VISSIM modelling will be supported by SIDRA intersection models of the identified upgrade works with the primary purpose of confirming intersection geometry requirements or intersections proposed for access or mitigation works.

1.3 Scope of Work

The scope of works for the VISSIM modelling for this project include the following:

- Development, calibration and validation of 2023 Base AM and PM traffic models
- Development of 2036 and 2046 future year traffic models to assess/identify impacts, needs and potential infrastructure upgrades for future year growths based on:
 - STFM forecast background traffic growths
 - Traffic generations from the Corrimal Coke Works site.

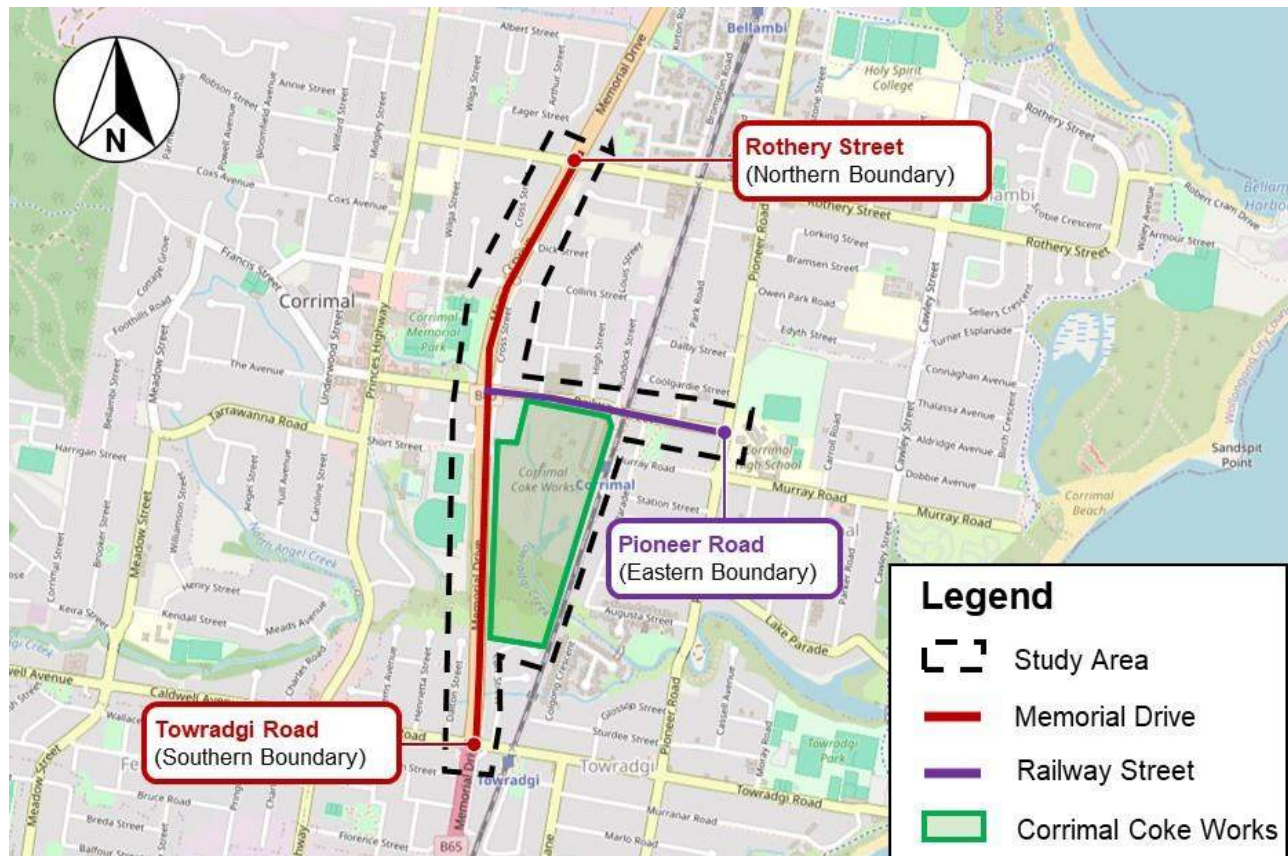
1.4 Study Area

The VISSIM model includes Railway Street between Memorial Drive and Pioneer Road, and Memorial Drive between Rothery Street and Towradgi Road as shown in Figure 1.1.

The key intersections that are most likely to be affected by the traffic volumes generated by the proposed development are the three (3) signal-controlled intersections along Railway Street:

- Memorial Drive / Railway Street
- Ruddock Street / Railway Street / Level Crossing
- Pioneer Road / Railway Street

The calibration of these intersections will be subject to the more stringent 'core-area' criteria.



Adapted from OpenStreetMap

Figure 1.1: Study Area

1.5 Report Outline

This report details the development, calibration and validation of the 2023 Base VISSIM models. It includes:

- **Chapter 2 – Existing Conditions** summarises the traffic data collection and the traffic conditions required to be represented in the 2023 Base VISSIM model
- **Chapter 3 – Model Assumptions** presents the key parameters and assumptions used in the development of the 2023 Base VISSIM model
- **Chapter 4 – Model Calibration and Validation** presents the criteria and results of the base model calibration and validation
- **Chapter 5 – Conclusion**

2. EXISTING CONDITIONS

2.1 Traffic Data Overview

Traffic data was collated and analysed for the purpose of model calibration and validation with the different types of data and their sources summarised in the following sections. A summary of the traffic data, dates, durations and purposes is provided below in Table 2.1.

Table 2.1: Traffic Data Summary

Traffic Data	Source and Location	Survey Data and Duration	Purpose
Intersection turning counts	Collected by Matrix Traffic and Transport Data (Matrix) at nine (9) intersections	Thursday 7 th December 2023, 7:00-9:00AM, 4:00-6:00PM (2-hour durations)	Model Calibration and Demand Estimation
Floating car travel time surveys	Collected by Matrix for two (2) bi-directional routes	Thursday 7 th December 2023, 7:00-9:00AM, 4:00-6:00PM (2-hour durations)	Model Validation
Queue length surveys	Collected by Matrix at nine (9) intersections	Thursday 7 th December 2023, 7:00-9:00AM, 4:00-6:00PM (2-hour durations)	Model Validation
SCATS data	Provided by TfNSW for four (4) traffic signals	Thursday 7 th December 2023 (24-hour duration)	Traffic signal coding

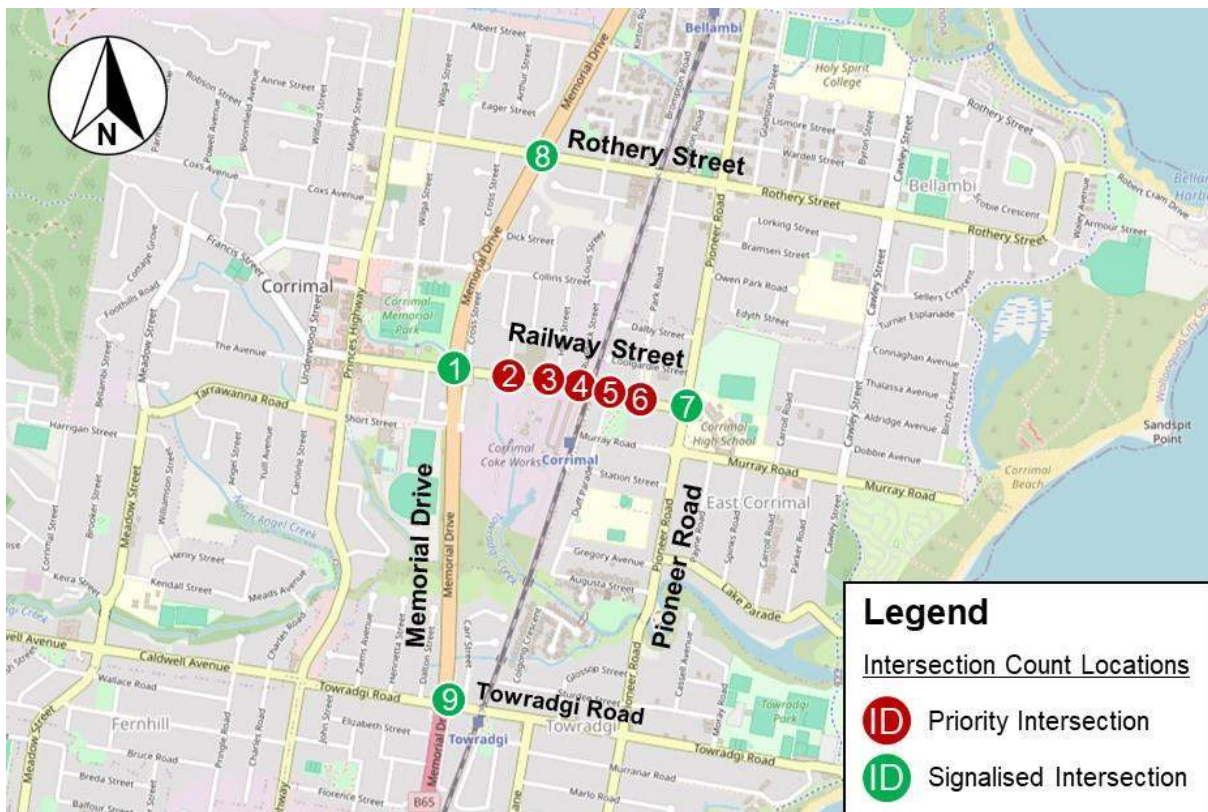
2.2 Intersection Turning Count Data

Intersection turning counts were the primary source of data used for calibration of the model. Additionally, turning counts for the Memorial Drive / Railway Street and Memorial Drive / Towradgi were used as part of 2023 demand estimation (further discussed in Section 3.4.1). The intersection count locations and their control types are summarised below in Table 2.2 and shown in Figure 2.1.

Traffic flow diagrams showing the turning counts and approach configurations for every intersection are provided in **Appendix A**.

Table 2.2: Intersection Details

ID	Intersection	Control Type
1	Memorial Drive / Railway Street	Signals
2	Railway Street / Harbinger Street	Give-way
3	Railway Street / High Street	Stop
4	Railway Street / Ruddock Street	Stop
5	Railway Street / Duff Parade	Give-way
6	Railway Street / Park Road	Give-way
7	Railway Street / Pioneer Road	Signals
8	Memorial Drive / Rothery Street	Signals
9	Memorial Drive / Towradgi Road	Signals



Adapted from OpenStreetMap

Figure 2.1: Intersection Count Locations



Adapted from OpenStreetMap

Figure 2.2: Travel Time Routes

2.3 Travel Time Data

Travel time routes were the primary source of data for validation of the base model. The surveys included two (2) bi-directional routes:

- **Route A:** Railway Street between Memorial Drive and Pioneer Road
- **Route B:** Memorial Drive between Rothery Street and Towradgi Road

The travel time routes and sub-sections are shown in Figure 2.2.

2.4 Queue Length Data

Queue length survey data was used to understand the key congestion locations that should be replicated in the modelling. The surveys included the same nine (9) intersections as the intersection count surveys (see Figure 2.1).

2.5 Traffic Signal Data

SCATS history data from the survey date and the regional LX settings were obtained for programming signal times and offsets. The details of the four (4) intersections controlled by SCATS are provided in Table 2.3.

On the day of the surveys during the AM peak, the SCATS data was not recorded correctly at the Memorial Drive / Towradgi Road signals. The AM peak signal timing was instead programmed based on the traffic flows at the signals and the LX data, and it was not included in the validation dataset.

The signals for the level crossing located on Railway Street between Ruddock Street and Duff Parade are not connected to SCATS. The level crossing appears unchanged between 2018 and 2023, so the VISSIM signal settings were retained from the approved 2018 model.

Table 2.3: SCATS Intersections

ID	Intersection	TCS Number	LX Region
1	Memorial Drive / Railway Street	2317	WOL
7	Railway Street / Pioneer Road	1595	WOL
8	Memorial Drive / Rothery Street	2318	WOL
9	Memorial Drive / Towradgi Road	2316	WOL

2.6 Site Visit Observations

A site visit was undertaken on the same day as the traffic surveys during the PM peak period. The observations included on-foot and drive-through inspections of the study area. These site visits contributed to:

- Understanding the operation, and traffic delay and queueing effects of the level crossing (near Railway Street / Ruddock Street)
- Traffic conditions of Memorial Drive and its impacts on traffic delays and queueing on Railway Street.

Some of the photos taken on-site are shown below in Figure 2.3.



Figure 2.3: Site Visit Photos

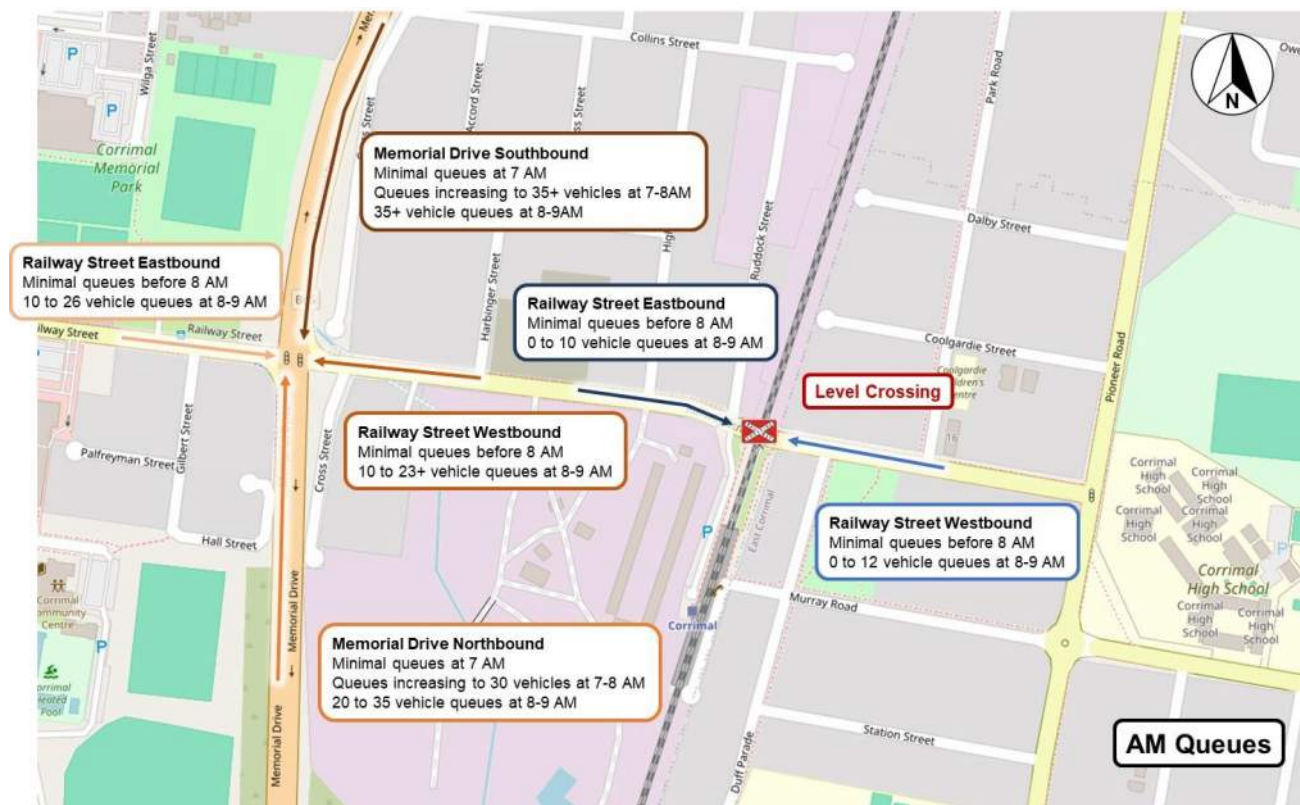
2.7 Congestion Locations

Substantial queues in both AM and PM peaks were observed along Memorial Drive and at the level crossing along Railway Street when the crossing gates were activated. Minimal queues were observed along the rest of Railway Street.

Queues extents during each of the AM and PM peak hours are summarised in Figure 2.4 and Figure 2.5 respectively. In general, the observed queues varied substantially within every hour due to differences in traffic arrival patterns.

In the morning peak, it was observed that:

- Memorial Drive becomes highly congested by 8:00 AM, with southbound queues at the Railway Street signals extending beyond the observable limit of 35 vehicles
- There are minimal delays along Railway Street before 8:00 AM, but both sides of Memorial Drive become moderately congested between 8:00 and 9:00 AM
- Queues caused by level crossing activity dissipated quickly and had minimal impacts on the operation of adjacent intersections.



Adapted from OpenStreetMap

Figure 2.4: Congestion Locations – AM Peak

In afternoon peak, it was observed that:

- In general, longer queues were observed between 4:00 and 5:00 PM compared to 5:00 to 6:00 PM
- Memorial Drive northbound and Railway Street east of Memorial Drive were relatively free from congestion
- Queues caused by level crossing activity dissipated quickly and had minimal impacts on the operation of adjacent intersections.



Adapted from OpenStreetMap

Figure 2.5: Congestion Locations – PM Peak

3. MODEL ASSUMPTIONS

3.1 General Parameters

3.1.1 Modelling Platform

The microsimulation models were developed using PTV VISSIM 2023 (SP 11).

3.1.2 Model Time Periods

The models were established for a two-hour 'evaluation period' (as well as a 30-minute 'warm up' period and a 30-minute 'cool down' period) for both the AM and PM peaks. The AM and PM peak periods used in the models are outlined in Table 3.1.

Table 3.1: Model Time Periods

Peak Period	Warm-up	Evaluation Period	Cool-down
AM	6:30 AM – 7:00 AM	7:00 AM – 9:00 AM	9:00 AM – 9:30 AM
PM	3:30 PM – 4:00 PM	4:00 PM – 6:00 PM	6:00 PM – 6:30 PM

Standard model outputs have been set up to be reported in two 1-hour intervals, while most of the model inputs are entered in 15-minute increments to allow for sensitivity in the way traffic is loaded and assigned to the network.

3.1.3 Traffic Assignment

The VISSIM model uses two stages of traffic assignment:

- **Equilibrium assignment:** Used for calculating the traffic route 'cost and path' files
- **Stochastic assignment (Kirchhoff):** Used for the final model outputs.

The 'cost and path' files created using the equilibrium assignment were used as inputs for the stochastic assignment.

The default VISSIM traffic assignment parameters were used for both stages, and the equilibrium assignment would be run for convergence to travel time along paths and volumes along edges.

3.1.4 Vehicle Types

Two main traffic types were used in the model, namely light vehicles and heavy vehicles. Both vehicle types were calibrated separately and have separate demand matrices.

The default VISSIM 'Car' and 'HGV' vehicle parameters were used for light vehicles and heavy vehicles respectively.

3.1.5 Behaviour Parameters

Generally, the default VISSIM driving behaviour for 'Urban' roads were used throughout the model area. The departures from the defaults were:

- Enabling 'cooperative lane changes' to improve lane changing behaviour
- Enabling 'overtake reduced speed areas' to improve behaviour at zipper merges
- Increasing 'waiting time before diffusion' from 60s to 180s as the traffic signal cycle times have an upper limit of 170s.

3.2 Road Network

3.2.1 Zone System

The road network was adopted from the 2018 VISSIM model which included Railway Street and the major cross streets between Memorial Drive and Pioneer Road. In this model update, Memorial Drive was extended to Rothery Street and Towradgi Road, with additional zones to accommodate the new intersections. An additional zone was included as a placeholder for future traffic from the proposed development (Zone 12).

The VISSIM zone system is shown in Figure 3.1.

3.2.2 Road Types

The 'Freeway' road type was used for Memorial Drive and the 'Urban' road type was used for all other roads but both road types use the 'Urban' driving behaviour. The 'Freeway' driving behaviour is less suitable for Memorial Drive as it is controlled by traffic signals (not free-flow).

3.2.3 Speed Profiles

The default VISSIM speed distributions generally overestimate vehicle speeds, so the speed distributions were adjusted to the following ranges:

- **40 km/h:** 35-45 km/h
- **50 km/h:** 45-55 km/h
- **60 km/h:** 55-65 km/h
- **80 km/h:** 65-90 km/h
- **90 km/h:** 75-100 km/h.

In the sections leading up to the speed cameras along Memorial Drive at Railway Street and Towradgi Road, the speed distribution was adjusted to be between 65km/h and 80km/h.

3.2.4 School Zones

School zones were coded using time-restricted 'desired speed decisions' to reduce vehicle speeds during the operational period to 40km/h. The school zones operate between:

- 8:00AM and 9:30AM in the morning
- 2:30PM and 4:00PM in the afternoon.

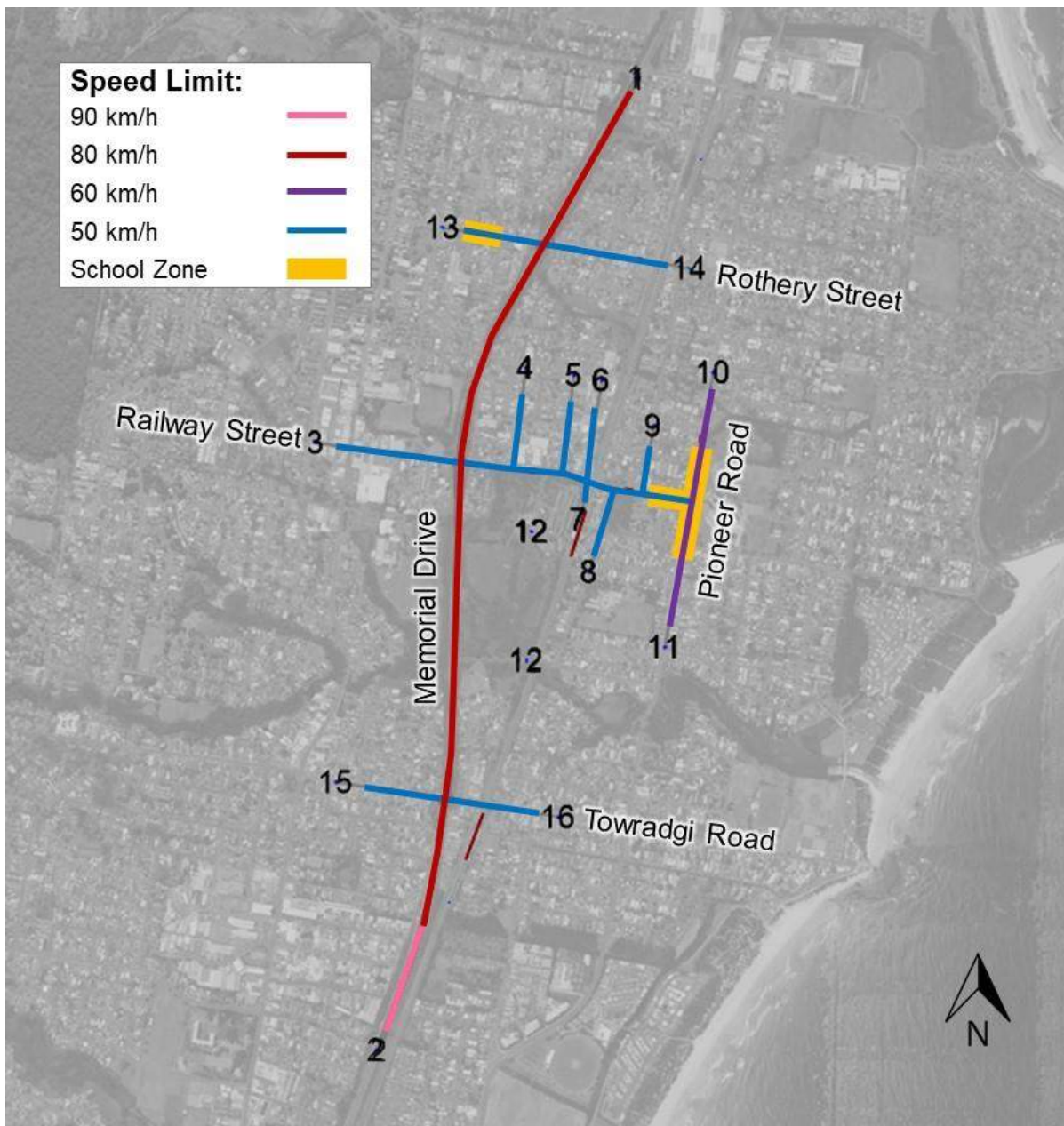
The usual speed limits and school zones are shown in Figure 3.1.

3.2.5 Road Gradients

Gradients were implemented as percentages along Memorial Drive and Railway Street based on Google Earth elevation data.

3.2.6 Traffic Signals

The traffic signals within the model are controlled with VAP files which mimic the behaviour of SCATS signal operations, including detector-based phase actuation. Signal phase times including minimum and maximum phase times, inter-phase durations, and total intersection cycle times were programmed based on the SCATS history and LX data provided by TfNSW.



Adapted from VISSIM

Figure 3.1: Road Network and Modelled Speed Limits

3.3 Public Transport

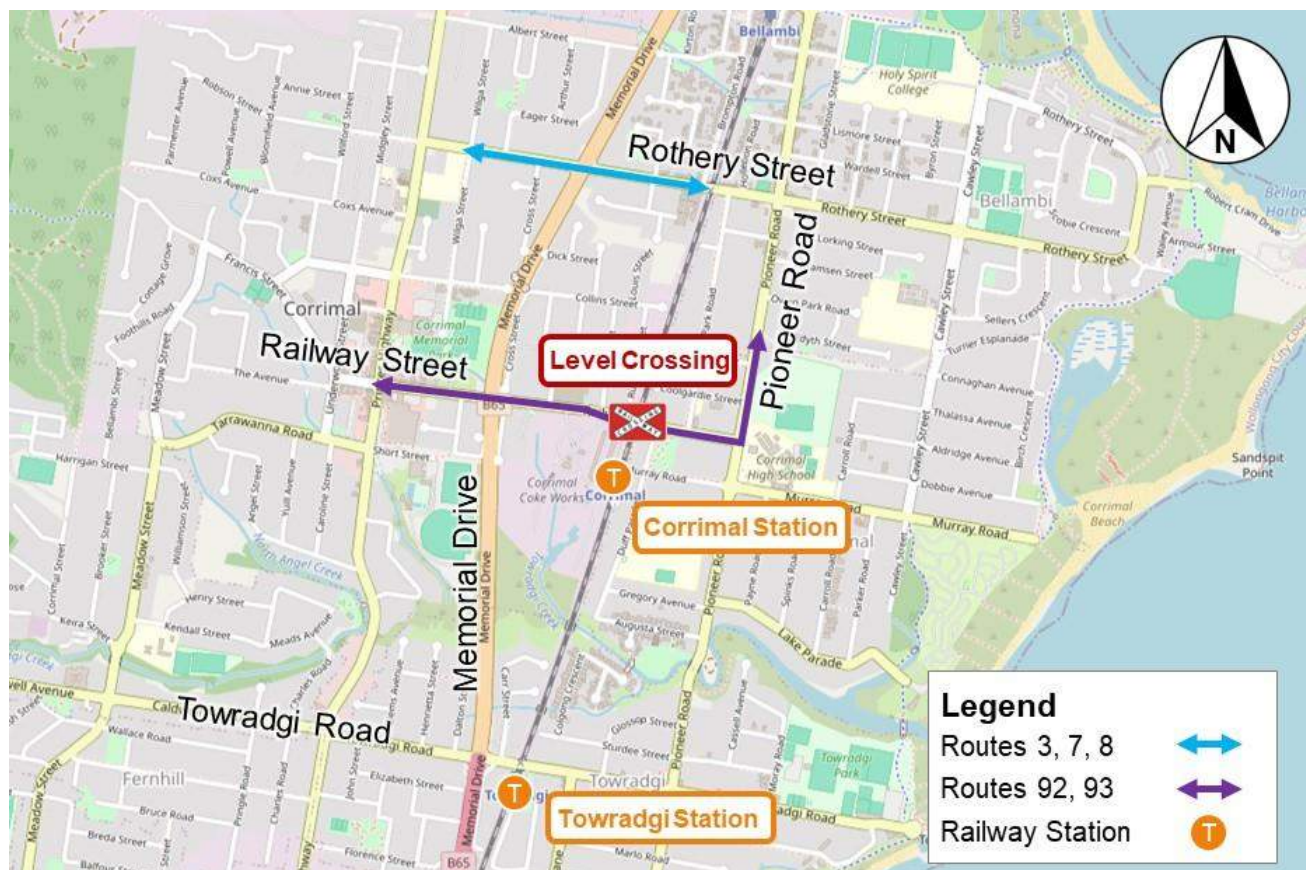
3.3.1 Bus Routes

The study area includes several bus routes along Railway Street, Pioneer Road and Rothery Street. The relevant timetables were retrieved from the transportsw.info website in January 2024.

The bus routes and timetables were modelled based on the retrieved information, and the routes and frequencies are outlined in Figure 3.2 and Table 3.2.

Table 3.2: Bus Route Summary

Route	Description	AM Frequency	PM Frequency
3	Wollongong to Bellambi via Towradgi	30 minutes	60 minutes
7	Wollongong to Bellambi	60 minutes	60 minutes
8	Wollongong to Bellambi via Balgownie	30 minutes	30 minutes
92	Bulli to Wollongong	60 minutes	90 minutes
93	Bulli to University of Wollongong	60 minutes	60 minutes



Adapted from OpenStreetMap

Figure 3.2: Public Transport Network

3.3.2 Rail Services

Timetables for the South Coast Line were retrieved from the transportsw.info website in January 2024, and the data for the peak periods is summarised in Table 3.3.

Table 3.3: Train Timetable Summary

Route	Description	AM Frequency	PM Frequency
NB Local	All Stops	20-60 minutes	60 minutes
NB Limited	Skips Towradgi and Corrimal Stations	20-40 minutes	30-60 minutes
SB Local	All Stops	20-40 minutes	20-60 minutes
SB Limited	Skips Towradgi and Corrimal Stations	120 minutes	20-60 minutes

3.4 Traffic Demands

3.4.1 Demand Estimation

The traffic demand matrices from the previous (2018) traffic model were used as the 'prior' matrices for each peak period and vehicle type. The matrices were expanded to include the added zones along Memorial Drive, and traffic count data at the new intersections was used to estimate the split of demands between the new zones.

3.4.2 Traffic Type Composition

The composition of the vehicles in the microsimulation model was based on the vehicle classifications from the intersection count survey which comprise of:

- **Light vehicles (LV):** Representing light vehicles such as cars, light trucks, vans and motorcycles (Austroads Class 1-2)
- **Heavy vehicles (HV):** Representing heavy vehicles such as rigid and articulated trucks (Austroads Class 3-12).

3.4.3 Traffic Profile

To ensure that the correct proportion of vehicles was released into the network in each defined time slice, traffic volumes for each 1-hour period were split into 15-minute increments based on the traffic survey data from all intersections in the study area. Separate demand profiles were created for light vehicles and heavy vehicles and are provided in Table 3.4.

Table 3.4: Traffic Demand Profile

AM Peak	Light Vehicles	Heavy Vehicles		PM Peak	Light Vehicle	Heavy Vehicles
7:00 – 7:15	19%	32%		16:00 – 16:15	25%	34%
7:15 – 7:30	21%	27%		16:15 – 16:30	26%	27%
7:30 – 7:45	27%	17%		16:30 – 16:45	25%	22%
7:45 – 8:00	33%	24%		16:45 – 17:00	25%	16%
8:00 – 8:15	24%	24%		17:00 – 17:15	25%	29%
8:15 – 8:30	24%	23%		17:15 – 17:30	25%	27%
8:30 – 8:45	25%	27%		17:30 – 17:45	26%	22%
8:45 – 9:00	27%	26%		17:45 – 18:00	24%	21%

3.4.4 Demand Adjustment

The matrices were run through VISSIM model with manual adjustments made to achieve a satisfactory representation of existing traffic patterns while achieving TfNSW calibration criteria for the observed versus modelled GEH statistics.

3.4.5 Trip Length Distribution Changes

The expansion of the model along Memorial Drive resulted in substantial changes to the distribution of trip lengths, as shown in Figure 3.3 and Figure 3.4.

In the 2018 model, the majority of trips were between 1.5km and 2km including trips between Memorial Drive and zones along Railway Street, and through trips along Memorial Drive.

In the 2023 model, the through trips were increased to 3km-3.5km, while trips between Memorial Drive and Railway Street were only increased to 2km-3km. Trips associated with Rothery Street and Towradgi Road also substantially increased trips between 500m and 1.5km.

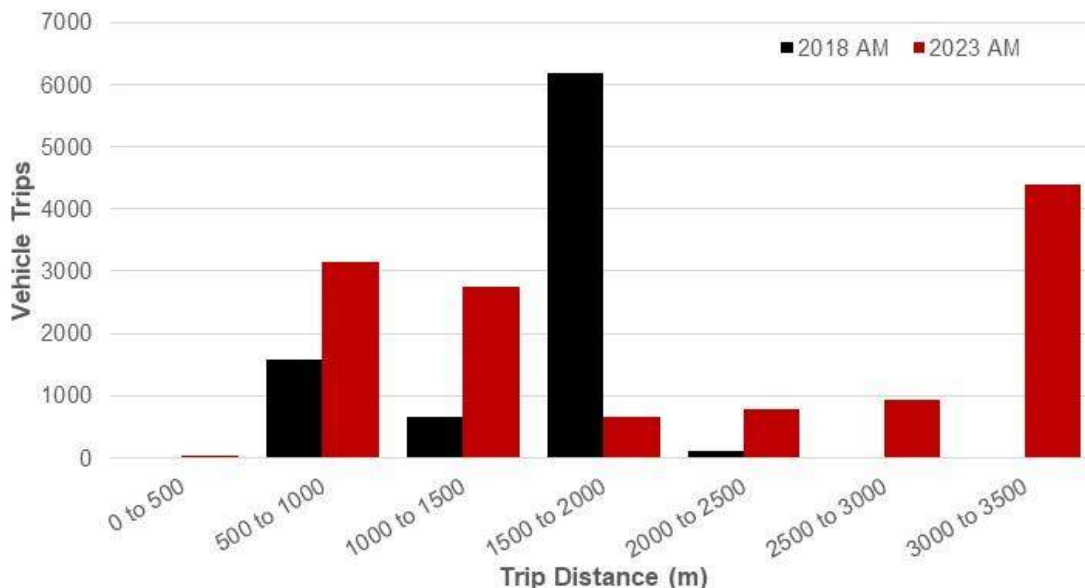


Figure 3.3: Trip Length Distribution Changes – 2-Hour AM Peak

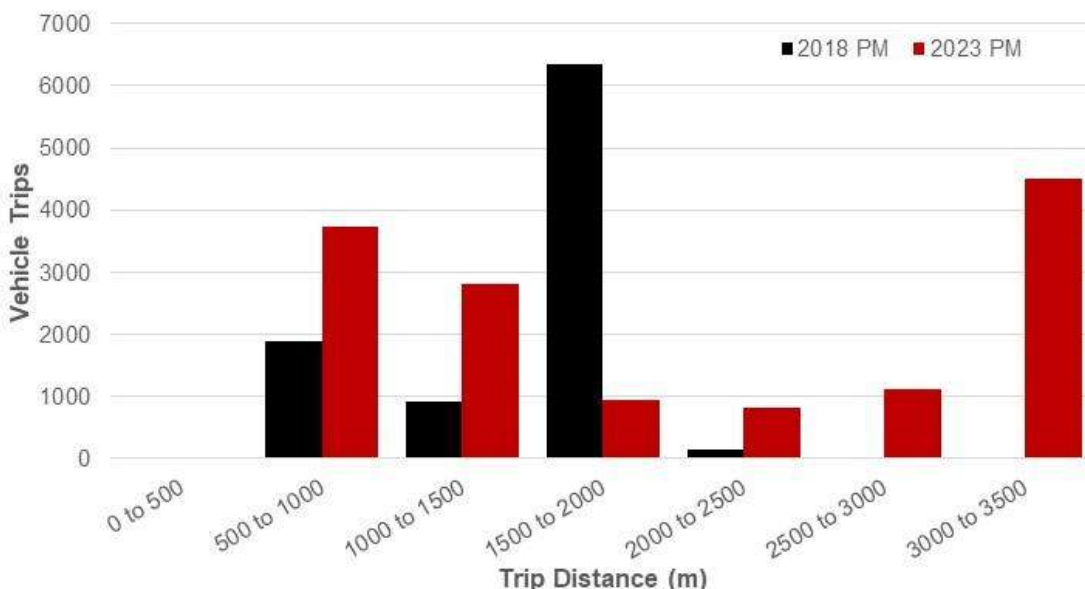


Figure 3.4: Trip Length Distribution Changes – 2-Hour PM Peak

3.5 Pedestrians and Cyclists

All pedestrian crossings at signalised intersections were included in the model. Pedestrian and cyclist demands were added based on traffic count data.

3.6 General Assumptions

3.6.1 Turn Speed

Reduced speed areas were included on turns and some dedicated turning bays to simulate more realistic turning speeds for vehicles. Turn speeds were set based on intersection geometry, including the radii of the turns.

3.6.2 Gap Acceptance

Movements within intersections are controlled by 'priority rules' to create appropriate give-way behaviours. The VISSIM gap acceptance parameters were adjusted to reflect the actual site conditions.

3.6.3 User Defined Costs and Route Closures

No user-defined costs and route closures were used as this is a corridor model with a fixed route choice.

4. CALIBRATION AND VALIDATION

4.1 Convergence

When creating the cost and path files, convergence determines the variability in traffic performance between individual model runs. A converged model indicates that an equilibrium of travel times and route volumes has been reached between various route choices. The AM and PM peak models were run for convergence following the process of incremental loading starting from 70% demand, and the default VISSIM convergence thresholds were used:

- Travel times within 15% along 85% of paths
- Simulated vehicles within ± 15 along 95% of edges.

The model successfully converges in both the AM and PM peak period scenarios as shown in Figure 4.1 and Figure 4.2.

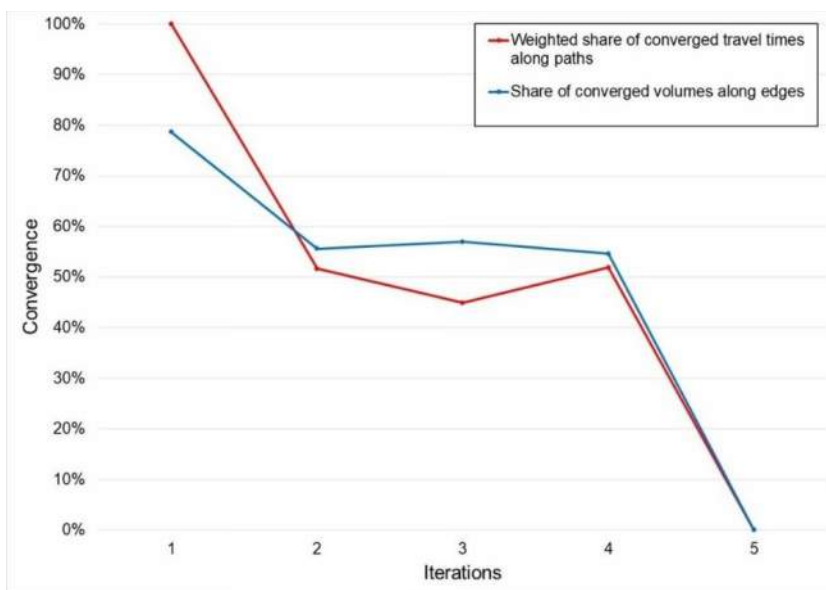


Figure 4.1: Convergence Graph – AM Peak

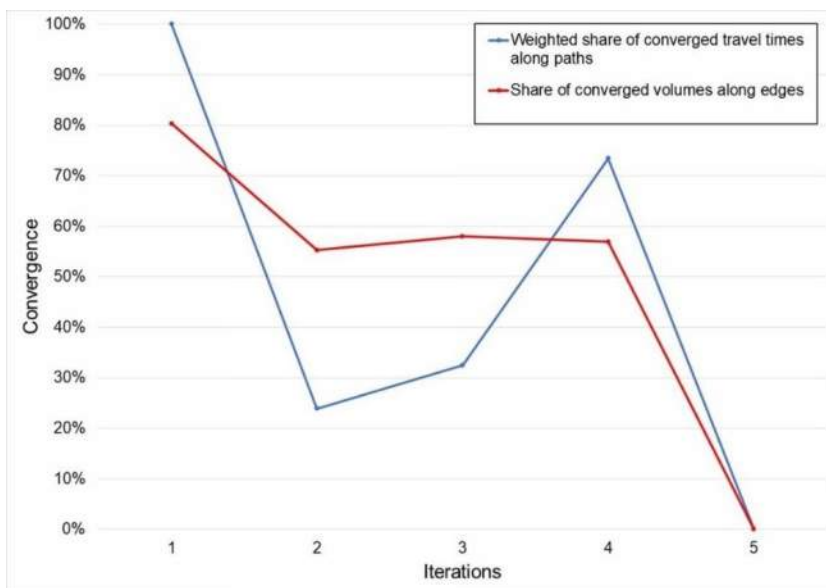


Figure 4.2: Convergence Graph – PM Peak

4.2 Model Stability

4.2.1 Stability Measures

Microsimulation models use seed values to generate randomness around many of the model's default attributes, as occurs in reality. Model stability using different seed values is particularly important in microsimulation models to ensure the models are robust. Stability is demonstrated using a variety of network performance measures. In this case, the following network performance measures have been adopted to demonstrate model stability:

- Cumulative travel time across all vehicles (vehicle hours travelled – VHT)
- Total number of vehicles in the model.

Each model was run five times with the random seed values listed in Table 4.1. Model outputs for each of the two measures at 15-minute increments are presented in Figure 4.3 to Figure 4.6.

Detailed network statistics are provided in **Appendix B**.

4.2.2 Median Seed

The median seed for each peak period was determined by selecting the median VHT out of the five (5) model runs. The median seeds for the AM and PM peak are:

- **AM Peak:** Seed 24
- **PM Peak:** Seed 1443.

The calibration and validation outputs in this report are drawn from the median seed run.

Table 4.1: VISSIM Random Seeds

Run	AM Peak	PM Peak
1	24	24
2	497	497
3	970	970
4	1443	1443
5	1916	1916

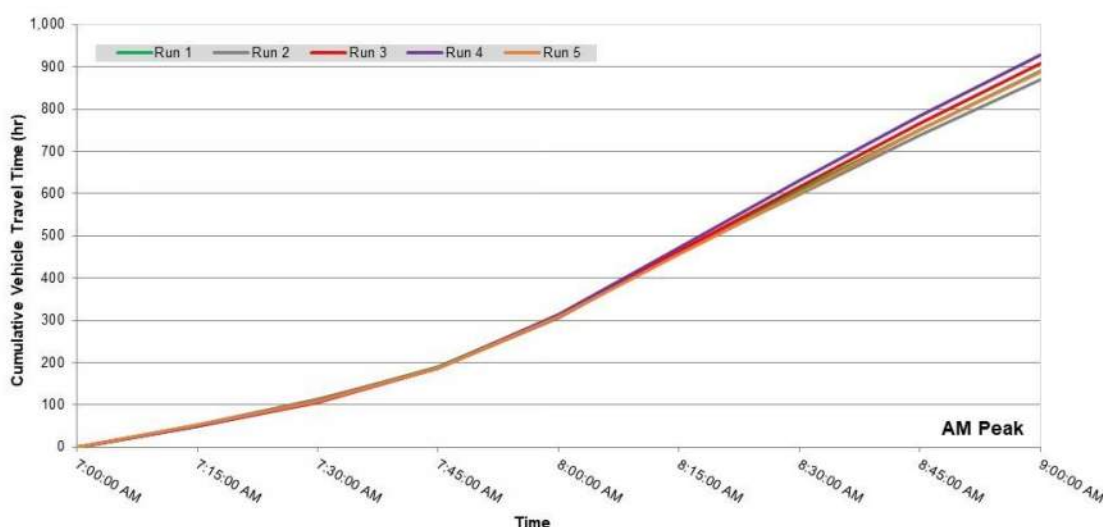


Figure 4.3: Cumulative Travel Time – AM Peak

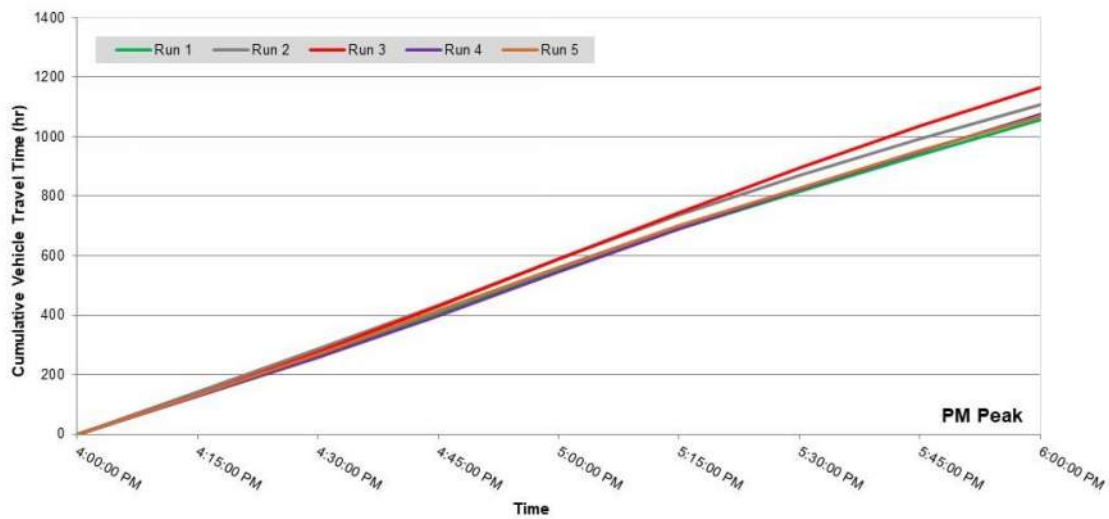


Figure 4.4: Cumulative Travel Time – PM Peak

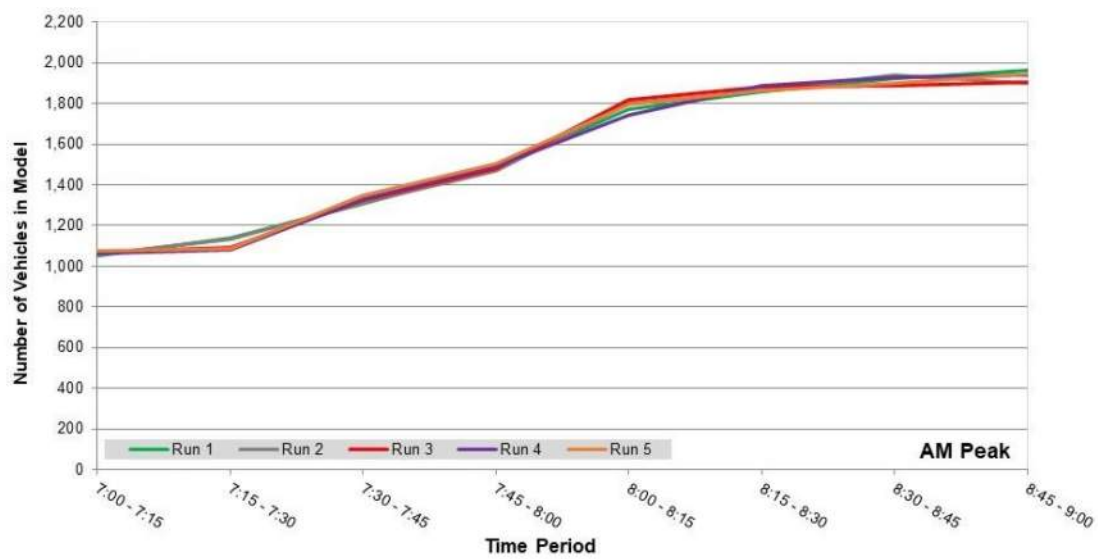


Figure 4.5: Number of Vehicles – AM Peak

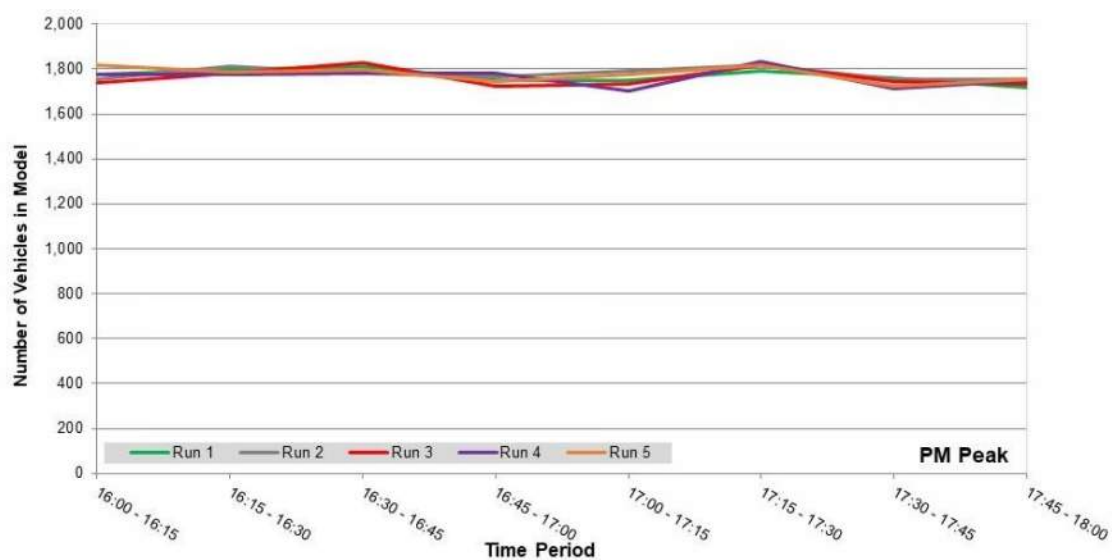


Figure 4.6: Number of Vehicles – PM Peak

4.3 Calibration

4.3.1 Calibration Criteria

The model was calibrated to the vehicle movement data sourced from turning counts. Model calibration was undertaken on a network-wide level as well as for a core-area (within the model network) to achieve a greater degree of calibration accuracy. This was undertaken in accordance with the criteria stipulated in the TfNSW *Traffic Modelling Guidelines 2013*, hereafter referred to as the 'Guidelines'.

Network-wide Criteria

The Geoffrey E. Havers (GEH) Statistic is an industry standard measure of variance between observed count and the modelled count, expressed by the formula:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where M is the Modelled Volume and C is the Observed Volume.

This expression effectively relates the severity of variance to the size of the observed volume and allows the variance from both large and small volumes to be assessed by the same measure.

Table 11.1 in the Guidelines uses the GEH Statistic as the main measurement of variance in microscopic modelling and sets out the following requirements for calibration to turning movement and link volumes:

- 100% of turns and links with a $GEH \leq 10$
- 85% of turns and links with a $GEH < 5$.

Additionally, the R^2 value when comparing observed and modelled volumes should be at least 0.9 across all turning movements.

Core Area Criteria

Table 11.2 in the Guidelines requires 100% of modelled link and turn volumes within the core area to be within the following tolerance limits:

- Flows < 99 – to be within 10 vehicles of the observed value
- Flows 100 to 999 – to be within 10% of the observed value
- Flows 1000 to 1999 – to be within 100 vehicles of the observed value
- Flows > 2000 – to be within 5% of the observed value.

Additionally, the R^2 value when comparing modelled volumes to observed volumes should be at least 0.95 across the turning movements within the core area.

The core area criteria were applied to the intersections that are critical to traffic behaviour along Railway Street, which are:

- Memorial Drive / Railway Street
- Ruddock Street / Railway Street / Level Crossing
- Pioneer Road / Railway Street.

4.3.2 Calibration Results

The calibration results for the 2023 Base models are summarised in Table 4.2 and Table 4.3 for the AM and PM peaks respectively. The results demonstrate that both the network-wide and core area calibration criteria were satisfied.

Overall, the model's traffic demands when assigned to the network very closely replicate observed traffic data with R^2 values close to one (1) in both hours of both peak periods.

Detailed calculations for each turning movement are provided in **Appendix C**.

Table 4.2: Turning Movement Calibration Results – AM Peak

Measure	7:00 – 8:00 AM		8:00 – 9:00 AM	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
% of GEH $\leq$ 10	100.0%	100.0%	100.0%	100.0%
% of GEH $<$ 5	100.0%	100.0%	100.0%	100.0%
% within Core Area Tolerance Limits	100.0%	100.0%	100.0%	100.0%
Network R^2	0.995		0.997	
Core Area R^2	1.000		0.999	

Table 4.3: Turning Movement Calibration Results – PM Peak

Measure	4:00 – 5:00 PM		5:00 – 6:00 PM	
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles
% of GEH $\leq$ 10	100.0%	100.0%	100.0%	100.0%
% of GEH $<$ 5	100.0%	100.0%	100.0%	100.0%
% within Core Area Tolerance Limits	100.0%	100.0%	100.0%	100.0%
Network R^2	0.999		0.999	
Core Area R^2	0.999		1.000	

4.4 Validation of Travel Times

Following the calibration of the model to vehicle flows, the model was validated to average travel time data. Travel time validation was undertaken for the two routes identified in Section 2.3.

The Guidelines consider the modelled travel time to validate to the observed travel time when they lie within $\pm 15\%$ or one minute (whichever is greater) of the observed average for the full length of the route.

Travel time comparisons for the validation routes are provided below in Table 4.4. Charts showing the validation checks for each route and sub-section are provided in **Appendix D**.

Table 4.4: Travel Time Along Validation Routes (mm:ss)

Route	Direction	AM Peak				PM Peak			
		7:00AM – 8:00AM		8:00AM – 9:00AM		4:00PM – 5:00PM		5:00PM – 6:00PM	
		Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
1	Eastbound	1:23	1:28	1:43	1:29	1:31	1:29	1:31	1:29
	Westbound	1:55	1:44	2:47	2:47	2:30	2:19	2:46	2:13
2	Northbound	2:38	2:42	3:17	2:56	2:55	2:59	2:55	2:50
	Southbound	4:56	4:35	6:58	7:48	5:58	6:17	4:34	5:05

mm:ss – modelled travel time within $\pm 15\%$ of average observed travel time of full route

mm:ss – modelled travel time not within $\pm 15\%$ of average observed travel time of full route

The modelled travel times were within $\pm 15\%$ of the observed average for all routes except for Railway Street westbound (Route 1) between 5:00 and 6:00 PM, although it was still within one minute of the observed average. The survey data showed that all the Railway Street westbound runs required a single green phase to clear the Memorial Drive signals, but the wait time at the signals tended to be longer than average (more than half of the cycle time).

As the surveys were found to overestimate the travel time along westbound Railway Street between 5:00 and 6:00 PM, the model should appropriately reflect traffic conditions along Railway Street.

4.5 Validation of Signal Timing

4.5.1 Data Comparison

SCATS data obtained from TfNSW was compared with the model signal times. As per the Guidelines, the following signal attributes were used in the comparison:

- **Cycle Time:** Average modelled cycle time for each 1-hour period
- **Green Time:** Total green time over each 1-hour period for each phase
- **Call Frequency:** Call frequency of demand-dependent phases (including pedestrian phase call) to be compared with observed data to ensure phase activation occurs to a similar level over each 1-hour period.

A detailed comparison of modelled and observed Cycle Time and Phase Time for the signalised intersections across each 1-hour period is presented in **Appendix E**. The modelled and observed values were generally similar. Any variations outside the validation tolerance are noted in the following sections.

4.5.2 Cycle Time

The 1-hour average cycle times were rounded to the nearest 10 seconds for each set of coordinated signals for use as the model cycle times. The modelled cycled times for all signals during each 1-hour peak period were within the tolerance limit of $\pm 10\%$ of the observed average.

4.5.3 Phase Times

Generally, the 1-hour average phase times were adopted in the models. Where average cycle times were rounded to the nearest 10 seconds, phase times were adjusted proportionally to match the cycle times. The modelled phase times for all signals were within the tolerance limit of $\pm 10\%$ of the observed average.

4.5.4 Call Frequency

SCATS data was interrogated to determine the call frequency of signal phases. Generally, all signal phases aside from the main phase were coded as optional phases.

4.5.5 Pedestrian Phases

Intersection count data was interrogated to quantify the pedestrian demand at various locations of the signalised intersections. Pedestrian protection times (walk and clear) were included in the signal programming.

4.6 Validation of Queue Lengths

4.6.1 General

The modelled queue patterns were compared against the queue length surveys at various points in throughout the model simulation period. The AM and PM peak queues at key locations are presented in the following sections for comparison with the queue observations outlined in Section 2.4.

4.6.2 AM Peak Queue Lengths

Figure 4.7 and Figure 4.8 show a range of queueing patterns in the AM peak around Railway Street. Extensive queuing was observed on Memorial Drive southbound, where vehicles required multiple green phases to clear Railway Street. Moderate queues built up on the other approaches, but mostly cleared out on every green phase.

Minor queues were formed while the level crossing was active but dissipated quickly.

The modelled queues in the AM peak compare favourably with the observed queue data.



Figure 4.7: Modelled Queues – AM Peak

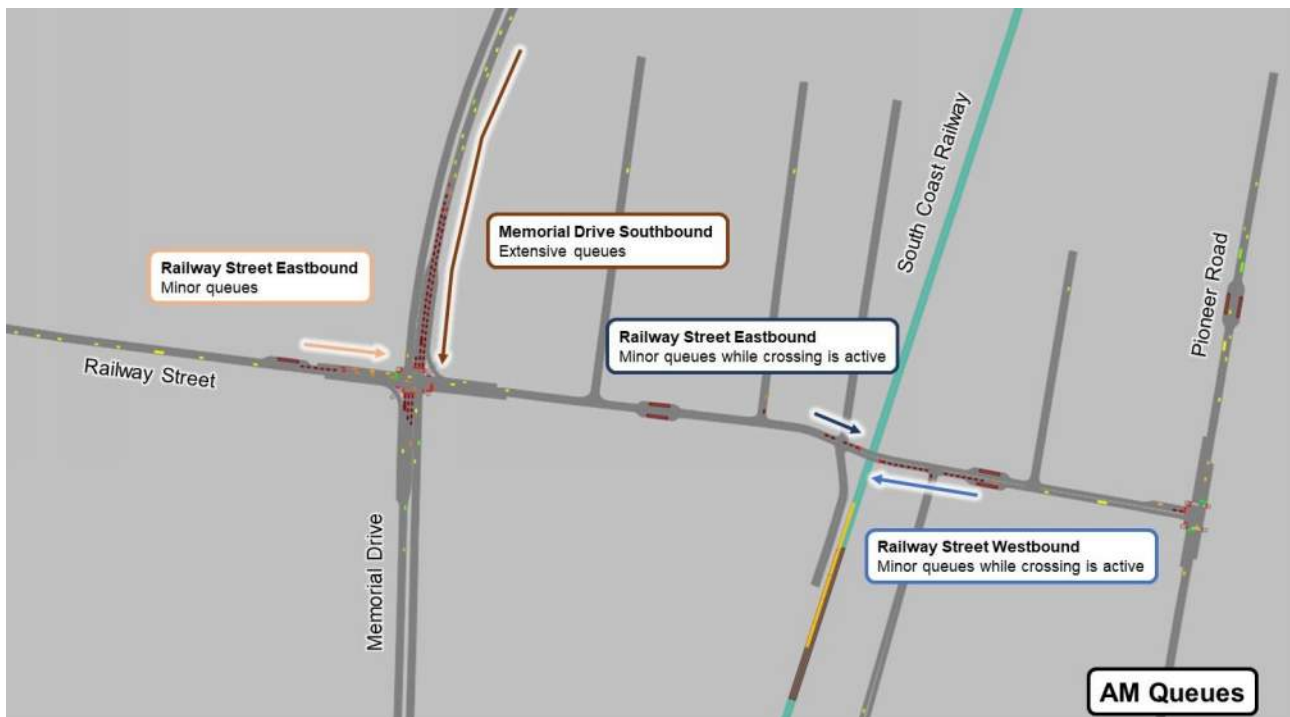


Figure 4.8: Modelled Queues – AM Peak (Railway Crossing Active)

4.6.3 PM Peak Queue Lengths

Figure 4.9 and Figure 4.10 show a range of queueing patterns in the PM peak around Railway Street. Moderate queues built up on all approaches to the Memorial Drive / Railway Street signals, but mostly cleared out on every green phase.

Minor queues were formed while the level crossing was active but dissipated quickly.

The modelled queues in the PM peak compare favourably with the observed queue data.



Figure 4.9: Modelled Queues – PM Peak

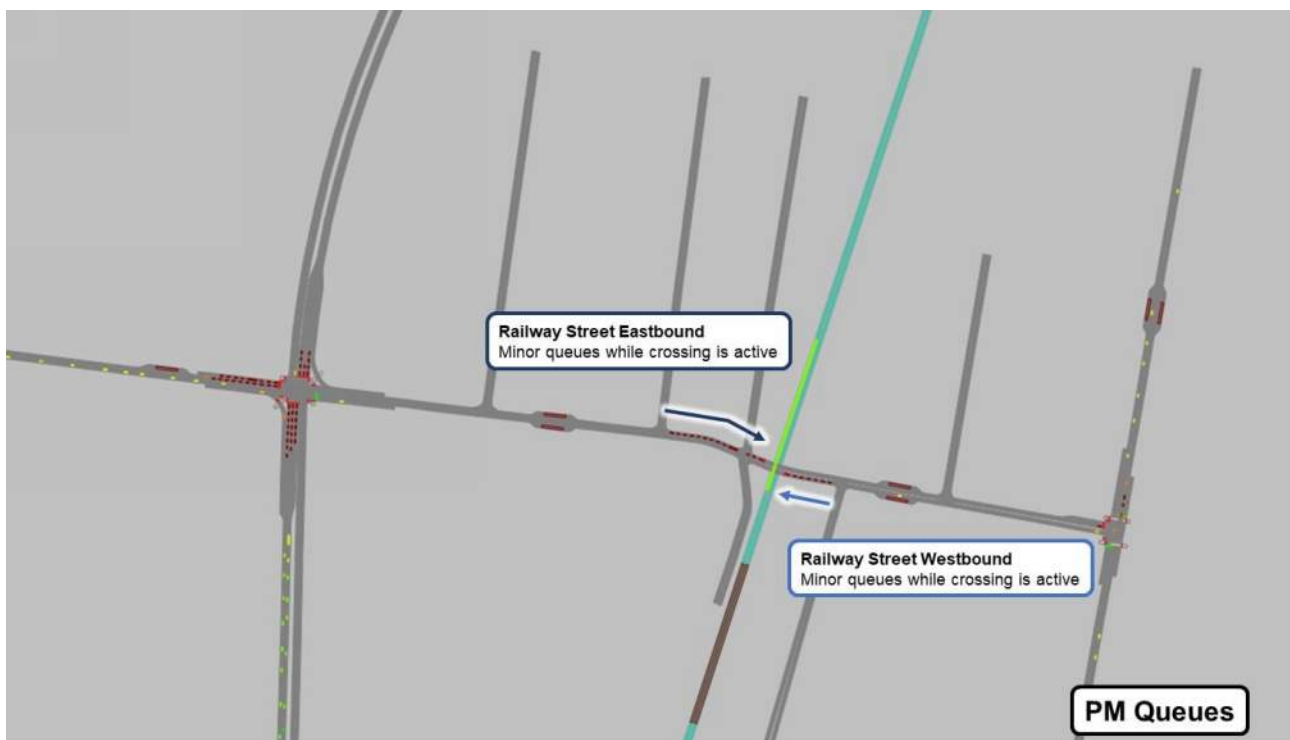


Figure 4.10: Modelled Queues – PM Peak (Railway Crossing Active)

4.7 Model Run Warnings

Details of the model run warnings created during the model runs were reviewed to ensure that the model coding did not have errors that substantially affect the results.

The only warnings were due to vehicles that were removed from the simulation due to exceeding the 'waiting time before diffusion' while waiting to change lanes before a turn. Only one or two vehicles per run were removed due to this issue and it did not have a significant impact on the model results.

5. CONCLUSION

Bitzios Consulting has developed the 2023 Base two-hour AM and two-hour PM peak VISSIM microsimulation models for the assessment of the proposed Corrimal Coke Works development.

In developing the models, it can be concluded that:

- The network coding reflects the traffic network conditions in typical AM and PM peak periods in December 2023
- The traffic demand estimates for the weekday peak when assigned to the network very closely match the observed traffic counts
- The travel times for vehicles in the model very closely match the observed vehicle travel times along Railway Street and Memorial Drive
- The modelled congestion behaviour matches the observed queue lengths around Railway Street.

The models are therefore deemed to be suitably calibrated and validated in accordance with the TfNSW Traffic Modelling Guidelines (2013).

Furthermore, these models are considered to be fit for the purpose of assessing the future year traffic impacts of the proposed development and testing road network improvements aimed at mitigating the development impacts.

Appendix A: Traffic Flow Diagrams

P6319 Corrimal Coke Works Updated Planning Proposal TIA

AM Peak

Time: 7:00 - 8:00

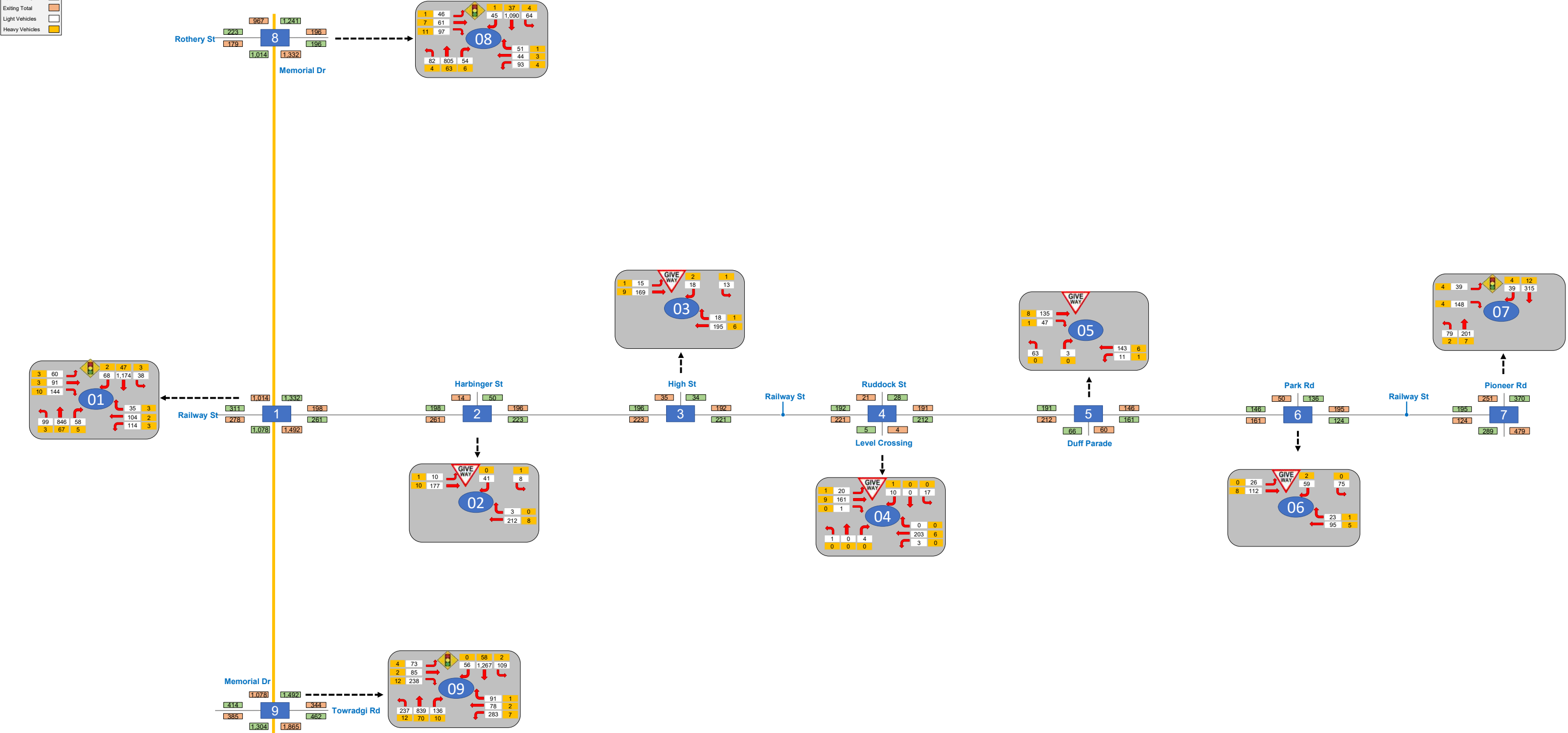
Legend

 Approaching Total

 Exiting Total

 Light Vehicles

 Heavy Vehicles



P6319 Corrimal Coke Works Updated Planning Proposal TIA

AM Peak

Time: 8:00 - 9:00

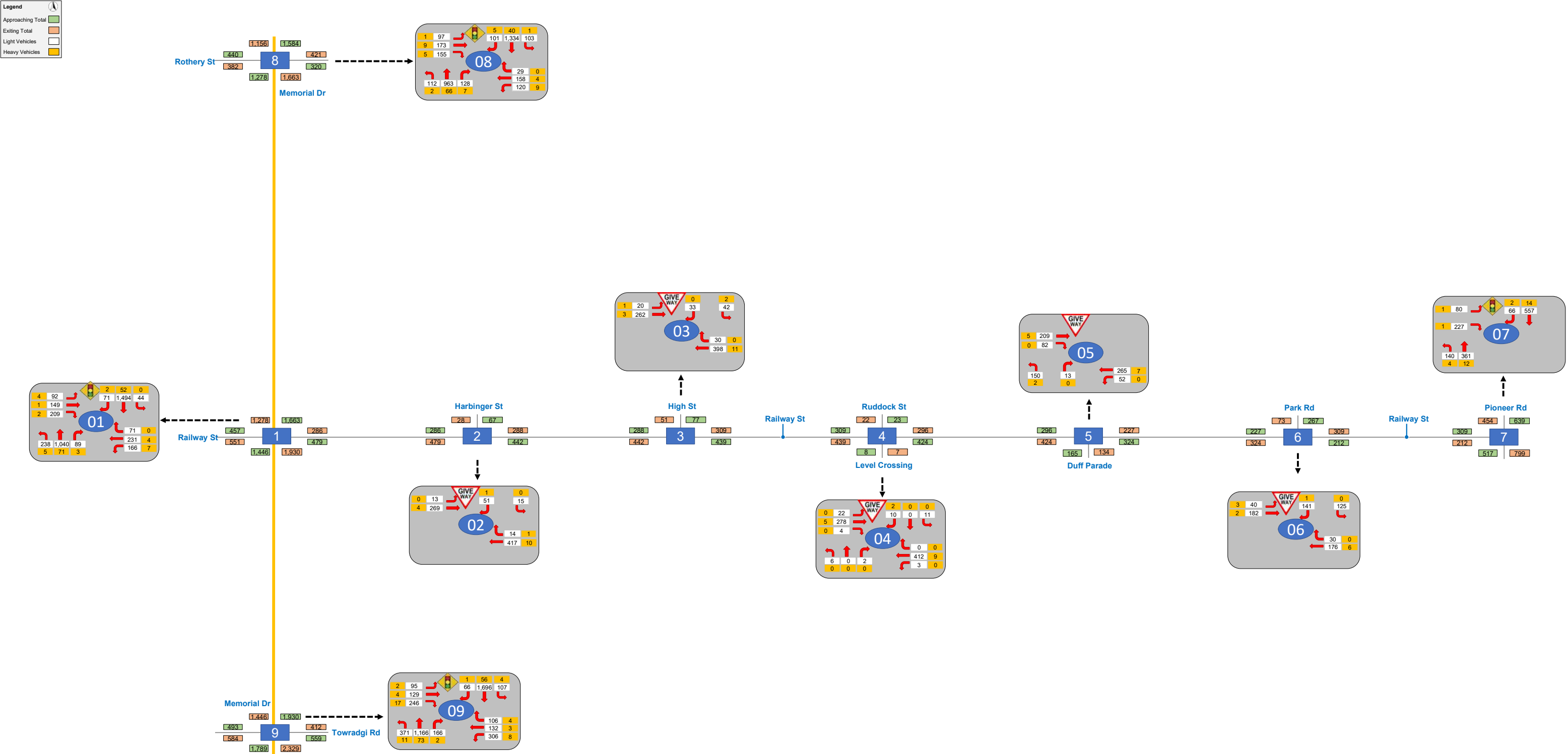
Legend

Approaching Total

Exiting Total

Light Vehicles

Heavy Vehicles



P6319 Corrimal Coke Works Updated Planning Proposal TIA

PM Peak

Time: 16:00 - 17:00

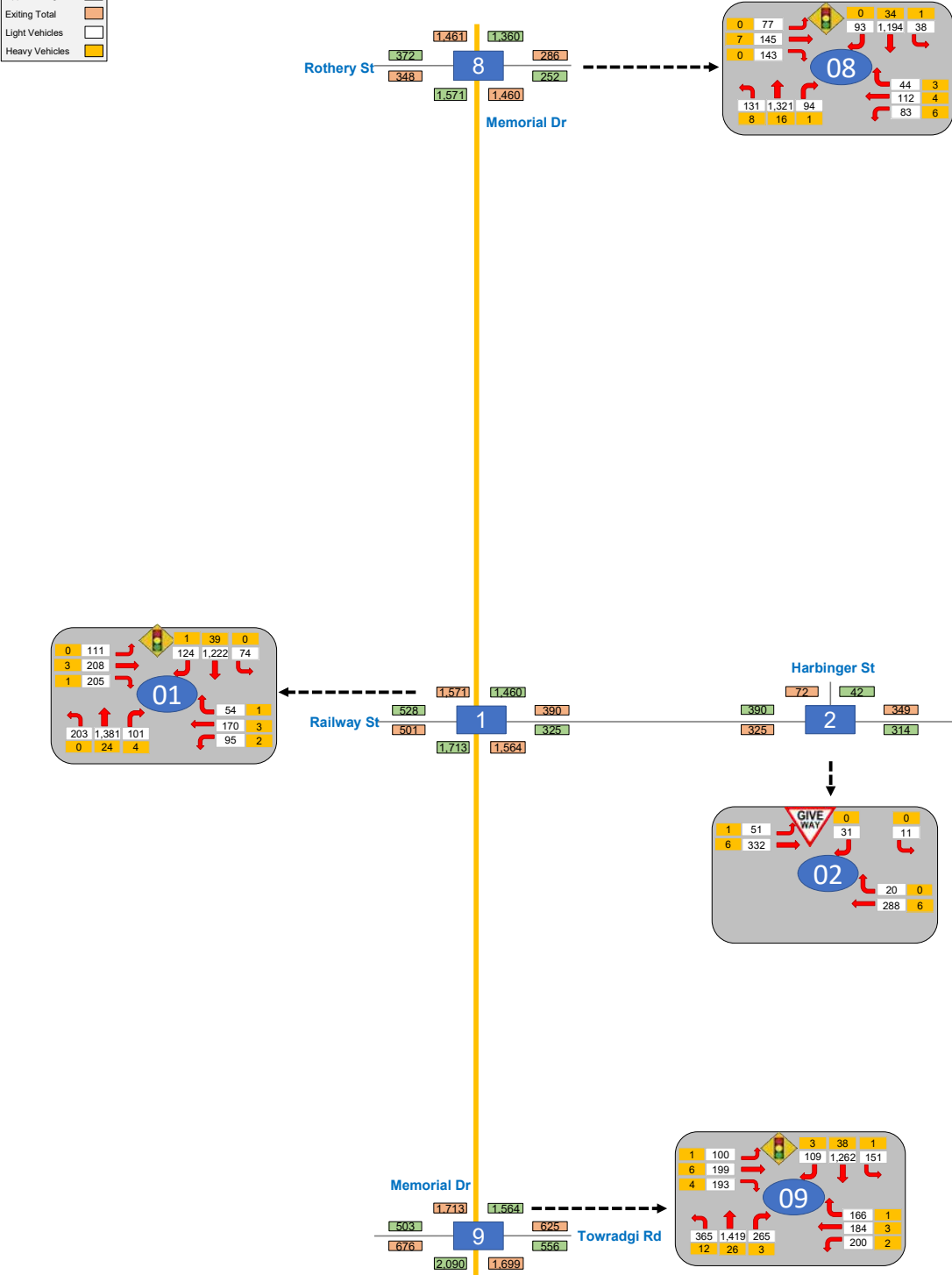
Legend

Approaching Total

Exiting Total

Light Vehicles

Heavy Vehicles



P6319 Corrimal Coke Works Updated Planning Proposal TIA

PM Peak

Time: 17:00 - 18:00

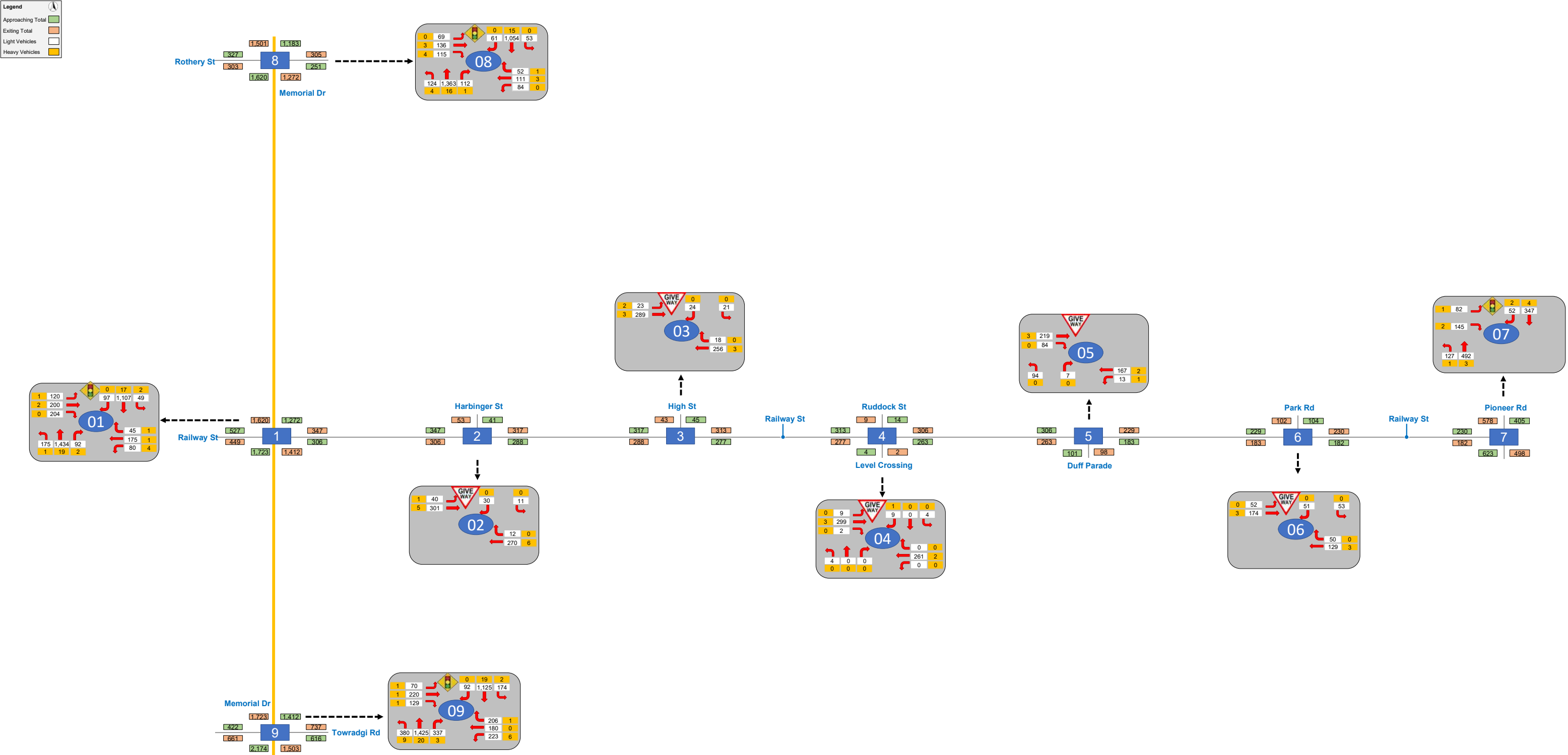
Legend

Approaching Total

Exiting Total

Light Vehicles

Heavy Vehicles



Appendix B: Network Statistics

P6319 Corrimal Coke Works Updated Planning Proposal TIA

VISSIM Data Analysis

Peak Period Network Statistics

	Weekday AM	Weekday PM
Total Travel Time (hr)	888	1,075
Total Distance Travelled (km)	25,818	28,346
Total Delay (hr)	508	657
Average Speed (km/hr)	29.1	26.4
Average Travel Time (min)	4.17	4.52
Average Distance (km)	2.02	1.99
Average Delay (s)	143	166
Completed Trips	12,513	14,107
Incomplete Trips	258	148
Unreleased Trips	0	0
Total Number of Vehicles	12,771	14,255
Stops per vehicle	2.5	3.0

Appendix C: Calibration Tables and Graphs

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Light Vehicles

AM Peak 0700-0800

GEH Turn Summary 0700-0800		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	68	66	-2	-2.9%	0.2	Y	49.1	D	4.6
1		1-2		Memorial Drive (S)	T	1,174	1,187	13	1.1%	0.4	Y	39.2	C	103.6
1		1-3		Railway Street (E)	L	38	41	3	7.9%	0.5	Y	4.4	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	35	34	-1	-2.9%	0.2	Y	43.6	D	14.0
1		1-5		Railway Street (W)	T	104	103	-1	-1.0%	0.1	Y	45.1	D	13.9
1		1-6		Memorial Drive (S)	L	114	105	-9	-7.9%	0.9	Y	24.7	B	13.9
1		1-7	Memorial Drive (S)	Railway Street (E)	R	58	51	-7	-12.1%	0.9	Y	34.3	C	2.9
1		1-8		Memorial Drive (N)	T	846	830	-16	-1.9%	0.6	Y	39.6	C	37.9
1		1-9		Railway Street (W)	L	99	92	-7	-7.1%	0.7	Y	2.9	A	0.0
1		1-10	Railway Street (W)	Memorial Drive (S)	R	144	147	3	2.1%	0.2	Y	55.0	D	19.8
1		1-11		Railway Street (E)	T	91	85	-6	-6.6%	0.6	Y	48.7	D	19.7
1		1-12		Memorial Drive (N)	L	60	65	5	8.3%	0.6	Y	42.1	C	19.8
1			All			2,831	2,806					38.7	C	103.6
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	41	37	-4	-9.8%	0.6	Y	3.7	A	0.1
2		2-3		Railway Street (E)	L	8	8	0	0.0%	0.0	Y	0.5	A	0.0
2		2-4	Railway Street (E)	Harbinger Street (N)	R	3	0	-3	-100.0%	2.4	Y	0.0	A	0.0
2		2-5		Railway Street (W)	T	212	205	-7	-3.3%	0.5	Y	0.2	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	177	164	-13	-7.3%	1.0	Y	0.3	A	0.0
2		2-12		Harbinger Street (N)	L	10	13	3	30.0%	0.9	Y	0.7	A	0.0
2			All			451	427					3.7	A	0.1
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	18	18	0	0.0%	0.0	Y	11.4	A	0.5
3		3-3		Railway Street (E)	L	13	13	0	0.0%	0.0	Y	7.8	A	0.4
3		3-4	Railway Street (E)	High Street (N)	R	18	15	-3	-16.7%	0.7	Y	1.1	A	0.0
3		3-5		Railway Street (W)	T	195	187	-8	-4.1%	0.6	Y	0.0	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	169	158	-11	-6.5%	0.9	Y	0.3	A	0.0
3		3-12		High Street (N)	L	15	15	0	0.0%	0.0	Y	0.4	A	0.0
3			All			428	406					11.4	A	0.5
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	10	8	-2	-20.0%	0.7	Y	8.2	A	0.3
4		4-2		Ruddock Street (S)	T	0	4	4	inf	2.8	Y	9.9	A	0.3
4		4-3		Railway Street (E)	L	17	16	-1	-5.9%	0.2	Y	7.0	A	0.3
4		4-5	Railway Street (E)	Railway Street (W)	T	203	192	-11	-5.4%	0.8	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	3	0	-3	-100.0%	2.4	Y	0.0	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	4	3	-1	-25.0%	0.5	Y	8.8	A	0.1
4		4-8		Ruddock Street (N)	T	0	0	0	inf	0.0	Y	0.0	A	0.1
4		4-9		Railway Street (W)	L	1	1	0	0.0%	0.0	Y	11.1	A	0.1
4		4-10	Railway Street (W)	Ruddock Street (S)	R	1	3	2	200.0%	1.4	Y	10.8	A	0.5
4		4-11		Railway Street (E)	T	161	155	-6	-3.7%	0.5	Y	4.0	A	0.5
4		4-12		Ruddock Street (N)	L	20	13	-7	-35.0%	1.7	Y	0.7	A	0.0
4			All			420	395					11.1	A	0.5
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	143	138	-5	-3.5%	0.4	Y	0.2	A	0.0
5		5-6		Duff Parade (S)	L	11	10	-1	-9.1%	0.3	Y	0.3	A	0.0
5		5-7	Duff Parade (S)	Railway Street (E)	R	3	1	-2	-66.7%	1.4	Y	5.5	A	0.0
5		5-9		Railway Street (W)	L	63	54	-9	-14.3%	1.2	Y	1.0	A	0.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	47	48	1	2.1%	0.1	Y	1.1	A	0.1
5		5-11		Railway Street (E)	T	135	126	-9	-6.7%	0.8	Y	0.4	A	0.0
5			All			402	377					5.5	A	0.1
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	59	62	3	5.1%	0.4	Y	1.7	A	0.1
6		6-3		Railway Street (E)	L	75	77	2	2.7%	0.2	Y	1.4	A	0.1
6		6-4	Railway Street (E)	Park Road (N)	R	23	25	2	8.7%	0.4	Y	2.0	A	0.0
6		6-5		Railway Street (W)	T	95	86	-9	-9.5%	0.9	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	112	100	-12	-10.7%	1.2	Y	0.3	A	0.0
6		6-12		Park Road (N)	L	26	26	0	0.0%	0.0	Y	0.3	A	0.0
6			All			390	376					2.0	A	0.1
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	39	39	0	0.0%	0.0	Y	10.4	A	2.1
7		7-2		Pioneer Road (S)	T	315	317	2	0.6%	0.1	Y	5.7	A	2.5
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	201	200	-1	-0.5%	0.1	Y	5.5	A	1.2
7		7-9		Railway Street (W)	L	79	73	-6	-7.6%	0.7	Y	1.8	A	1.1
7		7-10	Railway Street (W)	Pioneer Road (S)	R	148	148	0	0.0%	0.0	Y	19.5	B	4.5
7		7-12		Pioneer Road (N)	L	39	33	-6	-15.4%	1.0	Y	19.2	B	1.1
7			All			821	810					8.6	A	4.5
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	45	39	-6	-13.3%	0.9	Y	62.8	E	4.1
8		8-2		Memorial Drive (S)	T	1,090	1,229	139	12.8%	4.1	Y	22.7	B	31.6
8		8-3		Rothery Street (E)	L	64	64	0	0.0%	0.0	Y	4.7	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	51	52	1	2.0%	0.1	Y	92.8	F	22.6
8		8-5		Rothery Street (W)	T	44	41	-3	-6.8%	0.5	Y	90.1	F	22.6
8		8-6		Memorial Drive (S)	L	93	86	-7	-7.5%	0.7	Y	89.1	F	22.6
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	54	51	-3	-5.6%	0.4	Y	80.6	F	7.7
8		8-8		Memorial Drive (N)	T	805	782	-23	-2.9%	0.8	Y	19.9	B	15.9
8		8-9		Rothery Street (W)	L	82	82	0	0.0%	0.0	Y	2.4	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	97	95	-2	-2.1%	0.2	Y	73.1	F	24.0
8		8-11		Rothery Street (E)	T	61	57	-4	-6.6%	0.5	Y	73.2	F	24.0
8		8-12		Memorial Drive (N)	L	46	47	1	2.2%	0.1	Y	54.5	D	24.0
8			All			2,532	2,625					30.6	C	31.6
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	56	44	-12	-21.4%	1.7	Y	58.1	E	3.4
9		9-2		Memorial Drive (S)	T	1,267	1,139	-128	-10.1%	3.7	Y	59.9	E	201.6
9		9-3		Towradgi Road (E)	L	109	86	-23	-21.1%	2.3	Y	11.2	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	91	92	1	1.1%	0.1	Y	48.0	D	7.1
9		9-5		Towradgi Road (W)	T	78	80	2	2.6%	0.2	Y	50.9	D	20.4
9		9-6		Memorial Drive (S)	L	283	281	-2	-0.7%	0.1	Y	37.9	C	20.5
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	136	135	-1	-0.7%	0.1	Y	60.6	E	14.5
9		9-8		Memorial Drive (N)	T	839	827	-12	-1.4%	0.4	Y	33.6	C	33.5
9		9-9		Towradgi Road (W)	L	237	232	-5	-2.1%	0.3	Y	1.3	A	0.1
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	238	228	-10	-4.2%	0.7	Y	65.1	E	3.0
9		9-11		Towradgi Road (E)	T	85	85	0	0.0%	0.0	Y	48.5	D	3.0
9		9-12		Memorial Drive (N)	L	73	68	-5	-6.8%	0.6	Y	48.0	D	3.0
9			All			3,492	3,297					45.3	D	201.6

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Light Vehicles

AM Peak 0800-0900

GEH Turn Summary 0800-0900		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	71	71	0	0.0%	0.0	Y	80.4	F	9.5
1		1-2		Memorial Drive (S)	T	1,494	1,422	-72	-4.8%	1.9	Y	60.4	E	411.1
1		1-3		Railway Street (E)	L	44	40	-4	-9.1%	0.6	Y	15.9	B	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	71	67	-4	-5.6%	0.5	Y	95.0	F	80.2
1		1-5		Railway Street (W)	T	231	237	6	2.6%	0.4	Y	91.6	F	80.0
1		1-6		Memorial Drive (S)	L	166	166	0	0.0%	0.0	Y	45.8	D	80.1
1		1-7	Memorial Drive (S)	Railway Street (E)	R	89	98	9	10.1%	0.9	Y	83.1	F	14.5
1		1-8		Memorial Drive (N)	T	1040	1018	-22	-2.1%	0.7	Y	34.9	C	49.9
1		1-9		Railway Street (W)	L	238	237	-1	-0.4%	0.1	Y	5.5	A	0.4
1		1-10	Railway Street (W)	Memorial Drive (S)	R	209	215	6	2.9%	0.4	Y	61.8	E	31.9
1		1-11		Railway Street (E)	T	149	153	4	2.7%	0.3	Y	59.1	E	31.8
1		1-12		Memorial Drive (N)	L	92	90	-2	-2.2%	0.2	Y	55.7	D	31.9
1			All			3,894	3,814					52.5	D	411.1
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	51	57	6	11.8%	0.8	Y	14.4	A	0.4
2		2-3		Railway Street (E)	L	15	9	-6	-40.0%	1.7	Y	6.2	A	0.2
2		2-4	Railway Street (E)	Harbinger Street (N)	R	14	10	-4	-28.6%	1.2	Y	6.8	A	2.1
2		2-5		Railway Street (W)	T	417	420	3	0.7%	0.1	Y	7.3	A	0.4
2		2-11	Railway Street (W)	Railway Street (E)	T	269	276	7	2.6%	0.4	Y	0.5	A	0.0
2		2-12		Harbinger Street (N)	L	13	13	0	0.0%	0.0	Y	0.5	A	0.0
2			All			779	785					14.4	A	2.1
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	33	31	-2	-6.1%	0.4	Y	17.6	B	1.7
3		3-3		Railway Street (E)	L	42	34	-8	-19.0%	1.3	Y	15.4	B	1.8
3		3-4	Railway Street (E)	High Street (N)	R	30	29	-1	-3.3%	0.2	Y	4.0	A	0.3
3		3-5		Railway Street (W)	T	398	402	4	1.0%	0.2	Y	0.4	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	262	262	0	0.0%	0.0	Y	0.4	A	0.0
3		3-12		High Street (N)	L	20	21	1	5.0%	0.2	Y	0.4	A	0.0
3			All			785	779					17.6	B	1.8
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	10	10	0	0.0%	0.0	Y	12.3	A	0.3
4		4-2		Ruddock Street (S)	T	0	0	0	inf	0.0	Y	0.0	A	0.2
4		4-3		Railway Street (E)	L	11	12	1	9.1%	0.3	Y	12.2	A	0.2
4		4-5	Railway Street (E)	Railway Street (W)	T	412	423	11	2.7%	0.5	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	3	1	-2	-66.7%	1.4	Y	0.1	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	2	2	0	0.0%	0.0	Y	7.2	A	0.0
4		4-8		Ruddock Street (N)	T	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-9		Railway Street (W)	L	6	0	-6	-100.0%	3.5	Y	0.0	A	0.0
4		4-10	Railway Street (W)	Ruddock Street (S)	R	4	2	-2	-50.0%	1.2	Y	0.5	A	0.4
4		4-11		Railway Street (E)	T	278	273	-5	-1.8%	0.3	Y	2.6	A	0.4
4		4-12		Ruddock Street (N)	L	22	19	-3	-13.6%	0.7	Y	0.3	A	0.0
4			All			748	742					12.3	A	0.4
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	265	267	2	0.8%	0.1	Y	2.7	A	0.9
5		5-6		Duff Parade (S)	L	52	44	-8	-15.4%	1.2	Y	2.3	A	0.9
5		5-7	Duff Parade (S)	Railway Street (E)	R	13	16	3	23.1%	0.8	Y	9.9	A	0.8
5		5-9		Railway Street (W)	L	150	159	9	6.0%	0.7	Y	5.2	A	1.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	82	85	3	3.7%	0.3	Y	2.9	A	0.6
5		5-11		Railway Street (E)	T	209	201	-8	-3.8%	0.6	Y	1.1	A	0.2
5			All			771	772					9.9	A	1.0
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	141	140	-1	-0.7%	0.1	Y	3.9	A	0.7
6		6-3		Railway Street (E)	L	125	132	7	5.6%	0.6	Y	2.3	A	0.6
6		6-4	Railway Street (E)	Park Road (N)	R	30	26	-4	-13.3%	0.8	Y	0.6	A	0.0
6		6-5		Railway Street (W)	T	176	172	-4	-2.3%	0.3	Y	0.2	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	182	176	-6	-3.3%	0.4	Y	0.4	A	0.0
6		6-12		Park Road (N)	L	40	42	2	5.0%	0.3	Y	0.5	A	0.0
6			All			694	688					3.9	A	0.7
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	66	60	-6	-9.1%	0.8	Y	16.7	B	10.7
7		7-2		Pioneer Road (S)	T	557	551	-6	-1.1%	0.3	Y	10.2	A	11.1
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	361	362	1	0.3%	0.1	Y	7.9	A	5.1
7		7-9		Railway Street (W)	L	140	137	-3	-2.1%	0.3	Y	4.9	A	4.7
7		7-10	Railway Street (W)	Pioneer Road (S)	R	227	227	0	0.0%	0.0	Y	28.7	C	10.9
7		7-12		Pioneer Road (N)	L	80	81	1	1.3%	0.1	Y	26.5	B	3.6
7			All			1,431	1,418					13.3	A	11.1
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	101	103	2	2.0%	0.2	Y	100.1	F	18.6
8		8-2		Memorial Drive (S)	T	1,334	1,186	-148	-11.1%	4.2	Y	40.9	C	56.1
8		8-3		Rothery Street (E)	L	103	101	-2	-1.9%	0.2	Y	6.0	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	29	32	3	10.3%	0.5	Y	184.5	F	100.5
8		8-5		Rothery Street (W)	T	158	146	-12	-7.6%	1.0	Y	174.7	F	100.5
8		8-6		Memorial Drive (S)	L	120	123	3	2.5%	0.3	Y	173.1	F	100.5
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	128	118	-10	-7.8%	0.9	Y	80.3	F	16.7
8		8-8		Memorial Drive (N)	T	963	952	-11	-1.1%	0.4	Y	39.0	C	41.8
8		8-9		Rothery Street (W)	L	112	107	-5	-4.5%	0.5	Y	6.2	A	0.1
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	155	160	5	3.2%	0.4	Y	192.3	F	111.7
8		8-11		Rothery Street (E)	T	173	173	0	0.0%	0.0	Y	136.4	F	111.7
8		8-12		Memorial Drive (N)	L	97	96	-1	-1.0%	0.1	Y	80.1	F	111.7
8			All			3,473	3,297					67.1	E	111.7
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	66	73	7	10.6%	0.8	Y	95.4	F	10.3
9		9-2		Memorial Drive (S)	T	1,696	1,766	70	4.1%	1.7	Y	33.6	C	285.2
9		9-3		Towradgi Road (E)	L	107	126	19	17.8%	1.8	Y	7.0	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	106	98	-8	-7.5%	0.8	Y	70.3	F	12.4
9		9-5		Towradgi Road (W)	T	132	127	-5	-3.8%	0.4	Y	102.5	F	48.2
9		9-6		Memorial Drive (S)	L	306	303	-3	-1.0%	0.2	Y	72.1	F	48.3
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	166	166	0	0.0%	0.0	Y	120.5	F	37.7
9		9-8		Memorial Drive (N)	T	1166	1188	22	1.9%	0.6	Y	29.7	C	48.0
9		9-9		Towradgi Road (W)	L	371	370	-1	-0.3%	0.1	Y	2.1	A	0.2
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	246	219	-27	-11.0%	1.8	Y	311.9	F	112.1
9		9-11		Towradgi Road (E)	T	129	117	-12	-9.3%	1.1	Y	208.0	F	112.1
9		9-12		Memorial Drive (N)	L	95	87	-8	-8.4%	0.8	Y	186.9	F	112.1
9			All			4,586	4,640					59.0	E	285.2

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Heavy Vehicles

AM Peak 0700-0800

GEH Turn Summary 0700-0800		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	2	1	-1	-50.0%	🟢 0.8	Y	49.1	D	4.6
1		1-2		Memorial Drive (S)	T	47	49	2	4.3%	🟢 0.3	Y	39.2	C	103.6
1		1-3		Railway Street (E)	L	3	3	0	0.0%	🟢 0.0	Y	4.4	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	3	4	1	33.3%	🟢 0.5	Y	43.6	D	14.0
1		1-5		Railway Street (W)	T	2	5	3	150.0%	🟢 1.6	Y	45.1	D	13.9
1		1-6		Memorial Drive (S)	L	3	7	4	133.3%	🟢 1.8	Y	24.7	B	13.9
1		1-7	Memorial Drive (S)	Railway Street (E)	R	5	6	1	20.0%	🟢 0.4	Y	34.3	C	2.9
1		1-8		Memorial Drive (N)	T	67	69	2	3.0%	🟢 0.2	Y	39.6	C	37.9
1		1-9		Railway Street (W)	L	3	3	0	0.0%	🟢 0.0	Y	2.9	A	0.0
1		1-10	Railway Street (W)	Memorial Drive (S)	R	10	7	-3	-30.0%	🟢 1.0	Y	55.0	D	19.8
1		1-11		Railway Street (E)	T	3	3	0	0.0%	🟢 0.0	Y	48.7	D	19.7
1		1-12		Memorial Drive (N)	L	3	2	-1	-33.3%	🟢 0.6	Y	42.1	C	19.8
1			All			151	159					38.5	C	103.6
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	0	4	4	inf	🟢 2.8	Y	3.7	A	0.1
2		2-3		Railway Street (E)	L	1	0	-1	-100.0%	🟢 1.4	Y	0.5	A	0.0
2		2-4	Railway Street (E)	Harbinger Street (N)	R	0	0	0	inf	🟢 0.0	Y	0.0	A	0.0
2		2-5		Railway Street (W)	T	8	12	4	50.0%	🟢 1.3	Y	0.2	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	10	11	1	10.0%	🟢 0.3	Y	0.3	A	0.0
2		2-12		Harbinger Street (N)	L	1	1	0	0.0%	🟢 0.0	Y	0.7	A	0.0
2			All			20	28					3.7	A	0.1
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	2	2	0	0.0%	🟢 0.0	Y	11.4	A	0.5
3		3-3		Railway Street (E)	L	1	0	-1	-100.0%	🟢 1.4	Y	7.8	A	0.4
3		3-4	Railway Street (E)	High Street (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	1.1	A	0.0
3		3-5		Railway Street (W)	T	6	10	4	66.7%	🟢 1.4	Y	0.0	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	9	9	0	0.0%	🟢 0.0	Y	0.3	A	0.0
3		3-12		High Street (N)	L	1	2	1	100.0%	🟢 0.8	Y	0.4	A	0.0
3			All			20	23					11.4	A	0.5
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	1	0	-1	-100.0%	🟢 1.4	Y	8.2	A	0.3
4		4-2		Ruddock Street (S)	T	0	0	0	inf	🟢 0.0	Y	9.9	A	0.3
4		4-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	7.0	A	0.3
4		4-5	Railway Street (E)	Railway Street (W)	T	6	10	4	66.7%	🟢 1.4	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	0	0	inf	🟢 0.0	Y	0.0	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	0	0	inf	🟢 0.0	Y	8.8	A	0.1
4		4-8		Ruddock Street (N)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.1
4		4-9		Railway Street (W)	L	0	0	0	inf	🟢 0.0	Y	11.1	A	0.1
4		4-10	Railway Street (W)	Ruddock Street (S)	R	0	0	0	inf	🟢 0.0	Y	10.8	A	0.5
4		4-11		Railway Street (E)	T	9	9	0	0.0%	🟢 0.0	Y	4.0	A	0.5
4		4-12		Ruddock Street (N)	L	1	0	-1	-100.0%	🟢 1.4	Y	0.7	A	0.0
4			All			17	19					11.1	A	0.5
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	6	8	2	33.3%	🟢 0.8	Y	0.2	A	0.0
5		5-6		Duff Parade (S)	L	1	0	-1	-100.0%	🟢 1.4	Y	0.3	A	0.0
5		5-7	Duff Parade (S)	Railway Street (E)	R	0	1	1	inf	🟢 1.4	Y	5.5	A	0.0
5		5-9		Railway Street (W)	L	0	2	2	inf	🟢 2.0	Y	1.0	A	0.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	1	0	-1	-100.0%	🟢 1.4	Y	1.1	A	0.1
5		5-11		Railway Street (E)	T	8	9	1	12.5%	🟢 0.3	Y	0.4	A	0.0
5			All			16	20					5.5	A	0.1
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	2	3	1	50.0%	🟢 0.6	Y	1.7	A	0.1
6		6-3		Railway Street (E)	L	0	1	1	inf	🟢 1.4	Y	1.4	A	0.1
6		6-4	Railway Street (E)	Park Road (N)	R	1	1	0	0.0%	🟢 0.0	Y	2.0	A	0.0
6		6-5		Railway Street (W)	T	5	5	0	0.0%	🟢 0.0	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	8	10	2	25.0%	🟢 0.7	Y	0.3	A	0.0
6		6-12		Park Road (N)	L	0	0	0	inf	🟢 0.0	Y	0.3	A	0.0
6			All			16	20					2.0	A	0.1
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	4	2	-2	-50.0%	🟢 1.2	Y	10.4	A	2.1
7		7-2		Pioneer Road (S)	T	12	13	1	8.3%	🟢 0.3	Y	5.7	A	2.5
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	7	8	1	14.3%	🟢 0.4	Y	5.5	A	1.2
7		7-9		Railway Street (W)	L	2	4	2	100.0%	🟢 1.2	Y	1.8	A	1.1
7		7-10	Railway Street (W)	Pioneer Road (S)	R	4	4	0	0.0%	🟢 0.0	Y	19.5	B	4.5
7		7-12		Pioneer Road (N)	L	4	5	1	25.0%	🟢 0.5	Y	19.2	B	1.1
7			All			33	36					8.9	A	4.5
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	1	0	-1	-100.0%	🟢 1.4	Y	62.8	E	4.1
8		8-2		Memorial Drive (S)	T	37	37	0	0.0%	🟢 0.0	Y	22.7	B	31.6
8		8-3		Rothery Street (E)	L	4	5	1	25.0%	🟢 0.5	Y	4.7	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	1	3	2	200.0%	🟢 1.4	Y	92.8	F	22.6
8		8-5		Rothery Street (W)	T	3	6	3	100.0%	🟢 1.4	Y	90.1	F	22.6
8		8-6		Memorial Drive (S)	L	4	6	2	50.0%	🟢 0.9	Y	89.1	F	22.6
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	6	6	0	0.0%	🟢 0.0	Y	80.6	F	7.7
8		8-8		Memorial Drive (N)	T	63	64	1	1.6%	🟢 0.1	Y	19.9	B	15.9
8		8-9		Rothery Street (W)	L	4	4	0	0.0%	🟢 0.0	Y	2.4	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	11	9	-2	-18.2%	🟢 0.6	Y	73.1	F	24.0
8		8-11		Rothery Street (E)	T	7	10	3	42.9%	🟢 1.0	Y	73.2	F	24.0
8		8-12		Memorial Drive (N)	L	1	2	1	100.0%	🟢 0.8	Y	54.5	D	24.0
8			All			142	152					36.1	C	31.6
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	0	0	0	inf	🟢 0.0	Y	58.1	E	3.4
9		9-2		Memorial Drive (S)	T	58	56	-2	-3.4%	🟢 0.3	Y	59.9	E	201.6
9		9-3		Towradgi Road (E)	L	2	2	0	0.0%	🟢 0.0	Y	11.2	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	1	2	1	100.0%	🟢 0.8	Y	48.0	D	7.1
9		9-5		Towradgi Road (W)	T	2	2	0	0.0%	🟢 0.0	Y	50.9	D	20.4
9		9-6		Memorial Drive (S)	L	7	7	0	0.0%	🟢 0.0	Y	37.9	C	20.5
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	10	9	-1	-10.0%	🟢 0.3	Y	60.6	E	14.5
9		9-8		Memorial Drive (N)	T	70	71	1	1.4%	🟢 0.1	Y	33.6	C	33.5
9		9-9		Towradgi Road (W)	L	12	11	-1	-8.3%	🟢 0.3	Y	1.3	A	0.1
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	12	12	0	0.0%	🟢 0.0	Y	65.1	E	3.0
9		9-11		Towradgi Road (E)	T	2	3	1	50.0%	🟢 0.6	Y	48.5	D	3.0
9		9-12		Memorial Drive (N)	L	4	3	-1	-25.0%	🟢 0.5	Y	48.0	D	3.0
9			All			180	178					44.2	D	201.6

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Heavy Vehicles

AM Peak 0800-0900

GEH Turn Summary 0800-0900		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	2	2	0	0.0%	0.0	Y	80.4	F	9.5
1		1-2		Memorial Drive (S)	T	52	50	-2	-3.8%	0.3	Y	60.4	E	411.1
1		1-3		Railway Street (E)	L	0	2	2	inf	2.0	Y	15.9	B	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	0	1	1	inf	1.4	Y	95.0	F	80.2
1		1-5		Railway Street (W)	T	4	7	3	75.0%	1.3	Y	91.6	F	80.0
1		1-6		Memorial Drive (S)	L	7	6	-1	-14.3%	0.4	Y	45.8	D	80.1
1		1-7	Memorial Drive (S)	Railway Street (E)	R	3	4	1	33.3%	0.5	Y	83.1	F	14.5
1		1-8		Memorial Drive (N)	T	71	68	-3	-4.2%	0.4	Y	34.9	C	49.9
1		1-9		Railway Street (W)	L	5	7	2	40.0%	0.8	Y	5.5	A	0.4
1		1-10	Railway Street (W)	Memorial Drive (S)	R	2	3	1	50.0%	0.6	Y	61.8	E	31.9
1		1-11		Railway Street (E)	T	1	5	4	400.0%	2.3	Y	59.1	E	31.8
1		1-12		Memorial Drive (N)	L	4	5	1	25.0%	0.5	Y	55.7	D	31.9
1			All			151	160					48.3	D	411.1
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	1	0	-1	-100.0%	1.4	Y	14.4	A	0.4
2		2-3		Railway Street (E)	L	0	0	0	inf	0.0	Y	6.2	A	0.2
2		2-4	Railway Street (E)	Harbinger Street (N)	R	1	0	-1	-100.0%	1.4	Y	6.8	A	2.1
2		2-5		Railway Street (W)	T	10	13	3	30.0%	0.9	Y	7.3	A	0.4
2		2-11	Railway Street (W)	Railway Street (E)	T	4	11	7	175.0%	2.6	Y	0.5	A	0.0
2		2-12		Harbinger Street (N)	L	0	0	0	inf	0.0	Y	0.5	A	0.0
2			All			16	24					14.4	A	2.1
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	0	1	1	inf	1.4	Y	17.6	B	1.7
3		3-3		Railway Street (E)	L	2	3	1	50.0%	0.6	Y	15.4	B	1.8
3		3-4	Railway Street (E)	High Street (N)	R	0	2	2	inf	2.0	Y	4.0	A	0.3
3		3-5		Railway Street (W)	T	11	12	1	9.1%	0.3	Y	0.4	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	3	10	7	233.3%	2.7	Y	0.4	A	0.0
3		3-12		High Street (N)	L	1	1	0	0.0%	0.0	Y	0.4	A	0.0
3			All			17	29					17.6	B	1.8
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	2	0	-2	-100.0%	2.0	Y	12.3	A	0.3
4		4-2		Ruddock Street (S)	T	0	0	0	inf	0.0	Y	0.0	A	0.2
4		4-3		Railway Street (E)	L	0	0	0	inf	0.0	Y	12.2	A	0.2
4		4-5	Railway Street (E)	Railway Street (W)	T	9	14	5	55.6%	1.5	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	0	0	inf	0.0	Y	0.1	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	0	0	inf	0.0	Y	7.2	A	0.0
4		4-8		Ruddock Street (N)	T	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-9		Railway Street (W)	L	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-10	Railway Street (W)	Ruddock Street (S)	R	0	0	0	inf	0.0	Y	0.5	A	0.4
4		4-11		Railway Street (E)	T	5	13	8	160.0%	2.7	Y	2.6	A	0.4
4		4-12		Ruddock Street (N)	L	0	0	0	inf	0.0	Y	0.3	A	0.0
4			All			16	27					12.3	A	0.4
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	7	7	0	0.0%	0.0	Y	2.7	A	0.9
5		5-6		Duff Parade (S)	L	0	1	1	inf	1.4	Y	2.3	A	0.9
5		5-7	Duff Parade (S)	Railway Street (E)	R	0	1	1	inf	1.4	Y	9.9	A	0.8
5		5-9		Railway Street (W)	L	2	7	5	250.0%	2.4	Y	5.2	A	1.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	0	4	4	inf	2.8	Y	2.9	A	0.6
5		5-11		Railway Street (E)	T	5	9	4	80.0%	1.5	Y	1.1	A	0.2
5			All			14	29					9.9	A	1.0
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	1	2	1	100.0%	0.8	Y	3.9	A	0.7
6		6-3		Railway Street (E)	L	0	1	1	inf	1.4	Y	2.3	A	0.6
6		6-4	Railway Street (E)	Park Road (N)	R	0	0	0	inf	0.0	Y	0.6	A	0.0
6		6-5		Railway Street (W)	T	6	6	0	0.0%	0.0	Y	0.2	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	2	6	4	200.0%	2.0	Y	0.4	A	0.0
6		6-12		Park Road (N)	L	3	4	1	33.3%	0.5	Y	0.5	A	0.0
6			All			12	19					3.9	A	0.7
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	2	2	0	0.0%	0.0	Y	16.7	B	10.7
7		7-2		Pioneer Road (S)	T	14	14	0	0.0%	0.0	Y	10.2	A	11.1
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	12	12	0	0.0%	0.0	Y	7.9	A	5.1
7		7-9		Railway Street (W)	L	4	4	0	0.0%	0.0	Y	4.9	A	4.7
7		7-10	Railway Street (W)	Pioneer Road (S)	R	1	2	1	100.0%	0.8	Y	28.7	C	10.9
7		7-12		Pioneer Road (N)	L	1	7	6	600.0%	3.0	Y	26.5	B	3.6
7			All			34	41					13.0	A	11.1
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	5	6	1	20.0%	0.4	Y	100.1	F	18.6
8		8-2		Memorial Drive (S)	T	40	38	-2	-5.0%	0.3	Y	40.9	C	56.1
8		8-3		Rothery Street (E)	L	1	0	-1	-100.0%	1.4	Y	6.0	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	0	0	0	inf	0.0	Y	184.5	F	100.5
8		8-5		Rothery Street (W)	T	4	7	3	75.0%	1.3	Y	174.7	F	100.5
8		8-6		Memorial Drive (S)	L	9	10	1	11.1%	0.3	Y	173.1	F	100.5
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	7	2	-5	-71.4%	2.4	Y	80.3	F	16.7
8		8-8		Memorial Drive (N)	T	66	73	7	10.6%	0.8	Y	39.0	C	41.8
8		8-9		Rothery Street (W)	L	2	2	0	0.0%	0.0	Y	6.2	A	0.1
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	5	7	2	40.0%	0.8	Y	192.3	F	111.7
8		8-11		Rothery Street (E)	T	9	11	2	22.2%	0.6	Y	136.4	F	111.7
8		8-12		Memorial Drive (N)	L	1	2	1	100.0%	0.8	Y	80.1	F	111.7
8			All			149	158					70.4	F	111.7
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	1	0	-1	-100.0%	1.4	Y	95.4	F	10.3
9		9-2		Memorial Drive (S)	T	56	59	3	5.4%	0.4	Y	33.6	C	285.2
9		9-3		Towradgi Road (E)	L	4	6	2	50.0%	0.9	Y	7.0	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	4	1	-3	-75.0%	1.9	Y	70.3	F	12.4
9		9-5		Towradgi Road (W)	T	3	3	0	0.0%	0.0	Y	102.5	F	48.2
9		9-6		Memorial Drive (S)	L	8	8	0	0.0%	0.0	Y	72.1	F	48.3
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	2	2	0	0.0%	0.0	Y	120.5	F	37.7
9		9-8		Memorial Drive (N)	T	73	80	7	9.6%	0.8	Y	29.7	C	48.0
9		9-9		Towradgi Road (W)	L	11	11	0	0.0%	0.0	Y	2.1	A	0.2
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	17	16	-1	-5.9%	0.2	Y	311.9	F	112.1
9		9-11		Towradgi Road (E)	T	4	4	0	0.0%	0.0	Y	208.0	F	112.1
9		9-12		Memorial Drive (N)	L	2	0	-2	-100.0%	2.0	Y	186.9	F	112.1
9			All			185	190					60.2	E	285.2

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Base Model Calibration - Intersection Count - Light Vehicles

PM Peak 1600-1700

GEH Turn Summary 1600-1700		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	124	129	5	4.0%	0.4	Y	79.2	F	16.5
1		1-2		Memorial Drive (S)	T	1,222	1,266	44	3.6%	1.2	Y	38.8	C	77.0
1		1-3		Railway Street (E)	L	74	63	-11	-14.9%	1.3	Y	13.7	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	54	51	-3	-5.6%	0.4	Y	83.4	F	38.8
1		1-5		Railway Street (W)	T	170	183	13	7.6%	1.0	Y	77.6	F	38.6
1		1-6		Memorial Drive (S)	L	95	88	-7	-7.4%	0.7	Y	32.9	C	38.7
1		1-7	Memorial Drive (S)	Railway Street (E)	R	101	100	-1	-1.0%	0.1	Y	67.5	E	11.9
1		1-8		Memorial Drive (N)	T	1381	1342	-39	-2.8%	1.1	Y	51.6	D	80.4
1		1-9		Railway Street (W)	L	203	192	-11	-5.4%	0.8	Y	8.2	A	0.2
1		1-10	Railway Street (W)	Memorial Drive (S)	R	205	199	-6	-2.9%	0.4	Y	71.6	F	41.9
1		1-11		Railway Street (E)	T	208	216	8	3.8%	0.5	Y	67.9	E	41.8
1		1-12		Memorial Drive (N)	L	111	107	-4	-3.6%	0.4	Y	49.9	D	41.9
1			All			3,948	3,936					49.1	D	80.4
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	31	30	-1	-3.2%	0.2	Y	11.6	A	0.4
2		2-3		Railway Street (E)	L	11	8	-3	-27.3%	1.0	Y	2.2	A	0.2
2		2-4	Railway Street (E)	Harbinger Street (N)	R	20	9	-11	-55.0%	2.9	Y	6.5	A	0.1
2		2-5		Railway Street (W)	T	288	286	-2	-0.7%	0.1	Y	0.3	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	332	330	-2	-0.6%	0.1	Y	1.1	A	0.0
2		2-12		Harbinger Street (N)	L	51	49	-2	-3.9%	0.3	Y	1.3	A	0.0
2			All			733	712					11.6	A	0.4
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	36	35	-1	-2.8%	0.2	Y	13.3	A	1.0
3		3-3		Railway Street (E)	L	23	19	-4	-17.4%	0.9	Y	12.2	A	0.9
3		3-4	Railway Street (E)	High Street (N)	R	35	33	-2	-5.7%	0.3	Y	3.2	A	0.1
3		3-5		Railway Street (W)	T	272	261	-11	-4.0%	0.7	Y	0.1	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	313	309	-4	-1.3%	0.2	Y	1.0	A	0.0
3		3-12		High Street (N)	L	30	29	-1	-3.3%	0.2	Y	0.4	A	0.0
3			All			709	686					13.3	A	1.0
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	24	25	1	4.2%	0.2	Y	10.9	A	0.4
4		4-2		Ruddock Street (S)	T	0	0	0	inf	0.0	Y	0.0	A	0.3
4		4-3		Railway Street (E)	L	8	9	1	12.5%	0.3	Y	7.4	A	0.3
4		4-5	Railway Street (E)	Railway Street (W)	T	282	266	-16	-5.7%	1.0	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-8		Ruddock Street (N)	T	0	0	0	inf	0.0	Y	0.0	A	0.0
4		4-9		Railway Street (W)	L	1	2	1	100.0%	0.8	Y	6.3	A	0.0
4		4-10	Railway Street (W)	Ruddock Street (S)	R	0	2	2	inf	2.0	Y	0.3	A	2.7
4		4-11		Railway Street (E)	T	319	311	-8	-2.5%	0.5	Y	5.0	A	2.7
4		4-12		Ruddock Street (N)	L	17	15	-2	-11.8%	0.5	Y	10.1	A	1.9
4			All			651	630					10.9	A	2.7
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	188	175	-13	-6.9%	1.0	Y	0.9	A	0.0
5		5-6		Duff Parade (S)	L	17	18	1	5.9%	0.2	Y	0.3	A	0.0
5		5-7	Duff Parade (S)	Railway Street (E)	R	7	9	2	28.6%	0.7	Y	0.4	A	0.0
5		5-9		Railway Street (W)	L	94	92	-2	-2.1%	0.2	Y	1.4	A	0.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	90	87	-3	-3.3%	0.3	Y	2.2	A	0.3
5		5-11		Railway Street (E)	T	237	232	-5	-2.1%	0.3	Y	0.7	A	0.1
5			All			633	613					2.2	A	0.3
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	50	47	-3	-6.0%	0.4	Y	2.8	A	0.2
6		6-3		Railway Street (E)	L	59	59	0	0.0%	0.0	Y	2.1	A	0.2
6		6-4	Railway Street (E)	Park Road (N)	R	51	49	-2	-3.9%	0.3	Y	1.1	A	0.0
6		6-5		Railway Street (W)	T	155	146	-9	-5.8%	0.7	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	182	182	0	0.0%	0.0	Y	0.3	A	0.0
6		6-12		Park Road (N)	L	62	61	-1	-1.6%	0.1	Y	0.4	A	0.0
6			All			559	544					2.8	A	0.2
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	61	62	1	1.6%	0.1	Y	15.1	B	4.3
7		7-2		Pioneer Road (S)	T	368	370	2	0.5%	0.1	Y	8.8	A	4.6
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	476	478	2	0.4%	0.1	Y	6.6	A	3.4
7		7-9		Railway Street (W)	L	145	133	-12	-8.3%	1.0	Y	2.1	A	3.1
7		7-10	Railway Street (W)	Pioneer Road (S)	R	169	172	3	1.8%	0.2	Y	19.8	B	5.5
7		7-12		Pioneer Road (N)	L	72	70	-2	-2.8%	0.2	Y	18.3	B	1.8
7			All			1,291	1,285					9.6	A	5.5
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	93	99	6	6.5%	0.6	Y	82.8	F	12.8
8		8-2		Memorial Drive (S)	T	1,194	1,237	43	3.6%	1.2	Y	30.0	C	39.5
8		8-3		Rothery Street (E)	L	38	36	-2	-5.3%	0.3	Y	4.1	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	44	42	-2	-4.5%	0.3	Y	117.3	F	38.0
8		8-5		Rothery Street (W)	T	112	107	-5	-4.5%	0.5	Y	108.7	F	38.0
8		8-6		Memorial Drive (S)	L	83	81	-2	-2.4%	0.2	Y	104.2	F	38.0
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	94	95	1	1.1%	0.1	Y	71.7	F	10.5
8		8-8		Memorial Drive (N)	T	1321	1297	-24	-1.8%	0.7	Y	21.9	B	53.2
8		8-9		Rothery Street (W)	L	131	126	-5	-3.8%	0.4	Y	5.7	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	143	152	9	6.3%	0.7	Y	163.2	F	81.5
8		8-11		Rothery Street (E)	T	145	152	7	4.8%	0.6	Y	131.4	F	81.5
8		8-12		Memorial Drive (N)	L	77	78	1	1.3%	0.1	Y	65.2	E	81.5
8			All			3,475	3,502					44.6	D	81.5
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	109	96	-13	-11.9%	1.3	Y	87.0	F	12.7
9		9-2		Memorial Drive (S)	T	1,262	1,307	45	3.6%	1.3	Y	59.7	E	418.8
9		9-3		Towradgi Road (E)	L	151	136	-15	-9.9%	1.3	Y	13.0	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	166	168	2	1.2%	0.2	Y	70.6	F	21.0
9		9-5		Towradgi Road (W)	T	184	185	1	0.5%	0.1	Y	74.1	F	30.6
9		9-6		Memorial Drive (S)	L	200	200	0	0.0%	0.0	Y	37.0	C	30.6
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	265	258	-7	-2.6%	0.4	Y	94.7	F	329.1
9		9-8		Memorial Drive (N)	T	1419	1370	-49	-3.5%	1.3	Y	47.0	D	367.0
9		9-9		Towradgi Road (W)	L	365	352	-13	-3.6%	0.7	Y	4.7	A	1.1
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	193	202	9	4.7%	0.6	Y	78.0	F	10.2
9		9-11		Towradgi Road (E)	T	199	196	-3	-1.5%	0.2	Y	76.1	F	10.2
9		9-12		Memorial Drive (N)	L	100	91	-9	-9.0%	0.9	Y	69.7	E	10.2
9			All			4,613	4,561					54.5	D	418.8

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Heavy Vehicles

PM Peak 1600-1700

GEH Turn Summary 1600-1700		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	1	3	2	200.0%	🟢 1.4	Y	79.2	F	16.5
1		1-2		Memorial Drive (S)	T	39	40	1	2.6%	🟢 0.2	Y	38.8	C	77.0
1		1-3		Railway Street (E)	L	0	1	1	inf	🟢 1.4	Y	13.7	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	83.4	F	38.8
1		1-5		Railway Street (W)	T	3	6	3	100.0%	🟢 1.4	Y	77.6	F	38.6
1		1-6		Memorial Drive (S)	L	2	2	0	0.0%	🟢 0.0	Y	32.9	C	38.7
1		1-7	Memorial Drive (S)	Railway Street (E)	R	4	5	1	25.0%	🟢 0.5	Y	67.5	E	11.9
1		1-8		Memorial Drive (N)	T	24	26	2	8.3%	🟢 0.4	Y	51.6	D	80.4
1		1-9		Railway Street (W)	L	0	4	4	inf	🟢 2.8	Y	8.2	A	0.2
1		1-10	Railway Street (W)	Memorial Drive (S)	R	1	1	0	0.0%	🟢 0.0	Y	71.6	F	41.9
1		1-11		Railway Street (E)	T	3	4	1	33.3%	🟢 0.5	Y	67.9	E	41.8
1		1-12		Memorial Drive (N)	L	0	0	0	inf	🟢 0.0	Y	49.9	D	41.9
1			All			78	92					47.7	D	80.4
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	0	0	0	inf	🟢 0.0	Y	11.6	A	0.4
2		2-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	2.2	A	0.2
2		2-4	Railway Street (E)	Harbinger Street (N)	R	0	0	0	inf	🟢 0.0	Y	6.5	A	0.1
2		2-5		Railway Street (W)	T	6	7	1	16.7%	🟢 0.4	Y	0.3	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	6	10	4	66.7%	🟢 1.4	Y	1.1	A	0.0
2		2-12		Harbinger Street (N)	L	1	0	-1	-100.0%	🟢 1.4	Y	1.3	A	0.0
2			All			13	17					11.6	A	0.4
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	0	1	1	inf	🟢 1.4	Y	13.3	A	1.0
3		3-3		Railway Street (E)	L	1	0	-1	-100.0%	🟢 1.4	Y	12.2	A	0.9
3		3-4	Railway Street (E)	High Street (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	3.2	A	0.1
3		3-5		Railway Street (W)	T	6	6	0	0.0%	🟢 0.0	Y	0.1	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	6	8	2	33.3%	🟢 0.8	Y	1.0	A	0.0
3		3-12		High Street (N)	L	0	2	2	inf	🟢 2.0	Y	0.4	A	0.0
3			All			14	17					13.3	A	1.0
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	0	0	0	inf	🟢 0.0	Y	10.9	A	0.4
4		4-2		Ruddock Street (S)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.3
4		4-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	7.4	A	0.3
4		4-5	Railway Street (E)	Railway Street (W)	T	7	6	-1	-14.3%	🟢 0.4	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	0	0	inf	🟢 0.0	Y	0.0	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	0	0	inf	🟢 0.0	Y	0.0	A	0.0
4		4-8		Ruddock Street (N)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.0
4		4-9		Railway Street (W)	L	0	0	0	inf	🟢 0.0	Y	6.3	A	0.0
4		4-10	Railway Street (W)	Ruddock Street (S)	R	0	0	0	inf	🟢 0.0	Y	0.3	A	2.7
4		4-11		Railway Street (E)	T	6	8	2	33.3%	🟢 0.8	Y	5.0	A	2.7
4		4-12		Ruddock Street (N)	L	1	0	-1	-100.0%	🟢 1.4	Y	10.1	A	1.9
4			All			14	14					10.9	A	2.7
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	6	4	-2	-33.3%	🟢 0.9	Y	0.9	A	0.0
5		5-6		Duff Parade (S)	L	0	0	0	inf	🟢 0.0	Y	0.3	A	0.0
5		5-7	Duff Parade (S)	Railway Street (E)	R	0	0	0	inf	🟢 0.0	Y	0.4	A	0.0
5		5-9		Railway Street (W)	L	1	2	1	100.0%	🟢 0.8	Y	1.4	A	0.0
5		5-10	Railway Street (W)	Duff Parade (S)	R	1	2	1	100.0%	🟢 0.8	Y	2.2	A	0.3
5		5-11		Railway Street (E)	T	5	6	1	20.0%	🟢 0.4	Y	0.7	A	0.1
5			All			13	14					2.2	A	0.3
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	2	0	-2	-100.0%	🟢 2.0	Y	2.8	A	0.2
6		6-3		Railway Street (E)	L	2	0	-2	-100.0%	🟢 2.0	Y	2.1	A	0.2
6		6-4	Railway Street (E)	Park Road (N)	R	0	0	0	inf	🟢 0.0	Y	1.1	A	0.0
6		6-5		Railway Street (W)	T	4	4	0	0.0%	🟢 0.0	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	5	5	0	0.0%	🟢 0.0	Y	0.3	A	0.0
6		6-12		Park Road (N)	L	0	1	1	inf	🟢 1.4	Y	0.4	A	0.0
6			All			13	10					2.8	A	0.2
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	2	3	1	50.0%	🟢 0.6	Y	15.1	B	4.3
7		7-2		Pioneer Road (S)	T	4	4	0	0.0%	🟢 0.0	Y	8.8	A	4.6
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	8	9	1	12.5%	🟢 0.3	Y	6.6	A	3.4
7		7-9		Railway Street (W)	L	2	1	-1	-50.0%	🟢 0.8	Y	2.1	A	3.1
7		7-10	Railway Street (W)	Pioneer Road (S)	R	3	4	1	33.3%	🟢 0.5	Y	19.8	B	5.5
7		7-12		Pioneer Road (N)	L	4	1	-3	-75.0%	🟢 1.9	Y	18.3	B	1.8
7			All			23	22					10.9	A	5.5
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	0	0	0	inf	🟢 0.0	Y	82.8	F	12.8
8		8-2		Memorial Drive (S)	T	34	39	5	14.7%	🟢 0.8	Y	30.0	C	39.5
8		8-3		Rothery Street (E)	L	1	1	0	0.0%	🟢 0.0	Y	4.1	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	3	3	0	0.0%	🟢 0.0	Y	117.3	F	38.0
8		8-5		Rothery Street (W)	T	4	6	2	50.0%	🟢 0.9	Y	108.7	F	38.0
8		8-6		Memorial Drive (S)	L	6	5	-1	-16.7%	🟢 0.4	Y	104.2	F	38.0
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	1	1	0	0.0%	🟢 0.0	Y	71.7	F	10.5
8		8-8		Memorial Drive (N)	T	16	17	1	6.3%	🟢 0.2	Y	21.9	B	53.2
8		8-9		Rothery Street (W)	L	8	8	0	0.0%	🟢 0.0	Y	5.7	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	0	0	0	inf	🟢 0.0	Y	163.2	F	81.5
8		8-11		Rothery Street (E)	T	7	11	4	57.1%	🟢 1.3	Y	131.4	F	81.5
8		8-12		Memorial Drive (N)	L	0	0	0	inf	🟢 0.0	Y	65.2	E	81.5
8			All			80	91					50.9	D	81.5
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	3	3	0	0.0%	🟢 0.0	Y	87.0	F	12.7
9		9-2		Memorial Drive (S)	T	38	38	0	0.0%	🟢 0.0	Y	59.7	E	418.8
9		9-3		Towradgi Road (E)	L	1	2	1	100.0%	🟢 0.8	Y	13.0	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	70.6	F	21.0
9		9-5		Towradgi Road (W)	T	3	3	0	0.0%	🟢 0.0	Y	74.1	F	30.6
9		9-6		Memorial Drive (S)	L	2	1	-1	-50.0%	🟢 0.8	Y	37.0	C	30.6
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	3	2	-1	-33.3%	🟢 0.6	Y	94.7	F	329.1
9		9-8		Memorial Drive (N)	T	26	33	7	26.9%	🟢 1.3	Y	47.0	D	367.0
9		9-9		Towradgi Road (W)	L	12	13	1	8.3%	🟢 0.3	Y	4.7	A	1.1
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	4	4	0	0.0%	🟢 0.0	Y	78.0	F	10.2
9		9-11		Towradgi Road (E)	T	6	6	0	0.0%	🟢 0.0	Y	76.1	F	10.2
9		9-12		Memorial Drive (N)	L	1	1	0	0.0%	🟢 0.0	Y	69.7	E	10.2
9			All			100	106					51.5	D	418.8

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Light Vehicles

PM Peak 1700-1800

GEH Turn Summary 1700-1800		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	97	101	4	4.1%	🟢 0.4	Y	58.7	E	9.2
1		1-2		Memorial Drive (S)	T	1,107	1,101	-6	-0.5%	🟢 0.2	Y	38.3	C	51.6
1		1-3		Railway Street (E)	L	49	49	0	0.0%	🟢 0.0	Y	7.7	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	45	43	-2	-4.4%	🟢 0.3	Y	63.4	E	29.0
1		1-5		Railway Street (W)	T	175	178	3	1.7%	🟢 0.2	Y	67.0	E	28.8
1		1-6		Memorial Drive (S)	L	80	82	2	2.5%	🟢 0.2	Y	28.4	B	29.0
1		1-7	Memorial Drive (S)	Railway Street (E)	R	92	90	-2	-2.2%	🟢 0.2	Y	72.7	F	10.3
1		1-8		Memorial Drive (N)	T	1434	1416	-18	-1.3%	🟢 0.5	Y	46.6	D	77.8
1		1-9		Railway Street (W)	L	175	172	-3	-1.7%	🟢 0.2	Y	7.1	A	0.1
1		1-10	Railway Street (W)	Memorial Drive (S)	R	204	197	-7	-3.4%	🟢 0.5	Y	70.8	F	37.1
1		1-11		Railway Street (E)	T	200	216	16	8.0%	🟢 1.1	Y	72.0	F	37.0
1		1-12		Memorial Drive (N)	L	120	128	8	6.7%	🟢 0.7	Y	51.8	D	37.1
1			All			3,778	3,773					46.5	D	77.8
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	30	35	5	16.7%	🟢 0.9	Y	6.2	A	0.2
2		2-3		Railway Street (E)	L	11	3	-8	-72.7%	🟢 3.0	Y	5.0	A	0.1
2		2-4	Railway Street (E)	Harbinger Street (N)	R	12	12	0	0.0%	🟢 0.0	Y	5.0	A	0.1
2		2-5		Railway Street (W)	T	270	271	1	0.4%	🟢 0.1	Y	0.3	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	301	312	11	3.7%	🟢 0.6	Y	0.9	A	0.0
2		2-12		Harbinger Street (N)	L	40	43	3	7.5%	🟢 0.5	Y	1.2	A	0.0
2			All			664	676					6.2	A	0.2
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	24	31	7	29.2%	🟢 1.3	Y	14.1	A	0.8
3		3-3		Railway Street (E)	L	21	16	-5	-23.8%	🟢 1.2	Y	8.9	A	0.7
3		3-4	Railway Street (E)	High Street (N)	R	18	28	10	55.6%	🟢 2.1	Y	2.0	A	0.0
3		3-5		Railway Street (W)	T	256	251	-5	-2.0%	🟢 0.3	Y	0.1	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	289	290	1	0.3%	🟢 0.1	Y	1.8	A	0.1
3		3-12		High Street (N)	L	23	25	2	8.7%	🟢 0.4	Y	0.4	A	0.1
3			All			631	641					14.1	A	0.8
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	9	4	-5	-55.6%	🟢 2.0	Y	7.6	A	0.1
4		4-2		Ruddock Street (S)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.1
4		4-3		Railway Street (E)	L	4	9	5	125.0%	🟢 2.0	Y	18.1	B	0.2
4		4-5	Railway Street (E)	Railway Street (W)	T	261	270	9	3.4%	🟢 0.6	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	4	4	inf	🟢 2.8	Y	0.1	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	4	4	inf	🟢 2.8	Y	7.0	A	0.1
4		4-8		Ruddock Street (N)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.1
4		4-9		Railway Street (W)	L	4	6	2	50.0%	🟢 0.9	Y	9.4	A	0.2
4		4-10	Railway Street (W)	Ruddock Street (S)	R	2	1	-1	-50.0%	🟢 0.8	Y	0.3	A	2.1
4		4-11		Railway Street (E)	T	299	297	-2	-0.7%	🟢 0.1	Y	2.7	A	2.1
4		4-12		Ruddock Street (N)	L	9	8	-1	-11.1%	🟢 0.3	Y	0.4	A	1.7
4			All			588	603					18.1	B	2.1
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	167	176	9	5.4%	🟢 0.7	Y	2.9	A	0.4
5		5-6		Duff Parade (S)	L	13	13	0	0.0%	🟢 0.0	Y	0.4	A	0.4
5		5-7	Duff Parade (S)	Railway Street (E)	R	7	13	6	85.7%	🟢 1.9	Y	8.0	A	1.2
5		5-9		Railway Street (W)	L	94	97	3	3.2%	🟢 0.3	Y	8.6	A	1.3
5		5-10	Railway Street (W)	Duff Parade (S)	R	84	84	0	0.0%	🟢 0.0	Y	1.2	A	0.0
5		5-11		Railway Street (E)	T	219	226	7	3.2%	🟢 0.5	Y	0.4	A	0.0
5			All			584	609					8.6	A	1.3
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	51	54	3	5.9%	🟢 0.4	Y	2.7	A	0.1
6		6-3		Railway Street (E)	L	53	52	-1	-1.9%	🟢 0.1	Y	1.8	A	0.1
6		6-4	Railway Street (E)	Park Road (N)	R	50	52	2	4.0%	🟢 0.3	Y	2.2	A	0.1
6		6-5		Railway Street (W)	T	129	135	6	4.7%	🟢 0.5	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	174	176	2	1.1%	🟢 0.2	Y	0.5	A	0.0
6		6-12		Park Road (N)	L	52	61	9	17.3%	🟢 1.2	Y	0.4	A	0.0
6			All			509	530					2.7	A	0.1
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	52	59	7	13.5%	🟢 0.9	Y	16.8	B	3.8
7		7-2		Pioneer Road (S)	T	347	346	-1	-0.3%	🟢 0.1	Y	8.0	A	4.1
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	492	490	-2	-0.4%	🟢 0.1	Y	8.6	A	5.8
7		7-9		Railway Street (W)	L	127	127	0	0.0%	🟢 0.0	Y	3.3	A	5.5
7		7-10	Railway Street (W)	Pioneer Road (S)	R	145	146	1	0.7%	🟢 0.1	Y	25.8	B	6.8
7		7-12		Pioneer Road (N)	L	82	77	-5	-6.1%	🟢 0.6	Y	22.6	B	2.5
7			All			1,245	1,245					11.1	A	6.8
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	61	64	3	4.9%	🟢 0.4	Y	60.2	E	5.9
8		8-2		Memorial Drive (S)	T	1,054	1,021	-33	-3.1%	🟢 1.0	Y	23.4	B	22.6
8		8-3		Rothery Street (E)	L	53	53	0	0.0%	🟢 0.0	Y	5.0	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	52	56	4	7.7%	🟢 0.5	Y	171.0	F	63.7
8		8-5		Rothery Street (W)	T	111	115	4	3.6%	🟢 0.4	Y	160.1	F	63.7
8		8-6		Memorial Drive (S)	L	84	79	-5	-6.0%	🟢 0.6	Y	170.1	F	63.7
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	112	107	-5	-4.5%	🟢 0.5	Y	98.2	F	18.6
8		8-8		Memorial Drive (N)	T	1363	1333	-30	-2.2%	🟢 0.8	Y	19.1	B	49.7
8		8-9		Rothery Street (W)	L	124	126	2	1.6%	🟢 0.2	Y	4.6	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	115	115	0	0.0%	🟢 0.0	Y	165.4	F	76.2
8		8-11		Rothery Street (E)	T	136	131	-5	-3.7%	🟢 0.4	Y	139.4	F	76.2
8		8-12		Memorial Drive (N)	L	69	70	1	1.4%	🟢 0.1	Y	67.1	E	76.2
8			All			3,334	3,270					45.2	D	76.2
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	92	100	8	8.7%	🟢 0.8	Y	89.4	F	12.3
9		9-2		Memorial Drive (S)	T	1,125	1,181	56	5.0%	🟢 1.6	Y	66.5	E	229.2
9		9-3		Towradgi Road (E)	L	174	188	14	8.0%	🟢 1.0	Y	13.1	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	206	208	2	1.0%	🟢 0.1	Y	93.9	F	45.5
9		9-5		Towradgi Road (W)	T	180	177	-3	-1.7%	🟢 0.2	Y	65.0	E	30.6
9		9-6		Memorial Drive (S)	L	223	224	1	0.4%	🟢 0.1	Y	36.3	C	30.6
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	337	319	-18	-5.3%	🟢 1.0	Y	103.9	F	375.6
9		9-8		Memorial Drive (N)	T	1425	1392	-33	-2.3%	🟢 0.9	Y	44.2	D	390.7
9		9-9		Towradgi Road (W)	L	380	357	-23	-6.1%	🟢 1.2	Y	5.0	A	1.3
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	129	128	-1	-0.8%	🟢 0.1	Y	77.0	F	13.2
9		9-11		Towradgi Road (E)	T	220	220	0	0.0%	🟢 0.0	Y	94.9	F	13.2
9		9-12		Memorial Drive (N)	L	70	79	9	12.9%	🟢 1.0	Y	91.5	F	13.2
9			All			4,561	4,573					57.6	E	390.7

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Base Model Calibration - Intersection Count - Heavy Vehicles

PM Peak 1700-1800

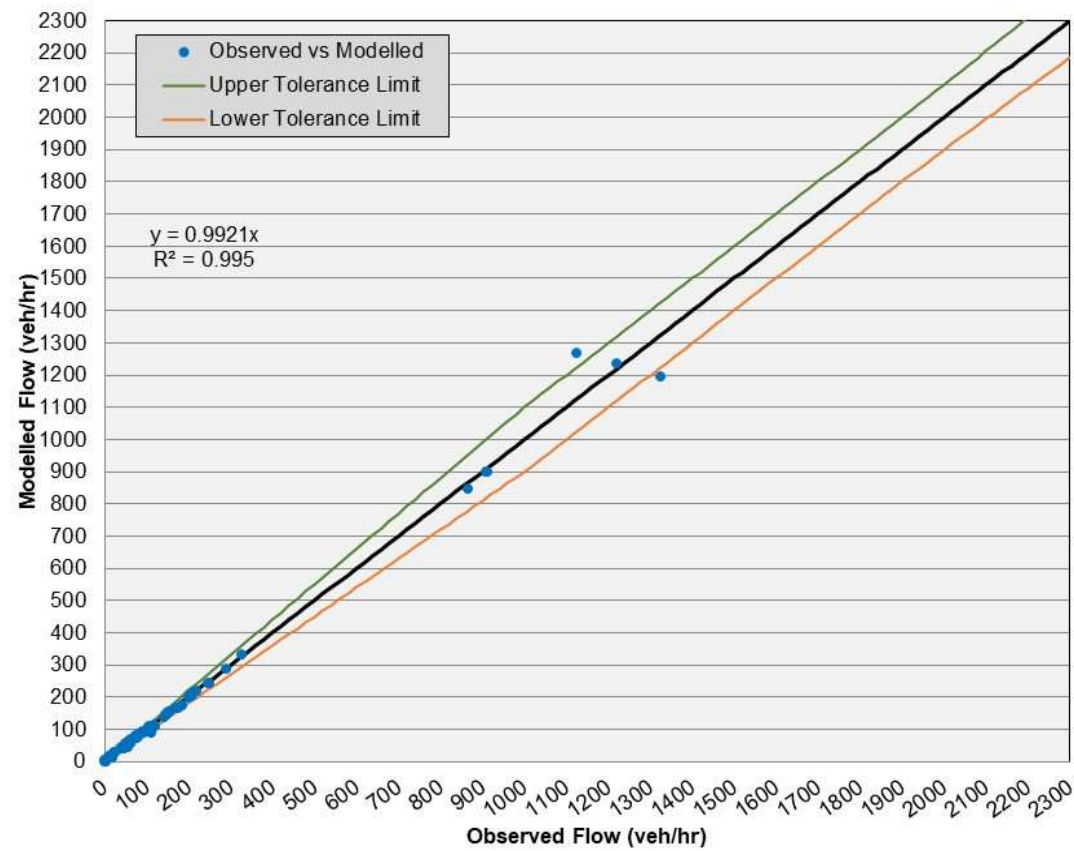
GEH Turn Summary 1700-1800		
>10	0	0.00%
>5, <=10	0	0.00%
<=5	77	100.00%

ID	Intersection	Movement Code	From	To	Turn	Observed	Modelled	Abs. Diff (Mod - Obs)	% Diff (Mod - Obs)	GEH	Accept	Delay (s)	LoS	Max Queue (m)
1	Railway Street Memorial Drive	1-1	Memorial Drive (N)	Railway Street (W)	R	0	2	2	inf	🟢 2.0	Y	58.7	E	9.2
1		1-2		Memorial Drive (S)	T	17	16	-1	-5.9%	🟢 0.2	Y	38.3	C	51.6
1		1-3		Railway Street (E)	L	2	0	-2	-100.0%	🟢 2.0	Y	7.7	A	0.0
1		1-4	Railway Street (E)	Memorial Drive (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	63.4	E	29.0
1		1-5		Railway Street (W)	T	1	1	0	0.0%	🟢 0.0	Y	67.0	E	28.8
1		1-6		Memorial Drive (S)	L	4	0	-4	-100.0%	🟢 2.8	Y	28.4	B	29.0
1		1-7	Memorial Drive (S)	Railway Street (E)	R	2	4	2	100.0%	🟢 1.2	Y	72.7	F	10.3
1		1-8		Memorial Drive (N)	T	19	23	4	21.1%	🟢 0.9	Y	46.6	D	77.8
1		1-9		Railway Street (W)	L	1	1	0	0.0%	🟢 0.0	Y	7.1	A	0.1
1		1-10	Railway Street (W)	Memorial Drive (S)	R	0	1	1	inf	🟢 1.4	Y	70.8	F	37.1
1		1-11		Railway Street (E)	T	2	5	3	150.0%	🟢 1.6	Y	72.0	F	37.0
1		1-12		Memorial Drive (N)	L	1	1	0	0.0%	🟢 0.0	Y	51.8	D	37.1
1			All			50	54					49.1	D	77.8
2	Railway Street Harbinger Street	2-1	Harbinger Street (N)	Railway Street (W)	R	0	0	0	inf	🟢 0.0	Y	6.2	A	0.2
2		2-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	5.0	A	0.1
2		2-4	Railway Street (E)	Harbinger Street (N)	R	0	0	0	inf	🟢 0.0	Y	5.0	A	0.1
2		2-5		Railway Street (W)	T	6	1	-5	-83.3%	🟢 2.7	Y	0.3	A	0.0
2		2-11	Railway Street (W)	Railway Street (E)	T	5	9	4	80.0%	🟢 1.5	Y	0.9	A	0.0
2		2-12		Harbinger Street (N)	L	1	0	-1	-100.0%	🟢 1.4	Y	1.2	A	0.0
2			All			12	10					6.2	A	0.2
3	Railway Street High Street	3-1	High Street (N)	Railway Street (W)	R	0	0	0	inf	🟢 0.0	Y	14.1	A	0.8
3		3-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	8.9	A	0.7
3		3-4	Railway Street (E)	High Street (N)	R	0	0	0	inf	🟢 0.0	Y	2.0	A	0.0
3		3-5		Railway Street (W)	T	3	1	-2	-66.7%	🟢 1.4	Y	0.1	A	0.0
3		3-11	Railway Street (W)	Railway Street (E)	T	3	9	6	200.0%	🟢 2.4	Y	1.8	A	0.1
3		3-12		High Street (N)	L	2	0	-2	-100.0%	🟢 2.0	Y	0.4	A	0.1
3			All			8	10					14.1	A	0.8
4	Railway Street Ruddock Street	4-1	Ruddock Street (N)	Railway Street (W)	R	1	0	-1	-100.0%	🟢 1.4	Y	7.6	A	0.1
4		4-2		Ruddock Street (S)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.1
4		4-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	18.1	B	0.2
4		4-5	Railway Street (E)	Railway Street (W)	T	2	1	-1	-50.0%	🟢 0.8	Y	0.0	A	0.0
4		4-6		Ruddock Street (S)	L	0	0	0	inf	🟢 0.0	Y	0.1	A	0.0
4		4-7	Ruddock Street (S)	Railway Street (E)	R	0	0	0	inf	🟢 0.0	Y	7.0	A	0.1
4		4-8		Ruddock Street (N)	T	0	0	0	inf	🟢 0.0	Y	0.0	A	0.1
4		4-9		Railway Street (W)	L	0	0	0	inf	🟢 0.0	Y	9.4	A	0.2
4		4-10	Railway Street (W)	Ruddock Street (S)	R	0	0	0	inf	🟢 0.0	Y	0.3	A	2.1
4		4-11		Railway Street (E)	T	3	9	6	200.0%	🟢 2.4	Y	2.7	A	2.1
4		4-12		Ruddock Street (N)	L	0	0	0	inf	🟢 0.0	Y	0.4	A	1.7
4			All			6	10					18.1	B	2.1
5	Railway Street Duff Parade	5-5	Railway Street (E)	Railway Street (W)	T	2	1	-1	-50.0%	🟢 0.8	Y	2.9	A	0.4
5		5-6		Duff Parade (S)	L	1	0	-1	-100.0%	🟢 1.4	Y	0.4	A	0.4
5		5-7	Duff Parade (S)	Railway Street (E)	R	0	1	1	inf	🟢 1.4	Y	8.0	A	1.2
5		5-9		Railway Street (W)	L	0	0	0	inf	🟢 0.0	Y	8.6	A	1.3
5		5-10	Railway Street (W)	Duff Parade (S)	R	0	2	2	inf	🟢 2.0	Y	1.2	A	0.0
5		5-11		Railway Street (E)	T	3	7	4	133.3%	🟢 1.8	Y	0.4	A	0.0
5			All			6	11					8.6	A	1.3
6	Railway Street Park Road	6-1	Park Road (N)	Railway Street (W)	R	0	0	0	inf	🟢 0.0	Y	2.7	A	0.1
6		6-3		Railway Street (E)	L	0	0	0	inf	🟢 0.0	Y	1.8	A	0.1
6		6-4	Railway Street (E)	Park Road (N)	R	0	0	0	inf	🟢 0.0	Y	2.2	A	0.1
6		6-5		Railway Street (W)	T	3	1	-2	-66.7%	🟢 1.4	Y	0.1	A	0.0
6		6-11	Railway Street (W)	Railway Street (E)	T	3	6	3	100.0%	🟢 1.4	Y	0.5	A	0.0
6		6-12		Park Road (N)	L	0	2	2	inf	🟢 2.0	Y	0.4	A	0.0
6			All			6	9					2.7	A	0.1
7	Pioneer Road Railway Street	7-1	Pioneer Road (N)	Railway Street (W)	R	2	1	-1	-50.0%	🟢 0.8	Y	16.8	B	3.8
7		7-2		Pioneer Road (S)	T	4	3	-1	-25.0%	🟢 0.5	Y	8.0	A	4.1
7		7-8	Pioneer Road (S)	Pioneer Road (N)	T	3	4	1	33.3%	🟢 0.5	Y	8.6	A	5.8
7		7-9		Railway Street (W)	L	1	0	-1	-100.0%	🟢 1.4	Y	3.3	A	5.5
7		7-10	Railway Street (W)	Pioneer Road (S)	R	2	5	3	150.0%	🟢 1.6	Y	25.8	B	6.8
7		7-12		Pioneer Road (N)	L	1	1	0	0.0%	🟢 0.0	Y	22.6	B	2.5
7			All			13	14					16.2	B	6.8
8	Memorial Drive Rothery Street	8-1	Memorial Drive (N)	Rothery Street (W)	R	0	0	0	inf	🟢 0.0	Y	60.2	E	5.9
8		8-2		Memorial Drive (S)	T	15	15	0	0.0%	🟢 0.0	Y	23.4	B	22.6
8		8-3		Rothery Street (E)	L	0	0	0	inf	🟢 0.0	Y	5.0	A	0.0
8		8-4	Rothery Street (E)	Memorial Drive (N)	R	1	0	-1	-100.0%	🟢 1.4	Y	171.0	F	63.7
8		8-5		Rothery Street (W)	T	3	5	2	66.7%	🟢 1.0	Y	160.1	F	63.7
8		8-6		Memorial Drive (S)	L	0	0	0	inf	🟢 0.0	Y	170.1	F	63.7
8		8-7	Memorial Drive (S)	Rothery Street (E)	R	1	3	2	200.0%	🟢 1.4	Y	98.2	F	18.6
8		8-8		Memorial Drive (N)	T	16	16	0	0.0%	🟢 0.0	Y	19.1	B	49.7
8		8-9		Rothery Street (W)	L	4	4	0	0.0%	🟢 0.0	Y	4.6	A	0.0
8		8-10	Rothery Street (W)	Memorial Drive (S)	R	4	4	0	0.0%	🟢 0.0	Y	165.4	F	76.2
8		8-11		Rothery Street (E)	T	3	6	3	100.0%	🟢 1.4	Y	139.4	F	76.2
8		8-12		Memorial Drive (N)	L	0	0	0	inf	🟢 0.0	Y	67.1	E	76.2
8			All			47	53					61.6	E	76.2
9	Memorial Drive Towradgi Road	9-1	Memorial Drive (N)	Towradgi Road (W)	R	0	0	0	inf	🟢 0.0	Y	89.4	F	12.3
9		9-2		Memorial Drive (S)	T	19	18	-1	-5.3%	🟢 0.2	Y	66.5	E	229.2
9		9-3		Towradgi Road (E)	L	2	1	-1	-50.0%	🟢 0.8	Y	13.1	A	0.0
9		9-4	Towradgi Road (E)	Memorial Drive (N)	R	1	1	0	0.0%	🟢 0.0	Y	93.9	F	45.5
9		9-5		Towradgi Road (W)	T	0	0	0	inf	🟢 0.0	Y	65.0	E	30.6
9		9-6		Memorial Drive (S)	L	6	6	0	0.0%	🟢 0.0	Y	36.3	C	30.6
9		9-7	Memorial Drive (S)	Towradgi Road (E)	R	3	4	1	33.3%	🟢 0.5	Y	103.9	F	375.6
9		9-8		Memorial Drive (N)	T	20	25	5	25.0%	🟢 1.1	Y	44.2	D	390.7
9		9-9		Towradgi Road (W)	L	9	7	-2	-22.2%	🟢 0.7	Y	5.0	A	1.3
9		9-10	Towradgi Road (W)	Memorial Drive (S)	R	1	0	-1	-100.0%	🟢 1.4	Y	77.0	F	13.2
9		9-11		Towradgi Road (E)	T	1	2	1	100.0%	🟢 0.8	Y	94.9	F	13.2
9		9-12		Memorial Drive (N)	L	1	2	1	100.0%	🟢 0.8	Y	91.5	F	13.2
9			All			63	66					52.3	D	390.7

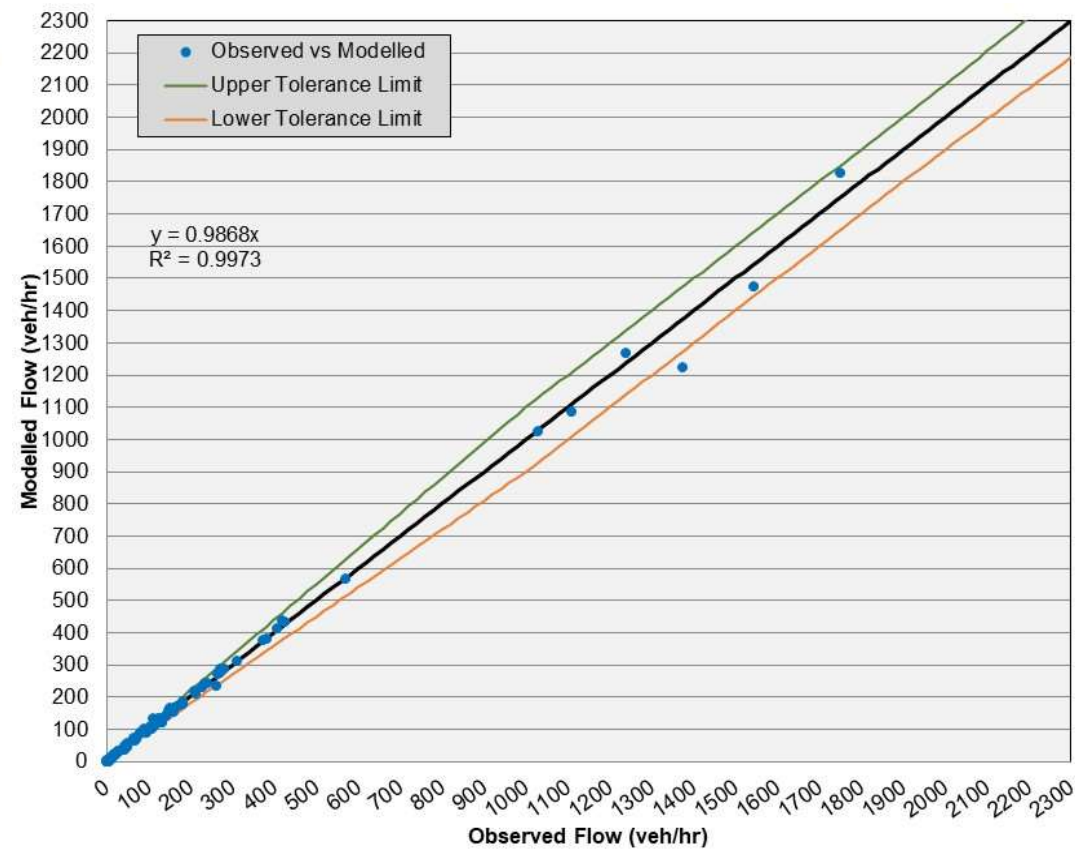
P6319 Corrimal Coke Works Base Model Report

Base AM Model Calibration (Network-wide) - Traffic Flow Comparison Plots - Light + Heavy Vehicles

AM Peak 0700-0800

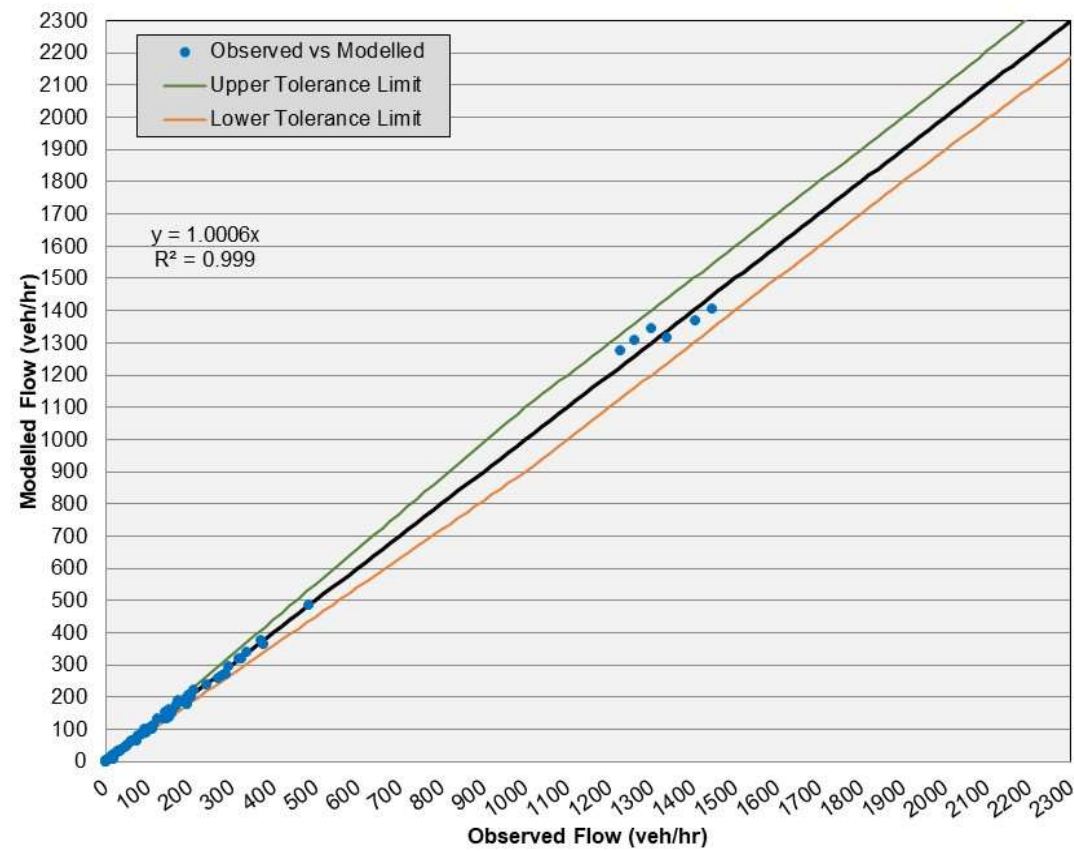


AM Peak 0800-0900

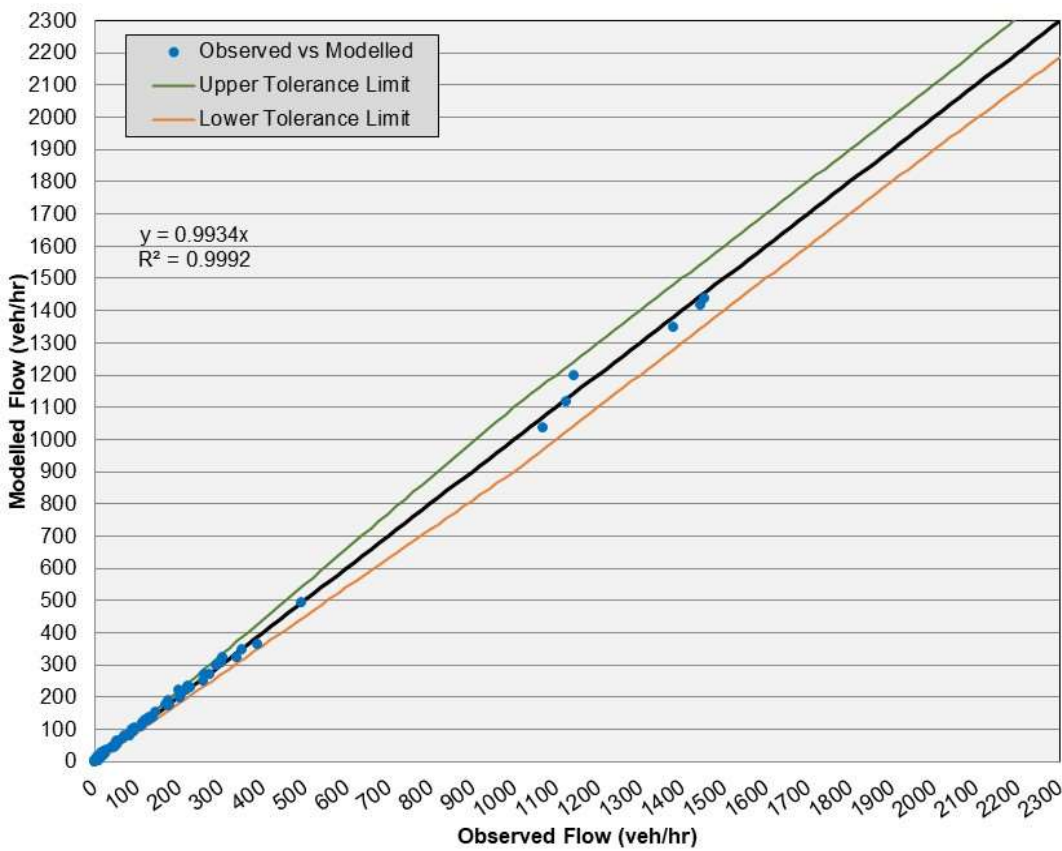


P6319 Corrimal Coke Works Base Model Report
Base PM Model Calibration (Network-wide) - Traffic Flow Comparison Plots - Light + Heavy Vehicles

PM Peak 1600-1700



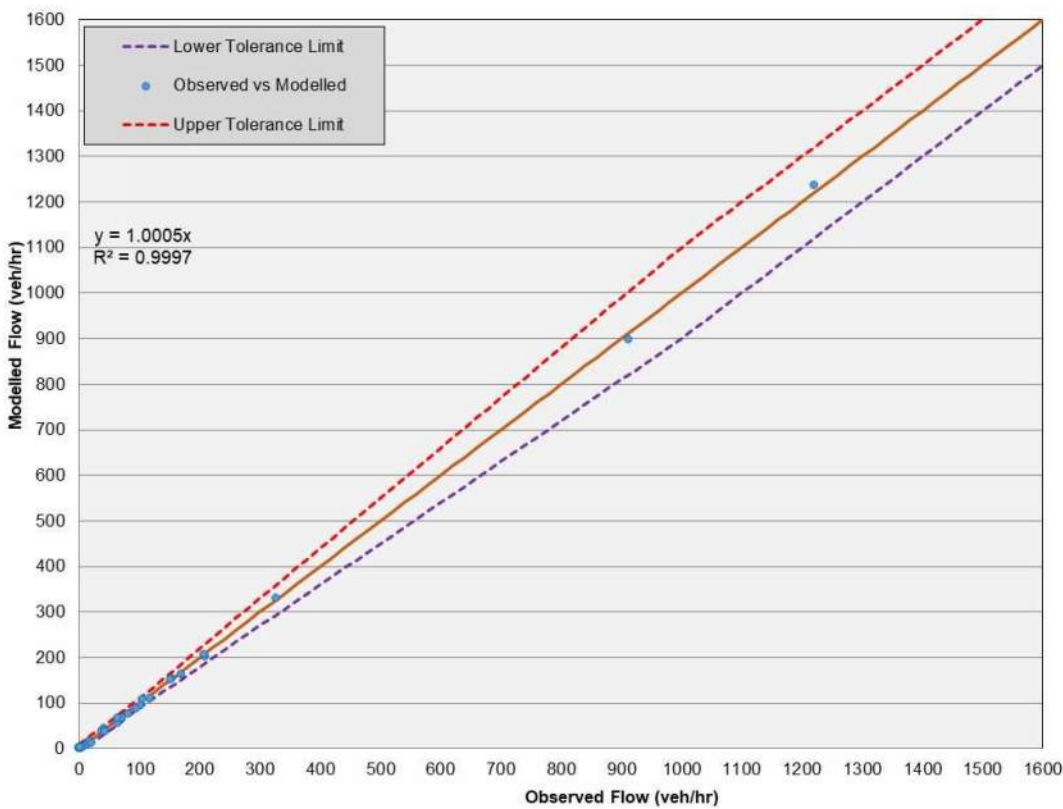
PM Peak 1700-1800



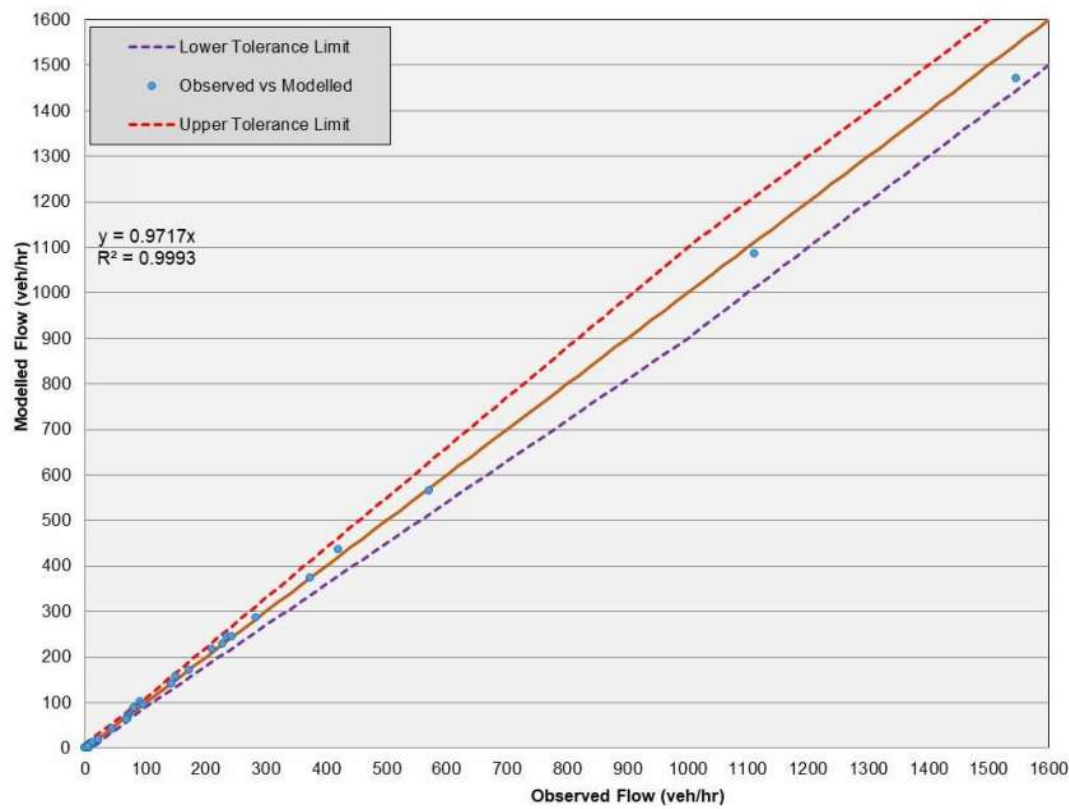
P6319 Corrimal Coke Works Base Model Report

Base AM Model Calibration (Core Area) - Traffic Flow Comparison Plots - Light + Heavy Vehicles

AM Peak 0700-0800



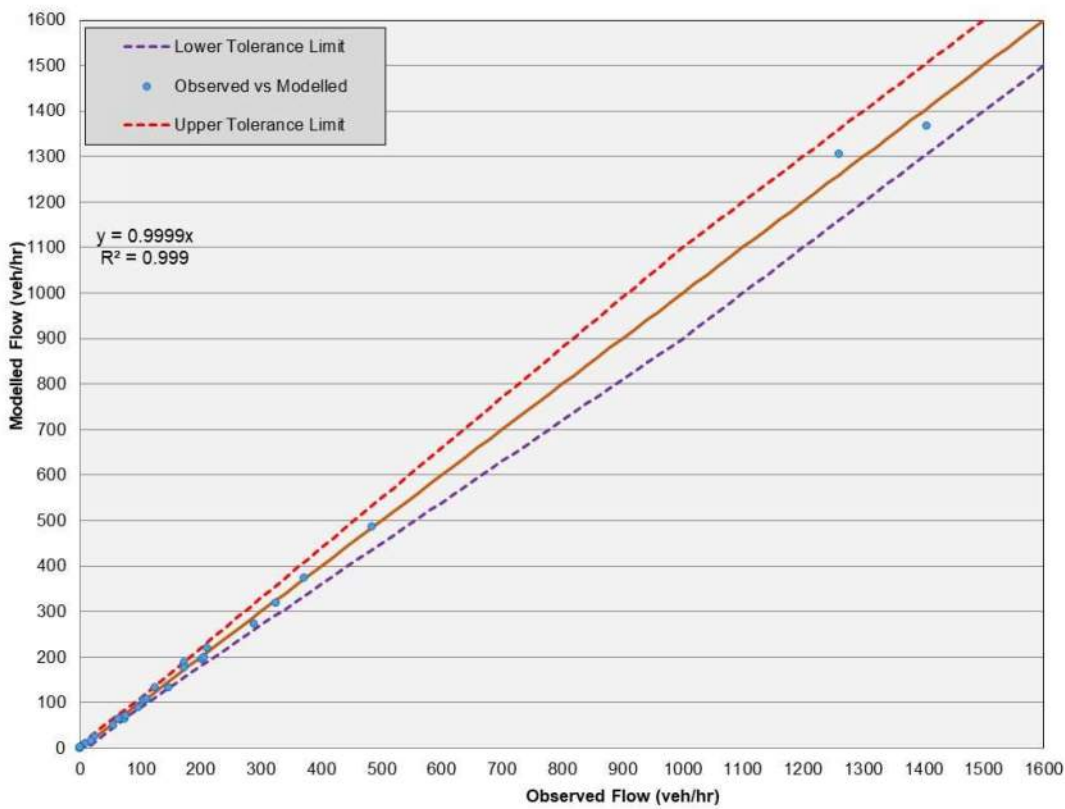
AM Peak 0800-0900



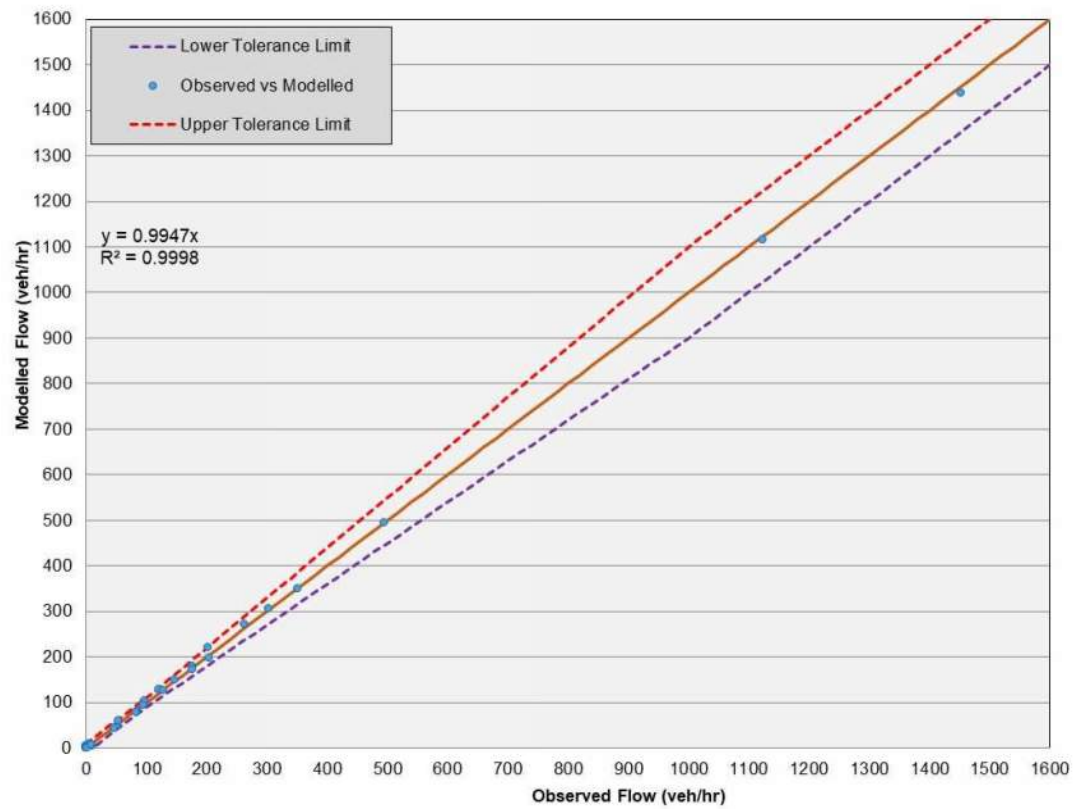
P6319 Corrimal Coke Works Base Model Report

Base PM Model Calibration (Core Area) - Traffic Flow Comparison Plots - Light + Heavy Vehicles

PM Peak 1600-1700



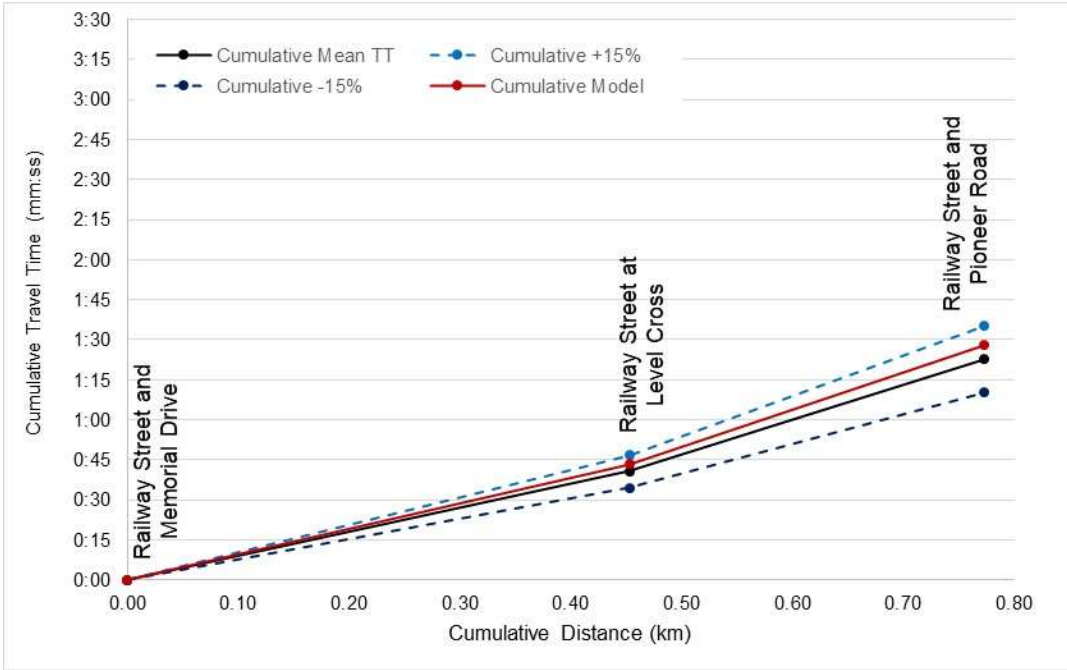
PM Peak 1700-1800



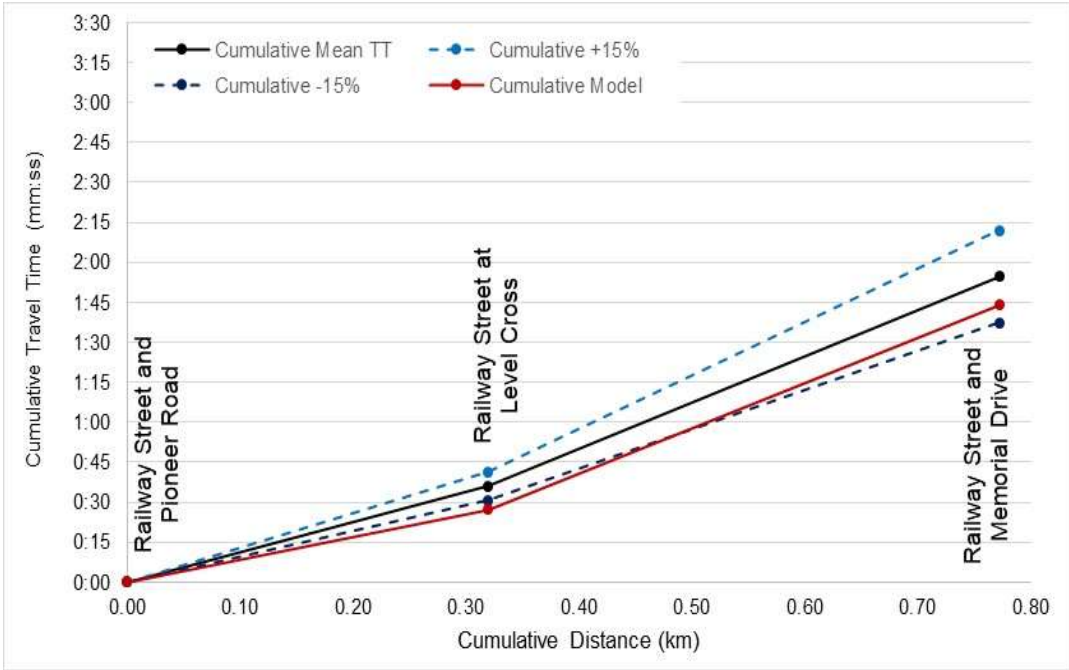
Appendix D: Travel Time Validation

P6319 Corrimal Works Base Model Report
Base AM Model Travel Time Validation
Route 1: Railway Street between Memorial Drive to Pioneer Road

AM Peak 0700-0800 – Route 1 EB

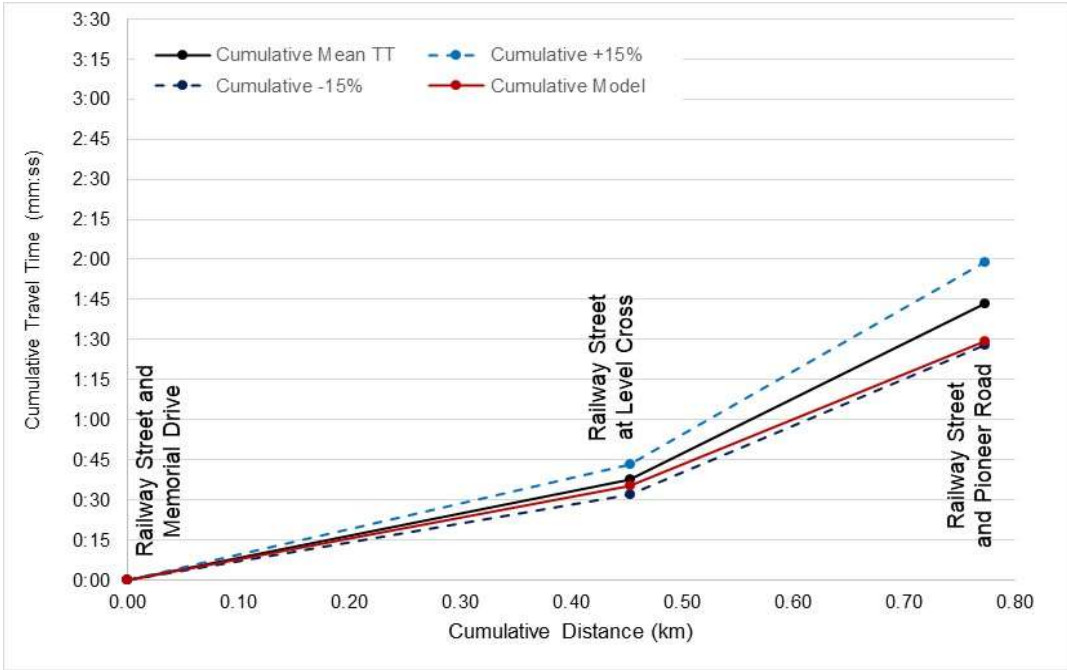


AM Peak 0700-0800 – Route 1 WB

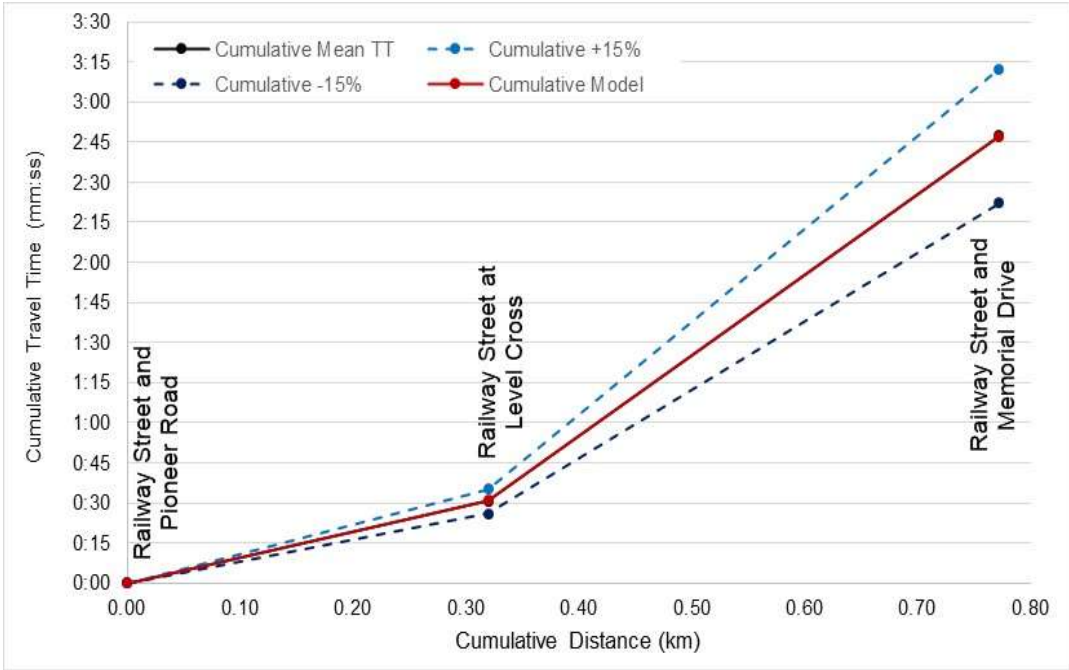


P6319 Corrimal Works Base Model Report
Base AM Model Travel Time Validation
Route 1: Railway Street between Memorial Drive to Pioneer Road

AM Peak 0800-0900 – Route 1 EB

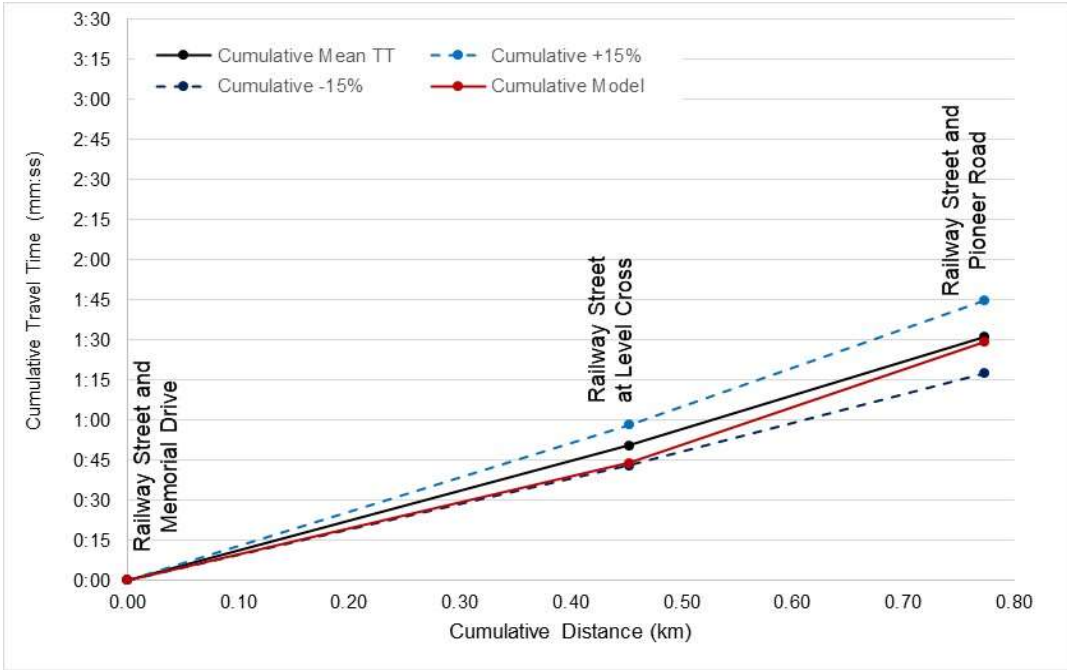


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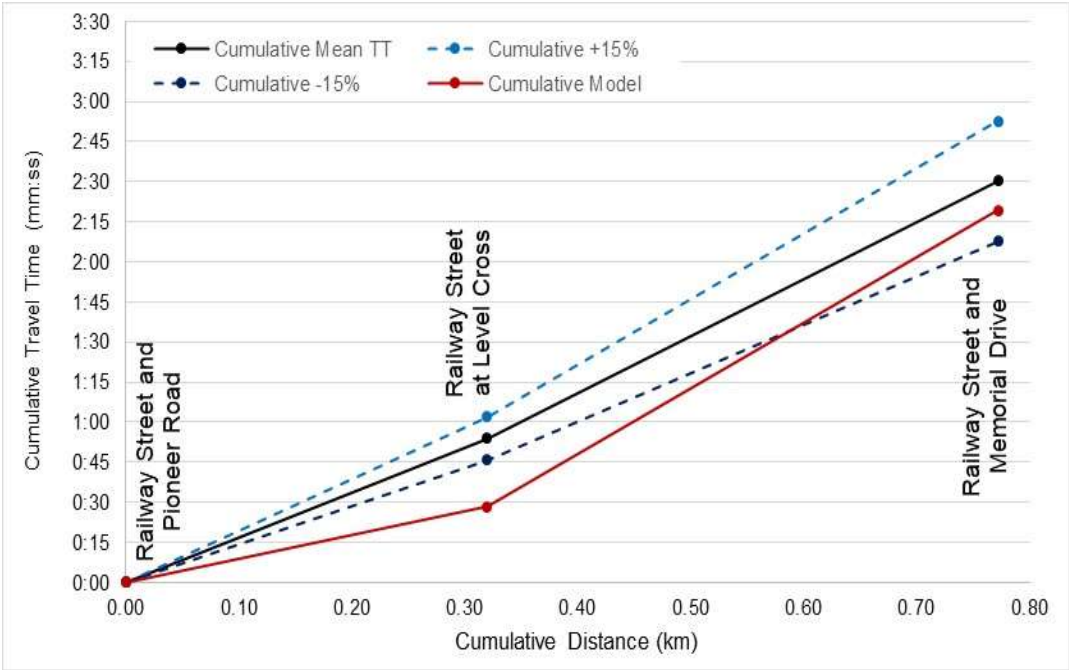


P6319 Corrimal Works Base Model Report
Base PM Model Travel Time Validation
Route 1: Railway Street between Memorial Drive to Pioneer Road

PM Peak 1600-1700 – Route 1 EB

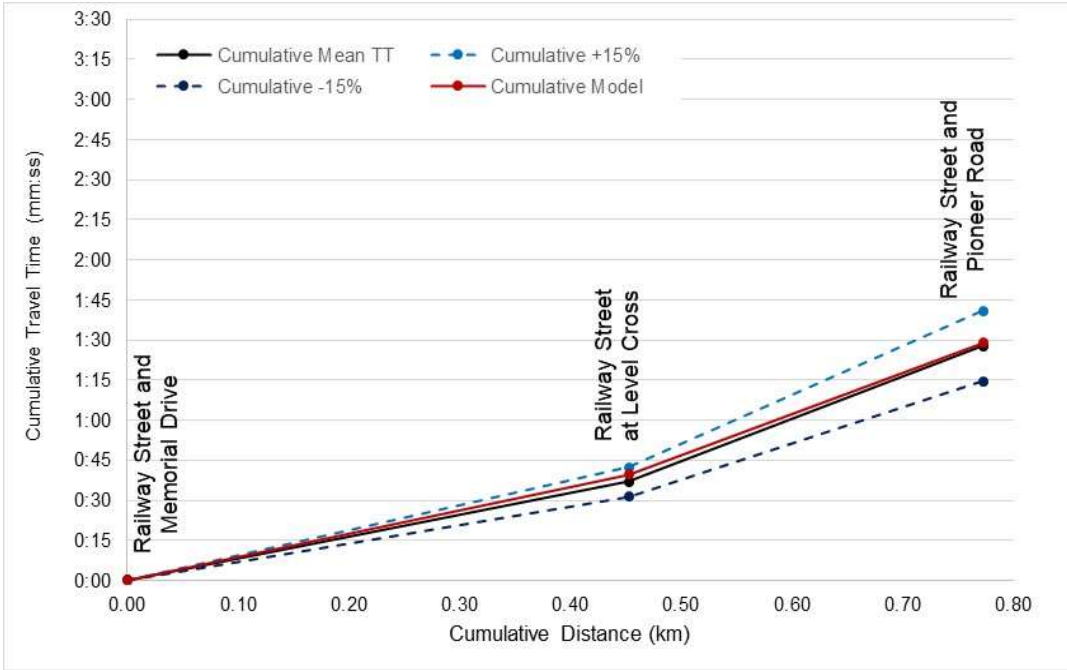


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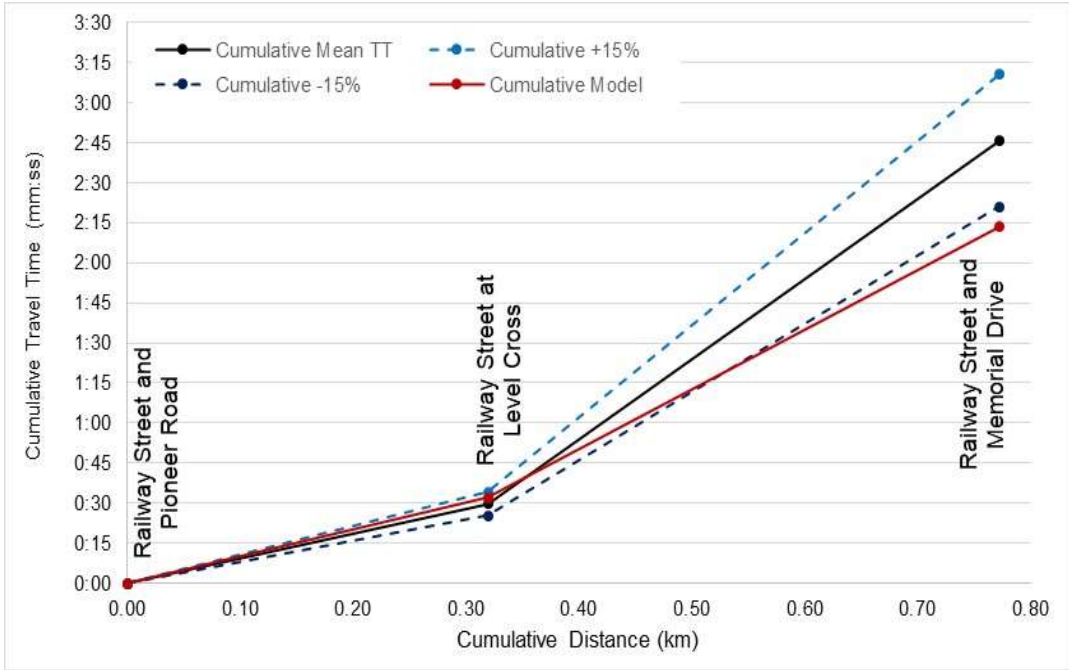


P6319 Corrimal Works Base Model Report
Base PM Model Travel Time Validation
Route 1: Railway Street between Memorial Drive to Pioneer Road

PM Peak 1700-1800 – Route 1 EB

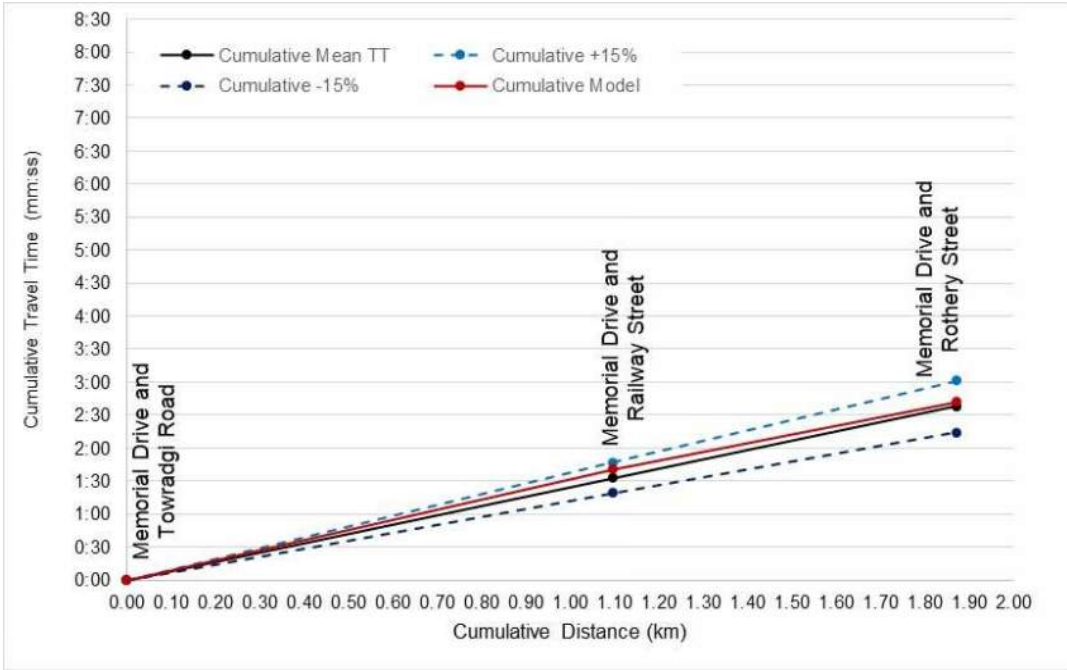


PM Peak 1700-1800 – Route 1 WB

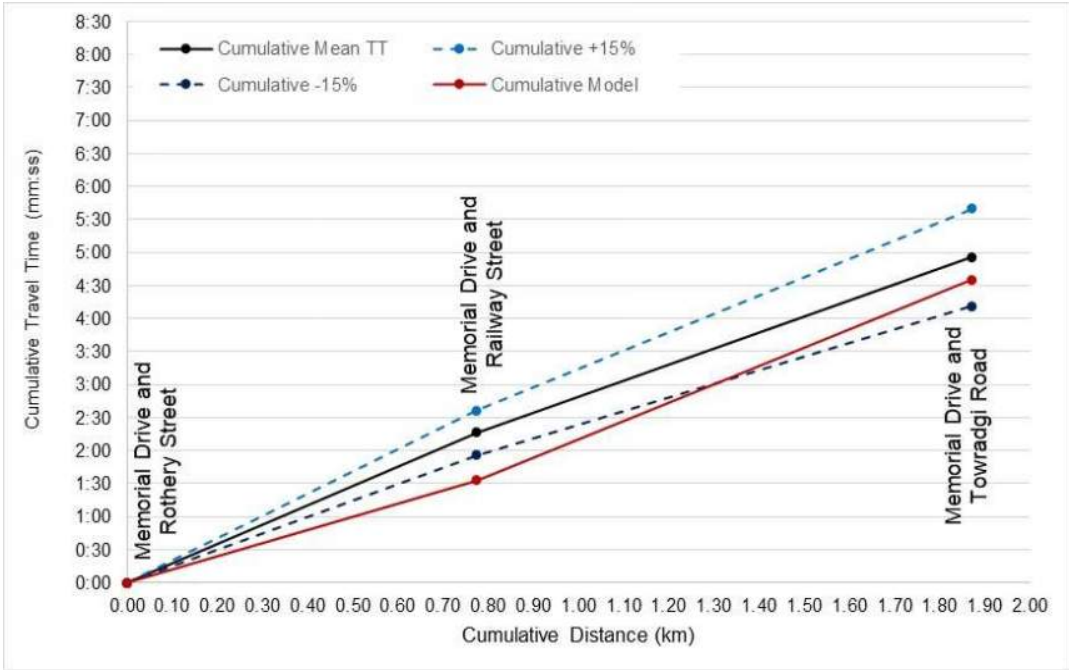


P6319 Corrimal Works Base Model Report
Base AM Model Travel Time Validation
Route 2: Memorial Drive between Towradgi Road and Railway Street

AM Peak 0700-0800 – Route 2 NB

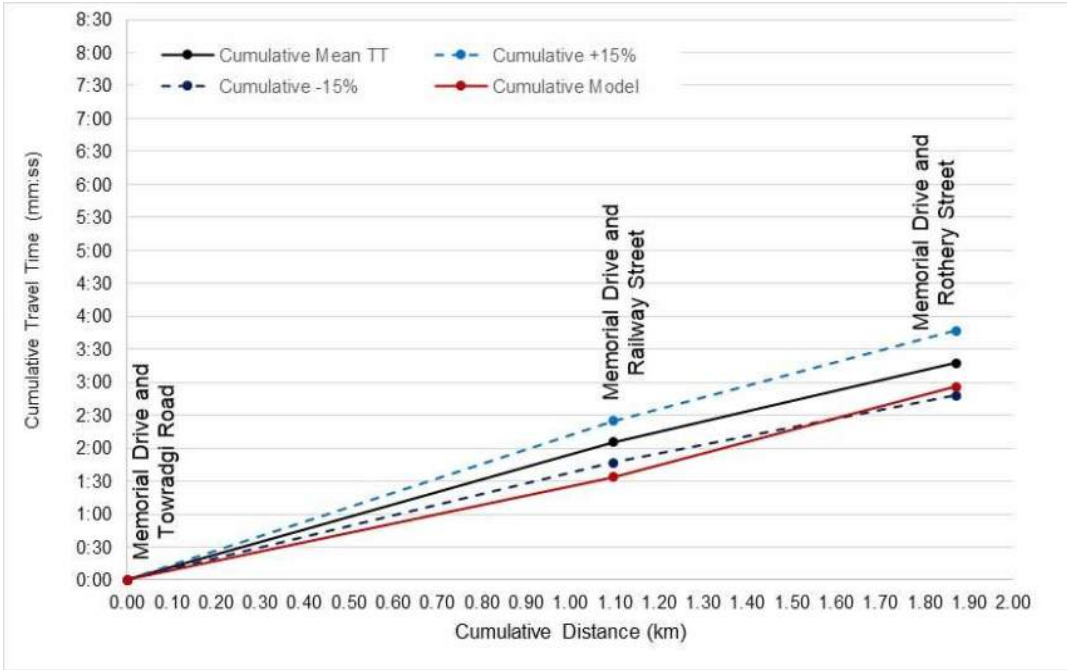


AM Peak 0700-0800 – Route 2 SB

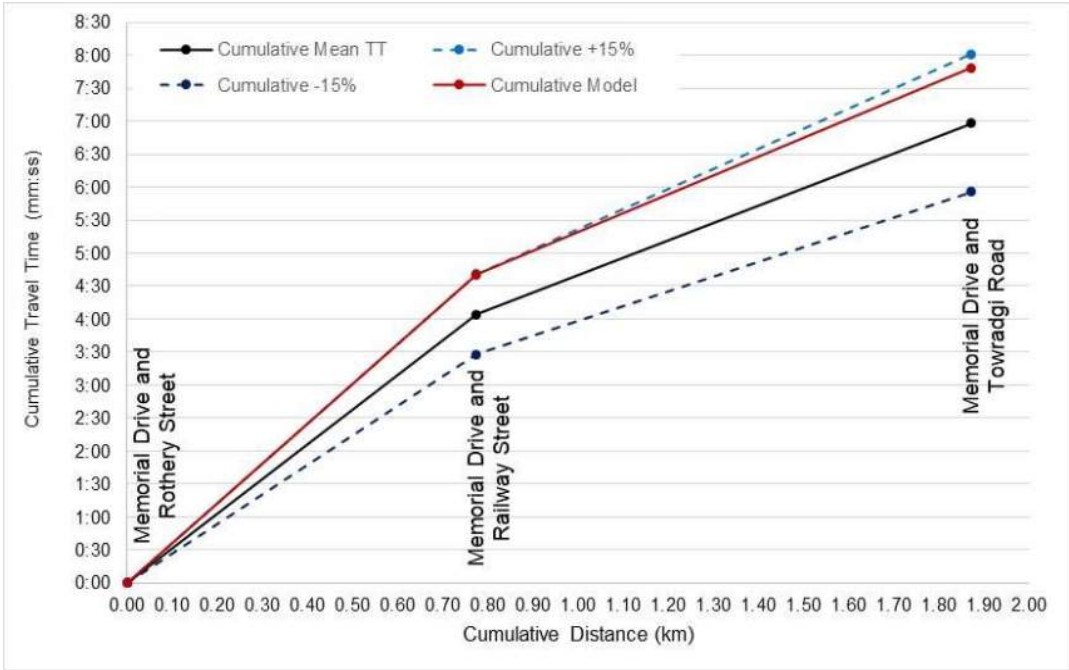


P6319 Corrimal Works Base Model Report
Base AM Model Travel Time Validation
Route 2: Memorial Drive between Towradgi Road and Railway Street

AM Peak 0800-0900 – Route 2 NB

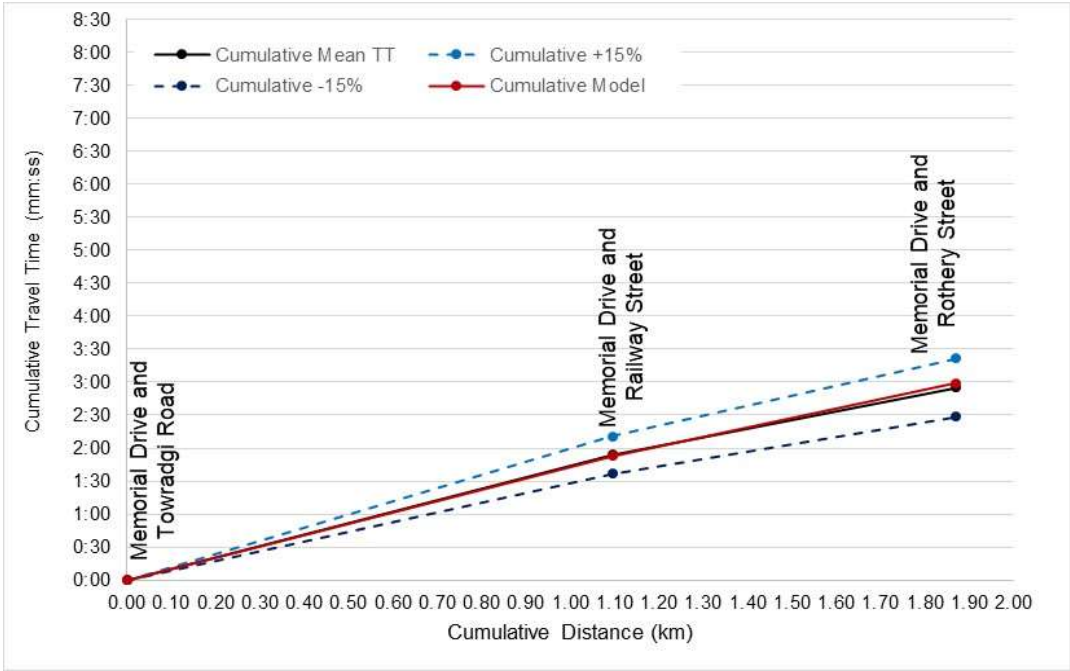


AM Peak 0800-0900 – Route 2 SB

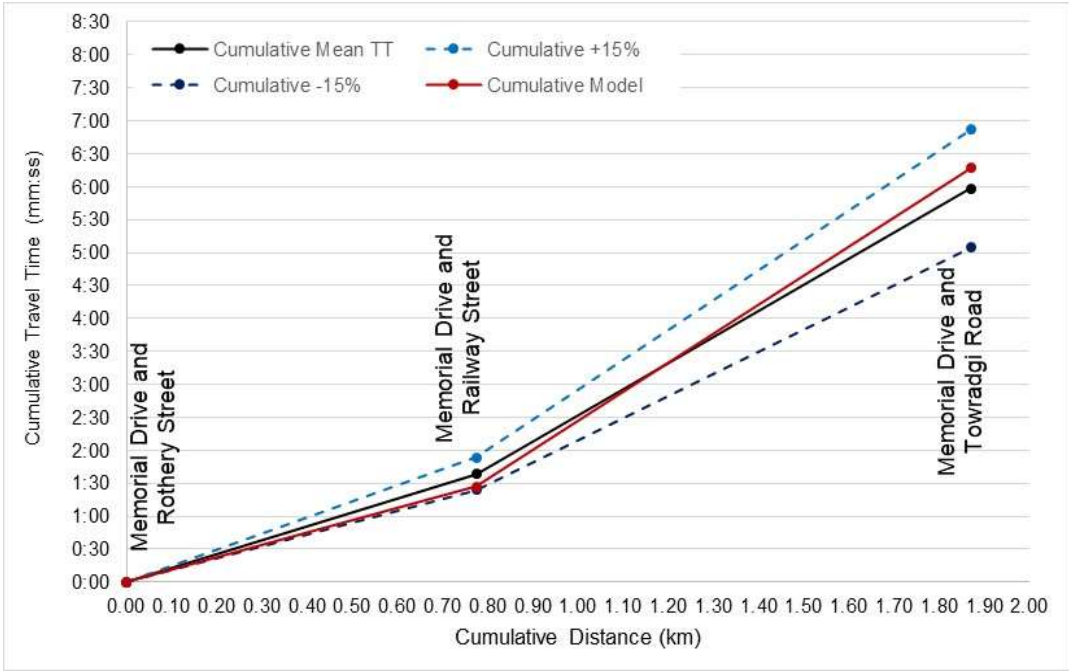


P6319 Corrimal Works Base Model Report
Base PM Model Travel Time Validation
Route 2: Memorial Drive between Towradgi Road and Railway Street

PM Peak 1600-1700 – Route 2 NB

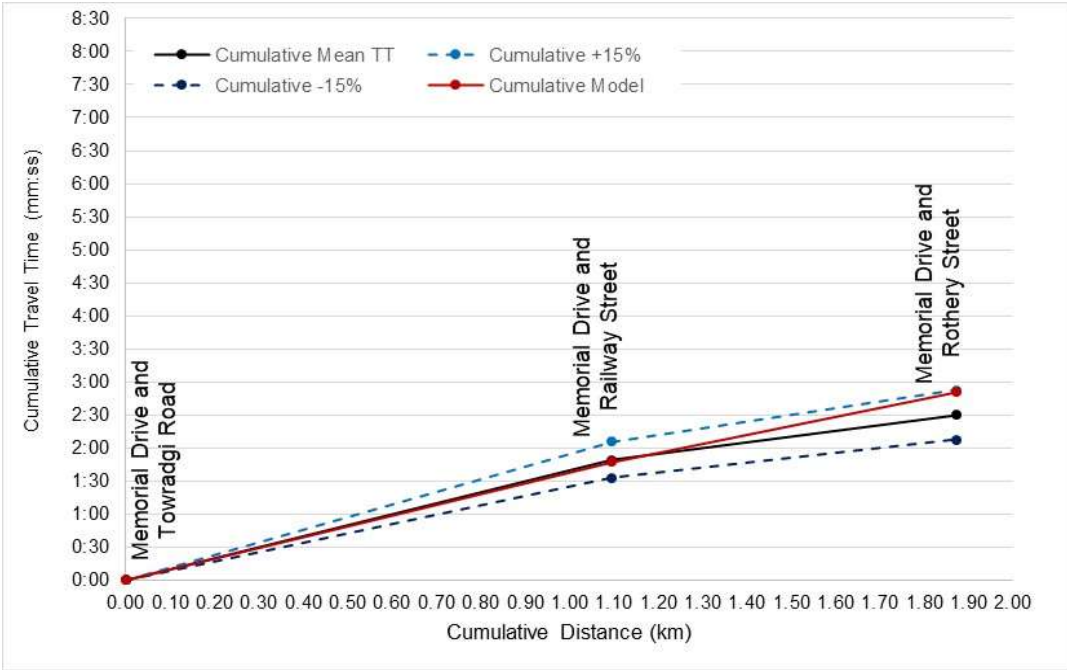


PM Peak 1600-1700 – Route 2 SB

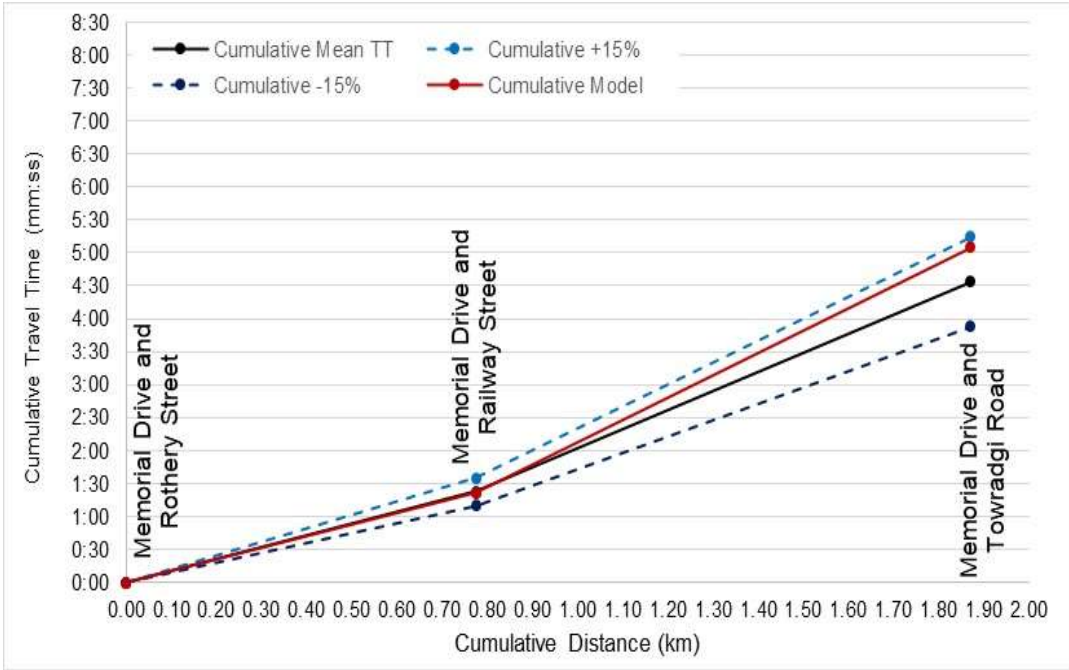


P6319 Corrimal Works Base Model Report
Base PM Model Travel Time Validation
Route 2: Memorial Drive between Towradgi Road and Railway Street

PM Peak 1700-1800 – Route 2 NB



PM Peak 1700-1800 – Route 2 SB



Appendix E: Signal Time Validation

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Signal Time Validation

2023 Base AM Peak 0700-0900

Intersection (TCS)	0700-0800						0800-0900					
	Cycle / Phase	SCATS History Data (s)			VISSIM (s)	Within 10%?	Cycle / Phase	SCATS History Data (s)			VISSIM (s)	Within 10%?
		Avg.	-10%	+10%				Avg.	-10%	+10%		
Pioneer Road / Railway Street (1595)	CT*	49	44	54	50	✓	CT*	70	63	77	70	✓
	A	32	29	35	33	✓	A	42	38	46	42	✓
	B	17	15	19	17	✓	B	28	25	31	28	✓
Memorial Drive / Towradgi Road (2316)	Insufficient data											
Memorial Drive / Railway Street (2317)	CT*	112	101	123	120	✓	CT*	172	155	189	160	✓
	A	44	40	48	47	✓	A	76	68	84	69	✓
	D	24	22	26	26	✓	D	37	33	41	35	✓
	E	25	23	28	27	✓	E	38	34	42	36	✓
	F	19	17	21	20	✓	F	21	19	23	20	✓
Memorial Drive / Rothery Street (2318)	CT*	151	136	166	150	✓	CT*	158	142	174	160	✓
	A	92	83	101	91	✓	A	88	79	97	86	✓
	D	19	17	21	19	✓	D	23	21	25	25	✓
	E	24	22	26	24	✓	E	27	24	30	29	✓
	F	16	14	18	16	✓	F	20	18	22	20	✓

P6319 Corrimal Coke Works Updated Planning Proposal TIA

Signal Time Validation

2023 Base PM Peak 1600-1800

Intersection (TCS)	1600-1700						1700-1800					
	Cycle / Phase	SCATS History Data (s)			VISSIM (s)	Within 10%?	Cycle / Phase	SCATS History Data (s)			VISSIM (s)	Within 10%?
		Avg.	-10%	+10%				Avg.	-10%	+10%		
Pioneer Road / Railway Street (1595)	CT*	53	48	58	50	✓	CT*	49	44	54	50	✓
	A	35	32	39	33	✓	A	32	29	35	33	✓
	B	18	16	20	17	✓	B	17	15	19	17	✓
Memorial Drive / Towradgi Road (2316)	CT*	157	141	173	160	✓	CT*	147	132	162	160	✓
	A	69	62	76	69	✓	A	66	59	73	71	✓
	D	26	23	29	27	✓	D	21	19	23	23	✓
	E	32	29	35	33	✓	E	30	27	33	33	✓
	G	30	27	33	31	✓	G	30	27	33	33	✓
Memorial Drive / Railway Street (2317)	CT*	159	143	175	160	✓	CT*	157	141	173	160	✓
	A	73	66	80	74	✓	A	75	68	83	78	✓
	D	30	27	33	30	✓	D	28	25	31	28	✓
	E	35	32	39	35	✓	E	34	31	37	34	✓
	F	21	19	23	21	✓	F	20	18	22	20	✓
Memorial Drive / Rothery Street (2318)	CT*	162	146	178	160	✓	CT*	160	144	176	160	✓
	A	87	78	96	85	✓	A	91	82	100	91	✓
	D	25	23	28	25	✓	D	22	20	24	22	✓
	E	29	26	32	29	✓	E	27	24	30	27	✓
	F	21	19	23	21	✓	F	20	18	22	20	✓

Appendix E: Modelling Summary Report





Corrimal Coke Works Stage 2A SSDA

850 Dwelling Traffic Assessment

Legacy Property

31 October 2025

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1. INTRODUCTION

1.1 Background

In 2018, Bitzios Consulting was engaged by Legacy Property to prepare a traffic and transport impact assessment (TIA) for the Planning Proposal of a residential development on the former Corrimall Coke Works site at 27 Railway Street, Corrimall.

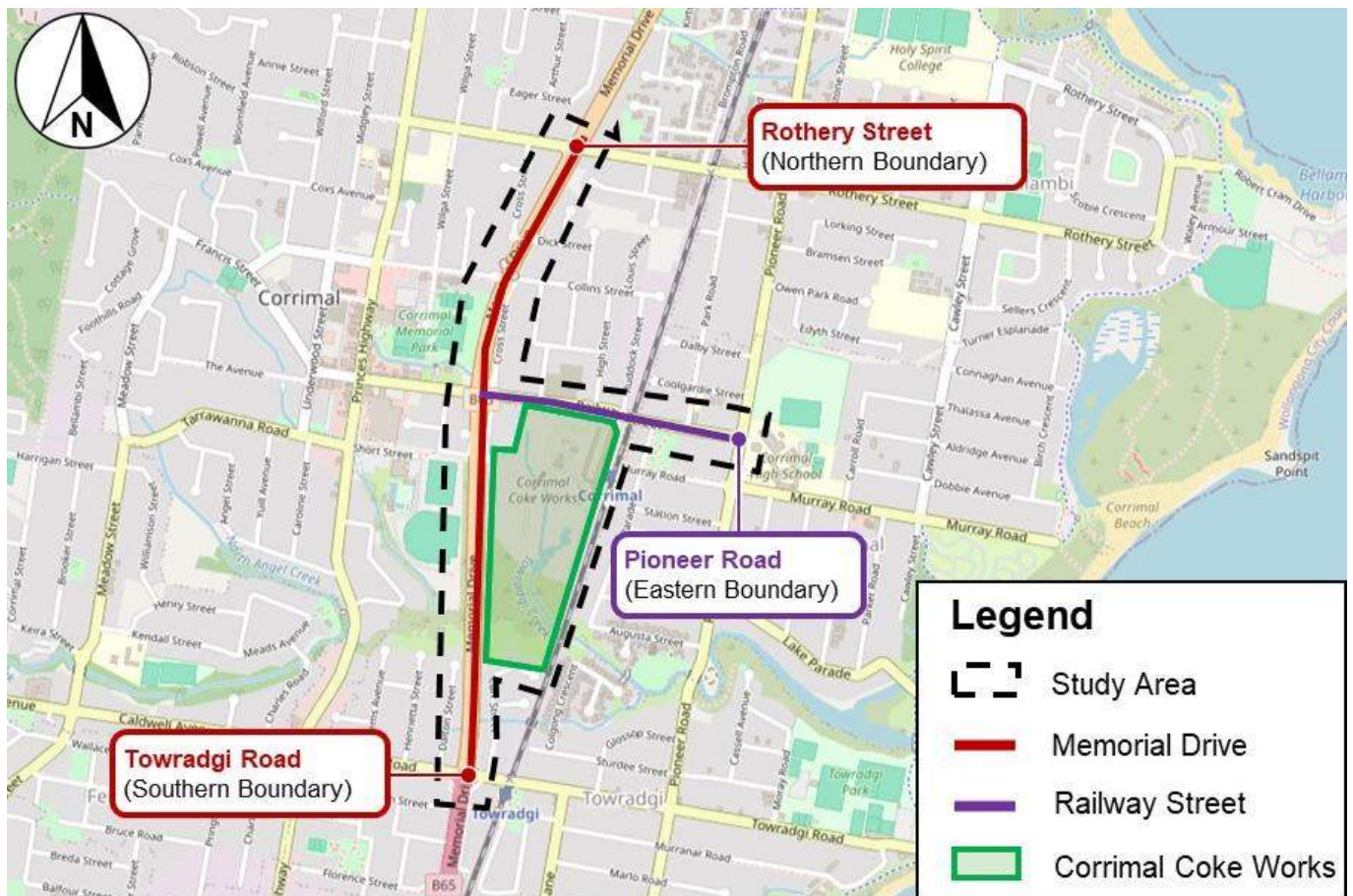
At its meeting of 1 November 2021, Wollongong City Council resolved to finalise the Planning Proposal on the basis of a maximum of 550 dwellings. Amendment of 50 of the Local Environment Plan (LEP) for the Corrimall Coke Works Site was then published by the NSW Department of Planning and Environment on 29 April 2022 and the site was rezoned. The eastern part of the site is now zoned R3 Medium Density Development to permit urban development and the western part is now RE1 Public Recreation.

Legacy Property is now planning for the Corrimall Coke Works Site to increase its residential yield to 850 dwellings.

Bitzios Consulting was commissioned by Legacy Property to undertake a traffic and transport impact assessment (TIA) of the new proposal (the development).

1.2 Study Area

The study area is focussed on the Railway Street and Memorial Drive corridors near the Corrimall Coke Works site, as previously agreed with TfNSW and shown in Figure 1.1.



Adapted from OpenStreetMap

Figure 1.1: Study Area

1.3 Scope of the Assessment

The scope of this assessment included:

- Understanding existing conditions via the collation of traffic survey data and the undertaking of a site inspection
- Recommendations on issues (if any) with the development plans based on the site inspection findings
- Consideration of alternative transport connections to the proposed development
- Assessment of the impacts of the proposed 850 dwellings on the surrounding road network, including the preferred location and form of the site access intersection onto Railway Street
- Determining required upgrades to surrounding intersections to account for the impacts of the 850 dwellings.

1.4 Key Stakeholders

Key stakeholders engaged for the development of this TIA include:

- Transport for NSW (TfNSW)
- Wollongong City Council (Council).

1.5 Report Contents

The structure of this report is as follows:

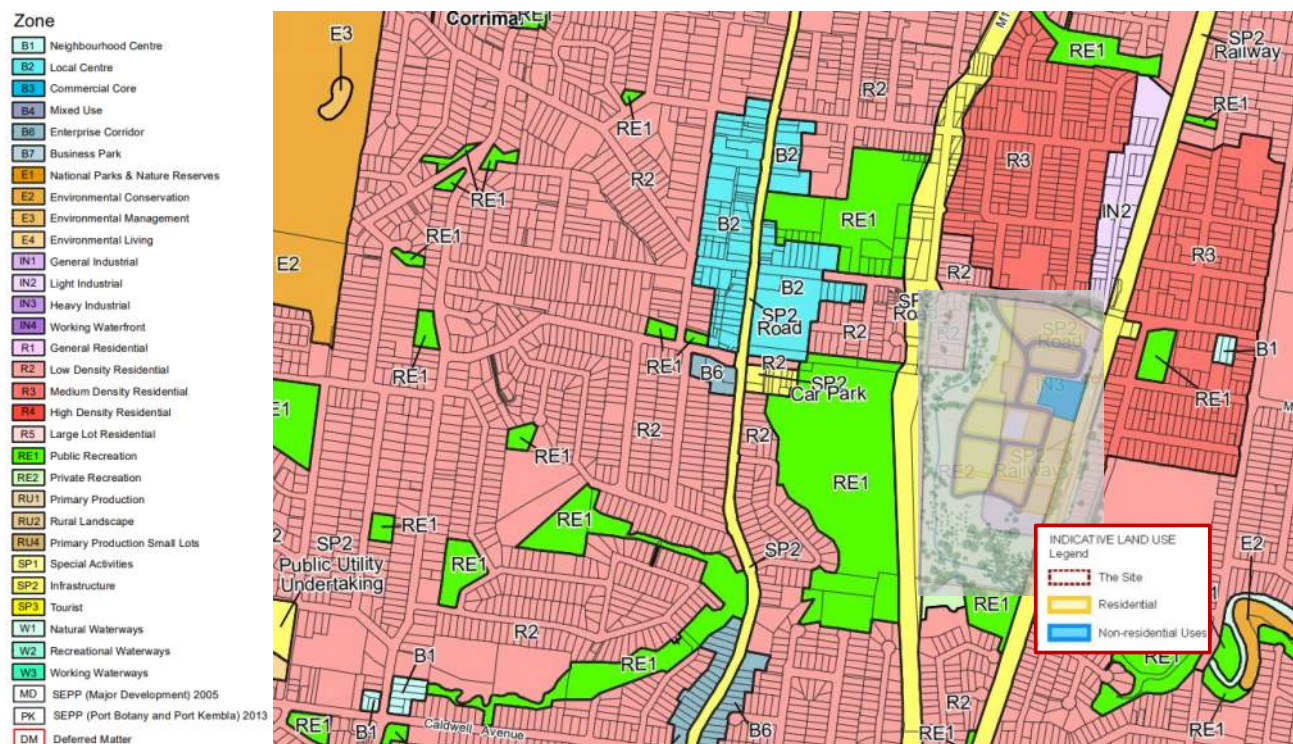
- **Section 1, Introduction:** Details the development proposal, describes the project scope used and identifies the key stakeholders involved in the study
- **Section 2, Existing Conditions:** Details the existing land uses, and transport infrastructure and services within the study area
- **Section 3, Crash Data Analysis:** Assesses the crash data for Railway Street between Memorial Drive and Pioneer Road, including the level crossing area
- **Section 4, Development Access Assessment:** Identifies the proposed access location and form, sight lines, construction period access considerations and alternative access locations. This section also includes conceptual layouts of the accesses and the outcomes of supplementary SIDRA modelling of the proposed new roundabout at the access
- **Section 5, Traffic Capacity Assessments – VISSIM:** Identifies the site traffic generation, assessment years and time periods, and describes the development and application of the VISSIM models.
- **Section 6, Mitigation Works Assessment – VISSIM:** Discusses the mitigation works developed in VISSIM to accommodate additional traffic due to the proposed development
- **Section 7, Traffic Capacity Assessments – SIDRA:** This section outlines the supplementary SIDRA modelling of the proposed upgrade configuration of the Memorial Drive / Railway Street intersection, and proposed new roundabout for Railway Street / Harbinger Street
- **Section 8, Conclusions:** Summarises the development's impacts and needs.

Note: This report was originally prepared for the 550 dwelling approval in 2023 and retains much of its earlier base conditions traffic and transport conditions assessment. The traffic modelling and traffic impact assessment chapters have however been updated to reflect the more recent 850 dwelling proposal.

2. EXISTING CONDITIONS

2.1 Existing Site and Surrounding Land Use

The subject site is currently zoned IN3 Heavy Industrial, SP2 Roads and RE2 Private Recreation under the Wollongong Local Environmental Plan 2009. Surrounding land uses predominantly consist of residential, business and recreation as shown in Figure 2.1.



Source: Wollongong Local Environmental Plan 2009 Land Zoning Map No. 24
Wollongong City Wide Development Control Plan 2009 – Chapter D19 Former Corrima Coke Works Site, Version: 9 (09/08/2022)

Figure 2.1: Development Site and Surrounding Land Uses

2.2 Road Hierarchy

Details of the key existing roads within the surrounding network are summarised in Table 2.1.

Table 2.1: Surrounding Road Network

Road Name	No. Lanes	Road Hierarchy	Posted Speed
Memorial Drive	6	State	80km/h
Rothery Street	4	Local	50km/h
Railway Street	4	Local	50km/h
Towradgi Road	4	Local / Regional	50km/h
Pioneer Road	4	Local	60km/h

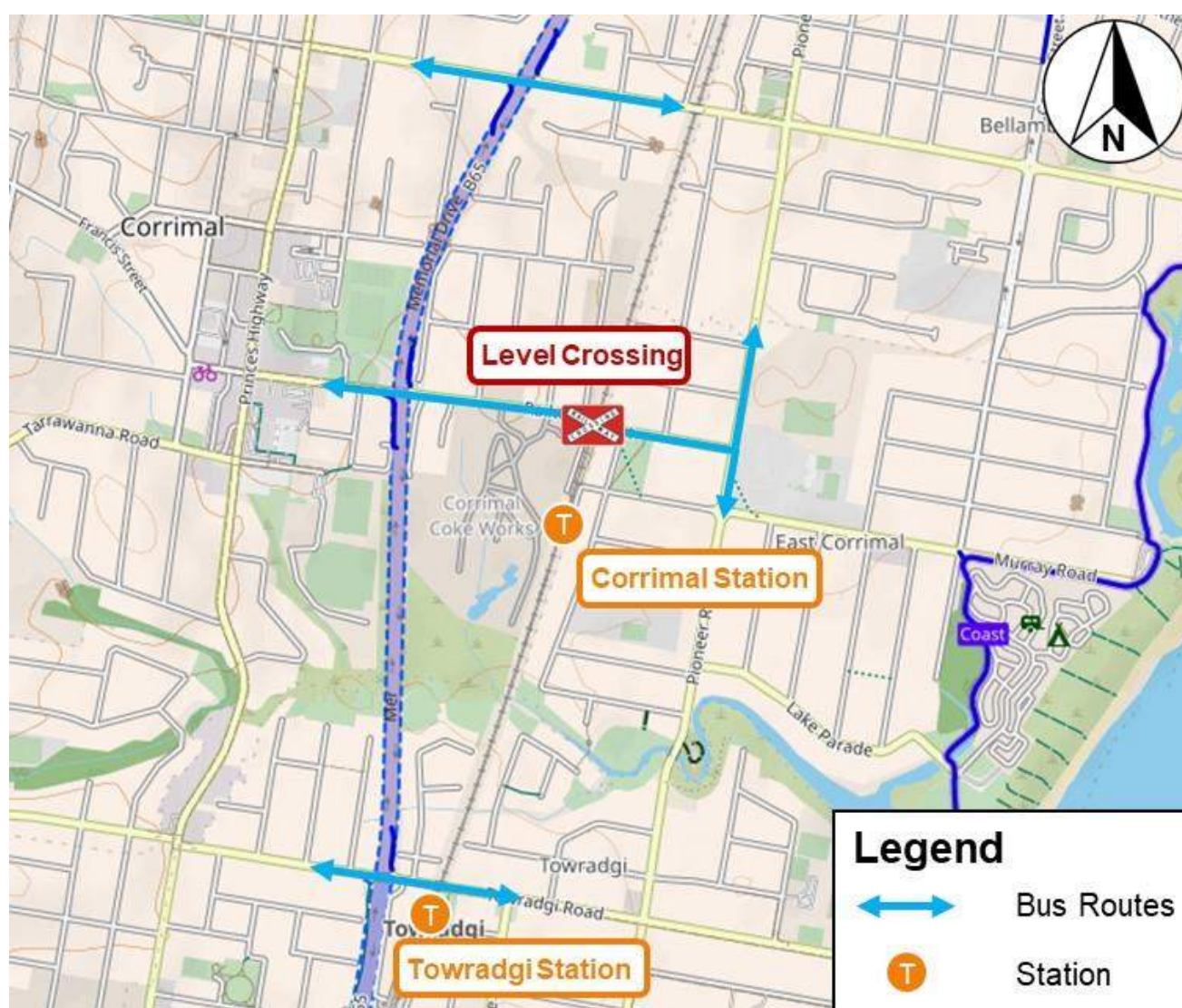
2.3 Public Transport

The road network carries several bus routes along Rothery Street, Railway Street, Pioneer Road and Towradgi Road, summarised in Table 2.2 and shown in Figure 2.2.

Table 2.2: Bus Routes in the Modelled Network

Route Number	Description
Route 3	Wollongong to Bellambi via Towradgi
Route 7	Wollongong to Bellambi
Route 8	Wollongong to Bellambi via Balgownie
Route 92	Bulli to Wollongong
Route 93	Bulli to University of Wollongong
Route 14SC	Dapto, then all stations to Thirroul and return

There are also 2 train stations near the study area: Corrimal Station and Towradgi Station. A rail level crossing with boom gates, pedestrian gates and flashing lights is located on Railway Street for the Illawarra Railway Line which carries both passenger trains (all stop and express services) and freight trains.



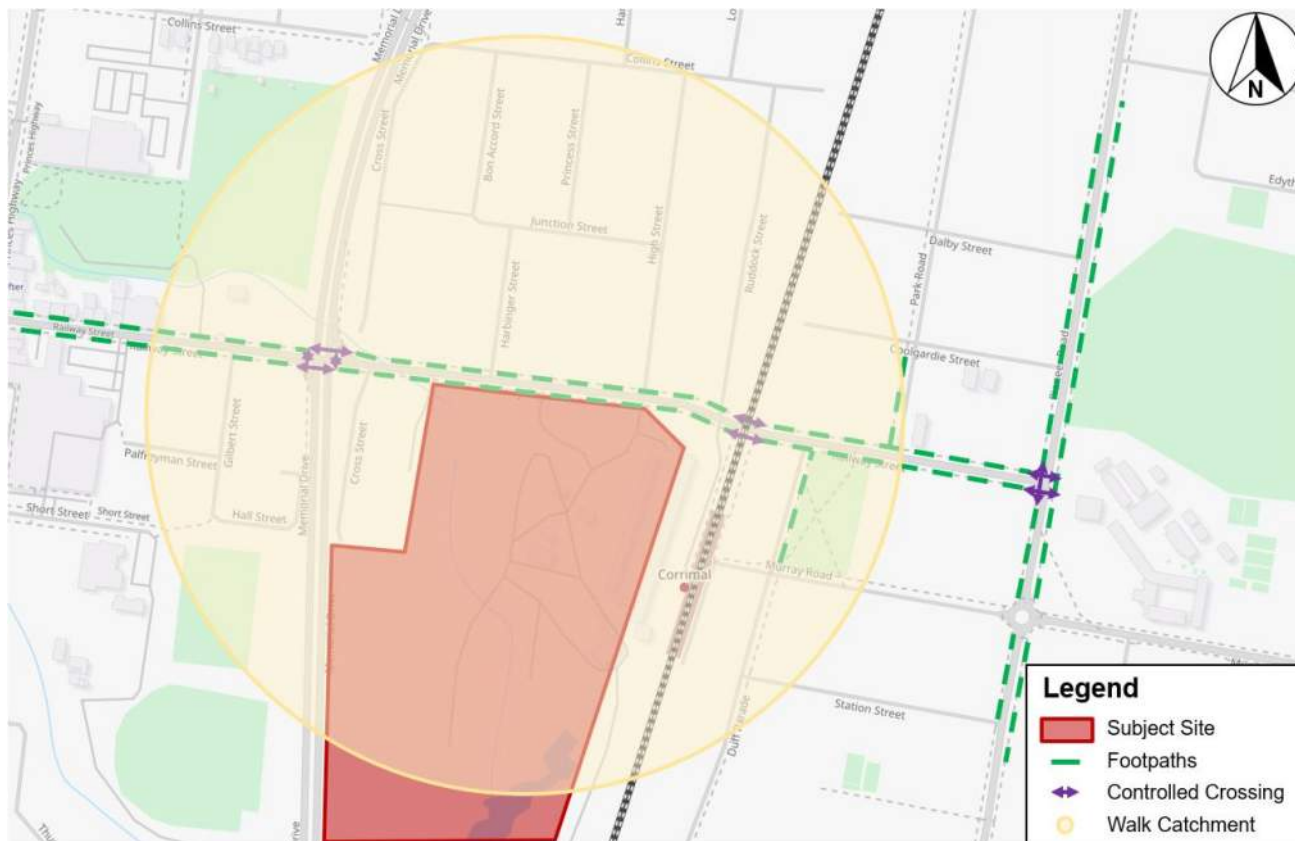
Adapted from OpenStreetMap

Figure 2.2: Public Transport Within and Surrounding the Network

2.4 Active Transport

2.4.1 Pedestrian Connectivity

The development is located within a moderately well-connected active transport network. The site provides direct access to the existing pathway network on Railway Street. Figure 2.3 illustrates the pathways and crossings in proximity to the development site along with a notional 400-500m walk catchment around the site access point. Footpaths are also provided on both sides of Rothery Street and Towradgi Road.

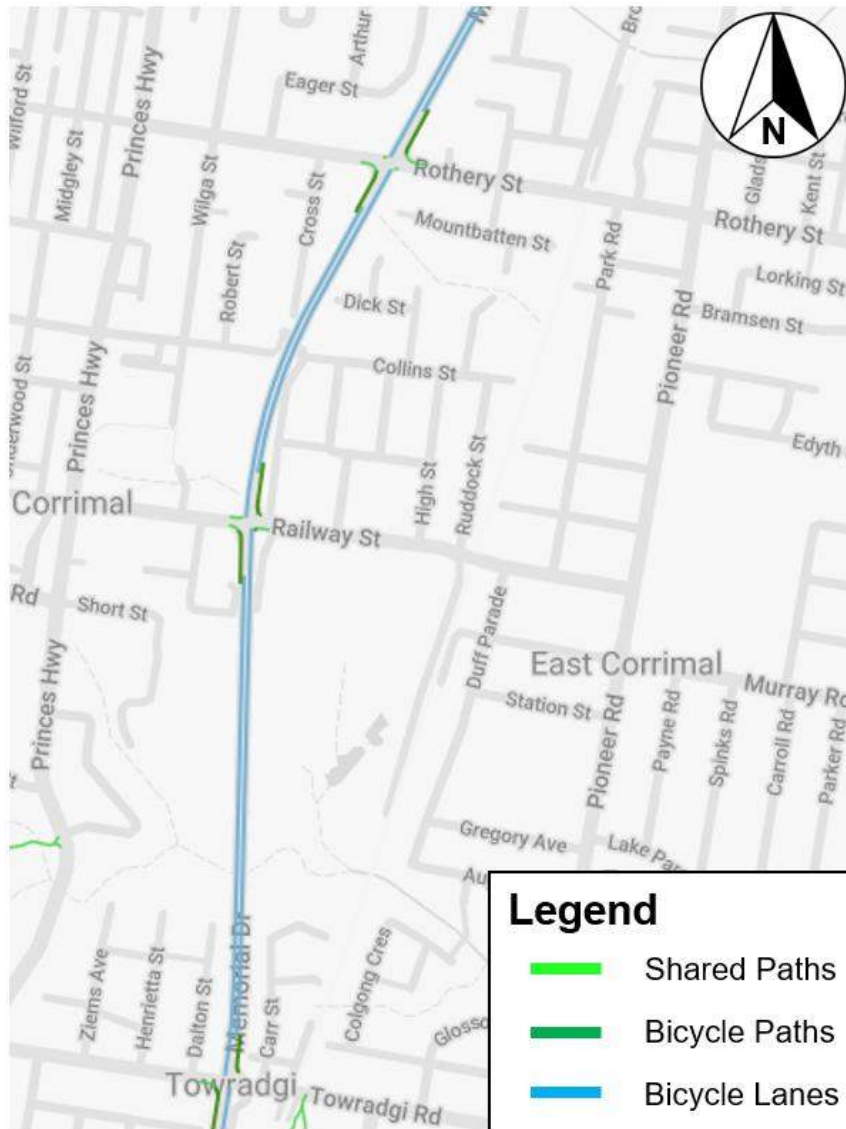


Adapted from OpenStreetMap

Figure 2.3: Pedestrian Connectivity

2.4.2 Cycling Network

There are few formal cycleways in the vicinity of the development site as shown in Figure 2.4. Memorial Drive has bicycle lanes on the highway shoulder, and the local streets surrounding the study area do not have any cycling infrastructure.



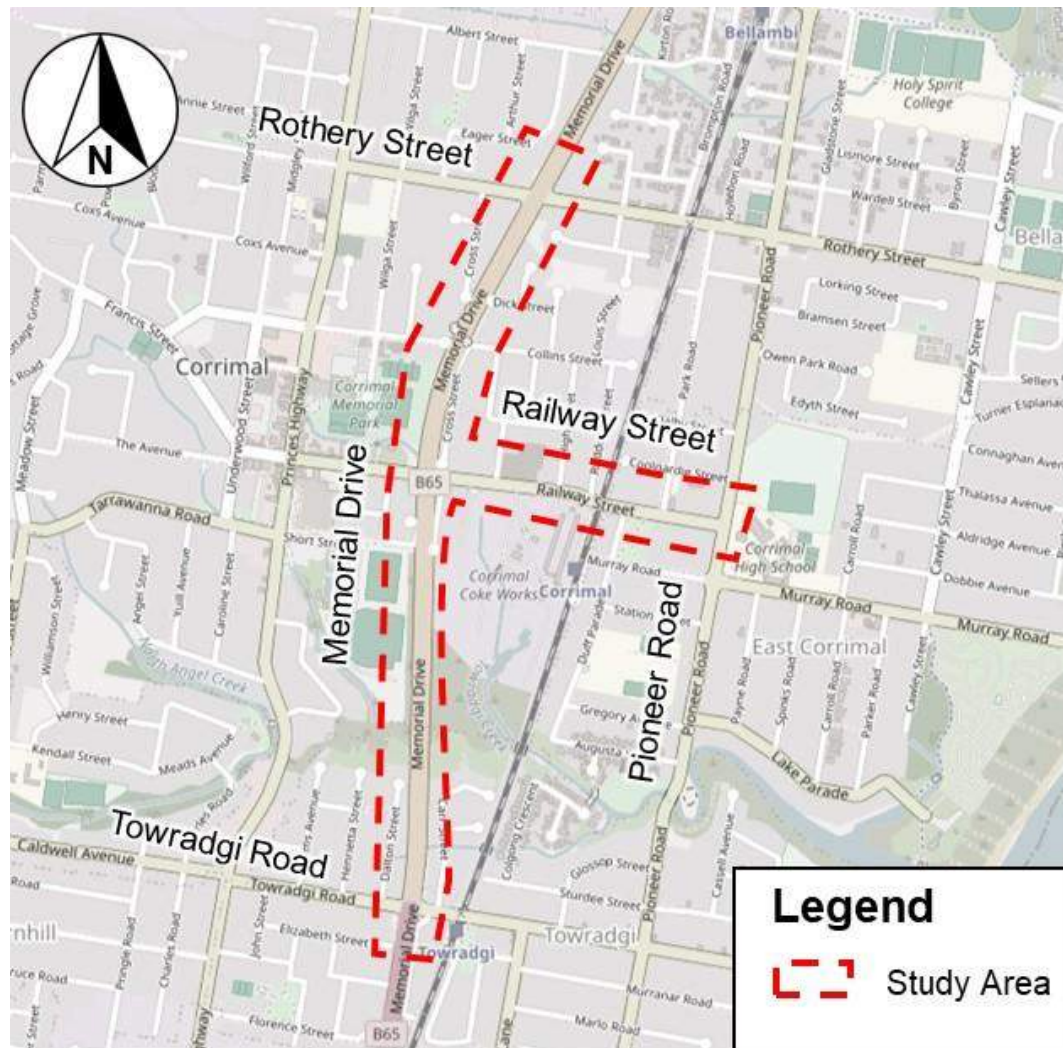
Adapted from NSW Cycleway Finder

Figure 2.4: Active Transport Facilities Within the Network

3. CRASH DATA ANALYSIS

3.1 Overview

Transport for NSW provided 5 years of crash data, dated between February 2018 and November 2022, for the road sections shown in Figure 3.1. The crash data was mapped using GIS software and is provided in **Appendix A** by crash severity and type (road user movement).



Adapted from OpenStreetMap

Figure 3.1: Crash Data Road Sections

During the five-year period, a total of 56 crashes were reported, equating to an average of 11.2 crashes per year.

3.2 Crash Severity

Most reported crashes resulting in either moderate injuries or non-casualties (tow-aways), with non-casualty crashes composing the largest proportion (of total crashes). There was only one crash which resulted in a fatality in 2022. Summaries of the crashes by degree of severity each year and across the 5-year period in Figure 3.2 and Table 3.1 respectively.

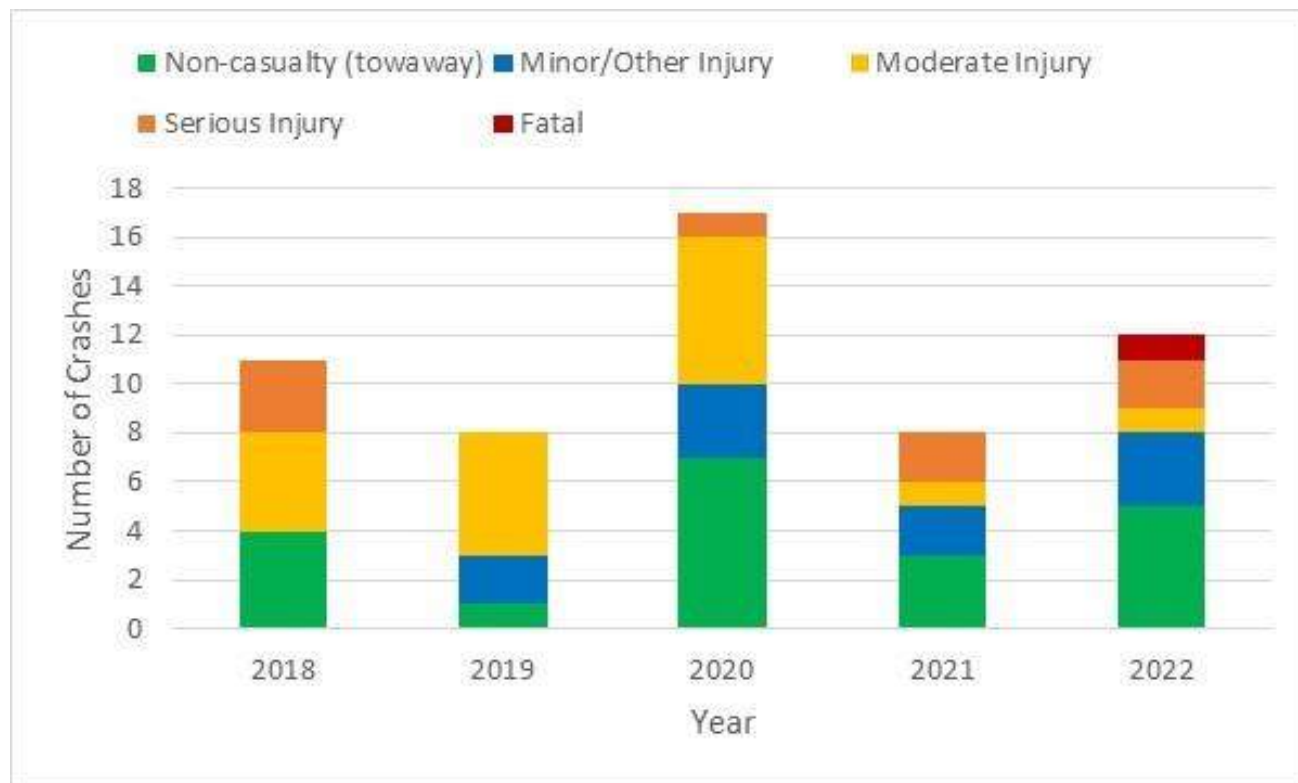


Figure 3.2: Reported Crashes by Severity each Year

Table 3.1: Summary of Reported Crash Severity

Crash Severity	Number of Crashes	%
Fatal	1	2%
Serious Injury	8	14%
Moderate Injury	17	30%
Minor/Other Injury	10	18%
Non-casualty (towaway)	20	36%
Total	56	100%

3.3 Crash Type

Almost half of the reported crashes were caused due to rear ends. While 18% of reported crashes were caused due to vehicles travelling in opposite directions, with most of these crashes (i.e. belonging to the RUM Code 20-29) occurring between a right-turning vehicle and through-movement vehicle. Overall, a summary of the reported crash types by road user movement (RUM) is provided below in Table 3.2. Maps of the crashes by RUM Group (i.e. Code range 0-9, 10-19, 20-29, etc.) are provided in **Appendix A**.

Table 3.2: Summary of Crash Types by Road User Movement

RUM Code	RUM Description	Number of Crashes	%
0	Pedestrian (on foot or in toy/pram) – near side	1	2%
10	Vehicles from adjacent direction (intersections only) – cross traffic	4	7%
11	Vehicles from adjacent direction – right far	1	2%
20	Vehicles from opposing direction – head on (not overtaking)	1	2%
21	Vehicles from opposing direction – right through	9	16%
30	Vehicles from same direction – rear end	27	48%
33	Vehicles from same direction – lane side swipe	1	2%
34	Vehicles from same direction – lane change right (not overtaking)	1	2%
39	Vehicles from same direction – other same direction	3	5%
62	On path – accident or broken down	1	2%
71	Off path, on straight – left off carriageway into object / parked vehicle	4	7%
73	Off path, on straight – right off carriageway into object / parked vehicle	1	2%
75	Off path, on straight – off end of road / 'T' intersection	1	2%
85	Off path, on curve or turning – off carriageway right on left bend into object / parked vehicle	1	2%
Total		56	100%

3.4 Crash Data Findings

The assessment of the crash data revealed that most of the crashes mostly were concentrated at the three intersections along Memorial Drive, and a few crashes concentrated at the railway level crossing in the study area. The one reported fatal crash occurred at Memorial Drive / Towradgi Road. Overall, the significant proportion of rear-ends at these 3 intersections is consistent with the levels of through traffic movement, congestion and prevailing speed environment on this road.

4. DEVELOPMENT ACCESS ASSESSMENT

4.1 Development Access Location and Configuration

The development was originally proposed to be access via a single intersection off Railway Street approximately 60m east of Harbinger Street and approximately 210m west of the rail line level crossing. Subsequent discussions with WCC in 2023 identified a preference to relocate the access intersection to the west to form a four-way roundabout controlled intersection with Railway Street and Harbinger Street.

An indicative concept of this arrangement is shown in Figure 4.1.



Adapted from Nearmap

Figure 4.1: Access Intersection Concept

The roundabout would be designed to Austroads requirements considering approach speeds and deflection requirements, and there is land within the development site to the south to facilitate any minor changes needed in the detailed design phase. The roundabout could also cater for semi-trailer movements east-west on Railway Street via a mountable central island, should this be required, and would allow large rigid vehicles and buses to turn around it for movements to and from the development site. The concept also involves:

- No property impacts on the northern side of Railway Street
- Limited intrusion into the site on its southern side
- A 10m internal diameter of which the outer 2.5m lip is mountable
- Pedestrian refuges across all four legs
- Using some of the (currently unmarked) on-street parking however some of this kerbside parking loss would be compensated in the location of the existing site crossover which will be removed.

Operation of this configuration was assessed using VISSIM and SIDRA modelling. Further details regarding this modelling is provided in Chapter 5.

4.2 Sight Lines

The streets approaching the proposed roundabout access onto Railway Street all have a posted speed limit of 50km/h. However, the geometric design of the roundabout should force drivers to slow down on all approaches. Some minor clearing of the trees on the south-east corner of the proposed intersection is likely to be required to provide sufficient sight distance, with the specific needs to be confirmed during the detailed design of the roundabout.

4.3 Construction Period Access Considerations

It is expected that the current driveway access 60m east of Harbinger Street or the proposed roundabout location will be used as the site's sole access point during construction. Traffic control may be required at this location to allow for the safe movement of trucks into and out of the site and to ensure that trucks are not queued on Railway Street such that other vehicles are blocked.

There is expected to be ample space on-site to store trucks and the private vehicles of construction workers, and as such minimal impacts to the surrounding street system would be expected. In any case, a Construction Traffic Management Plan (CTMP) for this period would be required as part of the approval of each stage of the development.

4.4 Alternative Additional Access Location Proposal

A proposal for an additional left in / left out access off Memorial Drive approximately 480m south of its intersection with Railway Street was previously investigated.

This access location was assessed and not considered further on the basis that:

- It would introduce another intersection onto a road which has limited access, impacting its primary through-traffic carrying function and potentially traffic safety as well
- It would require long deceleration and acceleration lanes to be provided given the 80km/h speed environment
- It may introduce weave conflicts associated with movements into turn pockets at the Towradgi Road intersection
- It was not supported by TfNSW or WCC.

5. TRAFFIC CAPACITY ASSESSMENTS

5.1 Methodology

In order to quantify the traffic performance within the study area, with and without the proposed full developed, a detailed assessment of road network capacity was undertaken for both the AM and PM peaks. A VISSIM traffic microsimulation model was used for this purpose and the following scenarios were assessed:

- 2023 Base Model (for calibration and validation purposes, approved by TfNSW)
- 2036 and 2046 Future Base Case
- 2036 and 2046 Future Base Case plus full development scenario.

Key model inputs for above the scenarios are provided below in Table 5.1.

Table 5.1: Model Scenario – Key Inputs

Year	Road Network	2-hour Total Traffic Demand	
		AM Peak	PM Peak
2023 Base	2023 existing network	12625	13942
2036 Base	2023 existing network	13376	14982
2046 Base	2023 existing network	14173	16014
2036 Project Case	2023 existing network + development access roads	14035	15522
2046 Project Case	2023 existing network + development access roads	14831	16554

5.2 Base Model Development

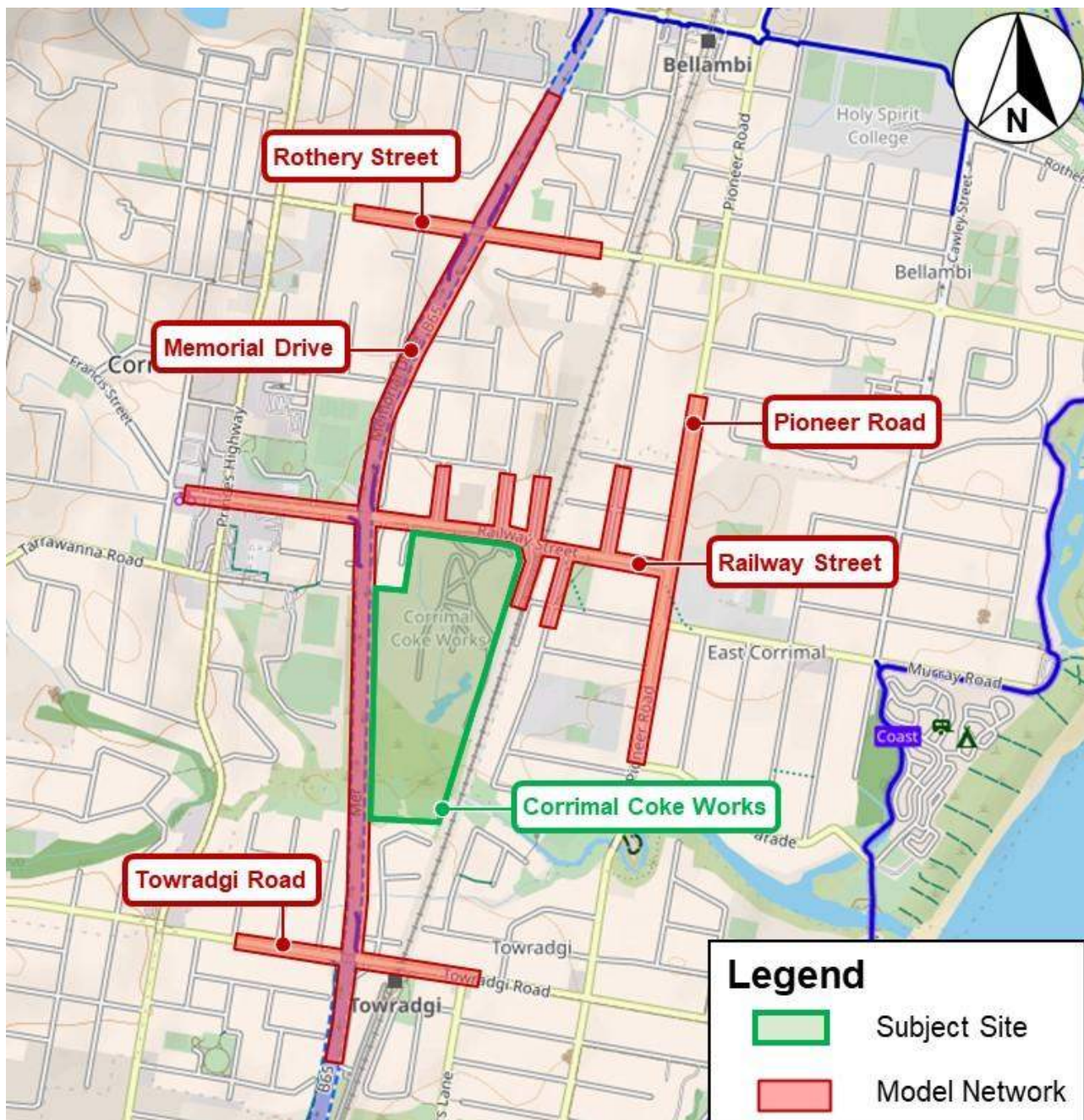
5.2.1 Model Boundary

The VISSIM model boundary is shown in Figure 5.1Adapted from OpenStreetMap

Figure 5.1 and includes:

- Memorial Drive / Rothery Street (to the north)
- Memorial Drive / Railway Street (to the west)
- Memorial Drive / Towradgi Road (to the south)
- Railway Street / Pioneer Road (to the east)
- Roads along Railway Street between Memorial Drive to the west and Pioneer Road to the east.

This area was verified as the practical extents of traffic impacts from the development outside of which the development traffic disperses across the network.



Adapted from OpenStreetMap

Figure 5.1: VISSIM Model Boundary

5.2.2 Assessment Years and Time Periods

A VISSIM Model was developed for the 2023 AM and 2023 PM peak traffic conditions. The AM and PM peak models were calibrated and validated for the following 1-hour periods:

- **Weekday AM Peak:** 07:00-08:00 and 08:00-09:00
- **Weekday PM Peak:** 16:00-17:00 and 17:00-18:00.

Appropriate 30-minute warm-up and cool-down periods were incorporated into the model as is common for microsimulation traffic models.

5.2.3 Traffic Demand Development

The process for traffic demand development for all scenarios is illustrated below in Figure 5.2.

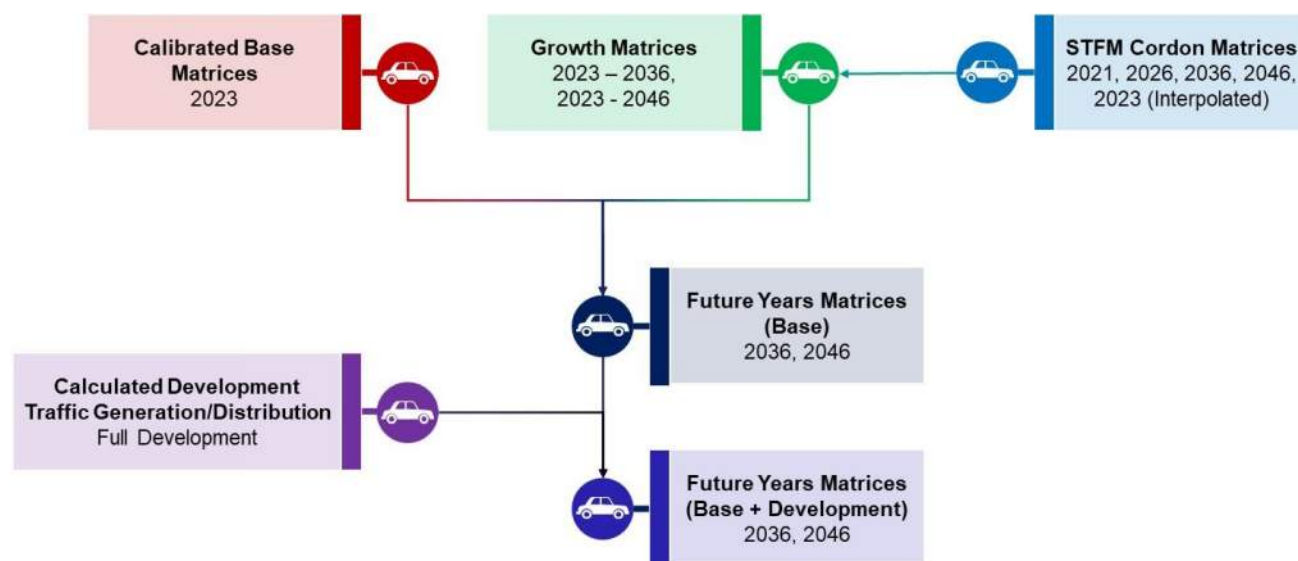


Figure 5.2: Traffic Demand Development Process – All Scenarios

The 2023 base demand matrices were initially based on the previous (2018) traffic model. Then, using the 2023 traffic count data, these matrices were expanded to include the additional zones along Memorial Drive as well as develop the 15-minute quarterly matrices for light and heavy vehicles. These quarterly matrices were calibrated prior to development of any future matrices.

Cordon matrices based on the Strategic Traffic Forecasting Model (STFM) outputs for the years 2021, 2026, 2036, and 2046 were sourced from TfNSW, and used to interpolate the 2023 cordon matrices and subsequently calculate the '2023 to 2036' and '2023 to 2046' growth matrices. Using the growth matrices and calibrated base matrices, 2036 and 2046 future base year matrices were developed.

Traffic generated due to the proposed development were calculated based on current residential yields and TfNSW's *Technical Direction Guide to Traffic Generating Developments TDT 2013/04*. The distribution of the traffic generated across the model network was calculated using Australian Bureau of Statistics' *Journey-to-Work* data. The resulting distributed traffic calculations and future base year matrices were then used to develop the 2036 and 2046 'future base year + development' matrices.

5.2.4 Network Coding

The VISSIM model network was coded based on the latest available aerial photography and was then validated through site inspections. The 'Links' in the model represent homogeneous sections of road cross-section, considering attributes such as posted speed limits, reduced speed areas, conflict points, priority rules, stop signs, school zones, signals, bust stops etc. which were used to replicate the traffic operations of the existing configuration. The model network is shown in Figure 5.3.

The traffic signal timing and phasing at signalised intersections was replicated from SCATS data provided by TfNSW. The effects of the rail level crossing were also replicated in the model through video footage of peak period operations cross-referenced with boom gate opening and closing data provided by Sydney Trains.



Figure 5.3: Base Model Network

5.2.5 Model Calibration Summary

The model was calibrated in accordance with TfNSW's *Traffic Modelling Guidelines 2013 (TMG 2013)*, which stipulate the requirements for model calibration for the network-wide area and core area. The core-area for this model includes:

- Memorial Drive / Railway Street
- Ruddock Street / Railway Street / Level Crossing
- Pioneer Road / Railway Street.

Key network-wide calibration criteria include the following requirements:

- Satisfactory GEH values for all turn and link volumes
- A minimum R^2 value of 0.9 of observed versus modelled turning volumes.

The achievement of these criteria is discussed below.

GEH Statistic

The Geoffrey E. Havers (GEH) Statistic is an industry standard measure of variance between the observed count and modelled count, expressed by the following:

$$GEH = \sqrt{\frac{2(M - C)^2}{M + C}}$$

Where M is the Modelled Volume and C is the Observed Volume.

This expression effectively relates to the severity of variance to the size of the observed volume and allows the variance from both large and small volumes to be assessed by the same measure.

Table 11.1 of the *TMG 2013* uses the GEH statistic as the main measurement of variance in microsimulation modelling and sets out the following requirements for calibration of turning movement and link volumes:

- 100% of turns and links with a GEH < 10
- 85% of turns and links with a GEH < 5.

The GEH results and network-wide R^2 value for the weekday AM and PM peak base models in relation to these criteria are summarised in Table 5.2. More detailed calculations for each movement are provided in the separate **Model Calibration and Validation Report**.

Table 5.2: AM and PM Base Model Turning Movement GEH Results and R^2 Values

Measure	AM Peak		PM Peak	
	07:00-08:00	08:00-09:00	16:00-17:00	17:00-18:00
% of GEH < 10	100%	100%	100%	100%
% of GEH < 5	100%	100%	100%	100%
Network-wide R^2 Values	0.995	0.997	0.999	0.999

As indicated by the results in Table 5.2, the model satisfies the GEH calibration requirements in both peak periods.

Core Area Tolerance Limits and R² Value

Table 11.2 of the *TMG 2013* recommends the following tolerance limits for all modelled volumes within the core areas:

- Flows < 99 – to be within 10 vehicles of the observed value
- Flows 100 to 999 – to be within 10% of the observed value
- Flows 1000 to 1999 – to be within 100 vehicles of the observed value
- Flows > 2000 – to be within 5% of the observed value
- R² value of modelled vs. observed volume plots to be > 0.95.

Results of the modelled volumes and R² values in the core area are summarised below in Table 5.3.

Table 5.3: Core Area Calibration Results

Measure	AM Peak		PM Peak	
	07:00-08:00	08:00-09:00	16:00-17:00	17:00-18:00
% within Core-Area Tolerance Limits	100%	100%	100%	100%
R ² Value – Core Area	1.000	0.999	0.999	1.000

As per the *TMG 2013*, plots of the modelled versus the observed flows with the R² value and equation of the linear trend line are to be provided. These plots are provided for the network-wide and core areas within the separate **Model Calibration and Validation Report**.

5.2.6 Model Validation Summary

Following model calibration, the model was validated in accordance with the *TMG 2013* in which validation criteria are provided for travel times for surveyed routes (i.e. travel time validation), signal time settings and back-of-queues. Travel time validation was the primary method for model validation. The *TMG 2013* considers the modelled travel time validated when it lies within $\pm 15\%$ or one minute (whichever is greater) of the observed average travel time for the full length of the route.

Travel time comparisons for the validation routes are provided below in Table 5.4.

Table 5.4: Travel Time Along Validation Routes (mm:ss)

Route	Direction	AM Peak				PM Peak			
		7:00AM – 8:00AM		8:00AM – 9:00AM		4:00PM – 5:00PM		5:00PM – 6:00PM	
		Observed	Modelled	Observed	Modelled	Observed	Modelled	Observed	Modelled
1	Eastbound	1:23	1:28	1:43	1:29	1:31	1:29	1:31	1:29
	Westbound	1:55	1:44	2:47	2:47	2:30	2:19	2:46	2:13
2	Northbound	2:38	2:42	3:17	2:56	2:55	2:59	2:55	2:50
	Southbound	4:56	4:35	6:58	7:48	5:58	6:17	4:34	5:05

mm:ss – modelled travel time within $\pm 15\%$ of average observed travel time of full route

mm:ss – modelled travel time not within $\pm 15\%$ of average observed travel time of full route

All modelled travel times were within in the $\pm 15\%$ of the observed average for all routes except for Railway Street westbound route (i.e. Route 1) between 5:00 and 6:00PM, despite being within one minute of the observed average. However, this is considered acceptable as survey data was found to overestimate this travel time with the data revealing wait times at the Memorial Drive signals tending to be longer than average despite a single green phase being sufficient to dissipate queues.

Details regarding the validation checks of route travel times and signal timings are provided in the separate **Model Calibration and Validation Report**. This base model was approved by TfNSW in 2023.

5.3 Development Traffic

5.3.1 Traffic Generation

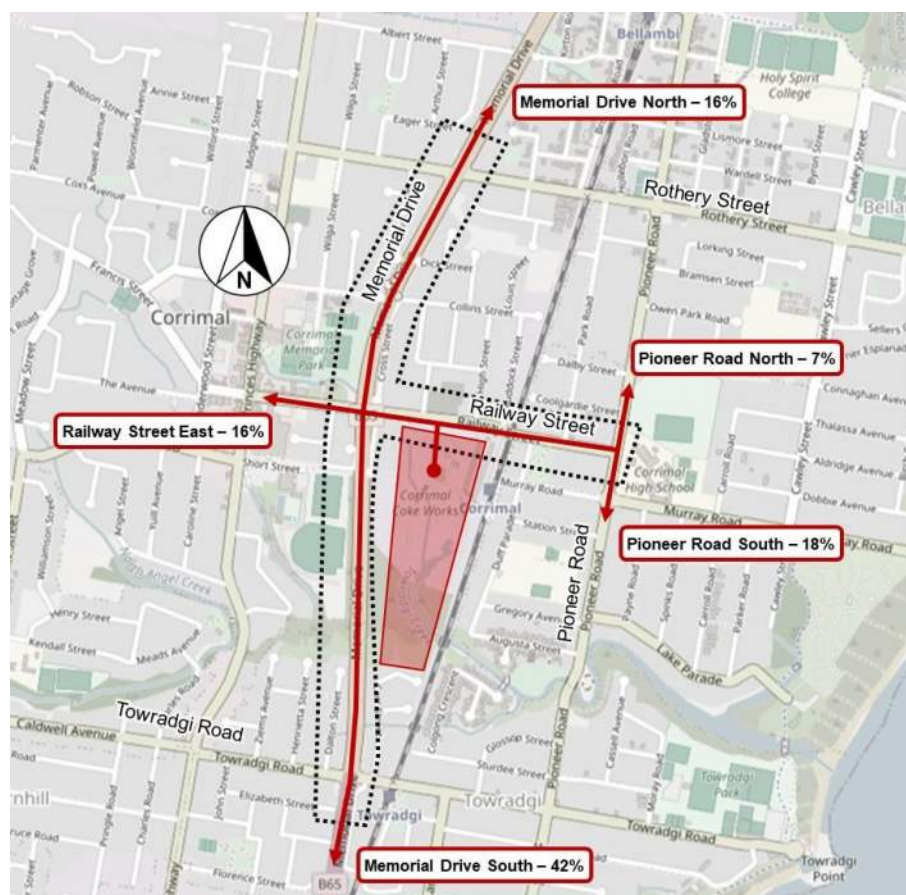
Traffic generation rates were sourced from the TfNSW *Guide to Transport Impact Assessment (GTIA)* and technical direction *Guide to Traffic Generating Developments Updated Traffic Surveys (TDT2013/04a)*. Traffic generation for high-density residential dwellings in both documents were based on a survey conducted in 2012. However, the per bedroom rates assumed for this project were only documented in TDT2013/04a. The assumed rates were 0.21 trips per bedroom in the AM peak and 0.15 trips per bedroom in the PM peak.

The proposal of 850 dwellings is assumed to comprise 108 1-bedroom units, 309 2-bedroom units, 393 3-bedroom units and 40 4-bedroom units. The proposed development is estimated to generate 400 vehicles/h in the AM peak and 286 vehicles/h in the PM peak.

Inbound and outbound trips were split 20:80 in the AM peak and 80:20 in the PM peak as is typical for residential land uses in regional areas.

5.3.2 Traffic Distribution

The distribution of development traffic was estimated using Census Journey to Work data, and intersection count data at the Memorial Drive / Railway Street and Pioneer Road / Railway Street intersections. The assumed development traffic distribution is shown in Figure 5.1.



Adapted from OpenStreetMap

Figure 5.4: Development Traffic Distribution

5.4 Network Scenarios and Assessment Criteria

In order to quantify the traffic performance within the study area, with and without the proposed development, a detailed assessment of road network capacity was undertaken for both the AM and PM peak periods. The following scenarios were run in the VISSIM model:

- 2023 Base Model (for calibration and validation purposes)
- 2036 Base Case
- 2036 Project Case (Base Case plus development traffic)
- 2036 Project + Upgrade Case (Project Case plus mitigation works)
- 2046 Base Case
- 2046 Project Case (Base Case plus development traffic)
- 2046 Project + Upgrade Case (Project Case plus mitigation works).

The year 2023 VISSIM models were run 5 times using different seed values. The results reported are from the median seed run determined during the model development process.

Intersection Levels of Service (LoS) based on average delay have been used as the primary metric for impact assessment in accordance with the TfNSW Guide to Transport Impact Assessment (GTIA). The LoS thresholds defined in the GTIA are summarised in Table 5.5.

Table 5.5: Intersection Level of Service Criteria

LOS Level	Delay Range	Typical Intersection Operations
A	≤14	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Operating near capacity
E	57 to 70	At capacity
F	70 and above	Unsatisfactory

For roundabouts and sign-controlled intersections, the LoS value is determined by the critical movement with the highest delay whereas for signalised intersections, the LoS is based on the average delay of all vehicles at the intersection.

The impact assessment methodology was based on a 'no worsening' approach, which involved ensuring that the '2036 Project Case' impacts were sufficiently mitigated by upgrade works such that the '2036 Project + Upgrades Case' intersection LoS was no worse than the '2036 Base' case.

5.5 Project Case Traffic Impacts

5.5.1 2023 Base Case

The year 2023 AM and PM peak performance of each key intersection within the study area is summarised in Table 5.6. The Memorial Drive / Railway Street signalised intersection currently experiences average delays in the LoS D range with 52s in the AM peak and 49s in the PM peak.

Table 5.6: Intersection Performance Results – 2023 Base

ID	Intersection Name	Intersection Control	2023 AM		2023 PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	52 (D)	3,974	49 (D)	4,028
2	Railway Street / Harbinger Street	Priority	14 (A)	809	12 (A)	729
3	Railway Street / High Street	Priority	18 (B)	808	13 (A)	703
4	Railway Street / Ruddock Street	Priority	12 (A)	769	11 (A)	644
5	Railway Street / Duff Parade	Priority	10 (A)	801	2 (A)	627
6	Railway Street / Park Road	Priority	4 (A)	707	3 (A)	554
7	Railway Street / Pioneer Road	Signals	13 (A)	1,459	10 (A)	1,307

5.5.2 2036 Base Case

The 2036 Base Case AM and PM peak models were developed using the existing road network with additional traffic demand from the STFM (Refer Section 5.2.3). The model results are shown in Table 5.7 and Table 5.8.

In the AM peak, there is very little change in average intersection delay between 2023 and 2036.

In the PM peak, the average delay at the Memorial Drive / Railway Street intersection increases from 49s to 57s, which is a minor increase in average delays, and the LoS worsens to LoS E. Delays at other intersections remain similar to 2023.

Table 5.7: Intersection Performance Results – 2036 AM Base Case

ID	Intersection Name	Intersection Control	2023 AM		2036 AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	52 (D)	3,974	54 (D)	4,088
2	Railway Street / Harbinger Street	Priority	14 (A)	809	21 (B)	802
3	Railway Street / High Street	Priority	18 (B)	808	20 (B)	802
4	Railway Street / Ruddock Street	Priority	12 (A)	769	15 (B)	762
5	Railway Street / Duff Parade	Priority	10 (A)	801	7 (A)	793
6	Railway Street / Park Road	Priority	4 (A)	707	4 (A)	702
7	Railway Street / Pioneer Road	Signals	13 (A)	1,459	14 (A)	1,487

Table 5.8: Intersection Performance Results – 2036 PM Base Case

ID	Intersection Name	Intersection Control	2023 PM		2036 PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	49 (D)	4,028	57 (E)	4,364
2	Railway Street / Harbinger Street	Priority	12 (A)	729	8 (A)	763
3	Railway Street / High Street	Priority	13 (A)	703	14 (A)	739
4	Railway Street / Ruddock Street	Priority	11 (A)	644	10 (A)	680
5	Railway Street / Duff Parade	Priority	2 (A)	627	2 (A)	665
6	Railway Street / Park Road	Priority	3 (A)	554	3 (A)	591
7	Railway Street / Pioneer Road	Signals	10 (A)	1,307	10 (A)	1,422

5.5.3 2036 Project Case

This section summarises the modelling results for the 2036 With Development case (850 dwellings). This case was modelled with the existing road network and with the traffic generated from the proposed development added to 2036 Base Case traffic. The model results are shown in Table 5.9 and Table 5.10. The results show that without any upgrades, the additional traffic from the development will exceed the capacity of the existing road network.

In the AM peak, constraints at the Memorial Drive intersection causes queues along Railway Street extending back into the development.

In the PM peak, additional demand for traffic turning into Railway Street from Memorial Drive causes additional congestion on Memorial Drive.

Table 5.9: Intersection Performance Results – 2036 AM Project Case

ID	Intersection Name	Intersection Control	2036 Base AM		2036 Project AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	54 (D)	4,088	58 (E)	4,131
2	Railway Street / Harbinger Street / Development Access	Roundabout	21 (B)	802	269 (F)	984
3	Railway Street / High Street	Priority	20 (B)	802	65 (E)	788
4	Railway Street / Ruddock Street	Priority	15 (B)	762	37 (C)	758
5	Railway Street / Duff Parade	Priority	7 (A)	793	199 (F)	794
6	Railway Street / Park Road	Priority	4 (A)	702	8 (A)	764
7	Railway Street / Pioneer Road	Signals	14 (A)	1,487	15 (B)	1,553

Table 5.10: Intersection Performance Results – 2036 PM Project Case

ID	Intersection Name	Intersection Control	2036 Base PM		2036 Project PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	57 (E)	4,364	74 (F)	4,366
2	Railway Street / Harbinger Street / Development Access	Priority	8 (A)	763	9 (A)	1,019
3	Railway Street / High Street	Priority	14 (A)	739	16 (B)	803
4	Railway Street / Ruddock Street	Priority	10 (A)	680	12 (A)	744
5	Railway Street / Duff Parade	Priority	2 (A)	665	4 (A)	730
6	Railway Street / Park Road	Priority	3 (A)	591	4 (A)	660
7	Railway Street / Pioneer Road	Signals	10 (A)	1,422	10 (A)	1,489

5.5.4 2046 Base Case

The 2046 Base Case AM and PM peak models were developed using the existing road network with additional traffic demand from the STFM (Refer Section 5.2.3). The model results for the 2046 Base Case are shown in Table 5.13 and Table 5.14.

In the AM peak, Railway Street / Harbinger Street is expected to worsen to LoS D, as traffic volumes on Railway Street increases and vehicles from Harbinger Street will have fewer safe gaps to turn onto Railway Street.

In the PM peak, the average delay at the Memorial Drive / Railway Street intersection increases from 49s to 64s, which is a moderate increase in average delays, and the LoS worsens to LoS E.

Table 5.11: Intersection Performance Results – 2046 AM Base Case

ID	Intersection Name	Intersection Control	2023 AM		2046 AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	52 (D)	3,974	56 (D)	4,165
2	Railway Street / Harbinger Street	Priority	14 (A)	809	45 (D)	819
3	Railway Street / High Street	Priority	18 (B)	808	17 (B)	822
4	Railway Street / Ruddock Street	Priority	12 (A)	769	15 (B)	784
5	Railway Street / Duff Parade	Priority	10 (A)	801	10 (A)	817
6	Railway Street / Park Road	Priority	4 (A)	707	4 (A)	727
7	Railway Street / Pioneer Road	Signals	13 (A)	1,459	15 (B)	1,599

Table 5.12: Intersection Performance Results – 2046 PM Base Case

ID	Intersection Name	Intersection Control	2023 PM		2046 PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	49 (D)	4,028	64 (E)	4,445
2	Railway Street / Harbinger Street	Priority	12 (A)	729	10 (A)	792
3	Railway Street / High Street	Priority	13 (A)	703	13 (A)	767
4	Railway Street / Ruddock Street	Priority	11 (A)	644	13 (A)	710
5	Railway Street / Duff Parade	Priority	2 (A)	627	2 (A)	699
6	Railway Street / Park Road	Priority	3 (A)	554	4 (A)	621
7	Railway Street / Pioneer Road	Signals	10 (A)	1,307	10 (A)	1,500

5.5.5 2046 Project Case

This section summarises the modelling results for the 2046 With Development case. This case was modelled with the existing road network and with the traffic generated from the proposed development added to 2046 Base Case traffic. The model results are shown in Table 5.13 and Table 5.14. The results show that without any upgrades, the additional traffic from the development will exceed the capacity of the existing road network.

In the AM peak, constraints at the Memorial Drive intersection causes queues along Railway Street extending back into the development.

In the PM peak, additional demand for traffic turning into Railway Street from Memorial Drive causes additional congestion on Memorial Drive.

Table 5.13: Intersection Performance Results – 2046 AM Project Case

ID	Intersection Name	Intersection Control	2046 Base AM		2046 Project AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	56 (D)	4,165	59 (E)	4,228
2	Railway Street / Harbinger Street / Development Access	Roundabout	45 (D)	819	270 (F)	978
3	Railway Street / High Street	Priority	17 (B)	822	82 (F)	780
4	Railway Street / Ruddock Street	Priority	15 (B)	784	37 (C)	754
5	Railway Street / Duff Parade	Priority	10 (A)	817	177 (F)	787
6	Railway Street / Park Road	Priority	4 (A)	727	10 (A)	789
7	Railway Street / Pioneer Road	Signals	15 (B)	1,599	16 (B)	1,668

Table 5.14: Intersection Performance Results – 2046 PM Project Case

ID	Intersection Name	Intersection Control	2046 Base PM		2046 Project PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	64 (E)	4,445	79 (F)	4,374
2	Railway Street / Harbinger Street / Development Access	Priority	10 (A)	792	9 (A)	1,038
3	Railway Street / High Street	Priority	13 (A)	767	16 (B)	830
4	Railway Street / Ruddock Street	Priority	13 (A)	710	18 (B)	769
5	Railway Street / Duff Parade	Priority	2 (A)	699	2 (A)	753
6	Railway Street / Park Road	Priority	4 (A)	621	6 (A)	690
7	Railway Street / Pioneer Road	Signals	10 (A)	1,500	11 (A)	1,568

5.6 Mitigation Works

5.6.1 Memorial Drive / Railway Street Upgrade

As shown in the Project Case modelling results, the primary road network constraint is the Memorial Drive / Railway Street intersection. The Memorial Drive / Railway Street intersection was upgraded in the VISSIM model as shown in Figure 5.5, with its upgraded configuration is summarised as follows:

- On the eastern side of Railway Street, the approach was widened to provide four approach lanes and one departure lane. This would require widening between Cross Street and Memorial Drive by one additional lane
- On the western side of Railway Street, the road was widened to provide a three lane approach, with one left turn lane, one through lane and one right turn lane. This would require widening up to 50m west of Memorial Drive by one additional lane
- The right turn pocket length on the Memorial Drive southern approach was extended from 95m to 160m
- The signal phase times of the intersection were modified to better balance flows and to align with the geometrical changes.

This was a draft configuration for this intersection which was subsequently refined through the SIDRA modelling. The configuration was sufficient to ensure that with development (850 dwellings) traffic flows could pass through the intersection and into Railway Street to allow for meaningful assessment of the performance of intersections along Railway Street.



Figure 5.5: Memorial Drive / Railway Street Intersection Modelled in VISSIM

5.6.2 2036 Project + Upgrades Case Results

The results for the 2036 Project + Upgrade Case models are shown in Table 5.15 and Table 5.16. The results show that the upgrades at Memorial Drive / Railway Street will accommodate development traffic in 2036, keeping intersection delays at levels similar to the 2036 Base Case.

In the AM peak, the Railway Street / Harbinger Street / Development Access roundabout will have increased delays from 21s to 53s in the Project + Upgrade Case. Increased delays at this intersection are acceptable though as this is the access to the development, and LoS D is a satisfactory level of service.

In the PM peak, all intersections have similar delays and LoS. While Railway Street / High Street worsens from LoS A to LoS B, it only represents an increase in overall delays of 3s.

Table 5.15: Intersection Performance Results – 2036 Project + Upgrade Case AM

ID	Intersection Name	Intersection Control	2036 Base AM		2036 Upgrade AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	54 (D)	4,088	55 (D)	4,313
2	Railway Street / Harbinger Street / Development Access	Roundabout	21 (B)	802	53 (D)	1,172
3	Railway Street / High Street	Priority	20 (B)	802	19 (B)	891
4	Railway Street / Ruddock Street	Priority	15 (B)	762	14 (A)	853
5	Railway Street / Duff Parade	Priority	7 (A)	793	10 (A)	886
6	Railway Street / Park Road	Priority	4 (A)	702	5 (A)	794
7	Railway Street / Pioneer Road	Signals	14 (A)	1,487	17 (B)	1,578

Table 5.16: Intersection Performance Results – 2036 Project + Upgrade Case PM

ID	Intersection Name	Intersection Control	2036 Base PM		2036 Upgrade PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	57 (E)	4,364	50 (D)	4,611
2	Railway Street / Harbinger Street / Development Access	Priority	8 (A)	763	9 (A)	1,041
3	Railway Street / High Street	Priority	14 (A)	739	17 (B)	817
4	Railway Street / Ruddock Street	Priority	10 (A)	680	14 (A)	752
5	Railway Street / Duff Parade	Priority	2 (A)	665	5 (A)	738
6	Railway Street / Park Road	Priority	3 (A)	591	3 (A)	667
7	Railway Street / Pioneer Road	Signals	10 (A)	1,422	11 (A)	1,494

5.6.3 2046 Project + Upgrade Case Results

The results for the 2046 Project + Upgrade Case models are shown in Table 5.17 and Table 5.18. The results show that the upgrades at Memorial Drive / Railway Street will accommodate development traffic in 2046, keeping intersection delays at levels similar to the Base Case.

In the AM peak, the Railway Street / Harbinger Street / Development Access will have slightly reduced delays compared to the Base Case as the intersection is converted from a give-way in the Base Case to a roundabout in the Project Case.

In the PM peak, all intersections have similar delays and LoS between the Base Case and Project + Upgrade Case.

Table 5.17: Intersection Performance Results – 2046 Project + Upgrade Case AM

ID	Intersection Name	Intersection Control	2046 Base AM		2046 Upgrade AM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	56 (D)	4,165	55 (D)	4,453
2	Railway Street / Harbinger Street / Development Access	Roundabout	45 (D)	819	40 (C)	1,203
3	Railway Street / High Street	Priority	17 (B)	822	18 (B)	920
4	Railway Street / Ruddock Street	Priority	15 (B)	784	17 (B)	882
5	Railway Street / Duff Parade	Priority	10 (A)	817	9 (A)	916
6	Railway Street / Park Road	Priority	4 (A)	727	6 (A)	828
7	Railway Street / Pioneer Road	Signals	15 (B)	1,599	18 (B)	1,700

Table 5.18: Intersection Performance Results – 2046 Project + Upgrade Case PM

ID	Intersection Name	Intersection Control	2046 Base PM		2046 Upgrade PM	
			Delay (s) (LoS)	Volume	Delay (s) (LoS)	Volume
1	Railway Street / Memorial Drive	Signals	64 (E)	4,445	53 (D)	4,765
2	Railway Street / Harbinger Street / Development Access	Priority	10 (A)	792	11 (A)	1,077
3	Railway Street / High Street	Priority	13 (A)	767	20 (B)	854
4	Railway Street / Ruddock Street	Priority	13 (A)	710	14 (A)	789
5	Railway Street / Duff Parade	Priority	2 (A)	699	4 (A)	772
6	Railway Street / Park Road	Priority	4 (A)	621	5 (A)	704
7	Railway Street / Pioneer Road	Signals	10 (A)	1,500	11 (A)	1,578

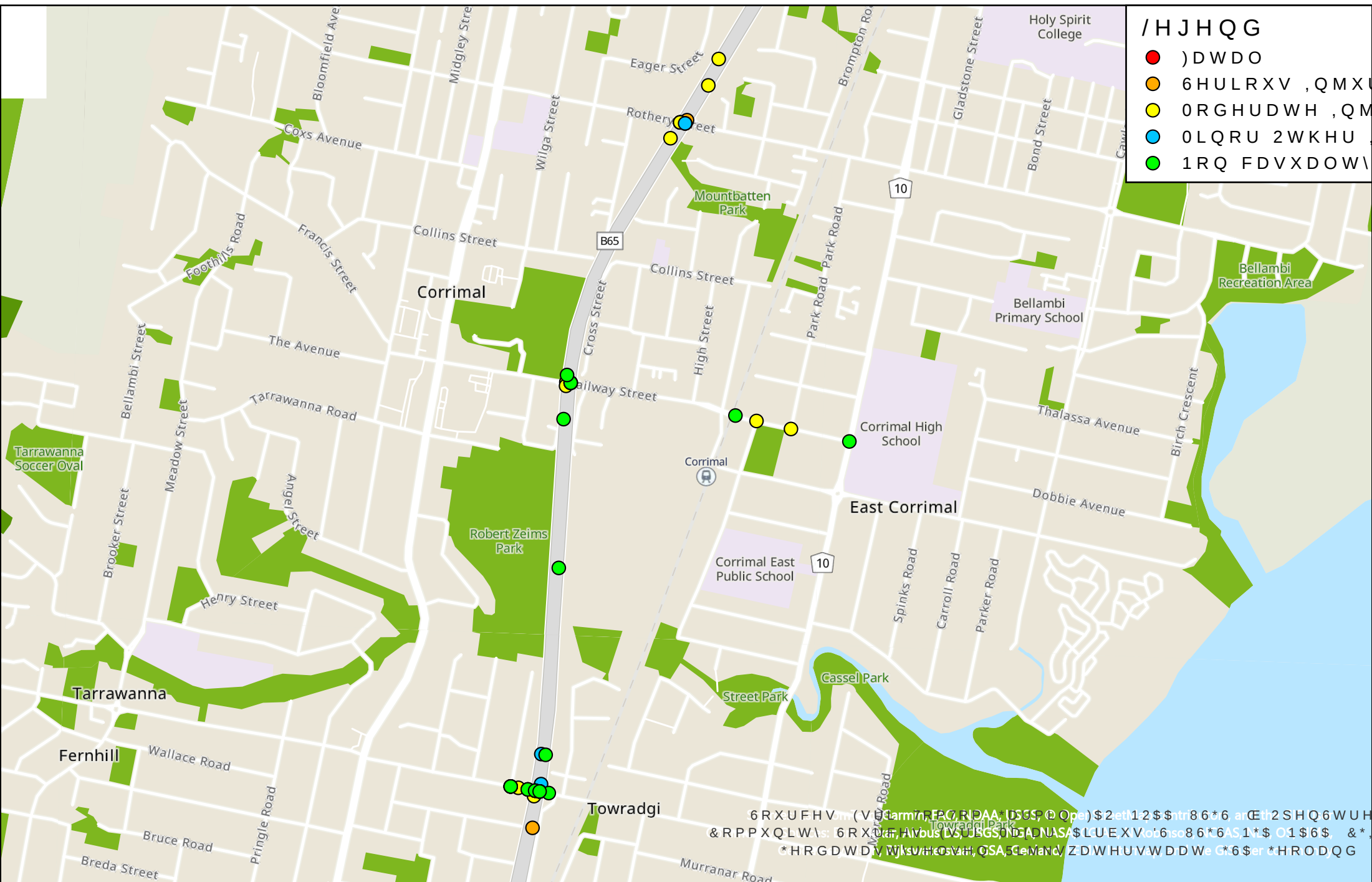
6. CONCLUSIONS

Key findings from the traffic and transport assessment of the 850 dwelling proposal for the Corrimal Coke Works Site are assessment are:

- The proposed development comprises 850 high-density residential dwellings, and this is expected to generate 400 vehicles/h in the AM peak and 286 vehicles/h in the PM peak
- Access to the development is proposed via a single-lane, four-way roundabout to replace the existing Railway Street / Harbinger Street intersection, which continues to operate satisfactorily in 2046 with 850 dwellings
- Upgrades at the Memorial Drive / Railway Street intersection are required to accommodate the additional traffic generated by the proposed development, as the existing intersection does not have enough capacity to accommodate the additional development traffic
- The proposed upgrades at the Memorial Drive / Railway Street intersection include the widening of the east and west Railway Street approaches by one lane, and the extension of the Memorial Drive northbound right turn bay to 160m of storage length
- When the proposed upgrades were implemented in the Project Case VISSIM model, the results showed that all intersections along Railway Street operated at a satisfactory level of service
- The proposed upgrades are expected to adequately mitigate the traffic impacts of the development.

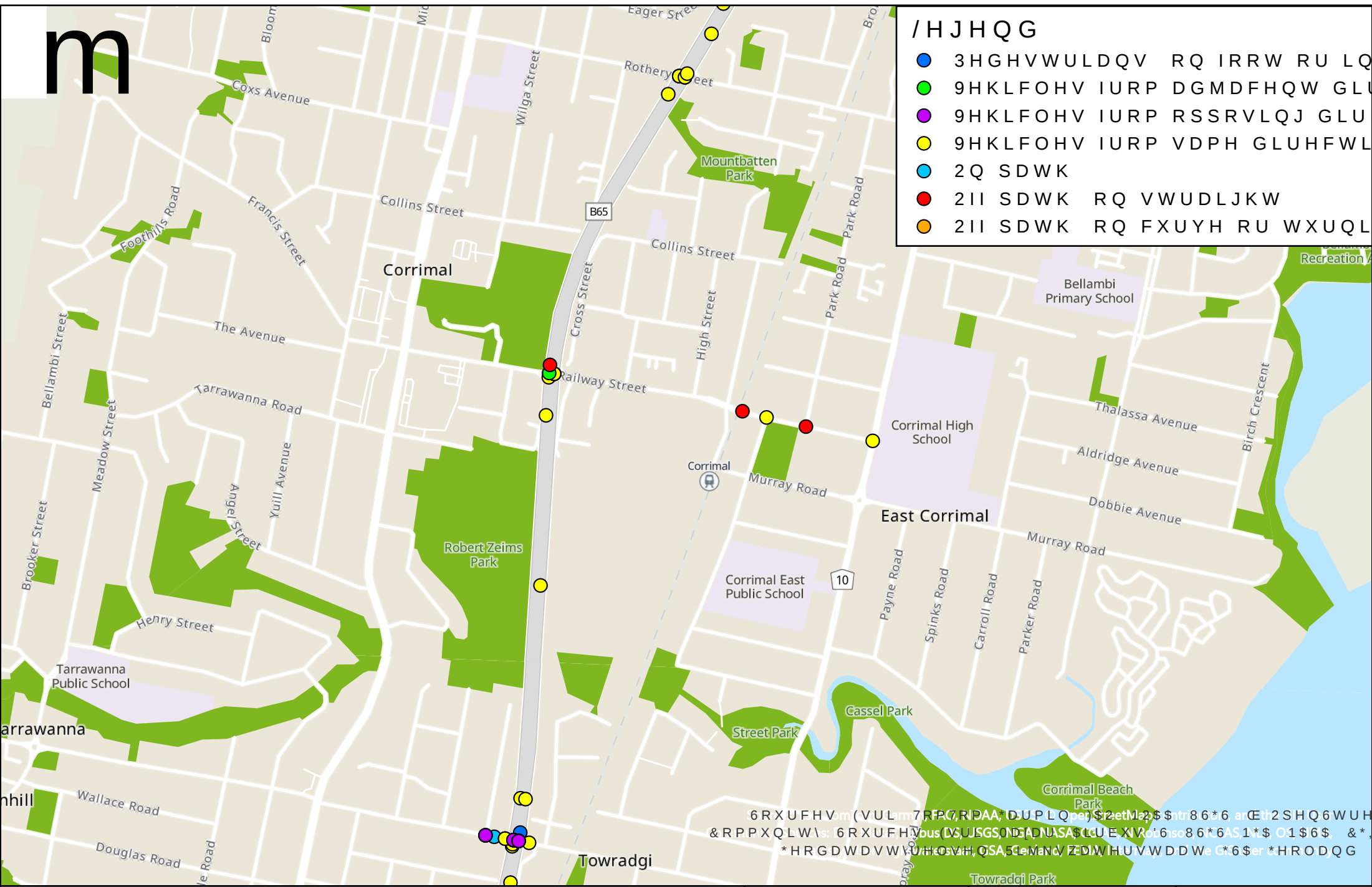
Overall, based on the above findings, there are no traffic and transport impacts associated with the development which cannot be mitigated through reasonable road network works within public land on-site.

Appendix A: Crash Data Maps



m

- /HJHQG
- 3HGHVWULDQV RQ IRRW RU LQ
 - 9HKLFOHV IURP DGMDFHQW GLU
 - 9HKLFOHV IURP RSSRVLQJ GLUH
 - 9HKLFOHV IURP VDPH GLUHFWR
 - 2Q SDWK
 - 2II SDWK RQ VWUDLJKW
 - 2II SDWK RQ FXUYH RU WXUQLQ



		*ROG & RDVW 6XLWH 5RELQD 4/1' 3 : ZZZ ELWJLRVFRQVX		%ULVEDQH 6SULQJ +LOO 4/1' 3 : ZZZ ELWJLRVFRQVX		6\GQH\ 1HZWRZQ 16: 3 : ZZZ ELWJLRVFRQVX		3URMHFW &RUULPDO &RNH 6WDJH \$ 66'\$		7LWOH :RUNDWK 580 &RGH		3URMHFW 1XP3HU TURKS ,VVXH	
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