Amber

Traffic & Transportation Direction

Steel River East BESS

Mayfield West, NSW

Traffic Impact Assessment

March 2025

Reference: 1079 rep 250320 final

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Traffic Impact Assessment

Prepared for: Ausgrid

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Executive Summary

Amber Organisation Pty Ltd (Amber) has been engaged by Ausgrid to prepare a Traffic Impact Assessment for the proposed Steel River East Battery Energy Storage System (BESS).

This report supports a state significant development application under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (SSD- 72258210) for the Project. The NSW Department of Planning, Housing and Infrastructure (DPHI) have issued Secretary's Environmental Assessment Requirements (SEARs) for the Project, with the traffic and transport matters addressed as part of this report.

The Project includes the construction, operation and decommissioning of a BESS and associated infrastructure with a maximum power output capacity of up to 200 MW/400 MWh (2 hours). The BESS would connect to the existing Mayfield West substation via a 33 kV underground cable.

The Project address is 1 McIntosh Drive in Mayfield West and is located within the City of Newcastle Local Government Area (LGA), approximately 7 km northwest of Newcastle CBD. Vehicle access to the site is via a shared accessway that runs through the site which connects to McIntosh Drive in the south and provides access to a recycling facility in the north.

Traffic generated by the Project can be separated by construction, operation and decommissioning stages. The peak traffic generating potential is during construction which generates trips associated with the workforce accessing the Project and the delivery of materials and plant. During operation, the Project is expected to generate a maximum of 4 vehicle movements per week associated with 1-2 maintenance personnel. Decommissioning is anticipated to generate a similar level of traffic to the construction stage.

The construction period is expected to commence in late-2025 and take approximately 18 months, with the peak construction period expected to take 6 months. A construction workforce of up to 100 personnel would be on-site during the peak construction phase. These staff would be primarily located in Newcastle and Sydney.

It is anticipated that during peak construction the Project could generate up to 136 light and 18 heavy vehicles per day. Construction of the BESS is expected to generate approximately 72 total vehicles per hour in the morning and evening peak hours during the peak construction period, which would reduce to 39 vehicles per peak hour during the average construction period.

Traffic modelling was completed for the nearest State road connection the during peak construction period, being the intersection of Industrial Drive and Steel River Boulevard. The assessment also included review of the cumulative traffic impact on the road network taking into account other major projects in the surrounding area. Overall, the assessment shows that this intersection has capacity to accommodate the peak construction traffic and the Project will have a minimal impact on the operation of the overall road network.

The shared accessway from McIntosh Drive provides access to the site and a recycling facility to the north. The traffic surveys of the accessway indicate that it currently accommodates a moderate level of traffic and is able to accommodate an increase in vehicle traffic associated with construction of the Project. Accordingly, it is concluded that the local and state road network is able to accommodate the traffic generated by the development during the construction period.

Amber has undertaken an assessment of the anticipated access routes for construction vehicles to the site. The nearest State road connection is the intersection of Industrial Drive and Steel River Boulevard which provides access to the site via traffic signals. No road upgrades are required at this intersection to accommodate general construction vehicles and good sightlines are available.

Port of Newcastle and Port Botany have been identified as the likely ports where the BESS plant will be imported. The access routes from these locations to the Site utilise roads that are designated for B-Double vehicles, as outlined within the National Heavy Vehicle Regulator (NHVR) Restricted Access Vehicle Map. A swept path assessment has been completed of the shared accessway from McIntosh Drive to access the site, which found that a 26 m B-Double can pass an 8.8 m medium-rigid truck, which is the typical vehicle accessing the recycling facility north of the site.

The preferred access route for the oversize/overmass vehicle transporting the largest BESS components (the battery containers) is from Port of Newcastle or Port Botany (to be determined). A 26 m B-Double has similar dimensions and manoeuvrability to the anticipated battery container vehicle. An analysis of the B-Double swept paths (attached at Appendix D) demonstrate that OSOM vehicles can access the site without the requirement for road upgrades.

In order to mitigate the traffic impacts of the Project a Construction Traffic Management Plan (CTMP) would be prepared. This will outline a range of traffic management measures to manage impacts to the capacity and safety of the surrounding road network. The CTMP would be prepared post-approval and prior to the commencement of construction.

Based on the assessment, it is concluded that the road network is able to accommodate the expected vehicle types and traffic volumes during the construction, operation, and decommissioning phases of the Project.

Table of Contents

Appendices

Appendix A

Response to TfNSW Agency Advice

Appendix B

Traffic Survey Data

Appendix C

SIDRA Results

Appendix D

Swept Path Assessment – Site Access

Appendix E

Sight Distance Assessment

Definitions

Term	Definition
Project	A Battery Energy Storage System (BESS) as described within the EIS to which this Application applies.
Project Area	Boundary shown on Figure 1 to which the Application applies (unless otherwise stipulated).
Applicant	Ausgrid
Application	Application for Development Consent under Part 4.7 of the EP&A Act; and Determination under Part 9 of the EPBC Act.
Terminology specific to this report	
Vehicle Trip	A trip is defined as a one way vehicular movement from one point to another excluding the return journey. Therefore, a return trip to and from the site is counted as two trips.
Vehicles per Day (vpd)	The volume of traffic (number of trips) occurring within a 24-hour period. For traffic volumes associated with the Project, this value is generally an even number to reflect the return trip associated with each vehicle.
Vehicles per Hour (vph)	The volume of traffic (number of trips) occurring within a one hour period.
Heavy Vehicle	A vehicle with a Gross Vehicle Mass (GVM) or Aggregate Trailer Mass (ATM) of more than 4.5 tonnes as defined in the Heavy Vehicle National Law (HVNL).
General Access Vehicle (GAV)	General Access Vehicles (GAV) don't require a permit or notice to access road networks; these vehicles have as-of-right access to the network unless signposted otherwise (e.g. a bridge tonnage restriction).
Restricted Access Vehicle (RAV)	Restricted Access Vehicles (RAV) include Class 1, 2 or 3 vehicles that operate under a notice or permit and vehicles operating under higher mass limits (HML) that have restrictions on the parts of the road network they can access.
Oversize and/or Overmass (OSOM) Vehicle	OSOM vehicles are defined as Class 1 vehicles under the Heavy Vehicle National Law. A vehicle or vehicle combination is considered to be OSOM if it exceeds any general access mass or dimension limits.
High Risk Oversize/Overmass Vehicle (requiring escort)	OSOM vehicles exceeding certain criteria for length, height, rear overhang, forward projection, width or total combination weight. These vehicles are subject to Transport Management Plans (TMPs) which provide a comprehensive planning and execution focus to ensure that these movements are carried out in a safe and responsible manner with reduced impact on other road users and road infrastructure. These vehicles also typically require pilot vehicle escort.

1. Background

1.1 Introduction

Amber Organisation Pty Ltd (Amber) has been engaged by Ausgrid to prepare a Traffic Impact Assessment of the proposed Steel River East Battery Energy Storage System (BESS) (the Project).

The Project includes the construction, operation and decommissioning of a BESS and associated infrastructure, with a targeted storage capacity of up to 200 MW/400 MWh (2 hours).

The Project is located at 1 McIntosh Drive in Mayfield West within the City of Newcastle LGA. The Newcastle CBD is approximately 7 km southeast of the Project. The Project is located in the eastern part of Lot 16 DP 270249, to the east of the existing substation. Figure 1 shows the location of the site in relation to the road network, access location, and existing infrastructure.

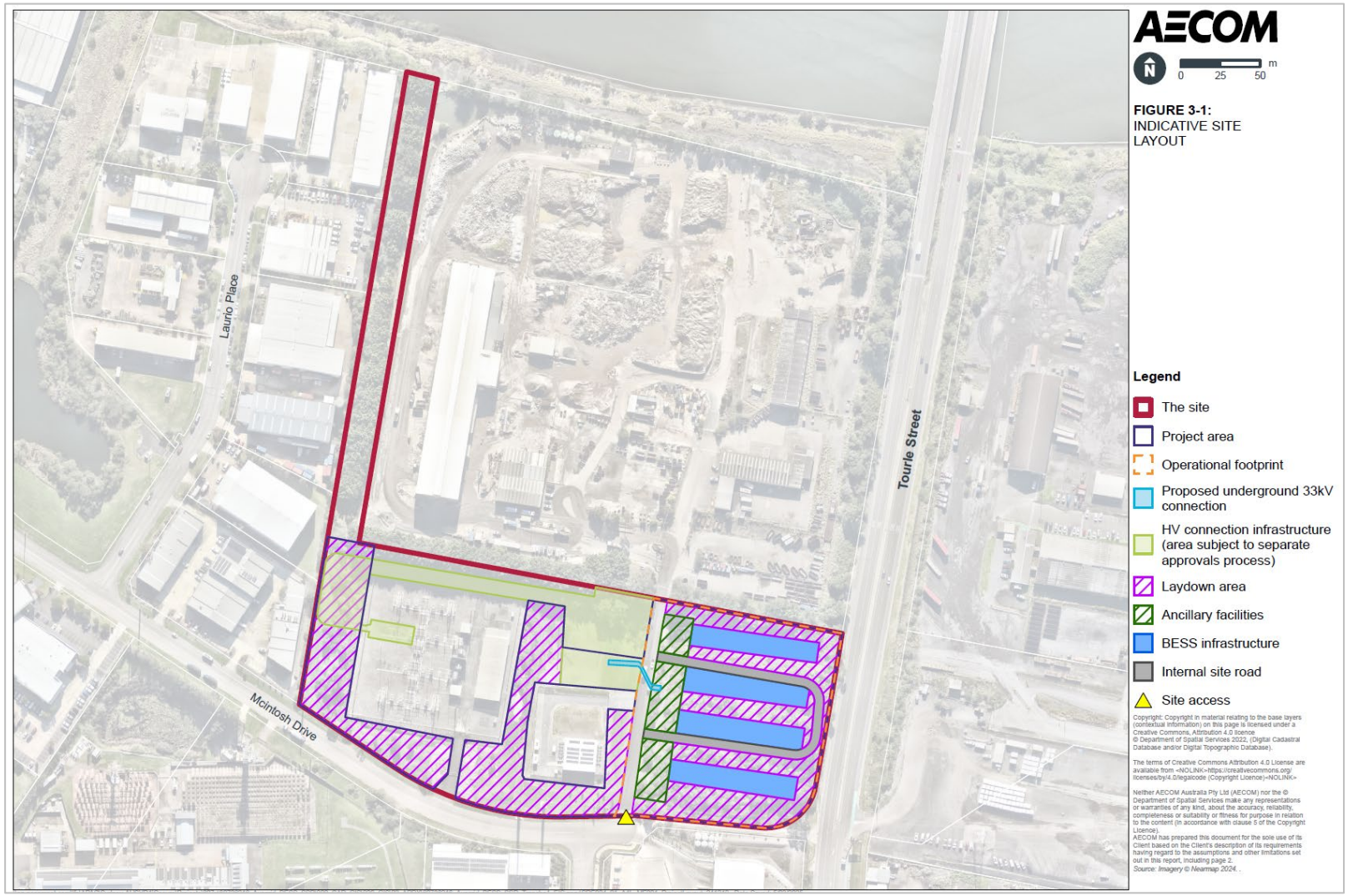
Vehicle access to the site is via a shared accessway that runs through the site connecting to McIntosh Drive in the south and to a recycling facility in the north. The shared accessway is on land owned by Ausgrid.

Construction of the Project is expected to commence in late-2025 and take approximately 18 months, with the peak construction period expected to last for 6 months. A construction workforce of up to 100 personnel would be on-site during the peak construction phase. These staff would be primarily located in Newcastle and Sydney.

Project specific plant such as the battery units are expected to be delivered from the Port of Newcastle or Port Botany. More general construction materials and equipment will be sourced from within the Hunter region.

The predicted traffic generated by the proposed construction, operation and decommissioning phases of the Project are outlined in this report. Relevant mitigation measures are also proposed.

Figure 1: Site Layout



Source: AECOM EIS Report

1.2 Environmental Assessment Requirements

This report supports a state significant development application under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (SSD- 72258210). The NSW Department of Planning, Housing and Infrastructure (DPHI) have issued Secretary's Environmental Assessment Requirements (SEARs) for the Project. Traffic and transport matters specified by the SEARs are listed in Table 1 along with the relevant response to each matter.

This Traffic Impact Assessment has also been prepared in response to the Agency Advice provided by Transport for New South Wales (TfNSW). Responses to each of the comments provided within the Agency Advice are outlined within Appendix A.

Table 1: Traffic and Transport SEARs and Responses

SEARs	Response
An assessment of the peak and average traffic generation, including light vehicles, shuttle buses, heavy vehicles and high risk heavy vehicles requiring escort and construction worker transportation.	Assessment of the peak and average traffic impacts provided at Section 4. The assessment includes a breakdown of the traffic volumes based on different vehicle types.
An assessment of the likely transport impacts to the site access route(s), including the above listed vehicles, site access point(s), any Crown land, particularly in relation to the capacity and condition of the roads, road safety and intersection performance.	The preferred access route for heavy vehicles and OSOM vehicles are discussed at Section 5. The Site is accessed via an existing shared accessway to McIntosh Drive. The design and impacts of the site access is discussed at Section 6. A review of the existing road safety data and casualty crash history is provided at Section 2.6. An assessment of the nearest State road intersection performance is provided at Section 4.1.6.
A cumulative impact assessment of traffic from nearby developments (including mining operations).	The cumulative traffic impacts of nearby developments is discussed at Section 4.1.5.
Provide details of measures to mitigate and / or manage potential impacts (developed in consultation with the relevant road authorities) including: - *a schedule of all required road upgrades (including resulting from heavy vehicle and heavy vehicle requiring escort traffic haulage routes),* - *clear figures of proposed road upgrades (including the site access point); and* - *road maintenance contributions, and any other traffic control measures.*	Mitigation measures and road upgrades are discussed at Section 7 and Section 8.

1.3 Road/Rail Authority Consultation

This Traffic Impact Assessment has been undertaken in consultation with TfNSW and City of Newcastle, with a summary provided in Table 2.

Table 2: Road Authority Consultation

Road Authority	Method	Correspondence
Transport for NSW	Email sent 16/01/2025 Reply received 30/01/2025	TfNSW provided the following feedback on the proposal: - The EIS to include calculations of the background traffic with and without a growth rate applied. No indication of an appropriate growth rate was provided (typically 1.5% per year). - Consideration of projects around Newcastle, for example, The Newcastle Inner City Bypass upgrades. - The EIS to provide crash data and undertake a road safety review in accordance with the Austroads Guide. - The EIS to undertake an assessment of the intersection of Industrial Drive/Steel River Boulevard, noting that Industrial Drive is highly trafficked. - That the EIS review the SEARs advice to ensure all aspects of the proposal are adequately considered.
City of Newcastle	Email sent 14/01/2025 Reply received 15/01/2025	Council do not have any traffic safety concerns on McIntosh Drive. Council did note that the following traffic concerns had been received by the community in nearby area: *1. During afternoon peak hours on weekdays, northbound vehicles in Steel River Boulevard while waiting to turn right onto Murray Dwyer Circuit may not be able to observe southbound vehicles on Steel River Boulevard.* *2. Sight distance concerns at the driveways to two businesses, one is located in Riverside Drive and another is located in Channel Road.* Council did not provide any comments on the proposed access routes at this stage.

1.4 Purpose of this Document

This Traffic Impact Assessment has been prepared to assess the construction, operational and decommissioning traffic impacts, and the access arrangements of the Project. The assessment responds to the SEARs and details how any adverse impacts of the Project's traffic, particularly from heavy vehicle use and oversize and overmass vehicles, would be avoided or managed.

More specifically, the report addresses the following key matters:

- Details of both light and heavy vehicle traffic volumes and proposed transport routes
- An assessment of the potential traffic impacts of the Project on road network function and safety
- An assessment of the capacity of the existing road network to accommodate the type and volume of traffic generated by the Project
- Details of measures to mitigate and/or manage potential impacts, including construction traffic control, road dilapidation surveys
- Details of access roads and how these connect to the existing road network and ongoing operational maintenance.

This traffic assessment has been undertaken in accordance with the *RTA Guide to Traffic Generating Developments* and relevant Austroads Guidelines.

2. Existing Conditions

2.1 Site Location

The Project is located at 1 McIntosh Drive in Mayfield West, approximately 7 kilometres northwest of Newcastle CBD. The Project is located in the eastern part of Lot 16 DP 270249 to the east of the existing substation (the Site). Figure 2 shows the location of the Site in relation to the surrounding transport network.

Figure 2: Site Location

Source: OpenStreetMap

The Site is well connected with the surrounding State road network. McIntosh Drive connects to Industrial Drive via Steel River Boulevard approximately 750 metres southwest of the Site. The nearby State roads facilitate access to Newcastle to the southeast, Sydney to the south, and other nearby regional centres.

The Site and the surrounding area are zoned E4 – General Industrial and are occupied by a range of warehouse, industrial and commercial properties.

The Project area is approximately 4.2 hectares, which includes the disturbance footprint for construction and operation of the BESS. The final operational footprint of the BESS is approximately 1.2 hectares. The Site is situated adjacent to the existing Ausgrid Mayfield West Substation and is currently vegetated or occupied by hardstand.

Access to the Site is provided via the existing shared accessway which has a width of approximately 9.0 metres and connects with McIntosh Drive to the south. The shared accessway is located on land owned by Ausgrid and contains an easement for access to the recycling facility north of the site.

Figure 3 provides an aerial photograph of the site and the surrounding area.

Figure 3: Aerial Photograph of Site and Surrounding Area

Source: MetroMap

2.2 Road Network

A summary of the surrounding road network is provided within Table 3.

Table 3: Road Network

Road	Typical Width	Speed Limit	Alignment
State Roads			
Tourle Street	21.8 m providing two through lanes and a bicycle lane in each direction, a raised central median, and channelised right turn lanes.	80 km/hr (60 km/hr extending for approximately 600m from Industrial Drive)	General north-south alignment between Industrial Drive in the south and its continuation as Cormorant Road in the north.
Industrial Drive	23.0 m providing two through lanes and a bicycle lane in each direction, a raised central median, and channelised right turn lanes.	80 km/hr	General northwest-southeast alignment between Pacific Highway in the northwest and Elizabeth Street in the southeast.
Local Roads			
Shared Accessway (Site Access) [1]	9.0 m accommodating two-way vehicle movement.	N/A – Private accessway	General north-south alignment extending north from McIntosh Drive for approximately 300 metres.
McIntosh Drive	13.0 m providing one traffic lane in each direction and kerbside parking on both sides of the road.	50 km/hr	General northwest-southeast alignment between Steel River Boulevard in the northwest and the Murray Dwyer Circuit in the southeast.
Murray Dwyer Circuit	12.1 m providing one traffic lane and a bicycle lane in each direction, and kerbside parking on the south side of the road.	50 km/hr	General east-west alignment between Steel River Boulevard in the west and McIntosh Drive in the east.
Steel River Boulevard	17.5 m providing one traffic lane in each direction and a central raised median.	50 km/hr	General northeast-southwest alignment between McIntosh Drive in the northeast and Industrial Drive in the southwest.

An overview of the key intersections within the surrounding area is provided in Table 4.

[1] The *NSW Road Network Classification Map* identifies the shared accessway as a local road, however, it is understood that this is a private accessway owned by Ausgrid with an easement for access to the recycling facility to the north.

Table 4: Intersection Summary

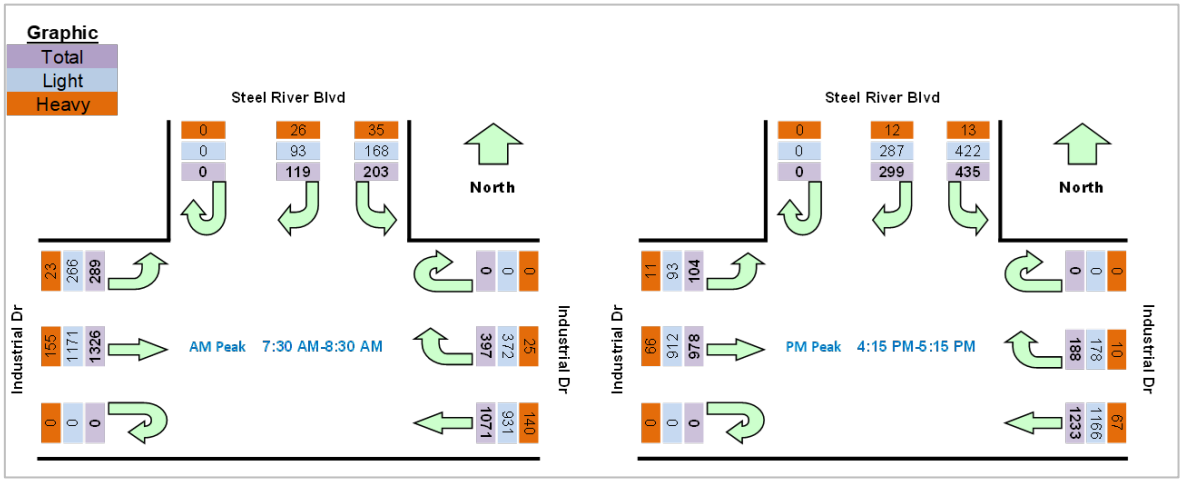
Road Name	Intersecting Road(s)	Configuration	Control / Turn Treatments
Industrial Drive	**Steel River Boulevard**	T-intersection (signalised)	Traffic signals are provided for each approach. A channelised right turn lane (CHR) is provided for vehicles turning right from Industrial Drive onto Steel River Boulevard. Pedestrian crossing legs are provided on the northeast and southeast approaches.
Industrial Drive	**Tourle Street**	T-intersection (signalised)	Traffic signals are provided for each approach. Two channelised right turn lanes (CHR) are provided for vehicles turning right from Industrial Drive onto Tourle Street.
Steel River Boulevard	**McIntosh Drive**	Roundabout	Roundabout signage and associated line marking are provided at all approaches.
Steel River Boulevard	**Murray Dwyer Circuit**	Cross Intersection	'Give-Way' signage and associated line marking are provided for vehicles exiting Murray Dwyer Circuit.
McIntosh Drive	**Murray Dwyer Circuit and the Shared Accessway**	Staggered Cross Intersection	'Give-Way' signage is provided for vehicles exiting Murray Dwyer Circuit.

2.3 Traffic Volumes

2.3.1 Industrial Drive/Steel River Boulevard Intersection

Turning movement count surveys were undertaken at the intersection of Industrial Drive/Steel River Boulevard in order to determine the existing traffic conditions. The surveys were undertaken on Thursday 21 November 2024 between 6:00am to 10:00am and 3:00pm to 7:00pm. The full survey results are presented at Appendix B, with the peak hour results summarised in Figure 3.

Figure 4: Turning Movement Count Peak Hour Survey Results



The survey results indicate the intersection currently carries a high level of traffic, in the order of 3,405 and 3,237 vehicle movements in the morning and evening peak hour, respectively. The morning peak hour was recorded as being from 7:30am to 8:30am and the evening peak hour was recorded from as being 4:15pm to 5:15pm.

The majority of vehicle movements are through movements on Industrial Drive. Steel River Boulevard accommodated 1,008 and 1,026 vehicle movements in the morning and evening peak hours. Approximately 70% of movements were northbound entering the Steel River Industrial Estate in the morning peak hour and 70% of movements were southbound exiting the estate in the evening peak hour.

Overall, the results indicate Industrial Drive and Steel River Boulevard accommodate a relatively high level of traffic, consistent with their classifications.

2.3.2 Shared Accessway to Site

Surveys were undertaken of the shared accessway to the site via McIntosh Drive to determine the existing traffic volumes. The surveys were completed on Thursday 21 November 2024 between 5:00am to 7:00pm, which encompasses an hour before and after the operating hours of the recycling facility north of the site. The accessway is gated and as such, the traffic volumes outside of the recycling facility operating hours are negligible. The full survey results are presented at Appendix B with a summary presented in Table 5.

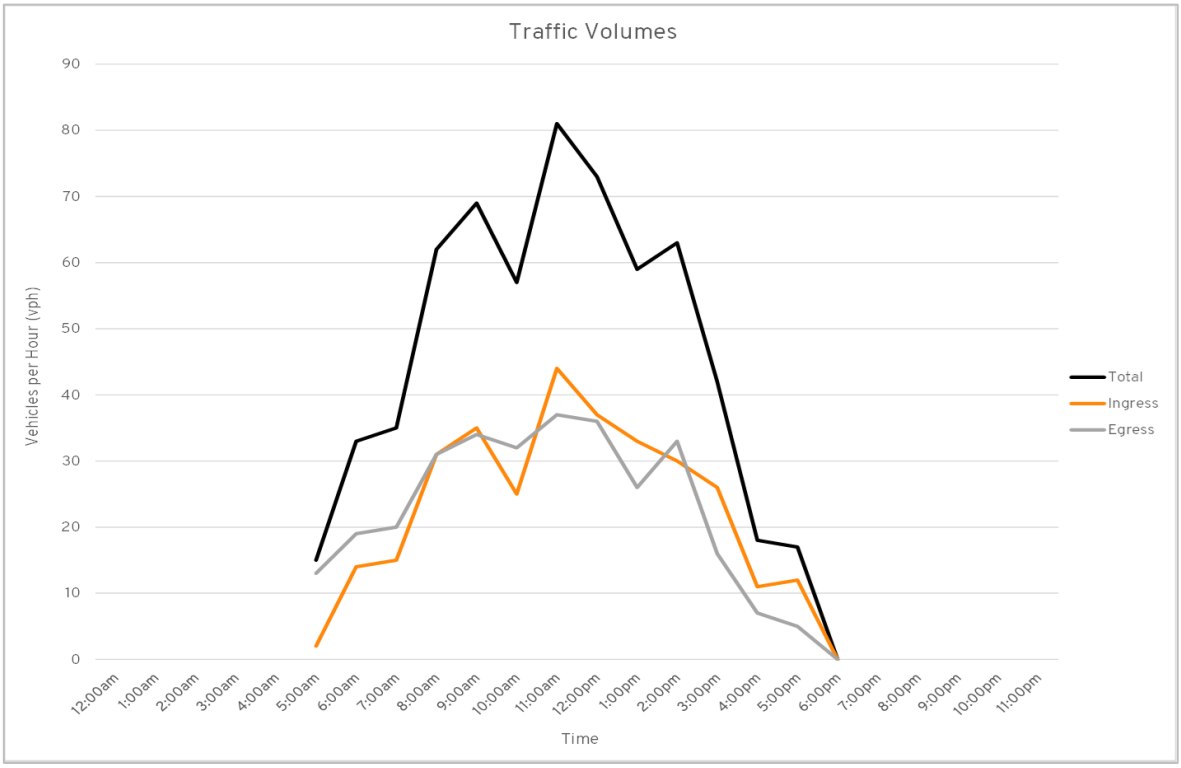
Table 5: Shared Accessway Traffic Volumes

	Typical Weekday Traffic Volumes (vpd)	Weekday AM Peak - 11:00 (vph)	Weekday PM Peak - 12:00 (vph)	Heavy Vehicle Percentage
Northbound (ingress)	315	44	37	72%
Southbound (egress)	309	37	36	
Two-way	624	81	73	

The survey data indicates the shared accessway currently experiences a moderate level of daily traffic, in the order of 624 vehicles per day, which is split evenly between northbound and southbound vehicles. The shared accessway accommodates approximately 72% heavy vehicle traffic, forming the majority of movements along the accessway.

The profile of the hourly traffic volumes over the survey period are shown graphically in Figure 5.

Figure 5: Hourly Weekday Traffic Volumes on Shared Accessway



The figure shows that the majority of movements along the accessway occur between 8:00am and 2:00pm with the peak hour recorded between 11:00am and 12:00pm.

Overall, the data indicates the shared accessway currently accommodates a moderate level of traffic and is able to accommodate an increase in vehicle traffic.

2.4 Sustainable Transport

2.4.1 Public Transport

There are three bus services which operate along Tourle Street within the vicinity of the Site, as outlined in Table 6.

Table 6: Bus Services Operating Nearest to Site

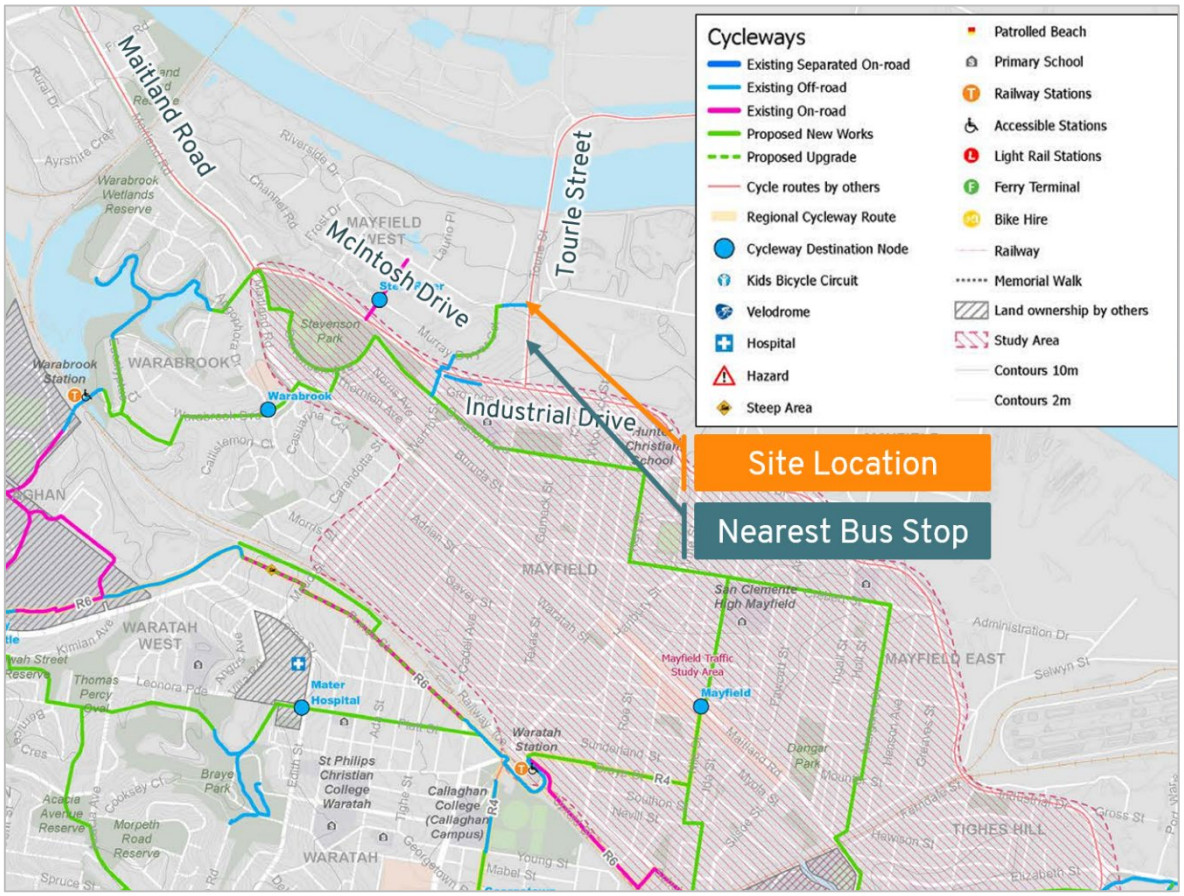
Service	Service	Nearest Stop	Approximate Frequency		
			Monday-Friday	Saturday	Sunday
130	Fingal Bay to Newcastle via Gan Gan Road	Located 250 metres south of the site on Tourle Street.	Every 20-60 minutes (4:30am-10:45pm)	Every 1-2 hours (6:15am-12:00am)	Every 1-2 hours (6:15am-10:00pm)
131	Fingal Bay to Newcastle (Express Service)	Located 250 metres south of the site on Tourle Street.	Five services operate between 7:45am to 6:30pm	No Services	No Services

Service	Service	Nearest Stop	Approximate Frequency		
			Monday-Friday	Saturday	Sunday
138	Newcastle Interchange to Lemon Tree Passage via Airport	Located 250 metres south of the site on Tourle Street.	Eight services operate between 6:30am to 6:45pm	No Services	No Services

2.4.2 Active Transport

Bicycle Lanes are provided on both sides of Industrial Drive, Tourle Street and Murray Dwyer Circuit. A shared path runs along the southern boundary of the Site which provides a link between McIntosh Drive and Tourle Street. This shared path provides access to on-road bicycle lanes in the nearby area and the broader cycling network within Newcastle, as shown in the City of Newcastle Cycling Plan in Figure 6.

Figure 6: Newcastle Cycling Plan 2021-2030



Source: City of Newcastle

2.5 Restricted Vehicle Access

2.5.1 B-Doubles

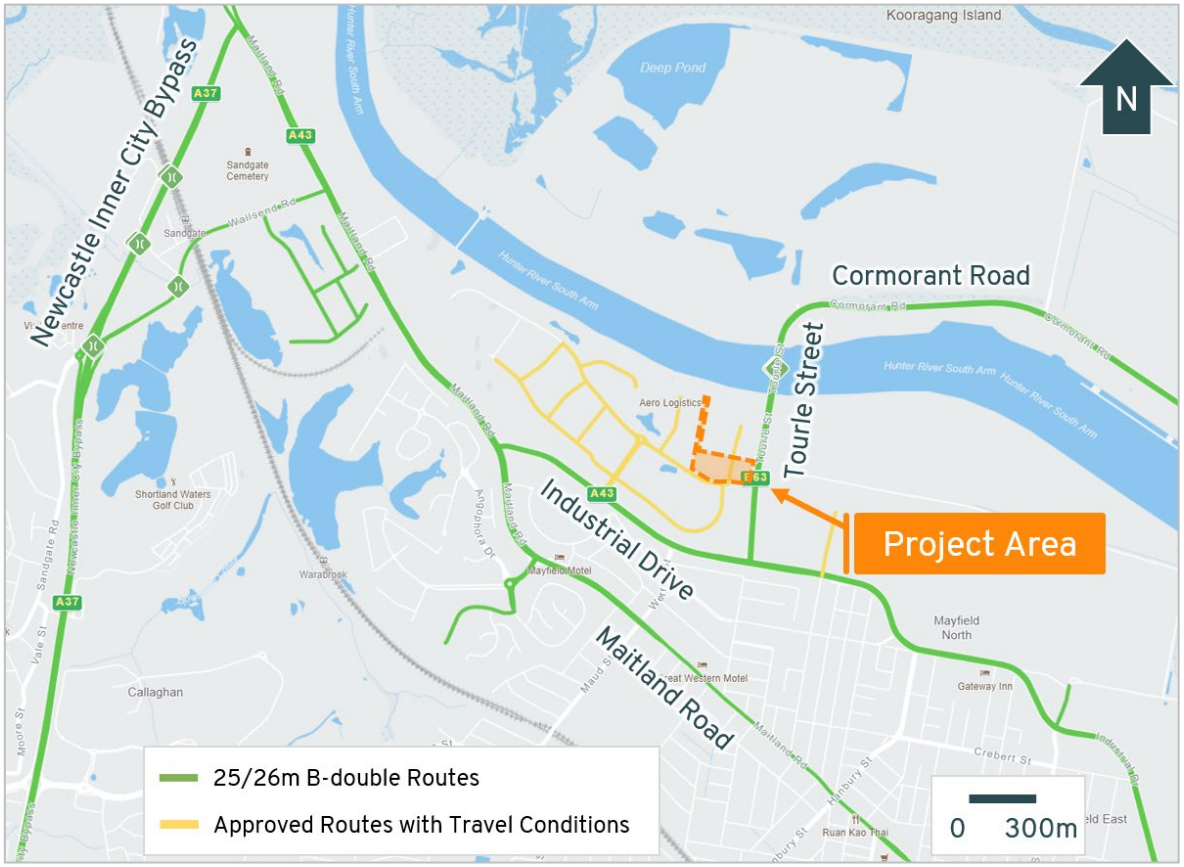
The TfNSW Restricted Access Vehicle Map for the surrounding area is provided within Figure 7. The green lines indicate approved B-Double routes while the yellow lines represent approved routes with travel conditions.

The figure shows that the surrounding State Road network are B-Double approved routes and that roads within the Steel River Industrial Estate, including the shared accessway through the Site, are approved subject to the following condition[2]:

> *Vehicles must have a destination within the precinct - all travel to and from an off street property must be in a forward direction - vehicles must not park on a road for any duration greater than one hour.*

Accordingly, the site has direct access to the B-Double approved road network.

Figure 7: TfNSW 26m B-Double Network Approved Roads



Source: TfNSW Restricted Access Vehicle Map

[2] Condition as detailed on the NHVR NSW Restricted Access Vehicle (RAV) Map.

2.5.2 Class 1 OSOM Vehicles

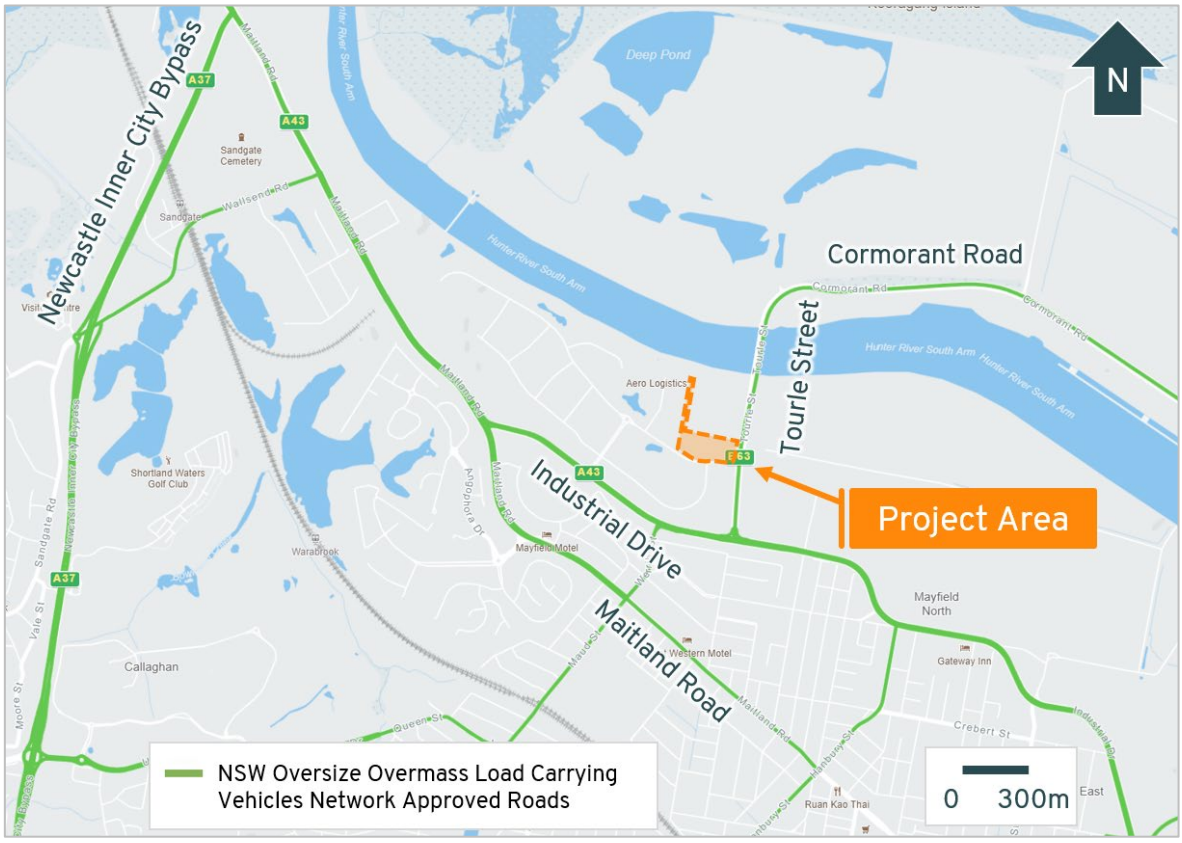
The TfNSW Oversize Overmass Load Carrying Vehicles Network map for the surrounding area is provided within Figure 8. The map shows approved routes for eligible vehicles operating under the Multi-State Class 1 Load Carrying Vehicles Mass and Mass Exemption Notices. A summary of the allowances under each exemption within New South Wales is provided below:

- Dimension: up to 5.0 m wide, 5.0 m high, 30.0 m long and 7.5 m rear overhang on approved (state owned) routes in NSW.
- Mass: up to 115.0 tonnes for rows of 8 tyres low loaders and up to 77.5 tonnes for rows of 4 tyres low loader combinations.

Vehicles operating in the daytime and not exceeding 3.5 m wide or 26 m long generally do not require a pilot vehicle.

The green lines indicate approved Class 1 OSOM Vehicle routes. Accordingly, the site has access to the Class 1 OSOM approved road network via Industrial Drive. The local roads within the Steel River Industrial Estate, including Steel River Boulevard and McIntosh Drive, are not approved for Class 1 OSOM vehicles. Therefore, access to the Site from Industrial Drive would require approval from City of Newcastle.

Figure 8: TfNSW Class 1 Oversize Overmass Load Carrying Vehicles Network Approved Roads



Source: NHVR OSOM Network Map

2.5.3 Special Purpose Vehicles (SPVs)

Vehicles built for a purpose other than carrying goods such as a mobile crane, a concrete pump or drill rig are defined as Special Purpose Vehicles (SPVs).

The NSW Special Purpose Vehicle Network map provides details of the approved roads as well as conditions of access and travel restrictions for eligible SPVs operating under the:

- National Class 1 Special Purpose Vehicle Notice, or
- NSW Class 1 4-Axle & 5-Axle All Terrain Mobile Crane Mass and Dimension Exemption Notice, or
- NSW Class 1 All Terrain Mobile Crane and Dolly Combination Mass and Dimension Exemption Notice.

Roads that are not approved on the map require an access permit from the National Heavy Vehicle Regulator or the relevant road manager. There are six SPV access networks for cranes travelling on approved State Roads in NSW:

- SPV Level 1: Cranes and SPVs up to 40 tonnes that comply with the Bridge Formula.
- SPV Level 2: Crane and dolly combinations up to 70 tonnes that comply with the Bridge Formula.
- SPV Level 3: 3-axle All Terrain Cranes up to 36 tonnes and 4-axle All Terrain Cranes up to 43 tonnes.
- SPV Level 4: 4-axle All Terrain Cranes up to 45.8 tonnes and 5-axle All Terrain Cranes up to 50 tonnes.
- SPV Level 4 / 12 tonnes per axle: 4-axle All Terrain Cranes up to 48 tonnes and 5-axle All Terrain Cranes up to 50 tonnes.
- SPV Level 6: 5-axle All Terrain Cranes up to 60 tonnes.

The approved routes for SPV Level 4 vehicles travelling within the surrounding area are identified within Figure 9. The figure shows that SPV Level 4 vehicles are typically approved on the surrounding State road network and on roads within the Steel River Industrial Estate, including the shared accessway through the site, subject to the following condition[3]:

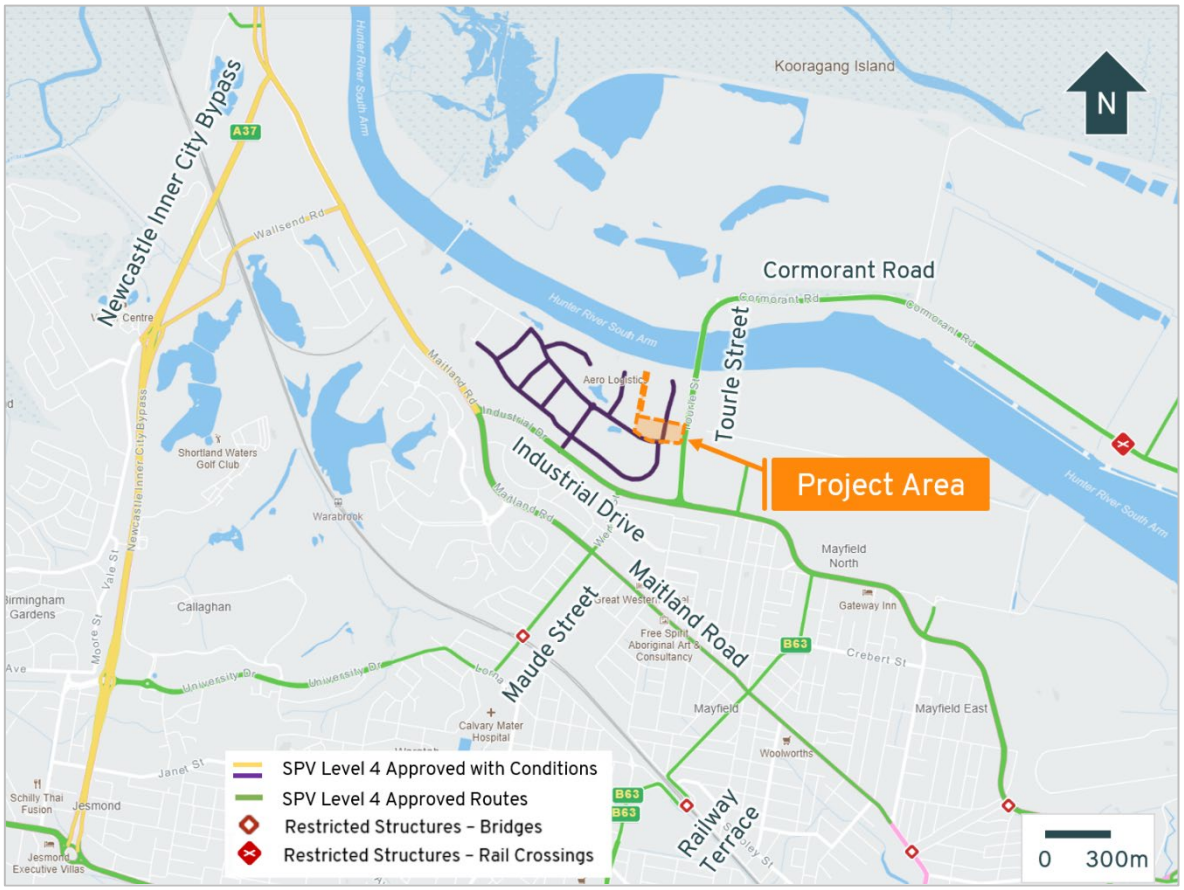
> *Vehicles must have a destination within the precinct - all travel to and from an off street property must be in a forward direction - vehicles must not park on a road for any duration greater than one hour.*

Some approved routes for SPV classified vehicles are limited due to restricted structures (bridges) and rail level crossings on the network in the surrounding area, including:

- Bridge on Maud Street over Main Northern Railway, approximately 2.3 kilometres southwest of the site restricted for SPV Level 3 and above
- Bridge on Railway Street over Main Northern Railway, approximately 4.3 kilometres southwest of the site restricted for SPV Level 3 and above
- Bridge on Maitland Road over Industrial Railway, approximately 4.9 kilometres southeast of the site restricted for all SPV classified vehicles
- Rail level crossing on Cormorant Road approximately 5.6 kilometres northeast of the site for all SPV classified vehicles.

[3] Condition as detailed on the NHVR NSW Special Purpose Vehicle Network Map.

Figure 9: TfNSW SPV Level 4 Network Approved Roads



Source: NHVR Special Purpose Vehicle Access Map

Figure 9 shows that the SPV Level 4 vehicle has access to the Project Area via the surrounding State road network, however, several bridges and a rail level crossing have restricted use. SPV routes to and from the Project would need to be assessed when specific details of the required vehicles are established to avoid road infrastructure that does not have capacity for the proposed loading.

2.6 Crash History

Amber has conducted a review of the TfNSW Centre for Road Safety Crash and Casualty Statistics database for all recorded crashes within the surrounding area of the Project. The crash database provides the location and severity of all injury and fatal crashes for the five-year period from 2019 to 2023. The search area included the following roads:

- The entirety of McIntosh Drive, Street River Boulevard, Murray Dwyer Circuit and the shared accessway through the site; and
- All associated intersections.

The results of the crash search are summarised in Table 7.

Table 7: Crash Search Results

Road	Location	Severity	Crash Type	Date and Time	Light and Weather Conditions
Industrial Drive	Intersection with Steel River Boulevard	Minor/Other Injury	Rear end (vehicles in same lane)	July 2020 (14:00 - 15:59)	Daylight (Fine)
		Moderate Injury	Right lane change crash	September 2020 (16:00 - 17:59)	Daylight (Fine)
		Serious Injury	Out of control on road	October 2020 (06:00 - 07:59)	Dawn (Raining)
		Moderate Injury	Rear end (vehicles in same lane)	November 2020 (14:00 - 15:59)	Daylight (Fine)

The review indicates that four crashes have been recorded at the intersection of Industrial Drive and Steel River Boulevard. Two of the crashes were rear end type, and no fatal crashes were recorded. It is noted that Industrial Drive is a State road and the number of recorded crashes is unsurprising given the traffic volumes and travel speeds at the intersection.

Given the large search area, the associated traffic volumes on the roads and the road classifications, it is concluded that the road network is currently operating in a relatively safe manner.

3. Project Description

3.1 The Project

The Project involves the development, construction, operation and decommissioning of a BESS with a maximum capacity of 200 MW/400 MWh (2 hours). The Project would consist of the following components:

- Containerised battery units (112 Megapacks) and associated infrastructure, including inverters and 56 medium voltage transformers. The Megapacks would stand at a height of approximately 2.75 m, with a footprint of 1.65 m by 8.8 m
- 33kV underground cable connection from the battery units to Mayfield West zone substation infrastructure
- Combined switch room and control room building
- Eight Ring Main Units (RMU)
- On-site workshop facility
- Two auxiliary transformers
- Backup diesel generator
- Two spaces for on-site car parking
- Other ancillary infrastructure including fire suppression, stormwater management, 2.4m high boundary security chain wire fencing, lighting and CCTV
- Access to the site would be via an existing Ausgrid-owned, shared driveway off McIntosh Drive.

3.2 Construction Information

The physical construction of the Project is expected to commence in late-2025 and take approximately 18 months, with the peak construction period expected to take 6 months. Construction activities would be undertaken during standard daytime construction hours as follows:

- Monday to Friday: 7am – 6pm
- Saturday: 8am – 1pm
- No work on Sundays or public holidays.

Some construction activities may require work on Sundays or during other out of hours periods due to electrical outage constraints. Any construction outside of normal working hours would only be undertaken with prior approval from relevant authorities and consultation with impacted road users.

A construction workforce of up to 100 full-time equivalent (FTE) personnel would be on-site during the peak construction phase. These staff would be primarily located in Newcastle and Sydney.

A Traffic Management Plan (TMP) would be prepared by the appointed contractor prior to construction commencing as outlined in Section 7 of this report.

4. Traffic Assessment

Traffic generated by the Project can be separated into three distinct stages: construction, operation and decommissioning. The peak traffic generating potential is during construction which generates trips associated with the workforce accessing the Project and the delivery of raw materials and plant. During operation the Project is expected to generate a lower amount of traffic associated with up to 1-2 full time maintenance personnel accessing the site per week. Decommissioning is anticipated to generate a similar level of traffic to the construction stage.

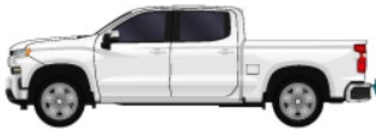
The following provides an assessment of the potential traffic impacts of the Project on the road network function for each of the three stages.

4.1 Construction Phase

4.1.1 Standard Construction Traffic Generation

Construction traffic generated by the Project on a day-to-day basis can be broadly separated into the categories outlined in Table 8.

Table 8: Standard Construction Traffic

Terminology	Definition	Example Vehicle Images
Light Vehicles	The use of light vehicles will be associated with transporting the workforce to/from the Project. A conservative vehicle occupancy of approximately 1.5 people per car has been adopted to calculate the light vehicle traffic generation noting the workforce would be encouraged to carpool.	
Heavy Vehicles		
Rigid Trucks	Rigid Trucks will be used to deliver raw materials and smaller plant and have a typical length between 8 and 13 metres.	
Truck and Dog	Truck and Dog vehicles consist of a rigid truck towing either a dog trailer or a pig trailer and are not more than 19 metres in length. A dog trailer is a trailer with axles at either end of the trailer, a pig trailer has the axles centred on the trailer. These vehicles will be utilised to transport the majority materials to/from the site.	
Semi-trailers	Semi-trailers will be used to transport larger equipment and materials. These vehicles consist of a truck and a single trailer with a total length of 19 metres.	
B-Doubles	B-Doubles will also be used to transport larger plant. B-Doubles consist of a truck with two trailers and have a maximum length of 26 metres.	

Terminology	Definition	Example Vehicle Images
Special Purpose Vehicles	A vehicle where the primary purpose for which it was built was not the carriage of goods or passengers (e.g. mobile cranes, concrete pump trucks, drilling rigs).	
Non High Risk OSOM	Class 1 OSOM vehicles which can operate on the approved network outlined in Section 2.5.2 subject to travel conditions. This includes the vehicle required to transport the batteries, which would be kept under 3.5 metres in width and less than 26 metres length to comply with the *National Heavy Vehicle Regulator Multi-State Class 1 Load Carrying Vehicle Mass Exemption Notice 2020 Information Sheet.*	

The construction traffic volumes for the Project have been provided by Ausgrid. It is anticipated that during peak construction the Project would generate up to 136 light vehicle and 18 heavy vehicle trips per day. Table 9 summarises the forecast traffic volumes expected to be generated during the construction period of the Project.

Table 9: Traffic generation during construction period

Vehicle Type		Average Construction Period		Peak Construction Period	
		Vehicle Trips per Day (vpd)	Peak Hour Trips (vph)	Vehicle Trips per Day (vpd)	Peak Hour Trips (vph)
Light Vehicles (LV)		68	34	136	68
Heavy Vehicles (HV)	Rigid Trucks	2	1	4	1
	Truck and Dog	2	1	0	0
	Semi-trailers	0	0	0	0
	B-Doubles	1	1	2	1
	Special Purpose Vehicles (SPV)	2	1	2	1
	Non High Risk OSOM	4	1	10	1
	HV Subtotal	*11*	*5*	*18*	*4*
Total		**79**	**39**	**154**	**72**

Overall, the Project is expected to generate up to 72 vehicles per hour in the morning and evening peak hours during the peak construction period, which would reduce to 39 vehicles per hour during the average construction periods.

4.1.2 OSOM Vehicles

There are a mix of OSOM vehicles required for construction which are not classified as high-risk, such as:

- cranes
- drum rollers
- dump truck
- concrete pumps
- excavators
- grader
- compactors
- pile driving rig
- cable trenching and laying equipment.

It is anticipated that the vehicles would comply with the Class 1 exemption notices and would be able to operate on the approved NSW Special Purpose Vehicle Network. The vehicles would access the site from McIntosh Drive via Industrial Drive, which are rated to accommodate complying vehicles on the SPV Network, subject to conditions.

Many of the vehicles listed above would not create daily trips to and from the site. It is expected that there will be influxes of arrivals and departures from the site depending on the phase of the construction. Once arrived, they would remain until not required, before being removed from the Site. These trips would be generated outside of peak site access hours.

The vehicle combinations to transport the batteries are to be confirmed but are anticipated to be prime mover with 2 by 4 axle dolly and 4 by 4 axle low loader. These combinations would be kept under 3.5 metres width and less than 26 metres length, would not be classified as high risk, and would comply with the *National Heavy Vehicle Regulator Multi-State Class 1 Load Carrying Vehicle Mass Exemption Notice 2020 Information Sheet*. These vehicles would access the site from McIntosh Drive via Industrial Drive. Industrial Drive is approved for Class 1 OSOM vehicles, however, the local roads within the Steel River Industrial Estate are not approved and would require approval from City of Newcastle.

Vehicle types and any necessary permits would be confirmed and obtained (as needed) once the construction methodology is determined.

4.1.3 High Risk OSOM Vehicles

There are no high-risk OSOM vehicles anticipated for the construction of the Project. The largest vehicle expected to access the site is the battery container vehicle, which would be kept under 3.5 metres width and 26 metres length. These vehicles would be classed as OSOM and not considered high-risk. These vehicles are permitted to travel on the Class 1 OSOM network, as outlined in Figure 8, and would comply with the *National Heavy Vehicle Regulator Multi-State Class 1 Load Carrying Vehicle Mass Exemption Notice 2020 Information Sheet.*

The following assessment focuses on the impacts of the regular light and heavy vehicles outlined in Table 9 which generate the bulk of the traffic and represent the typical traffic impact of the Project on a day-to-day basis.

4.1.4 Traffic Distribution

Traffic accessing the site would do so via the existing shared accessway to McIntosh Drive which connects with the State road network via Industrial Drive.

It is anticipated that the majority of the workforce for the construction of the Project would be located in Newcastle, with some located in Sydney. Materials and equipment will generally be sourced from Newcastle and the surrounding area where practicable, with all larger plant expected to be delivered from Port of Newcastle or Port Botany.

During the morning peak all vehicle trips would be toward the site and in the evening peak all vehicle trips would be away from the site. The majority of heavy vehicle trips would be distributed throughout the day and would be split evenly between inbound and outbound trips.

The following provides a breakdown of the anticipated access distribution for each of the vehicle classifications outlined within Table 9:

- **Light Vehicles:** 50% from the east and 50% from the west on Industrial Drive.
- **Heavy Vehicles:** 50% from the east and 50% from the west on Industrial Drive.
- **Heavy Vehicles delivering plant and larger components:** The plant would be delivered from Port of Newcastle or Port Botany, with the delivery port to be determined prior to construction. For this assessment it has been assumed that 50% are from the east and 50% are from the west on Industrial Drive.

All vehicles accessing the Project do so via the intersection of Industrial Drive and Steel River Boulevard. Vehicles entering and exiting the site along the shared accessway have been assessed as traveling via McIntosh Drive. As such, all entering movements will be left-in and all exiting movements will be right-out at the Site access.

The peak hours for construction would occur at the start and end of the day when staff are transported to/from the site. For the purpose of this assessment, it has been assumed that all staff would arrive on-site between 6:00am and 7:00am. However, staff generally have staggered finish times which results in the evening peak hour being less pronounced. For the purpose of this assessment, it has been assumed that all staff depart between 5:30pm and 6:30pm and the evening peak traffic volume is the same as the morning peak volume, which is highly conservative.

The resulting peak hour construction traffic volumes generated by the Project at the Site access are outlined in Figure 10. The peak hour volumes generated by the Project through the intersection of Industrial Drive/Steel River Boulevard are shown in Figure 11.

Figure 10: Expected Project Traffic During Peak Construction – Site Access on McIntosh Drive

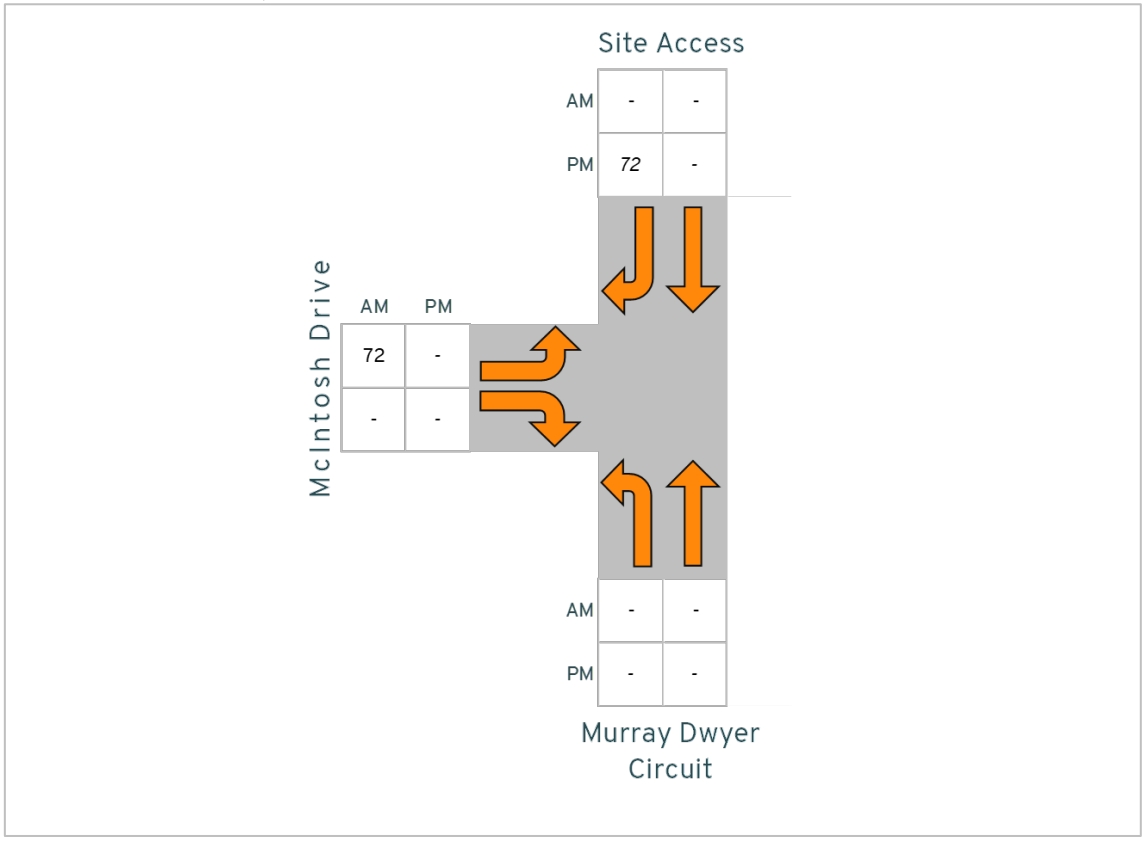
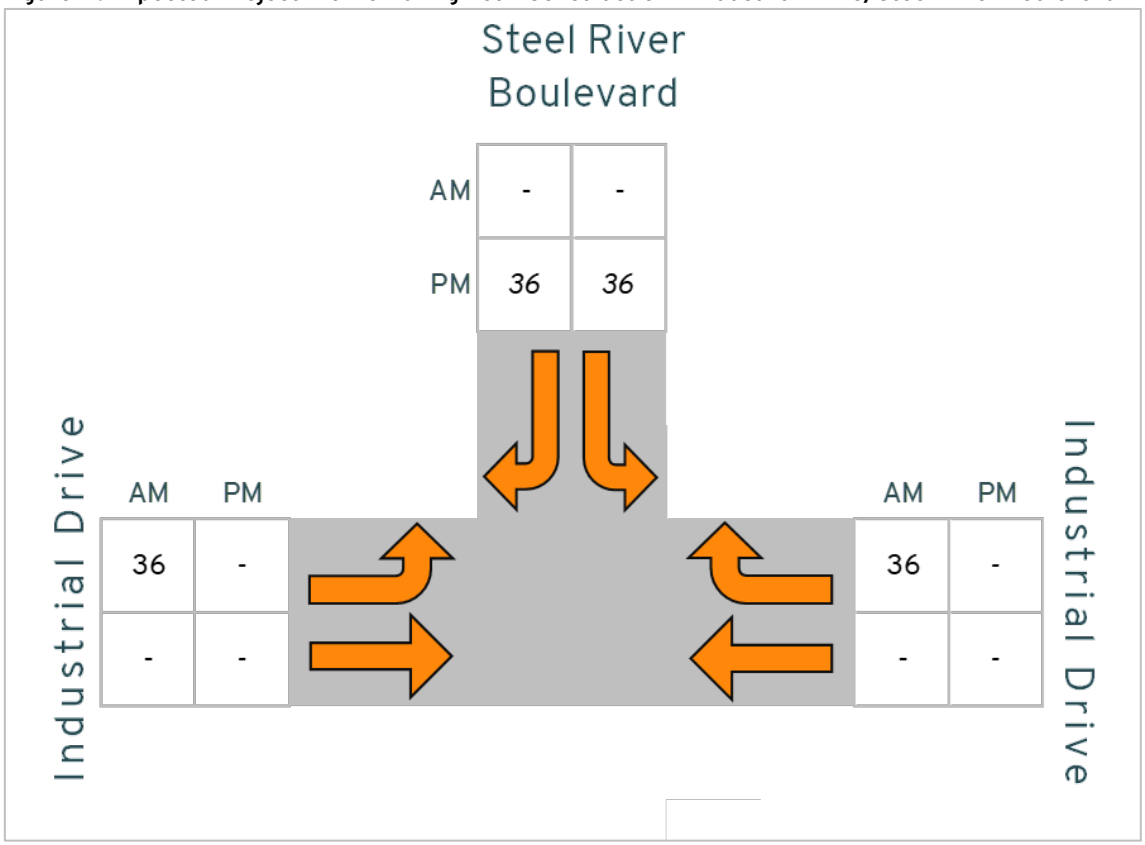


Figure 11: Expected Project Traffic During Peak Construction – Industrial Drive/Steel River Boulevard



4.1.5 Cumulative Traffic Impacts

The primary traffic impact of the Project is generated during construction, which is anticipated to commence in late-2025 and take approximately 18 months.

To gain an appreciation of other potential traffic generating activities in the locality that may result in cumulative traffic impacts, a review of the DPHI major projects website for within the Newcastle LGA was undertaken. A search was also completed of the City of Newcastle development activity database for development applications within 1 kilometre of the Project[4].

The search identified a number of projects occurring in the locality, noting that most do not propose to utilise Industrial Drive for access. A summary of the key major projects that are proposed in the surrounding area are identified in Table 10. The highlighted project is likely to use Industrial Drive within the vicinity of the Project.

Table 10: Assessment of Cumulative Impacts of Nearby Developments

Project	Description	Potential Vehicle Conflict
Clean Energy Precinct (Preparing EIS)	The Port of Newcastle propose to construct a facility for the production of clean energy. Once constructed the Clean Energy Precinct Concept would help facilitate clean energy production, storage, transmission, domestic distribution and international export.	Heavy vehicle transport routes for the Clean Energy Precinct project are likely to utilise Cormorant Road (an extension of Tourle Street) and Industrial Drive, which could result in a cumulative impact on traffic if the construction programs overlap. Construction is expected to commence in early 2025 and may last up to 24 months. While there is potential for cumulative traffic impacts with the proposal, this project is still at the preparing EIS stage and an assessment of the cumulative impacts cannot be completed at this time.
Tomago BESS (Determination Phase)	AGL is proposing to build either a BESS of up to 500 MW or a Gas Fired Power Station at 1940 Pacific Highway, Tomago. AGL have confirmed in its application documentation that they will build either the BESS or the Power Station, but not both.	Construction is estimated to start in 2026 and last for approximately 18 months. It is understood from the traffic impact assessment that proposed haulage routes for construction would be along Pacific Highway, New England Highway and Maitland Road. Light vehicles would be drawn from the surrounding area. As such, it is not anticipated that construction vehicles would utilise Industrial Drive and have a cumulative impact on the Project.

[4] Applications on the City of Newcastle database sourced from Scoping Report prepared by AECOM, Revision 3, dated 31 October 2024.

Project	Description	Potential Vehicle Conflict
Hunter Valley Hydrogen Hub (Determination Phase)	The Hydrogen Hub would include a hydrogen production facility, hydrogen supply pipeline and recycled water pipeline. The facility is proposed to be located at 43-45 Greenleaf Road, Kooragang Island. In October 2024 Origin announced its intention to exit the Hunter Valley Hydrogen Hub. Orica has advised that it remains committed to exploring opportunities in the renewables hydrogen sector.	Construction is estimated to start in 2025 and last 25 months. It is understood from the traffic impact assessment that proposed haulage routes for construction would be along Cormorant Road, Teal Street, Nelson Bay Road, and Greenleaf Road. Light vehicles would be drawn from the surrounding area. As such, it is not anticipated that construction vehicles would utilise Industrial Drive and have a cumulative impact on the Project.
Light Industrial Units (Determination Phase with Council)	Precinct Capital have submitted a development application for 60 light industrial units at 60 Riverside Drive, Mayfield West.	If construction occurs at the same time as the Project, there would be a possibility of cumulative traffic impact, given that access is via the Industrial Drive/Steel River Boulevard intersection. The DA does not provide the indicative timeframes for construction. TfNSW have indicated that upgrades will be required at the intersection of Steel River Boulevard/Industrial Drive to accommodate the development traffic. This would include extending or duplicating the right-turn lane on Industrial Drive[5].

The haulage/access route for the Project is clearly understood and there does not appear to be a direct cross over between the proposed haulage routes and routes of nearby projects. The construction window of the Project is relatively short and as such, the cumulative traffic impacts on the surrounding road network are expected to be negligible.

4.1.6 Traffic Assessment

In order to determine the ability of the road network to accommodate the traffic expected to be generated during peak construction periods, a traffic modelling exercise has been undertaken for the intersection of Industrial Drive/Steel River Boulevard using the SIDRA intersection modelling software.

Level of Service (LOS) is a qualitative measure used to describe the operating conditions of a section of road or an intersection. Levels of Service are designated from A (free flow conditions) to F (forced flow with stop start operation, long queues and delays) and represent the perception of the road conditions by motorists. This includes factors such as speed and travel time, freedom to manoeuvre, traffic interruptions, comfort and convenience, and safety.

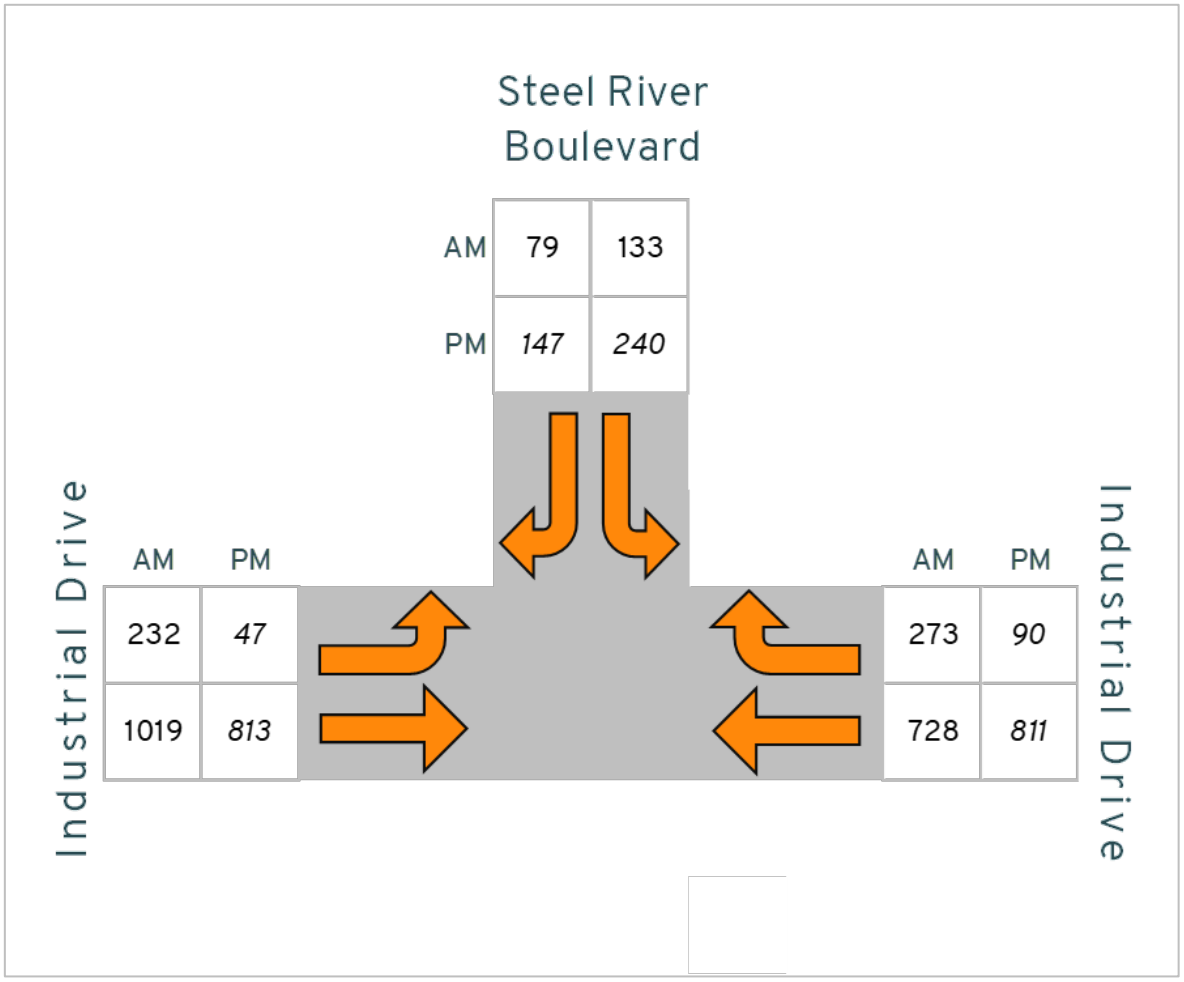
The best indicator of the LOS at an intersection is the average delay experienced by vehicles at that intersection. For traffic signals, the average delay over all movements should be taken.

[5] City of Newcastle Development Application Committee Meeting minutes, dated 16 July 2024.

The modelled traffic volumes at the intersection have been based on the morning and evening peak hour of construction (i.e. 6:00am-7:00am and 5:30pm-6:30pm). The signal phasing of the traffic signals has been based on observations at the intersection during the relevant peak periods.

The Project traffic presented at Figure 11 has been added to the surveyed traffic volumes during the peak periods. A growth rate has not been applied to the surveyed background traffic given construction is planned to commence within 12 months of the traffic surveys. The modelled traffic volumes are presented at Figure 12.

Figure 12: Expected Peak Hour Traffic During Peak Construction – Industrial Drive/Steel River Boulevard



The results of the SIDRA analysis are provided within Appendix C and summarised in Table 11. The analysis has been completed for the morning and evening peak hours during the peak construction period (i.e. background traffic plus construction traffic).

Table 11: Summary of SIDRA results – Construction peak hours

Approach / Movement		Morning Peak Hour				Evening Peak Hour			
		Degree of Saturation	Average Delay (sec)	95% Queue (m)	Level of Service	Degree of Saturation	Average Delay (sec)	95% Queue (m)	Level of Service
Industrial Drive (East)	Through	0.257	2.6	36.8	A	0.285	2.6	42.3	A
	Right	0.785	54.7	136.3	D	0.449	59.8	38.9	E
Steel River Boulevard (North)	Left	0.081	5.8	0	A	0.146	5.7	0	A
	Right	0.452	57.8	34.1	E	0.855	68.6	73.5	E
Industrial Drive (West)	Left	0.228	16.3	33.3	B	0.034	8.1	2.1	A
	Through	0.587	21	160.4	B	0.363	10.1	83.3	A
All Vehicles		**0.785**	**19.7**	**160.4**	**B**	**0.855**	**12.8**	**83.3**	**A**

The SIDRA analysis indicates the following:

- The average delay for all vehicles through the intersection is 19.7 seconds and 12.8 seconds in the morning and evening peak hours, respectively. This represents a level of service B and A during each of the peak hours.
- The degree of saturation for the intersection is 0.785 and 0.855 in the morning and evening peak hours, respectively. This falls well within the metrics of acceptability for a signalised intersection.
- The 95th percentile queue of vehicles turning right into Steel River Boulevard is 136.3 metres and 38.9 metres in the morning and evening peak hours, respectively. These queues can be accommodated within the storage length of the channelised turn lane without impacting through movements on Industrial Drive. Therefore, whilst the recorded LOS was E, it is considered that the operation of the right turn is acceptable given the impacts are temporary and only during peak construction.
- The LOS E for the right turn movement from Steel River Boulevard is due to the average delay of 58 seconds and 69 seconds in each of the peak hours. The average delay is due to the short green time of this phase and the overall cycle time of the signals, which requires vehicles making this movement to typically wait for one cycle.

It is noted that the existing traffic volumes on the road network during the construction peak hours are significantly lower than the traffic volumes recorded during the road network peak hours as shown in Table 12. Therefore, the addition of 72 vehicle movements during the construction peak hours will result in lower volumes than the existing road network peak hours.

Table 12: Traffic Volumes – Construction Peak Hour vs Road Network Peak Hour

Construction Peak Hour Volumes		Road Network Peak Hour Volumes	
Morning Peak (6am-7am)	**Evening Peak (5:30pm-6:30pm)**	**Morning Peak (7:30am-8:30am)**	**Evening Peak (4:15pm-5:15pm)**
2,464	2,076	3,405	3,237

During the middle of the day the construction traffic movements are expected to be predominantly associated with heavy vehicles, with approximately 4 vehicle movements per hour expected. This increase in traffic would be within the daily variation of traffic volumes on Industrial Drive and can be readily accommodated, including during the road network peak hours.

Accordingly, the road network is able to accommodate the traffic generated by the development during the construction and operational periods, irrespective of Port of Newcastle or Port Botany being chosen as the delivery port.

4.2 Operational Phase

During operation, the BESS is expected to generate a minimal level of traffic associated with maintenance and operation services. The BESS is expected to be operated by up to 1-2 maintenance personnel and occasional deliveries resulting in a traffic generation of up to four vehicle movements per week, which would result in a negligible change to the traffic environment. There would also be occasional heavy vehicles delivering to the Site, but only as required for maintenance.

4.3 Decommissioning Phase

At the end of the operational life of the Project all above ground infrastructure would be dismantled and removed from the Project Area. Traffic generation during decommissioning would be similar to traffic generation during the average construction period. A Decommissioning Traffic Management Plan would be prepared prior to the decommissioning phase in conjunction with the relevant road authorities. This would aim to ensure adequate road safety and road network operations are maintained.

4.4 Summary

The Project is expected to generate its highest traffic volumes during the peak construction period. The assessment presented above indicates that the road network is able to accommodate the Project traffic during the peak construction period. The assessment also included a review of the cumulative traffic generated by other major Projects within the surrounding area.

During construction the vehicle trips throughout the middle of the day are expected to be predominantly associated with heavy vehicles, with approximately four vehicles per hour expected. This increase in traffic would be within the daily variation of traffic volumes on the road network and can be readily accommodated.

During operation the increase in traffic of up to four vehicle movements per week would result in a negligible change to the existing traffic environment.

Accordingly, the road network is able to readily accommodate the traffic generated by the Project during the construction, operation, and decommissioning periods.

5. Route Assessment

5.1 Plant Delivery – Heavy Vehicles

5.1.1 Access Routes

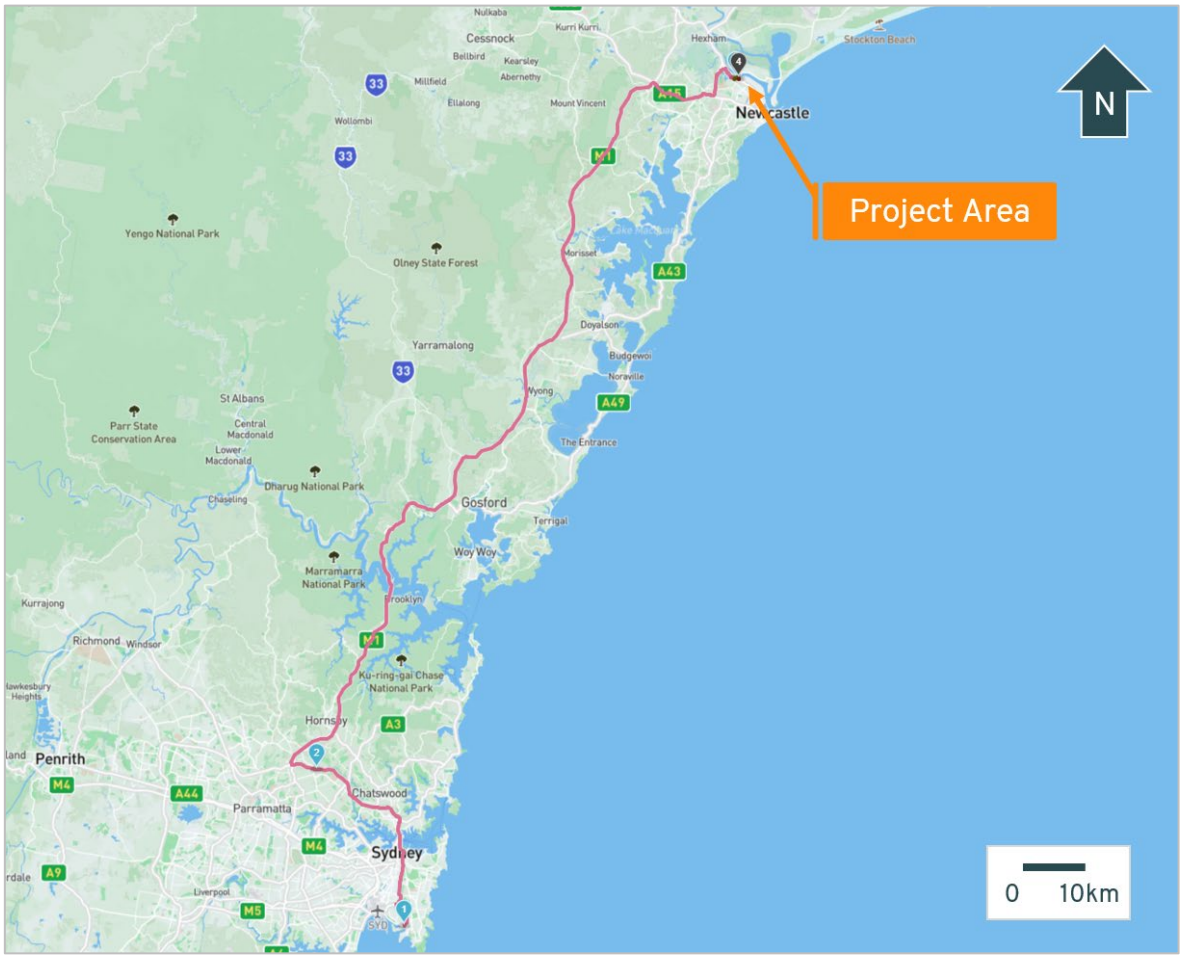
All plant is expected to be delivered from Port of Newcastle or Port Botany. The following provides a review of the proposed access routes for heavy vehicles (excluding OSOM vehicles) travelling from the ports. The proposed access routes are outlined in Figure 13 and Figure 14, with a summary of the relevant roads provided in Table 13.

The access routes utilise roads that are designated for B-Double vehicles as outlined within the NHVR Restricted Access Vehicle Map and subsequently vehicles up to a 26 metre B-Double are able to readily access the Site from each port.

Figure 13: Access Route from Port of Newcastle

Source: NHVR Route Planner – Route ID: 1VXJB-1 v1

Figure 14: Access Route from Port Botany



Source: NHVR Route Planner – Route ID: 1VXJB-1 v2

Table 13: B-Double Vehicle Routes - Access Roads

Road Name	State	Jurisdiction	B-Double Approved
Port of Newcastle			
Selwyn Street, George Street	New South Wales	City of Newcastle	Approved
Industrial Drive		TfNSW	Approved
Steel River Boulevard		City of Newcastle	Approved with conditions
McIntosh Drive			
Site Accessway			

Road Name	State	Jurisdiction	B-Double Approved
Port Botany			
Foreshore Road	New South Wales	TfNSW	Approved
M1, M2, M1			Approved with conditions
Pacific Motorway			Approved
Newcastle Link Road			
Newcastle Road			
Newcastle Inner City Bypass			
Sandgate Road			
Wallsend Road			
Maitland Road			
Industrial Drive			
Steel River Boulevard		City of Newcastle	Approved with conditions
McIntosh Drive			
Site Accessway			

5.2 Plant Delivery – OSOM Vehicles

OSOM vehicles expected to access the site can be separated into the following categories:

- The vehicle combinations to transport the batteries which are anticipated to be prime mover with 2 by 4 axle dolly and 4 by 4 axle low loader. These combinations would be kept under 3.5 metres width and less than 26 metres length and would not be classified as high-risk. However, these vehicles would likely be considered OSOM due to the mass of the load.
- The control and switchroom components are anticipated to arrive in parts and be assembled on-site. These components are anticipated to be transported by a vehicle similar to the battery container vehicle or other OSOM vehicle classified as Class 1.

There are no high-risk OSOM vehicles anticipated during the construction of the Project. The largest vehicle expected to access the site is the battery container vehicle outlined above.

The OSOM vehicles would comply with the *National Heavy Vehicle Regulator Multi-State Class 1 Load Carrying Vehicle Mass Exemption Notice 2020 Information Sheet*. The vehicle types and any necessary permits would be confirmed and obtained (as needed) once the construction methodology is determined.

5.2.1 OSOM Access Routes

OSOM vehicles are proposed to utilise the routes outlined within Figure 13 and Figure 14, depending on the delivery port, which adopt approved routes within the NSW Oversize Overmass Load Carrying Vehicles Network Map. The local roads within the Steel River Industrial Estate, including Steel River Boulevard and McIntosh Drive, are not approved for Class 1 OSOM vehicles and as such would require approval from City of Newcastle.

A review of the load limits on all bridges and structures along the adopted route will be undertaken as part of the permit process for OSOM vehicles, noting that the routes predominantly utilise roads forming part of the approved Class 1 OSOM network. Formal approval will be sought from the rail authority for any railway crossings on the adopted route. The State roads along the routes have been utilised for other renewable energy projects. Accordingly, it is expected that the vehicle loading will be within the allowable limit for all bridges, culverts and other structures on the State road network.

5.3 Mitigation Measures

A CTMP is to be developed which is recommended to include the following measures to minimise the impact of construction traffic:

- Community notifications will be undertaken where required. The recycling facility to the north will be notified regarding the timing of major deliveries which may require additional traffic control or disrupt access.
- Heavy vehicles should avoid travel during peak bus operating times where possible. Buses operate along Industrial Drive between Tourle Street and Ingall Street which may be used by heavy vehicles, depending on the adopted delivery port.

It is recommended that any OSOM movements are timed so they do not coincide with other OSOM vehicles within the surrounding area to limit the impact to the road network, which can be undertaken as part of the permit application process. Accordingly, it is concluded that the proposed routes are suitable for use by heavy vehicles and OSOM vehicles associated with the Project, with permits to be applied for as part of the finalisation of the CTMP.

6. Site Access

6.1 Turn Treatments

The nearest State road connection to access the Site is the intersection of Industrial Drive and Steel River Boulevard. This intersection is signalised with channelised turn lanes provided on both of the Industrial Drive approaches. The SIDRA analysis at Section 4.1.6 indicates that the existing turn lanes can accommodate the 95th percentile queue lengths and no upgrades are required at the intersection for the construction of the Project.

Turn treatments to access the site from McIntosh Drive are not considered necessary as McIntosh Drive is a local road, carries low volumes, and the site access is located at the end of the road where vehicles are slowing to access properties.

6.2 Access Design

A swept path assessment has been undertaken for the intersection of McIntosh Drive and the shared accessway to the site. The shared accessway serves the site and the recycling facility to the north only. The largest vehicle typically observed travelling along the accessway is similar to an 8.8 m medium-rigid truck.

A swept path assessment has been completed for a 26 m B-Double passing an 8.8 m medium-rigid truck at the site access. A 26 m B-Double has similar dimensions and manoeuvrability to the anticipated battery container vehicle and as such, is considered an appropriate design vehicles for the site access. The swept path assessment is provided within Appendix D.

The assessment found that simultaneous two-way passing can occur when a 26 m B-Double is exiting the site, however, vehicles would be required to prop and pass when a 26 m B-double enters the site. This is appropriate given the sightlines available between vehicles, the flat alignment and McIntosh Drive and the accessway, and the low level of B-Double/battery container vehicles entering the site (up to 6 per day). Furthermore, movements along the accessway can be suitably controlled by traffic management if required.

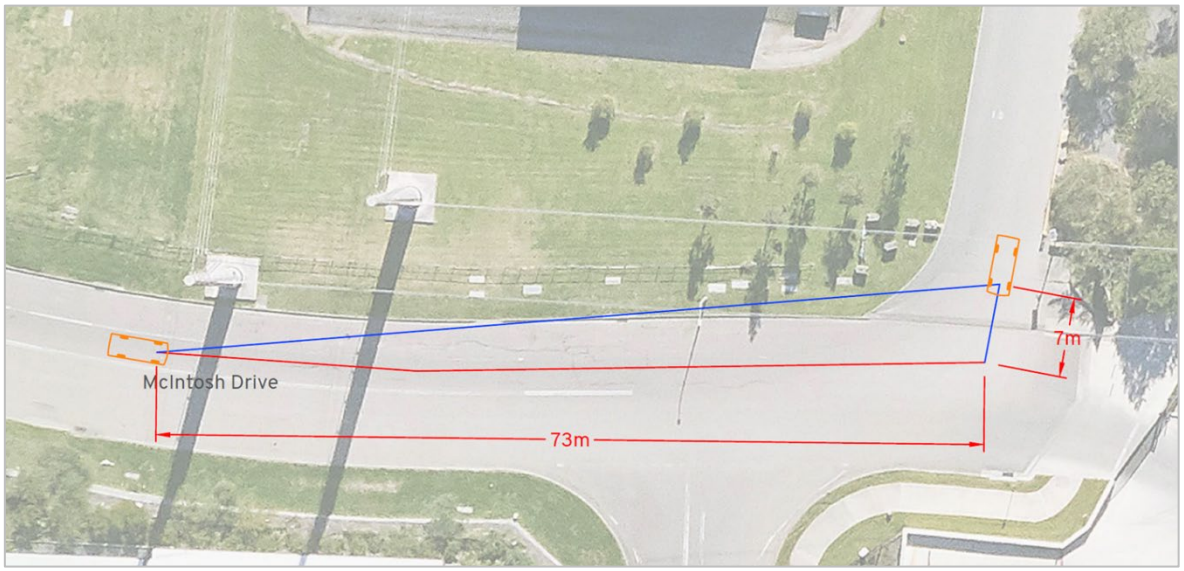
On the basis of the above, it is concluded that the intersection is able to accommodate the future construction traffic volumes and vehicle types generated by the Project without road upgrades.

6.3 Sight Distance

The shared accessway to the site from McIntosh Drive is existing and a sight distance assessment is not technically required. Notwithstanding, a desktop review of the sightlines available for exiting vehicles has been completed. Given the accessway is at the end of the road, vehicles would be travelling at low speeds when approaching the accessway. Based on a design speed of 40 km/hr, a Safe Intersection Sight Distance (SISD) of 73 metres is required under Table 3.1 of the *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*.

A SISD drawing is provided in Appendix E and shown within Figure 15, which indicates that the sight distance available meets the requirements of the Austroads Guide.

Figure 15: Sight Distance at Site Access



7. Traffic Management Plan

It is recommended that a CTMP be prepared prior to commencement of construction of the development. The CTMP should be prepared and implemented in accordance with Australian Standard 1742.3 and the Work Health and Safety Regulation 2017. The CTMP would provide additional information regarding the traffic volumes and distribution of construction vehicles that is not available at this time including:

- Road transport volumes, distribution and vehicle types broken down into:
  - Hours and days of construction.
  - Schedules for phasing/staging of the Project.
- The origin, destination and routes for:
  - Employee and contractor light vehicles.
  - Heavy vehicle traffic.
  - Oversize/overmass vehicles.
- A map of the primary haulage routes highlighting critical locations.
- An induction process for vehicle operators and regular toolbox meetings.
- A complaint resolution and disciplinary procedure.
- Local climatic conditions that may impact road safety of employees throughout all project phases (e.g. fog, wet and significant dry, dusty weather).

The following provides recommended measures that should be adopted within the CTMP to minimise the impact of construction traffic along the road network.

7.1 Information and Communication

The implementation of a community information and awareness program would assist in managing the traffic impacts. Prior to construction commencing and during the construction period, a program of consultation shall be initiated to ensure local residents are aware of construction traffic accessing the Project. This program may include elements of the following as appropriate to the phase of works:

- Press releases in local newspapers.
- Specific emails, newsletters and individual letter drops to neighbouring residents along the access route to the Project.
- Provision of a website providing details of the status of works and contact details for complaints or enquiries.
- Provide key contact personnel and contact details, including out of hours contact information to residents, schools, public activities and business operating alongside the local route.

Community notifications will be undertaken where required. The recycling facility to the north will be notified regarding the timing of major deliveries which may require additional traffic control or disrupt access.

7.2 Signage

If deemed necessary, specific warning signs advising of the changed traffic operations and heavy vehicles are to be appropriately located on approaches to and from the transport routes on Council roads. These should warn existing road users of changed traffic conditions. The use of day warning notices where signs are activated on a specific day to warn local road users of construction activities may also be applied.

7.3 Shuttle Buses

While not proposed at this stage, a shuttle bus program may be implemented to transport some of the workforce to and from Site for a portion of the construction phase. A local bus company would be contracted to manage the service.

Measures to ensure any shuttle bus program implemented can be practically achieved and monitored would be included within the Construction Environmental Management Plan and/or CTMP. Recommended measures could include:

- Limiting car parking for light vehicles on-site.
- Regular toolbox meeting sessions identifying method of travel to work and strongly encouraging use of the shuttle buses.
- Identifying the bus drop off/pick up locations and clearly communicating these locations with the workforce.
- Allocating a team member to be responsible for enforcement and management of the shuttle buses.
- Identifying mechanisms to be put in place if shuttle bus passenger numbers are not achieved.

7.4 On-Site Mitigation Measures

On-site mitigation measures targeted at safety and reducing the impact of on-site transport would include:

- On-site speed restrictions.
- Appropriate dust suppression measures.
- Maintenance program for on-site access tracks to ensure safe access.
- Loading and unloading is proposed to occur within the work area. No street or roads would be used for material storage at any time.
- Sufficient car parking is to be provided on-site to ensure vehicles do not park on the surrounding road network.
- All car parking and loading areas to be designed in accordance with the relevant Australian Standard (2890 series) and Council requirements.

It is noted that there are extensive areas available on the existing substation site for parking vehicles and as such, there is not anticipated to be any on-street parking impacts during construction of the Project.

7.5 Driver Protocols

Management of vehicular access to and from the site is essential in order to maintain the safety of the general public as well as the workforce. A Driver Code of Conduct is to be implemented as a measure to maintain safety within and around the site:

- All vehicles would enter and exit the site in a forward direction.
- Heavy vehicle movements should avoid peak school bus times to limit the interaction of larger vehicles and vulnerable road users.
- Safety initiatives for impacts to residential areas and/or school bus zones.
- Utilisation of only the designated transport routes.
- Construction vehicle movements are to abide by finalised schedules as agreed by the relevant authorities.
- All permits for working within the road reserve must be received from the relevant authority prior to works commencing.

The above recommendations will ensure the construction traffic would have a minimal impact to the capacity and safety of the surrounding road network. The CTMP would be prepared in conjunction with consultation with Transport for NSW and Newcastle City Council.

8. Mitigation Measure Summary

The assessment has identified a number of traffic management measures that are to be implemented during construction and recommended to be included in the TMP. The key measures are summarised below:

- Prior to construction, a pre-condition survey of McIntosh Drive should be undertaken by the appointed contractor in consultation with Council. During construction the sections of the road network utilised by the proposal are to be monitored and maintained to ensure continued safe use by all road users, and any faults attributed to construction of the Project would be rectified. At the end of construction, a post-condition survey would be undertaken to ensure the road network is left in a condition equivalent to that at the start of construction.
- Neighbours of the Project are to be consulted and notified regarding the timing of major deliveries which may require additional traffic control and disrupt access.
- Heavy vehicles should avoid travel during peak bus operating times to limit the interaction of larger vehicles and vulnerable road users. Buses operate along Tourle Street as outlined in Section 2.4.
- It is recommended that any OSOM vehicle trips be timed so they do not coincide with other OSOM vehicles within the surrounding area to limit the impact to the road network, which can be undertaken as part of the permit application.

9. Conclusion

Amber has assessed the traffic impacts of the proposed Steel River East BESS project. The Project address is 1 McIntosh Drive in Mayfield West and is located within the City of Newcastle LGA. The Site is approximately 7 km northwest of Newcastle CBD. Vehicle access to the site is via a shared accessway owned by Ausgrid that runs through the Site which connects to McIntosh Drive in the south and provides access to a recycling facility in the north.

The construction period is expected to commence in late-2025 and take approximately 18 months, with the peak construction period expected to take 6 months. A construction workforce of up to 100 personnel would be on-site during the peak construction phase. These staff would be primarily located in Newcastle and Sydney.

Plant is expected to be delivered from either Port of Newcastle or Port Botany. The largest Project component are the battery containers, which are expected to be delivered from either Port of Newcastle or Port Botany. General construction materials and equipment will be sourced from within the Hunter Region, where practicable.

The above assessment determined the following:

- The Site is expected to generate up to 154 vehicles per day during the peak construction period, including 18 heavy vehicles and 136 light vehicles.
- The road network is able to accommodate the traffic generated by the development during the construction, operation and decommissioning stages. Further, the cumulative impact of the Site traffic with nearby developments is expected to be minimal.
- The B-Double access routes utilises roads that are designated within the Transport for New South Wales Restricted Access Vehicle Map.
- The largest vehicle expected to access the site is the vehicle delivering the battery containers, which are expected to generate 10 trips per day during the peak construction phase. The access route for these vehicles would be from either Port of Newcastle or Port Botany. The vehicle combination would be kept under 3.5 metres width and less than 26 metres length and would not be classified as high-risk OSOM.
- The Site access on McIntosh Drive is designed to accommodate the Project traffic and is provided with adequate sight distance to allow vehicles to safely enter the road network.
- In order to mitigate the impacts of the development during construction a CTMP would be prepared which should include the recommendations provided within this document.

Accordingly, based on the assessment above, it is concluded that the proposed access arrangements are suitable to accommodate the expected construction vehicle types and traffic volumes during the construction and operation phase of the Project.

Appendix A

Response to TfNSW Agency Advice

TfNSW Comment	Response
Hours, days and periods of construction.	The proposed construction hours and project timeframe are provided within Section 3.2.
Schedule for phasing/staging of the project (including pre-construction, accommodation and ancillary infrastructure works) and identify the traffic volumes for each stage	The traffic assessment in Section 4 details the known works associated with each stage including traffic volumes.
Traffic volumes: • Surveyed existing background traffic at key intersections per Part 3 Austroads Guide to Traffic Management with survey raw data included. • Project-related traffic volumes (measured as vehicle trips per hour and per day) for each stage, including pre-construction, construction, operation and decommissioning and identifying the peak period for traffic volumes. • Traffic volumes are to include a description of: o Ratio of light vehicles to heavy vehicles. o Differentiation of Over Size/Over Mass (OSOM) that do or do not require an NHVR permit and proposed times of operation on the State road network. o Project-related traffic interaction with existing and projected background traffic with annual growth applied linearly. o Peak times for existing traffic and project related traffic. o Transportation hours. • The origin, destination and routes for: o Employee and contractor light traffic. o Heavy vehicle traffic. o OSOM vehicle traffic. o OSOM high risk loads.	Traffic data is presented at Section 2.3 and attached at Appendix B. The anticipated Project traffic is presented in Section 4.1.1. Section 4 shows the different vehicle classifications using the road network, different impacts at differing peak times of day, and traffic distribution. A growth rate has not been applied to the background traffic given construction is planned to commence within the next 12 months. The traffic assessment within this report has subsequently focused on the traffic impacts during construction when the majority of vehicle movements are generated.
A description of all non-high risk OSOM vehicles and materials to be transported. The shortest and least trafficked route is to be given priority for movement of materials and machinery to minimise risk and impact to other motorists, so far as is reasonably practicable.	Section 5 details the proposed heavy vehicles and OSOM vehicles, as well as the anticipated access routes.
The impact of generated traffic and measures employed to ensure efficiency and safety on the public road network during construction, operation and decommissioning of the project. This includes enforcement to managing traffic volumes, driver behaviour and access paths to site.	The traffic generation is shown in Section 4 and mitigation measures to ensure road efficiency and safety in Section 5.3 for heavy vehicles and Section 8 for general mitigation measures.
A turn warrant assessment for the worst-case scenario (i.e., peak project traffic volumes applied to peak background traffic) in accordance with Part 6 Austroads Guide to Traffic Management is to be undertaken at identified key intersections on project routes, project site access and site access points to access ancillary infrastructure.	The nearest State road connection to access the site is the intersection of Industrial Drive and Steel River Boulevard. This intersection is signalised with channelised turn lanes provided on both of the Industrial Drive approaches and a turn treatment assessment is not warranted.

TfNSW Comment	Response
TIA is to detail improvements to the road network, such as road widening and intersection treatments, to cater for and to mitigate the impact of project-related traffic (including accommodation and ancillary infrastructure components) at key intersections with State roads. Proposed road facilities, access and intersection treatments are to be identified and conform with Austroads Guide to Road Design and TfNSW Supplements, including safe intersection sight distance. Strategic designs are to include swept path analysis for largest vehicle passing through the intersection(s).	As discussed at Section 6, the existing turn treatments at the signalised intersection of Industrial Drive/Steel River Boulevard and the available sight distance at the site access from McIntosh Drive comply with the requirements of the Austroads Guide. Accordingly, no further road upgrades are required to accommodate the construction traffic.
Traffic safety assessment: • Local climate conditions that may affect road safety for vehicles used during construction, operation and decommissioning of the project (e.g., fog, wet weather, etc.). • A review of crash data along the identified transport route/s for the most recent 5-year reporting period and an assessment of road safety along the proposed transport route(s). • Measures to be employed to ensure a high level of road safety for daily staff commutes between accommodation and construction site(s), specifically addressing impacts of unsafe driver behaviour and driver fatigue for all project stages and how measures employed will be enforced.	Recommendations have been provided for inclusion within the TMP which address the proposed operation measures during local climate events explained in Section 7. A road safety review has been completed at Section 2.6 for the nearby road network and intersections. Recommendations will be made within the TMP. Driver Protocols explained in Section 7.5.
Details of emergency access/egress, including details of: • The location of the emergency access(es). • How the access will be managed (e.g., gates) to prevent non-emergency-related vehicle movements from using it. • Sufficient storage at the throat of the access to allow emergency vehicle(s) to store within the access and not within the through lane or road shoulder.	Emergency vehicles can access the site via the shared accessway to McIntosh Drive. It is noted that emergency measures to manage risks (such as fire, medical etc) will be included in future management plans prepared prior to commencement of construction of the development. It is noted that there is sufficient area to accommodate emergency vehicles on-site clear of McIntosh Drive in the event they are required.

TfNSW Comment	Response
In relation to the EIS, TfNSW requires the identification of ancillary infrastructure, such as Electricity Transmission Lines that are crossing or near the state-classified road network or rail infrastructure within TfNSW remit. With respect to this matter the following information is required: • The heights or depths (under boring) and the vertical and horizontal clearances (overhead) in accordance with Austroads. • The method for construction of the transmission lines. • location of infrastructure and impacts (excavation or fill) relative to the road reserve, including demarcation of local and state-classified road reserves. • Access required to construct and maintain the infrastructure. Access points or access tracks required for ETLs or other infrastructure will require the same level of assessment as the primary project access point. • Strategic concept designs must be provided for each transmission line crossing the state-classified road network.	Not applicable: transmission lines proposed to connect with the adjacent substation do not cross or impact any State Roads.
If workforce accommodation is proposed, then the TIA is required to assess the pre-construction, construction schedule, staging, parallel construction activities and traffic generation until the workforce is fully accommodated at the camp. The traffic assessment requirements identified in this letter will apply to the workforce accommodation.	Not applicable: no on-site accommodation.

TfNSW Comment	Response
The route assessment is required for high risk OSOM (as defined on TfNSW website) delivering components to the project. The concept level route analysis must include: • Port or point of origin for the entire route to the site access and intersections required to facilitate high risk OSOM movements required for the project. • Overall combination type, configuration, load and vehicle configuration. • The laden dimensions and weight of the vehicle configuration and loads. • The TIA is required to include details of all high risk OSOM loads and vehicle configurations for the project. • The location of pull-over bays / rest areas along high risk OSOM routes (including GPS coordinates) and demonstrate through swept paths that high risk OSOMs can be physically accommodated for the project (in terms of size, width and accessibility). • Bridge Assessments for any at risk bridges on classified roads due to dimensions and weight of OSOM vehicles. • The design vehicle templates used in the swept path analysis software are also requested in order for TfNSW to review the performance within the software (e.g. Autodesk Vehicle Tracking or Transoft AutoTURN). • Highlighting each at-risk road structures that the haulage route crosses including bridges, traffic signals, signage, major culverts, and minor culverts that may not meet the desirable cover to cater for proposed axle loads. • Traffic mitigation measures or road works, modifications, or road upgrades to facilitate the movement of the high risk OSOM(s) associated with the project. • Potential high level mitigation measures or commitments to mitigate known traffic, safety and impacts to road users along the high risk OSOM route (i.e school bus routes, mining shift changes, TSRs, harvest periods and events). • Identify and assess implications of any road and rail projects under construction during the indicative schedule for project related OSOM movements.	As discussed at Section 4.1.3, there are no High Risk OSOM vehicles anticipated for the construction of the Project. The largest vehicle expected to access the site is the battery container vehicle, which would be kept under 3.5 metres width and 26 metres length. These vehicles would be classed as OSOM and not considered high risk. The battery container vehicles are permitted to travel on the Class 1 OSOM network as outlined in Figure 8 and would comply with the *National Heavy Vehicle Regulator Multi-State Class 1 Load Carrying Vehicle Mass Exemption Notice 2020 Information Sheet.* The preferred access route for OSOM vehicles is discussed at Section 5. A 26m B-Double has similar dimensions and manoeuvrability to the anticipated battery container vehicle and as such, the B-Double swept paths attached at Appendix D demonstrate that OSOM vehicles can access the site without the requirement for road upgrades. Accordingly, it is concluded that the proposed routes are suitable for use by OSOM vehicles associated with the Project, with permits to be applied for as part of the finalisation of the TMP. It is recommended that any OSOM movements are timed so they do not coincide with other OSOM vehicles within the surrounding area to limit the impact to the road network, which can be undertaken as part of the permit application process.

Appendix B

Traffic Survey Data

TRANS TRAFFIC SURVEY

trafficsurvey.com.au

TURNING MOVEMENT SURVEY

Intersection of Industrial Dr and Steel River Blvd, Mayfie

GPS *-32.884167, 151.724356*

Date:	Thu 21/11/24
Weather:	Fine
Suburban:	Mayfield West
Customer:	N/A

North:	Steel River Blvd
East:	Industrial Dr
South:	N/A
West:	Industrial Dr

Survey	AM:	6:00 AM-10:00 AM
Period	PM:	3:00 PM-7:00 PM
Traffic	AM:	7:30 AM-8:30 AM
Peak	PM:	4:15 PM-5:15 PM

All Vehicles

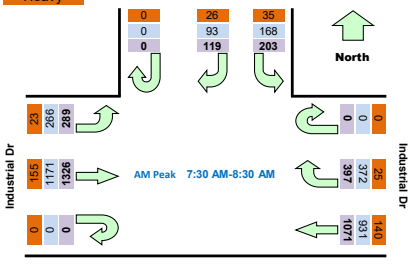
Time		rth Approach Steel River B			East Approach Industrial Dr			West Approach Industrial D			Hourly Total	
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	Hour	Peak
6:00	6:15	0	11	23	0	49	168	0	197	34	2464	
6:15	6:30	0	19	28	0	66	172	0	244	52	2671	
6:30	6:45	0	20	38	0	73	196	0	280	60	2834	
6:45	7:00	0	29	44	0	85	192	0	298	86	3034	
7:00	7:15	0	31	48	0	58	212	0	261	79	3158	
7:15	7:30	0	23	44	0	90	245	0	270	72	3349	
7:30	7:45	0	30	46	0	65	295	0	373	58	3405	Peak
7:45	8:00	0	22	48	0	151	286	0	274	77	3356	
8:00	8:15	0	31	51	0	94	260	0	354	90	3245	
8:15	8:30	0	36	58	0	87	230	0	325	64	2989	
8:30	8:45	0	19	40	0	118	252	0	316	73	2856	
8:45	9:00	0	31	48	0	113	194	0	273	88	2659	
9:00	9:15	0	30	45	0	99	184	0	194	72	2488	
9:15	9:30	0	36	51	0	85	223	0	221	51		
9:30	9:45	0	27	48	0	84	207	0	201	54		
9:45	10:00	0	41	64	0	58	169	0	194	50		
15:00	15:15	0	76	102	0	48	326	0	190	34	3090	
15:15	15:30	0	68	76	0	77	283	0	208	35	3129	
15:30	15:45	0	80	95	0	48	355	0	251	35	3214	
15:45	16:00	0	41	83	0	60	269	0	211	39	3161	
16:00	16:15	0	88	156	0	31	259	0	255	26	3221	
16:15	16:30	0	61	90	0	48	350	0	260	23	3237	Peak
16:30	16:45	0	93	108	0	42	313	0	228	27	3134	
16:45	17:00	0	66	118	0	57	280	0	213	29	3007	
17:00	17:15	0	79	119	0	41	290	0	277	25	2840	
17:15	17:30	0	71	78	0	31	299	0	226	24	2463	
17:30	17:45	0	32	62	0	25	280	0	277	8	2076	
17:45	18:00	0	27	65	0	25	237	0	222	20	1709	
18:00	18:15	0	31	40	0	23	163	0	187	10	1370	
18:15	18:30	0	21	37	0	17	131	0	127	9		
18:30	18:45	0	11	25	0	25	118	0	128	10		
18:45	19:00	0	13	20	0	10	112	0	93	9		

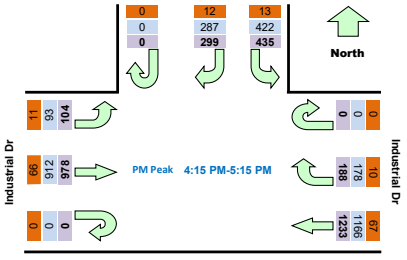
Peak Time		rth Approach Steel River B			East Approach Industrial Dr			West Approach Industrial D			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
7:30	8:30	0	119	203	0	397	1071	0	1326	289	3405
16:15	17:15	0	299	435	0	188	1233	0	978	104	3237

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy





Light Vehicles

Time		rth Approach Steel River B			East Approach Industrial D			West Approach Industrial D		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
6:00	6:15	0	9	18	0	44	145	0	173	32
6:15	6:30	0	16	21	0	62	148	0	204	49
6:30	6:45	0	11	31	0	69	169	0	248	52
6:45	7:00	0	21	31	0	81	171	0	260	78
7:00	7:15	0	27	40	0	54	179	0	226	71
7:15	7:30	0	18	39	0	79	220	0	231	68
7:30	7:45	0	25	34	0	60	255	0	328	54
7:45	8:00	0	16	40	0	145	245	0	250	70
8:00	8:15	0	24	43	0	87	227	0	308	84
8:15	8:30	0	28	51	0	80	204	0	285	58
8:30	8:45	0	16	32	0	108	223	0	292	67
8:45	9:00	0	24	39	0	107	164	0	244	79
9:00	9:15	0	23	34	0	92	155	0	161	55
9:15	9:30	0	29	46	0	79	177	0	189	46
9:30	9:45	0	18	41	0	73	170	0	172	47
9:45	10:00	0	34	54	0	52	143	0	162	42
15:00	15:15	0	68	100	0	46	289	0	171	27
15:15	15:30	0	59	67	0	64	254	0	184	30
15:30	15:45	0	72	90	0	40	332	0	228	28
15:45	16:00	0	36	81	0	54	252	0	193	31
16:00	16:15	0	84	150	0	29	238	0	236	24
16:15	16:30	0	59	88	0	46	331	0	242	22
16:30	16:45	0	90	104	0	40	294	0	206	24
16:45	17:00	0	62	115	0	54	264	0	206	25
17:00	17:15	0	76	115	0	38	277	0	258	22
17:15	17:30	0	67	77	0	29	286	0	214	24
17:30	17:45	0	30	60	0	25	268	0	266	8
17:45	18:00	0	27	65	0	24	227	0	217	20
18:00	18:15	0	30	40	0	22	153	0	176	9
18:15	18:30	0	20	37	0	15	117	0	126	8
18:30	18:45	0	10	25	0	25	110	0	122	8
18:45	19:00	0	13	20	0	10	103	0	82	9

Peak Time		rth Approach Steel River B			East Approach Industrial D			West Approach Industrial D			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
7:30	8:30	0	93	168	0	372	931	0	1171	266	3001
16:15	17:15	0	287	422	0	178	1166	0	912	93	3058

Heavy Vehicles

Time		rth Approach Steel River B			East Approach Industrial D			West Approach Industrial D		
Period Start	Period End	U	R	L	U	R	WB	U	EB	L
6:00	6:15	0	2	5	0	5	23	0	24	2
6:15	6:30	0	3	7	0	4	24	0	40	3
6:30	6:45	0	9	7	0	4	27	0	32	8
6:45	7:00	0	8	13	0	4	21	0	38	8
7:00	7:15	0	4	8	0	4	33	0	35	8
7:15	7:30	0	5	5	0	11	25	0	39	4
7:30	7:45	0	5	12	0	5	40	0	45	4
7:45	8:00	0	6	8	0	6	41	0	24	7
8:00	8:15	0	7	8	0	7	33	0	46	6
8:15	8:30	0	8	7	0	7	26	0	40	6
8:30	8:45	0	3	8	0	10	29	0	24	6
8:45	9:00	0	7	9	0	6	30	0	29	9
9:00	9:15	0	7	11	0	7	29	0	33	17
9:15	9:30	0	7	5	0	6	46	0	32	5
9:30	9:45	0	9	7	0	11	37	0	29	7
9:45	10:00	0	7	10	0	6	26	0	32	8
15:00	15:15	0	8	2	0	2	37	0	19	7
15:15	15:30	0	9	9	0	13	29	0	24	5
15:30	15:45	0	8	5	0	8	23	0	23	7
15:45	16:00	0	5	2	0	6	17	0	18	8
16:00	16:15	0	4	6	0	2	21	0	19	2
16:15	16:30	0	2	2	0	2	19	0	18	1
16:30	16:45	0	3	4	0	2	19	0	22	3
16:45	17:00	0	4	3	0	3	16	0	7	4
17:00	17:15	0	3	4	0	3	13	0	19	3
17:15	17:30	0	4	1	0	2	13	0	12	0
17:30	17:45	0	2	2	0	0	12	0	11	0
17:45	18:00	0	0	0	0	1	10	0	5	0
18:00	18:15	0	1	0	0	1	10	0	11	1
18:15	18:30	0	1	0	0	2	14	0	1	1
18:30	18:45	0	1	0	0	0	8	0	6	2
18:45	19:00	0	0	0	0	0	9	0	11	0

Peak Time		rth Approach Steel River B			East Approach Industrial D			West Approach Industrial D			Peak
Period Start	Period End	U	R	L	U	R	WB	U	EB	L	total
7:30	8:30	0	26	35	0	25	140	0	155	23	404
16:15	17:15	0	12	13	0	10	67	0	66	11	179

TRANS TRAFFIC SURVEY

TURNING MOVEMENT SURVEY

trafficsurvey.com.au

Intersection of McIntosh Dr and Northern Access Rd, Mayfield West

GPS	-32.883670, 151.730694
Date:	Thu 21/11/24
Weather:	Fine
Suburban:	Mayfield West
Customer:	N/A

North:	Northern Access Rd
East:	McIntosh Dr
South:	Murray Dwyer Cct
West:	McIntosh Dr

Survey	AM:	5:00 AM-12:00 PM
Period	PM:	12:00 PM-7:00 PM
Traffic	AM:	11:00 AM-12:00 PM
Peak	PM:	12:00 PM-1:00 PM

All Vehicles

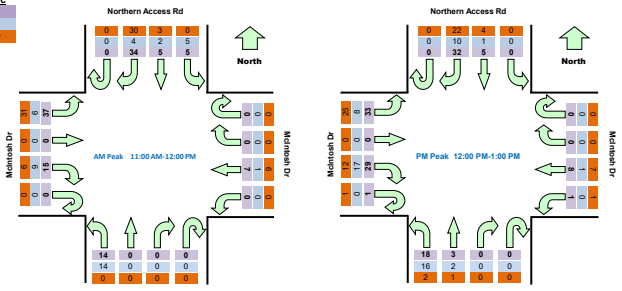
Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr				Hourly Total	
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	Hour	Peak
5:00	5:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1	27	
5:15	5:30	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	29	
5:30	5:45	0	1	0	0	0	0	1	0	0	0	0	2	0	2	0	1	42	
5:45	6:00	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	11	51	
6:00	6:15	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	3	51	
6:15	6:30	0	5	0	0	0	0	5	0	0	0	0	2	0	1	0	2	55	
6:30	6:45	0	2	0	0	0	0	2	0	0	0	0	1	0	1	0	10	56	
6:45	7:00	0	5	1	0	0	0	3	0	0	0	0	0	0	2	0	4	61	
7:00	7:15	0	4	0	0	0	0	1	0	0	0	0	0	0	1	0	3	66	
7:15	7:30	0	1	0	0	0	0	1	0	0	0	0	4	0	5	0	5	83	
7:30	7:45	0	4	1	0	0	0	3	0	0	0	1	3	0	5	0	4	89	
7:45	8:00	0	3	2	0	0	0	1	0	0	0	0	4	0	3	0	7	94	
8:00	8:15	0	6	0	0	0	0	3	1	0	0	0	2	0	5	0	9	101	
8:15	8:30	0	8	2	0	0	0	1	0	0	0	0	2	0	5	0	4	104	
8:30	8:45	0	8	0	0	0	0	1	0	0	0	0	1	0	6	0	10	111	
8:45	9:00	0	6	1	0	0	0	2	1	0	0	0	4	0	5	0	8	109	
9:00	9:15	0	8	0	0	0	0	0	1	1	0	1	2	0	9	0	7	107	
9:15	9:30	0	7	3	0	0	0	0	1	0	0	2	5	0	5	0	6	102	
9:30	9:45	0	5	2	0	0	0	1	0	0	0	2	2	0	2	0	10	90	
9:45	10:00	0	9	1	0	0	0	5	0	0	0	0	2	0	2	0	6	83	
10:00	10:15	0	5	2	0	0	0	1	0	0	0	1	3	0	4	0	8	86	
10:15	10:30	0	7	1	0	0	0	0	0	0	0	0	1	1	3	0	4	90	
10:30	10:45	0	6	0	0	0	0	0	0	0	0	0	4	0	3	0	4	111	
10:45	11:00	0	3	1	0	0	0	1	1	0	0	0	3	0	4	0	15	115	
11:00	11:15	0	10	0	3	0	0	1	0	0	0	0	5	0	1	0	8	117	Peak
11:15	11:30	0	13	1	2	0	0	3	0	0	0	0	3	0	6	0	10		
11:30	11:45	0	5	3	0	0	0	0	0	0	0	0	4	0	1	0	8		
11:45	12:00	0	6	1	0	0	0	3	0	0	0	0	2	0	7	0	11		
12:00	12:15	0	10	2	0	0	0	2	0	0	0	0	7	0	7	0	5	130	Peak
12:15	12:30	0	5	1	0	0	0	1	0	0	0	3	3	0	8	0	11	120	
12:30	12:45	0	11	2	0	0	0	3	1	0	0	0	3	1	6	0	6	112	
12:45	13:00	0	6	0	0	0	0	2	0	0	0	0	5	0	8	0	11	101	
13:00	13:15	0	8	3	0	0	0	2	0	0	0	0	0	0	5	0	5	95	
13:15	13:30	0	4	1	0	0	0	4	0	1	0	1	2	0	4	0	7	102	
13:30	13:45	0	4	2	0	0	0	1	1	0	0	0	3	0	4	0	7	101	
13:45	14:00	0	9	2	0	0	0	1	0	0	0	1	4	0	4	0	5	110	
14:00	14:15	0	7	1	0	0	0	4	0	0	0	0	3	0	4	0	11	109	
14:15	14:30	0	7	0	0	0	0	0	0	2	0	0	3	1	4	0	6	102	
14:30	14:45	0	8	1	0	0	1	3	0	0	0	0	2	0	10	0	6	103	
14:45	15:00	0	5	1	0	0	0	1	1	0	0	0	1	2	5	0	9	91	
15:00	15:15	0	4	1	0	0	0	2	0	0	0	0	7	0	4	0	5	82	
15:15	15:30	0	10	0	0	0	0	2	0	0	0	0	2	0	6	0	4	82	
15:30	15:45	0	5	2	0	0	0	2	0	0	0	0	1	1	4	0	4	75	
15:45	16:00	0	3	1	0	0	0	2	0	0	0	0	5	0	2	0	3	71	
16:00	16:15	0	2	0	0	0	0	1	0	0	0	0	12	1	7	0	0	65	
16:15	16:30	0	2	1	0	0	0	1	0	0	0	0	7	1	1	0	4	56	
16:30	16:45	0	3	2	0	0	0	4	0	0	0	0	0	1	4	0	1	49	
16:45	17:00	0	1	0	0	0	0	1	0	0	0	0	3	0	3	0	2	45	
17:00	17:15	0	3	1	0	0	0	1	0	0	0	0	3	0	3	0	3	36	
17:15	17:30	0	3	0	0	0	0	1	0	0	0	0	1	0	4	0	1	25	
17:30	17:45	0	2	3	0	0	0	3	0	0	0	0	1	2	0	0	0	20	
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	16	
18:15	18:30	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0		
18:30	18:45	0	0	0	0	0	0	2	0	0	0	0	1	1	2	0	0		
18:45	19:00	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0		

Peak Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
11:00	12:00	0	34	5	5	0	0	7	0	0	0	0	14	0	15	0	37	117
12:00	13:00	0	32	5	0	0	0	8	1	0	0	3	18	1	29	0	33	130

Note: Site sketch is for illustrating traffic flows. Direction is indicative only, drawing is not to scale and not an exact streets configuration.

Graphic

Total
Light
Heavy



Light Vehicles

		Murray Dwyer Cct								Murray Dwyer Cct							
Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
5:00	5:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5:15	5:30	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
5:30	5:45	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1
5:45	6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9
6:00	6:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6:15	6:30	0	1	0	0	0	0	1	0	0	0	0	2	0	1	0	0
6:30	6:45	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5
6:45	7:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
7:00	7:15	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	1
7:15	7:30	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	1
7:30	7:45	0	1	0	0	0	0	0	0	0	0	1	3	0	1	0	0
7:45	8:00	0	0	1	0	0	0	0	0	0	0	0	3	0	3	0	0
8:00	8:15	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	3
8:15	8:30	0	2	0	0	0	0	0	0	0	0	0	2	0	3	0	0
8:30	8:45	0	2	0	0	0	0	0	0	0	0	0	0	0	4	0	0
8:45	9:00	0	0	1	0	0	0	0	1	0	0	0	4	0	4	0	3
9:00	9:15	0	1	0	0	0	0	0	0	1	0	1	1	0	6	0	1
9:15	9:30	0	1	3	0	0	0	0	0	0	0	2	4	0	4	0	3
9:30	9:45	0	2	1	0	0	0	0	0	0	0	2	1	0	0	0	2
9:45	10:00	0	1	0	0	0	0	1	0	0	0	0	2	0	0	0	2
10:00	10:15	0	3	1	0	0	0	0	0	0	0	1	2	0	3	0	2
10:15	10:30	0	3	0	0	0	0	0	0	0	0	0	1	1	2	0	1
10:30	10:45	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0
10:45	11:00	0	0	1	0	0	0	0	0	0	0	0	2	0	1	0	3
11:00	11:15	0	1	0	3	0	0	0	0	0	0	0	5	0	1	0	0
11:15	11:30	0	2	1	2	0	0	0	0	0	0	0	3	0	3	0	4
11:30	11:45	0	1	1	0	0	0	0	0	0	0	0	4	0	1	0	0
11:45	12:00	0	0	0	0	0	0	1	0	0	0	0	2	0	4	0	2
12:00	12:15	0	3	1	0	0	0	1	0	0	0	0	6	0	6	0	2
12:15	12:30	0	1	0	0	0	0	0	0	0	0	2	3	0	5	0	1
12:30	12:45	0	3	0	0	0	0	0	0	0	0	0	3	0	3	0	1
12:45	13:00	0	3	0	0	0	0	0	0	0	0	0	4	0	3	0	4
13:00	13:15	0	1	1	0	0	0	0	0	0	0	0	0	0	3	0	2
13:15	13:30	0	0	1	0	0	0	0	0	1	0	0	2	0	1	0	2
13:30	13:45	0	0	2	0	0	0	0	0	0	0	0	2	0	3	0	1
13:45	14:00	0	3	1	0	0	0	0	0	0	0	1	3	0	1	0	0
14:00	14:15	0	1	1	0	0	0	3	0	0	0	0	2	0	0	0	2
14:15	14:30	0	1	0	0	0	0	0	0	2	0	0	3	1	3	0	2
14:30	14:45	0	5	0	0	0	0	1	0	0	0	0	2	0	8	0	1
14:45	15:00	0	0	0	0	0	0	0	1	0	0	0	1	2	1	0	5
15:00	15:15	0	1	1	0	0	0	0	0	0	0	0	7	0	3	0	3
15:15	15:30	0	5	0	0	0	0	0	0	0	0	0	1	0	2	0	0
15:30	15:45	0	2	2	0	0	0	1	0	0	0	0	1	1	2	0	0
15:45	16:00	0	0	1	0	0	0	1	0	0	0	0	5	0	1	0	0
16:00	16:15	0	0	0	0	0	0	0	0	0	0	0	12	0	6	0	0
16:15	16:30	0	0	1	0	0	0	1	0	0	0	0	7	1	1	0	2
16:30	16:45	0	3	2	0	0	0	3	0	0	0	0	0	1	2	0	0
16:45	17:00	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
17:00	17:15	0	2	0	0	0	0	1	0	0	0	0	3	0	1	0	0
17:15	17:30	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0
17:30	17:45	0	1	3	0	0	0	2	0	0	0	0	1	2	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
18:15	18:30	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0
18:30	18:45	0	0	0	0	0	0	2	0	0	0	0	1	1	1	0	0
18:45	19:00	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0

Peak Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
11:00	12:00	0	4	2	5	0	0	1	0	0	0	0	14	0	9	0	6	41
12:00	13:00	0	10	1	0	0	0	1	0	0	0	2	16	0	17	0	8	55

Heavy Vehicles

Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr			
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L
5:00	5:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:15	5:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5:30	5:45	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0
5:45	6:00	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
6:00	6:15	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	2
6:15	6:30	0	4	0	0	0	0	4	0	0	0	0	0	0	0	0	2
6:30	6:45	0	2	0	0	0	0	2	0	0	0	0	0	0	1	0	5
6:45	7:00	0	4	1	0	0	0	3	0	0	0	0	0	0	2	0	3
7:00	7:15	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	2
7:15	7:30	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	4
7:30	7:45	0	3	1	0	0	0	3	0	0	0	0	0	0	4	0	4
7:45	8:00	0	3	1	0	0	0	1	0	0	0	0	1	0	0	0	7
8:00	8:15	0	6	0	0	0	0	3	0	0	0	0	0	0	4	0	6
8:15	8:30	0	6	2	0	0	0	1	0	0	0	0	0	0	2	0	4
8:30	8:45	0	6	0	0	0	0	1	0	0	0	0	1	0	2	0	10
8:45	9:00	0	6	0	0	0	0	2	0	0	0	0	0	0	1	0	5
9:00	9:15	0	7	0	0	0	0	0	1	0	0	0	1	0	3	0	6
9:15	9:30	0	6	0	0	0	0	0	1	0	0	0	1	0	1	0	3
9:30	9:45	0	3	1	0	0	0	1	0	0	0	0	1	0	2	0	8
9:45	10:00	0	8	1	0	0	0	4	0	0	0	0	0	0	2	0	4
10:00	10:15	0	2	1	0	0	0	1	0	0	0	0	1	0	1	0	6
10:15	10:30	0	4	1	0	0	0	0	0	0	0	0	0	0	1	0	3
10:30	10:45	0	6	0	0	0	0	0	0	0	0	0	1	0	1	0	4
10:45	11:00	0	3	0	0	0	0	1	1	0	0	0	1	0	3	0	12
11:00	11:15	0	9	0	0	0	0	1	0	0	0	0	0	0	0	0	8
11:15	11:30	0	11	0	0	0	0	3	0	0	0	0	0	0	3	0	6
11:30	11:45	0	4	2	0	0	0	0	0	0	0	0	0	0	0	0	8
11:45	12:00	0	6	1	0	0	0	2	0	0	0	0	0	0	3	0	9
12:00	12:15	0	7	1	0	0	0	1	0	0	0	0	1	0	1	0	3
12:15	12:30	0	4	1	0	0	0	1	0	0	0	1	0	0	3	0	10
12:30	12:45	0	8	2	0	0	0	3	1	0	0	0	0	1	3	0	5
12:45	13:00	0	3	0	0	0	0	2	0	0	0	0	1	0	5	0	7
13:00	13:15	0	7	2	0	0	0	2	0	0	0	0	0	0	2	0	3
13:15	13:30	0	4	0	0	0	0	4	0	0	0	1	0	0	3	0	5
13:30	13:45	0	4	0	0	0	0	1	1	0	0	0	1	0	1	0	6
13:45	14:00	0	6	1	0	0	0	1	0	0	0	0	1	0	3	0	5
14:00	14:15	0	6	0	0	0	0	1	0	0	0	0	1	0	4	0	9
14:15	14:30	0	6	0	0	0	0	0	0	0	0	0	0	0	1	0	4
14:30	14:45	0	3	1	0	0	1	2	0	0	0	0	0	0	2	0	5
14:45	15:00	0	5	1	0	0	0	1	0	0	0	0	0	0	4	0	4
15:00	15:15	0	3	0	0	0	0	2	0	0	0	0	0	0	1	0	2
15:15	15:30	0	5	0	0	0	0	2	0	0	0	0	1	0	4	0	4
15:30	15:45	0	3	0	0	0	0	1	0	0	0	0	0	0	2	0	4
15:45	16:00	0	3	0	0	0	0	1	0	0	0	0	0	0	1	0	3
16:00	16:15	0	2	0	0	0	0	1	0	0	0	0	0	1	1	0	0
16:15	16:30	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2
16:30	16:45	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	1
16:45	17:00	0	1	0	0	0	0	1	0	0	0	0	0	0	3	0	2
17:00	17:15	0	1	1	0	0	0	0	0	0	0	0	0	0	2	0	3
17:15	17:30	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	1
17:30	17:45	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
17:45	18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
18:15	18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
18:30	18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
18:45	19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Peak Time		North Approach Northern Access Rd				East Approach McIntosh Dr				South Approach Murray Dwyer Cct				West Approach McIntosh Dr				Peak
Period Start	Period End	U	R	SB	L	U	R	WB	L	U	R	NB	L	U	R	EB	L	total
11:00	12:00	0	30	3	0	0	0	6	0	0	0	0	0	0	6	0	31	76
12:00	13:00	0	22	4	0	0	0	7	1	0	0	1	2	1	12	0	25	75

Appendix C

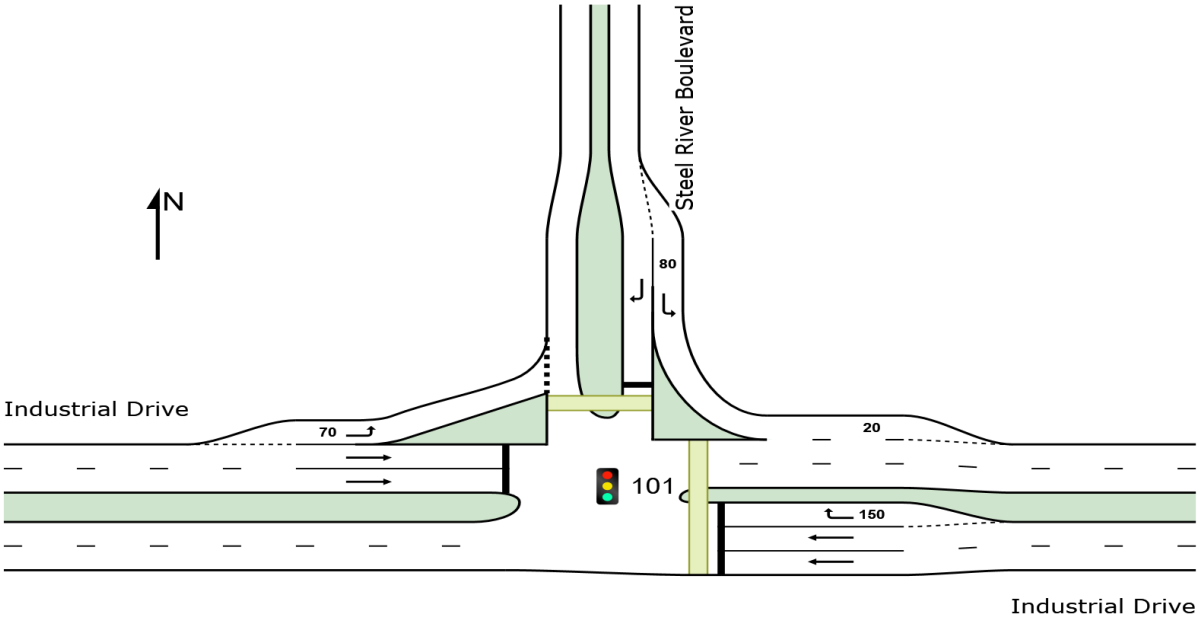
SIDRA Results

SITE LAYOUT

Site: 101 [Industrial Drive/Steel River Boulevard - Existing AM Peak (6am-7am) (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [Industrial Drive/Steel River Boulevard - Post-Dev AM Peak (6am-7am) (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 113 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Industrial Drive															
5	T1	All MCs	766	10.0	766	10.0	0.257	2.6	LOS A	4.8	36.8	0.25	0.22	0.25	75.7
6	R2	All MCs	325	10.0	325	10.0	* 0.785	54.7	LOS D	17.9	136.3	1.00	0.89	1.09	31.8
Approach			1092	10.0	1092	10.0	0.785	18.1	LOS B	17.9	136.3	0.47	0.42	0.50	53.6
North: Steel River Boulevard															
7	L2	All MCs	140	10.0	140	10.0	0.081	5.8	LOS A	0.0	0.0	0.00	0.46	0.00	46.4
9	R2	All MCs	83	10.0	83	10.0	* 0.452	57.8	LOS E	4.5	34.1	0.98	0.77	0.98	29.6
Approach			223	10.0	223	10.0	0.452	25.2	LOS B	4.5	34.1	0.37	0.58	0.37	38.3
West: Industrial Drive															
10	L2	All MCs	282	10.0	282	10.0	0.228	16.3	LOS B	4.4	33.3	0.33	0.69	0.33	50.8
11	T1	All MCs	1073	10.0	1073	10.0	* 0.587	21.0	LOS B	21.1	160.4	0.74	0.66	0.74	55.9
Approach			1355	10.0	1355	10.0	0.587	20.0	LOS B	21.1	160.4	0.66	0.67	0.66	54.7
All Vehicles			2669	10.0	2669	10.0	0.785	19.7	LOS B	21.1	160.4	0.56	0.56	0.57	52.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Industrial Drive												
P2	Full	1	1	50.7	LOS E	0.0	0.0	0.95	0.95	204.5	200.0	0.98
North: Steel River Boulevard												
P3	Full	1	1	50.7	LOS E	0.0	0.0	0.95	0.95	204.5	200.0	0.98
All Pedestrians		2	2	50.7	LOS E	0.0	0.0	0.95	0.95	204.5	200.0	0.98

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 101 [Industrial Drive/Steel River Boulevard - Post-Dev AM Peak (6am-7am) (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 113 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Two-Phase
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

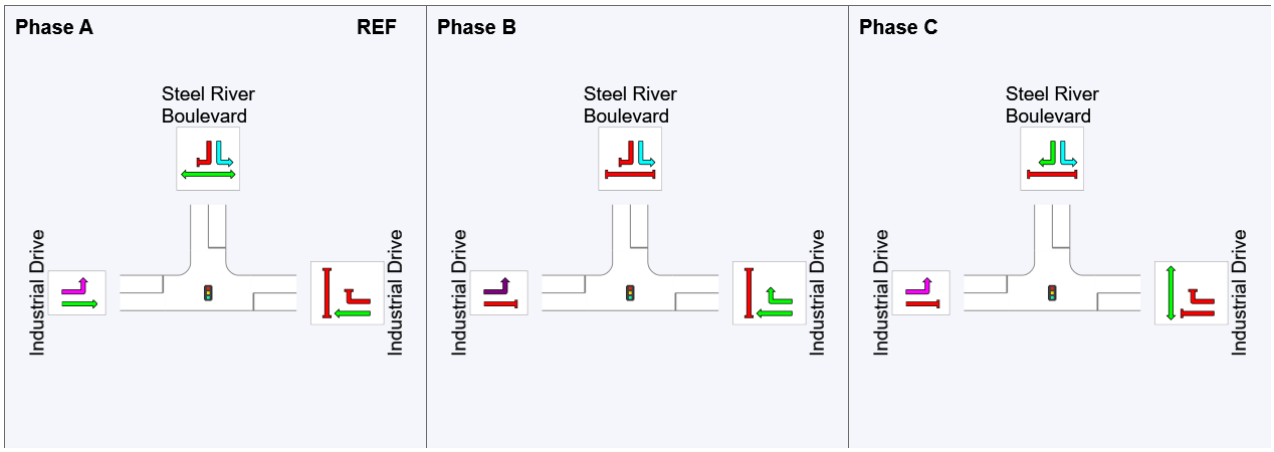
Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	62	95
Green Time (sec)	59	27	12
Phase Time (sec)	65	33	15
Phase Split	58%	29%	13%
Phase Frequency (%)	100.0	100.0	55.6[2]

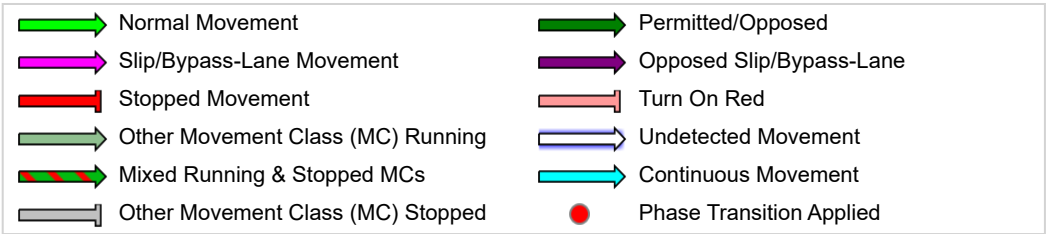
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

2 Phase Frequency is implied by a Phase Time specified by the user that is less than the Required Movement Time.

Output Phase Sequence



REF: Reference Phase
VAR: Variable Phase



MOVEMENT SUMMARY

Site: 101 [Industrial Drive/Steel River Boulevard - Post-Dev PM Peak (530pm-6:30pm) (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 115 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Industrial Drive															
5	T1	All MCs	854	10.0	854	10.0	0.285	2.6	LOS A	5.6	42.3	0.26	0.23	0.26	75.7
6	R2	All MCs	95	10.0	95	10.0	* 0.449	59.8	LOS E	5.1	38.9	0.97	0.78	0.97	30.5
Approach			948	10.0	948	10.0	0.449	8.3	LOS A	5.6	42.3	0.33	0.28	0.33	65.9
North: Steel River Boulevard															
7	L2	All MCs	253	10.0	253	10.0	0.146	5.7	LOS A	0.0	0.0	0.00	0.46	0.00	46.3
9	R2	All MCs	155	10.0	155	10.0	* 0.855	68.6	LOS E	9.7	73.5	1.00	1.00	1.31	27.2
Approach			407	10.0	407	10.0	0.855	29.5	LOS C	9.7	73.5	0.38	0.66	0.50	36.6
West: Industrial Drive															
10	L2	All MCs	49	10.0	49	10.0	0.034	8.1	LOS A	0.3	2.1	0.13	0.63	0.13	53.2
11	T1	All MCs	856	10.0	856	10.0	* 0.363	10.1	LOS A	11.0	83.3	0.50	0.44	0.50	65.6
Approach			905	10.0	905	10.0	0.363	10.0	LOS A	11.0	83.3	0.48	0.45	0.48	64.8
All Vehicles			2261	10.0	2261	10.0	0.855	12.8	LOS A	11.0	83.3	0.40	0.42	0.42	57.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Eff. Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
East: Industrial Drive												
P2	Full	1	1	51.7	LOS E	0.0	0.0	0.95	0.95	205.5	200.0	0.97
North: Steel River Boulevard												
P3	Full	1	1	51.7	LOS E	0.0	0.0	0.95	0.95	205.5	200.0	0.97
All Pedestrians		2	2	51.7	LOS E	0.0	0.0	0.95	0.95	205.5	200.0	0.97

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

PHASING SUMMARY

Site: 101 [Industrial Drive/Steel River Boulevard - Post-Dev PM Peak (530pm-6:30pm) (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 115 seconds (Site User-Given Phase Times)

Timings based on settings in the Site Phasing & Timing dialog
Phase Times specified by the user
Phase Sequence: Two-Phase
Input Phase Sequence: A, B, C
Output Phase Sequence: A, B, C
Reference Phase: Phase A

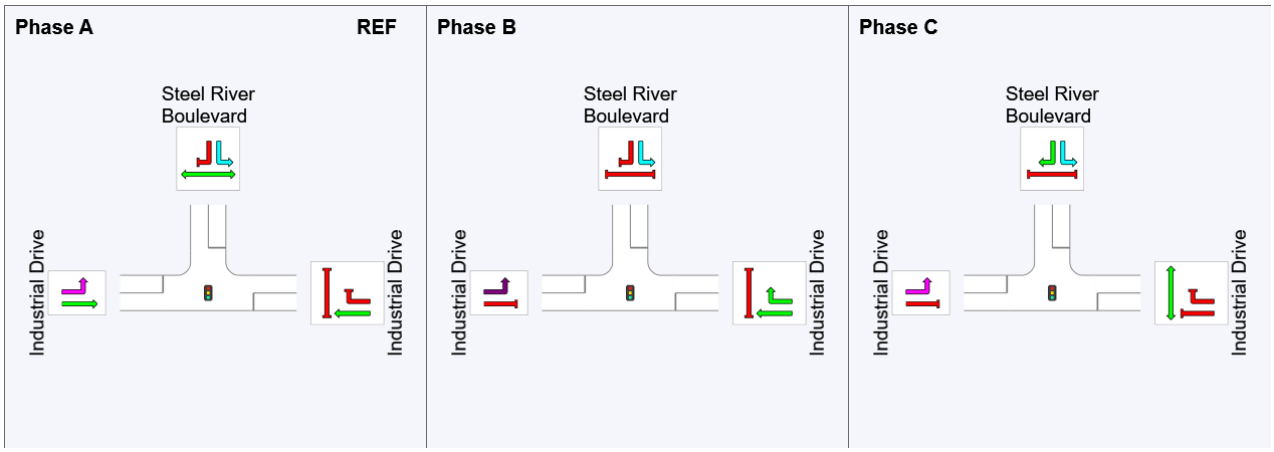
Phase Timing Summary

Phase	A	B	C
Phase Change Time (sec)	0	77	97
Green Time (sec)	74	14	12
Phase Time (sec)	80	20	15
Phase Split	70%	17%	13%
Phase Frequency (%)	100.0	100.0	55.6[2]

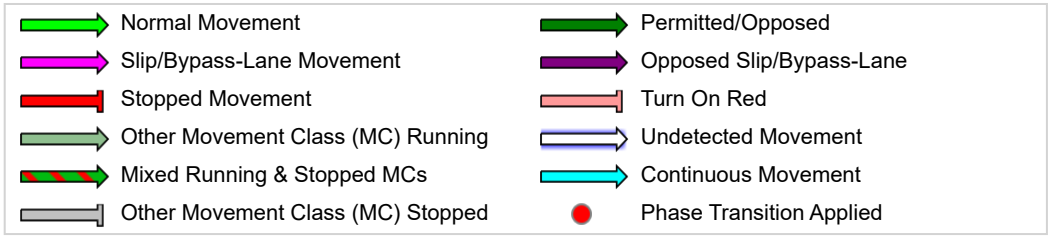
See the Timing Analysis report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Minor Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.

2 Phase Frequency is implied by a Phase Time specified by the user that is less than the Required Movement Time.

Output Phase Sequence

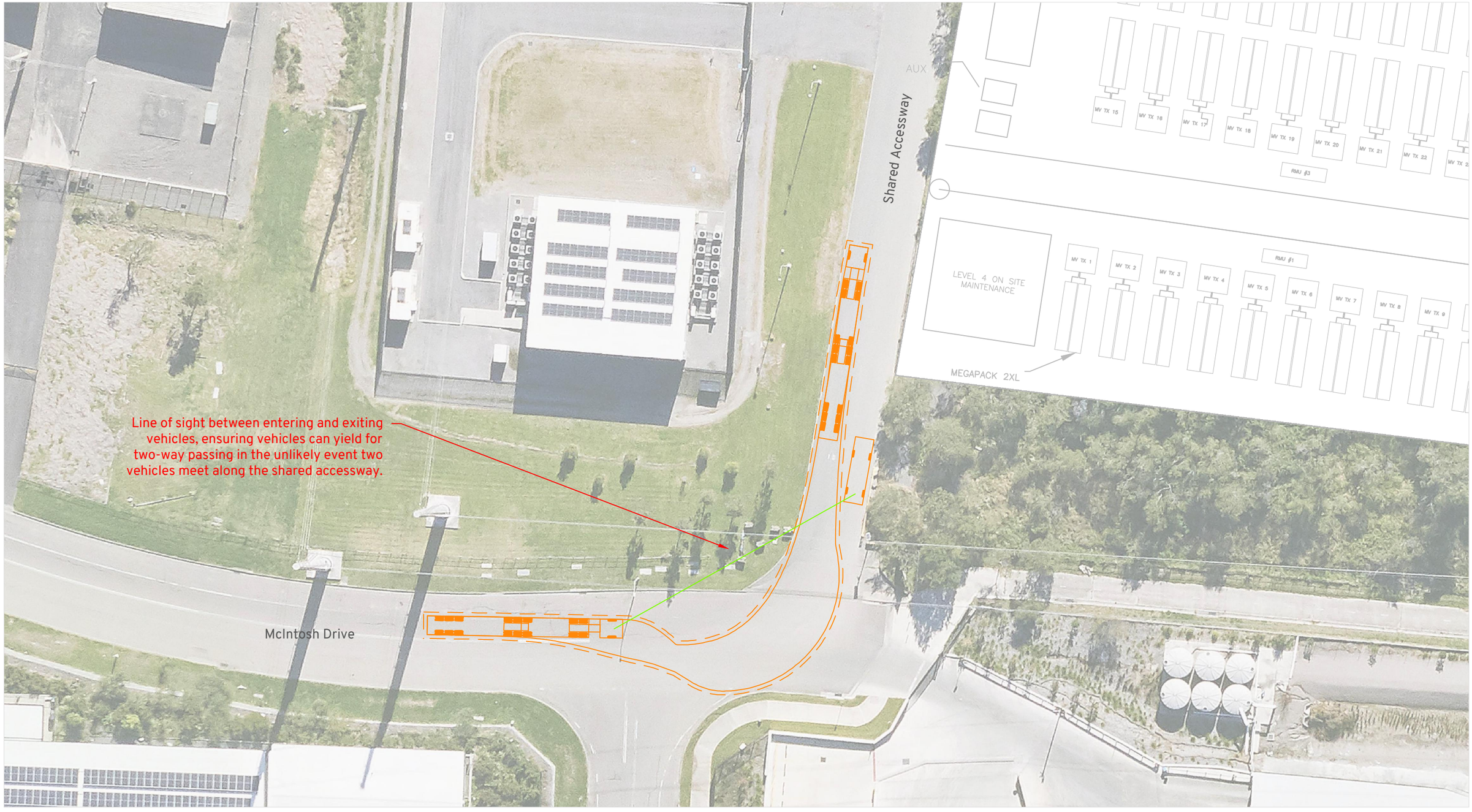


REF: Reference Phase
VAR: Variable Phase



Appendix D

Swept Path Assessment – Site Access



26m B-Double Ingress - Two-way Passing

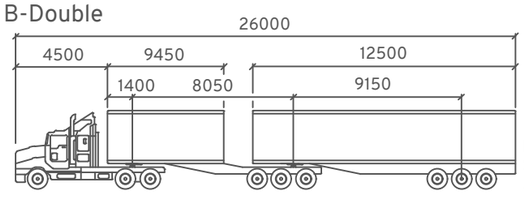
Vehicle Envelope

500mm Clearance

Reverse Manoevure

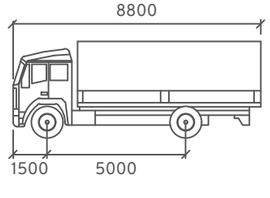
Min. Design Speed 5km/h

26.0m B-Double



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 22.2
Articulating Angle	70.0

MRV



	mm
Width	: 2500
Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 34.0

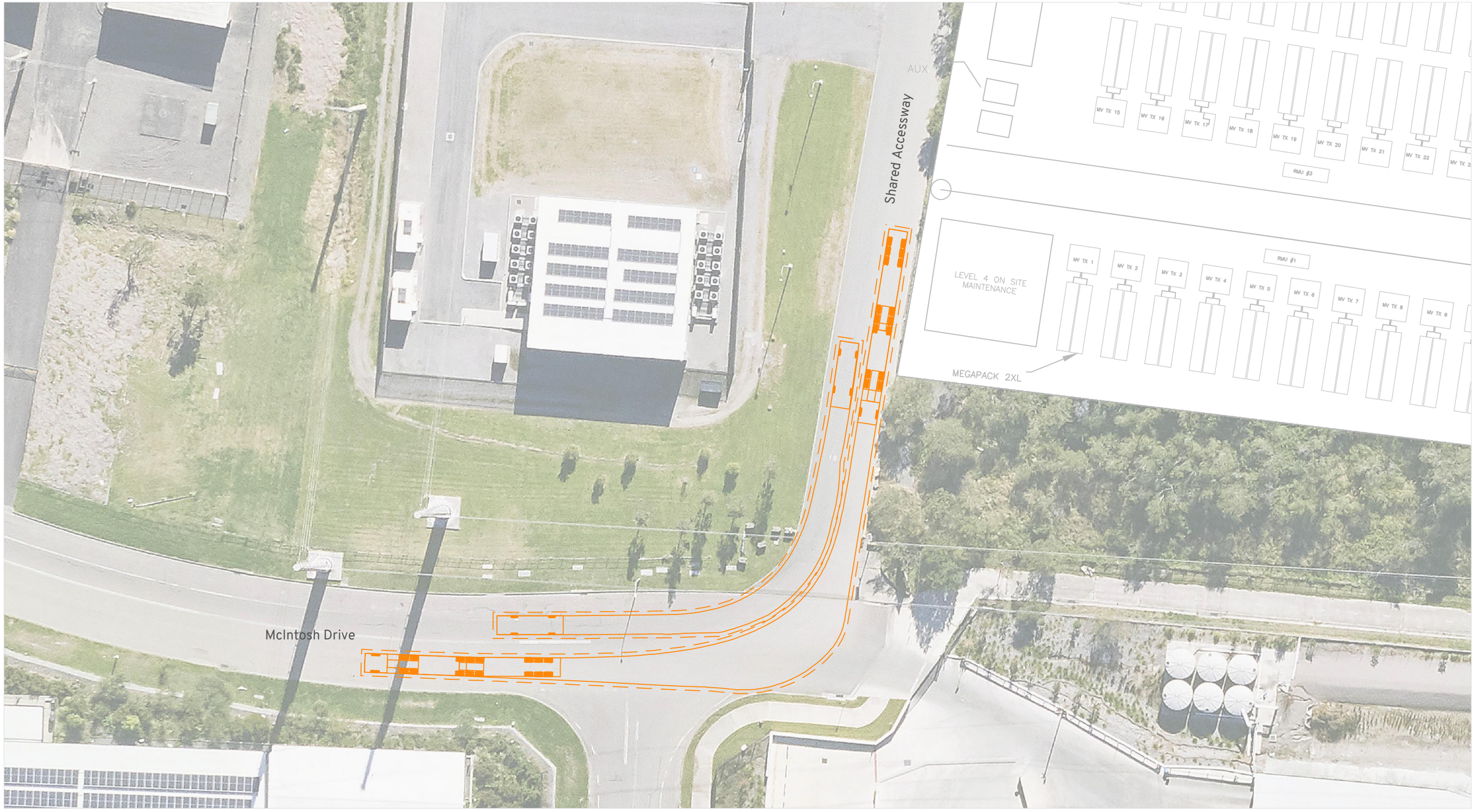
Steel River East BESS

1 McIntosh Drive, Mayfield West

Swept Path Assessment

DRAWN: KB
DATE: 27/11/2024
DWG NO: 1079 - S01A
SCALE at A3: 1:500

Amber 01



26m B-Double Egress - Two-way Passing

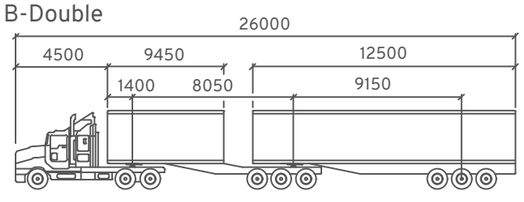
Vehicle Envelope

500mm Clearance

Reverse Manoevure

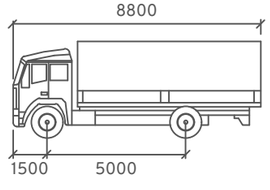
Min. Design Speed 5km/h

26.0m B-Double



	mm
Tractor Width	: 2500
Trailer Width	: 2500
Tractor Track	: 2500
Trailer Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 22.2
Articulating Angle	70.0

MRV



	mm
Width	: 2500
Track	: 2500
Lock to Lock	: 6.0s
Steering Angle	: 34.0

Steel River East BESS

1 McIntosh Drive, Mayfield West

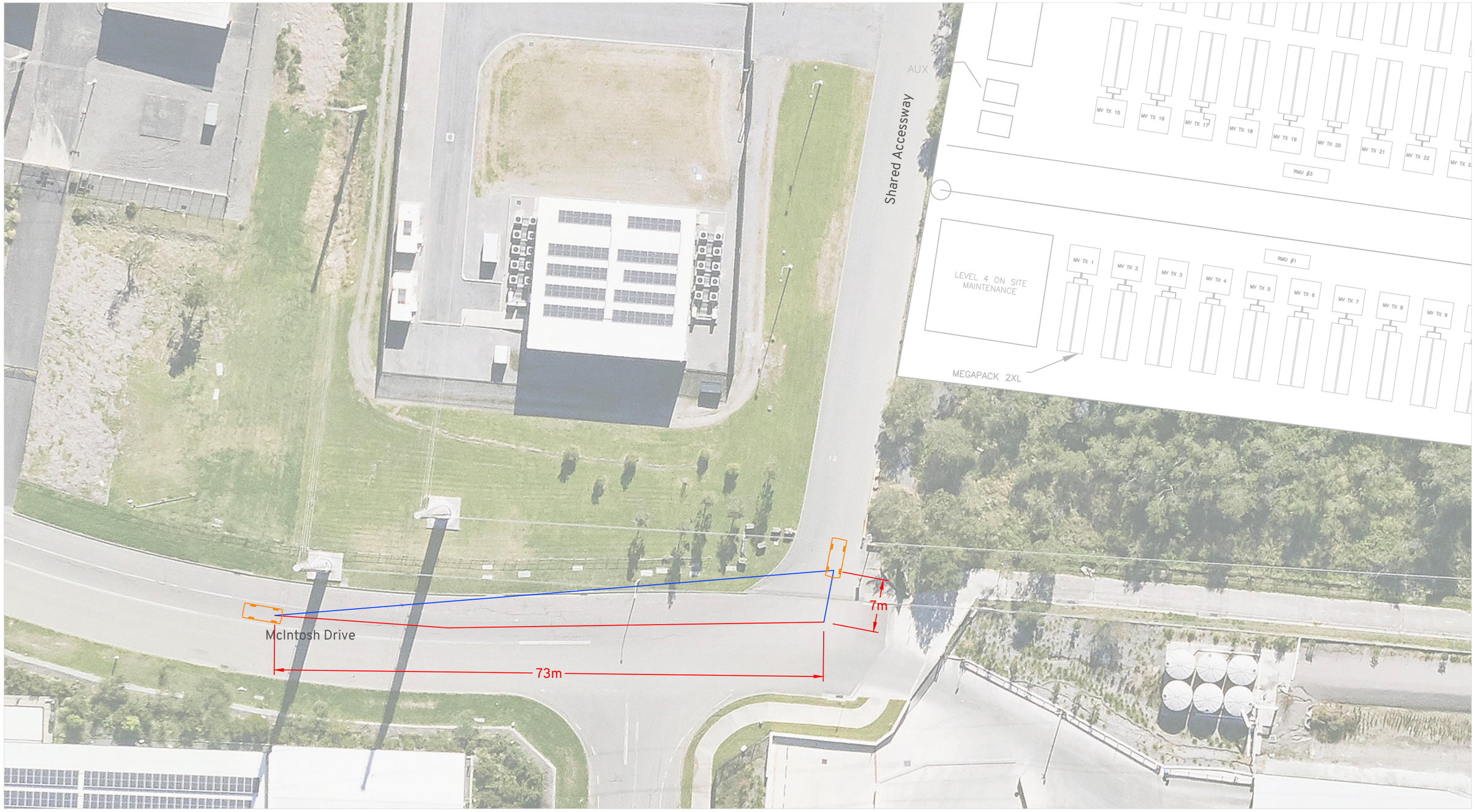
Swept Path Assessment

DRAWN: KB
DATE: 27/11/2024
DWG NO: 1079 - S01A
SCALE at A3: 1:500

Amber 02

Appendix E

Sight Distance Assessment

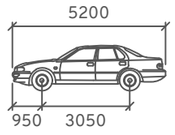


26m B-Double Egress - Two-way Passing

Sight Distance

Sight Line

B99



	mm
Width	: 1940
Track	: 1840
Height	: 2200
Lock to Lock	: 6.0s
Steering Angle	: 33.9

Steel River East BESS

1 McIntosh Drive, Mayfield West

Sight Distance Assessment

DRAWN: KB
DATE: 27/11/2024
DWG NO: 1079 - S01A
SCALE at A3: 1:500

Amber

SD01