Traffix Group

Traffic Engineering Assessment

Proposed Cement Processing and Distribution Development

265 Whitehall Street, Yarraville

Prepared for
Steel Cement Pty Ltd

July 2022

G31806R-01A - KB

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1. Introduction

Traffix Group has been engaged by Steel Cement Pty Ltd to undertake a traffic engineering assessment for a proposed cement processing and distribution development at 265 Whitehall Street, Yarraville.

2. Proposal

The proposal is for an increase in floor area to an existing cement processing and distribution centre. The various works at the site are proposed in order to increase the processing capacity available at the site.

A copy of the development plans prepared by Amm John Project Engineering are attached at Appendix A.

A breakdown of the building floor areas is provided in the following table. We note that in addition to the buildings the various hardstand areas around the site are also used for the various industrial processes that are undertaken.

Table 1: Development Summary

Use	Area Increase
Main Storage Shed	8,280m^2
Additive Shed	2,369m^2
Loadout Areas	2,214m^2
Mills (Mill 1 and Mill 2)	1,632m^2
Maintenance Shed	600m^2
Mill Feed Silos	540m^2
TOTAL	**15,635m^2**

The site currently produces bagged cement and bulk carrier cement products. Bagged premix concrete mix is also produced at the site.

The cement produced at the site is distributed to various commercial customers (wholesale) and off-site concrete batching facilities. No retail sales are undertaken from the site.

The majority of raw materials used in the various production processes are transferred to the site via shipping, with direct access to the site available to Yarraville Wharves (Lime and Sand supplies). Some other raw materials are also transferred to the site via trucks.

Advice provided by the site operator has identified that the various works proposed will require 9 additional staff on-site at any one time (increase from 16 staff per day to 25 staff per day).

Vehicle Access Arrangements

Vehicle access to the site is proposed via the following access points:

- Existing Crossover to Whitehall Street
  - Will provide for entry and exit movements
  - Commercial vehicle movements will typically be limited to entry only
- Crossovers to Francis Street
  - New entry crossover providing entry movements from Francis Street
  - New exit Crossover providing exit movements to Francis Street

The largest vehicle to access the site will be a 26m B-double associated with bulk cement carriers.

The proposed vehicle circulation through the site associated with commercial based traffic is detailed in the following figure.

Figure 1: Vehicle circulation (Source: Development Plans)

External Upgrades – Francis Street

Under existing conditions Francis Street does not include formal; kerb and channel through the middle section between the Whitehall Street intersection and the dead end.

As part of the proposed crossover works formal kerb and channel shall be installed along the northern side of Francis Street along the site's frontage. These works would be subject to detailed design process and Council's approval (i.e. condition of permit). A figure that indicatively identifies the works is provided below.

Figure 2: Indicative Crossovers and Works Along Francis Street

3. Existing Conditions

3.1. Subject Site

The table below summarises the key characteristics of the subject site.

Table 2: Subject Site Description

Characteristic	Description
Address	265 Whitehall Street, Yarraville
Site Area (approximate)	11ha
Frontages (approximate)	485m to Lyell Street along northern boundary 365m to Francis Street along southern boundary 250m to Whitehall Street (Docklands Hwy) along western boundary
Zoning	Industrial 1 Zone – IN1Z
Activity Centre	Yarraville Port Industrial Precinct

The site currently operates as a cement processing and distribution centre. Products produced at the site include bagged cement products and bulk carrier cement. Bagged premix concrete mix is also produced at the site.

The cement produced at the site is distributed to various commercial customers (wholesale) and off-site concrete batching facilities.

The majority of raw material are transferred to the site via shipping, with direct access to the site available to Yarraville Wharves (Lime and Sand supplies). Some other raw materials are also transferred to the site via trucks.

Vehicle access to the site is currently available at the following locations:

- Whitehall Street at the site's northern boundary, and
- Francis Street at the site's eastern boundary (exit movements).

The vehicle access to Whitehall Street and Francis Street can be seen in Figure 5 and Figure 6, respectively.

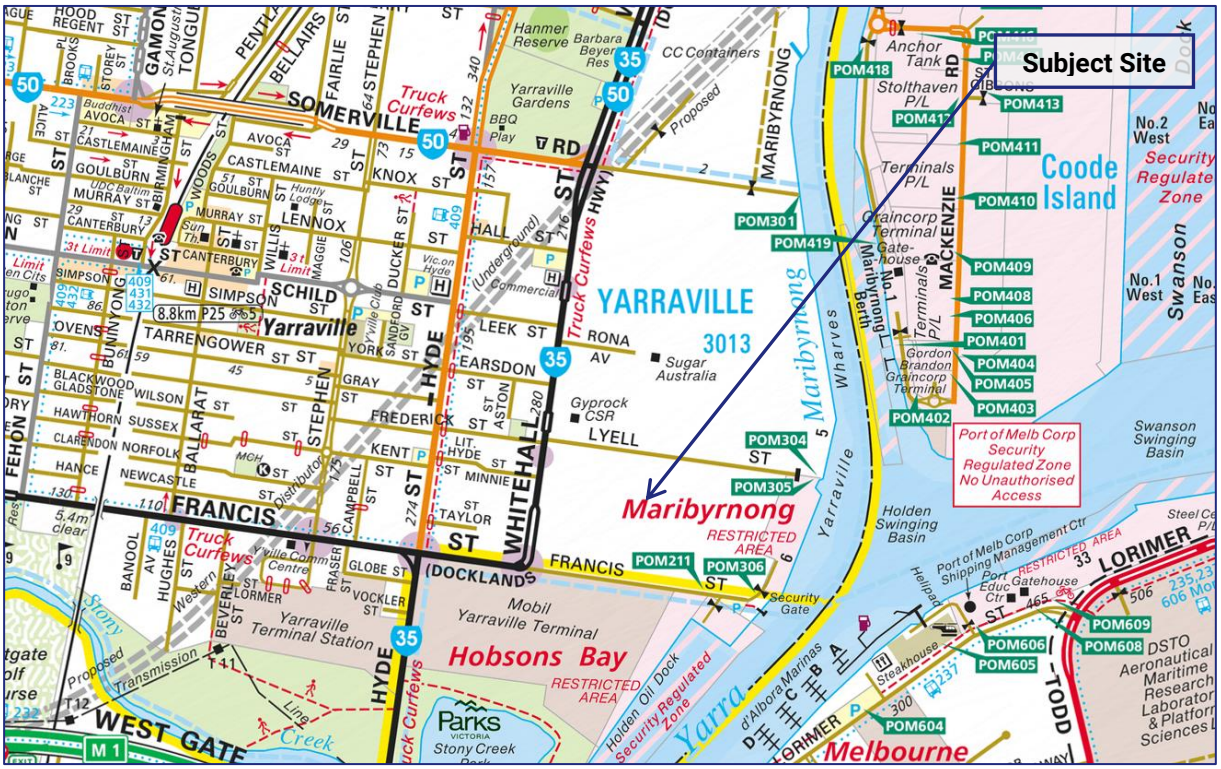


Figure 3: Locality Plan (Source: Melway)

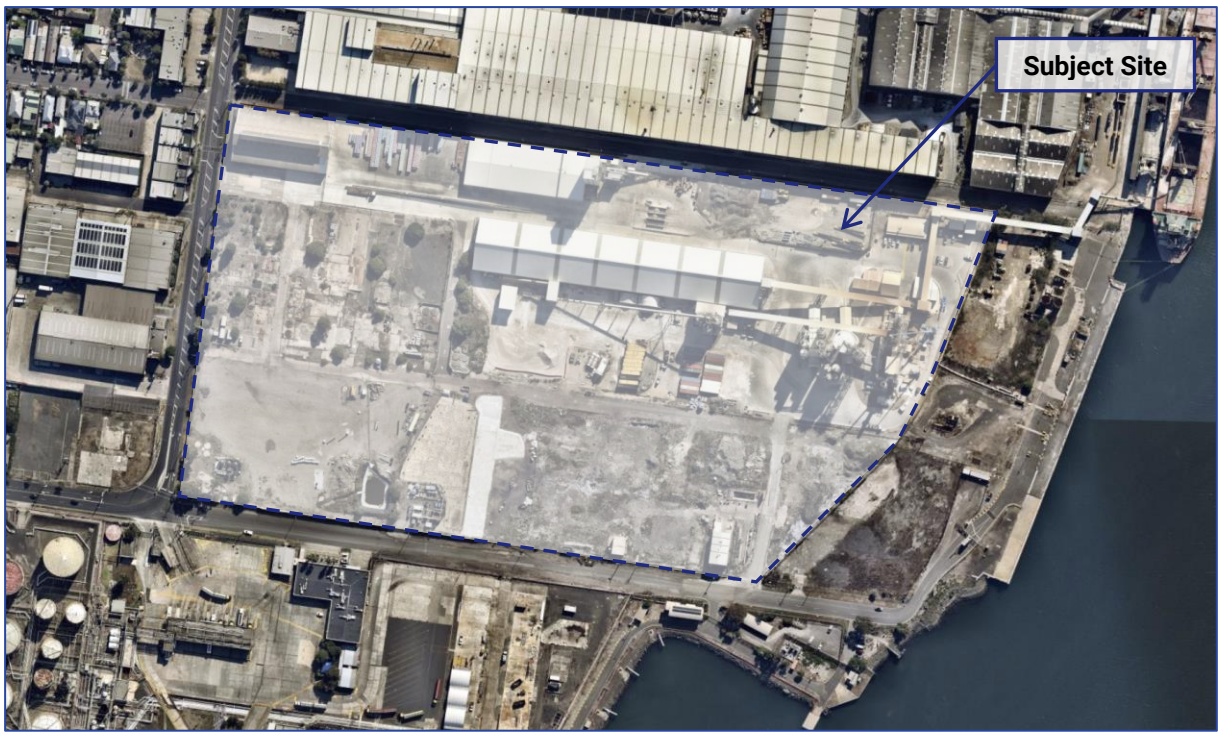


Figure 4: Aerial Photograph (Source: Nearmap)

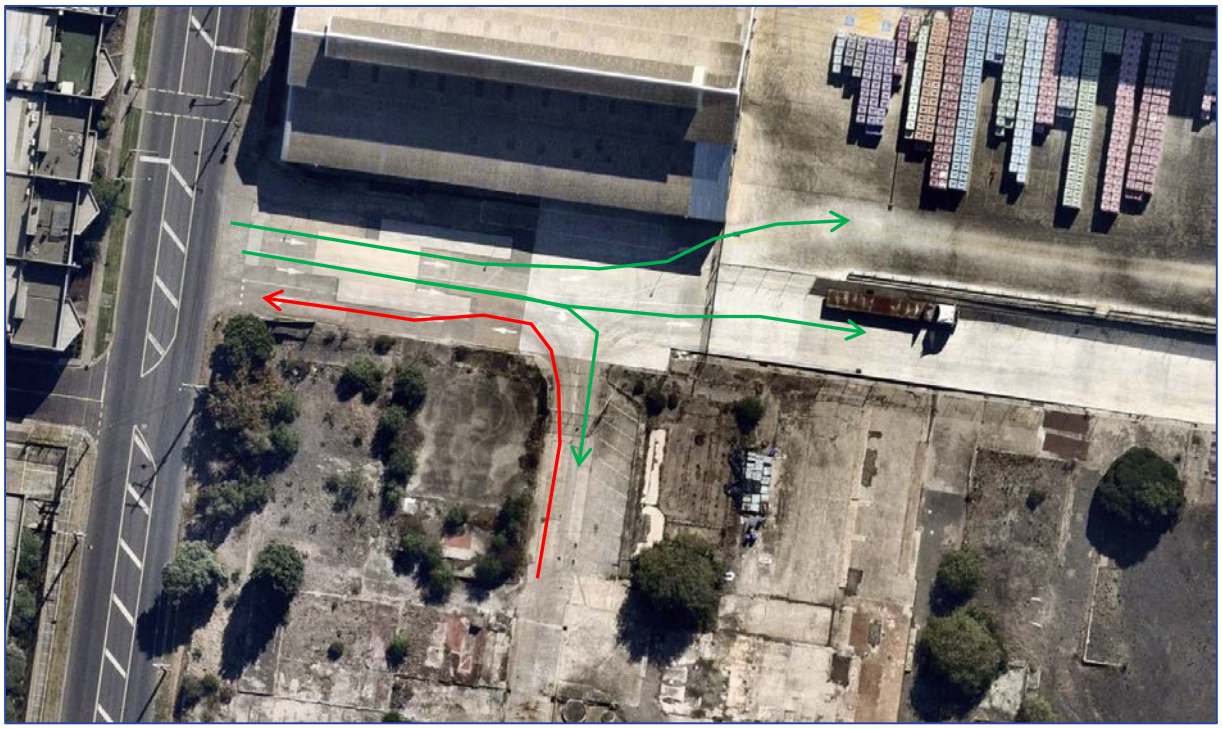


Figure 5: Aerial Photograph – Vehicle Access at Whitehall Street (Source: Nearmap)

Figure 6: Aerial Photograph – Vehicle Access at Francis Street (Source: Nearmap)

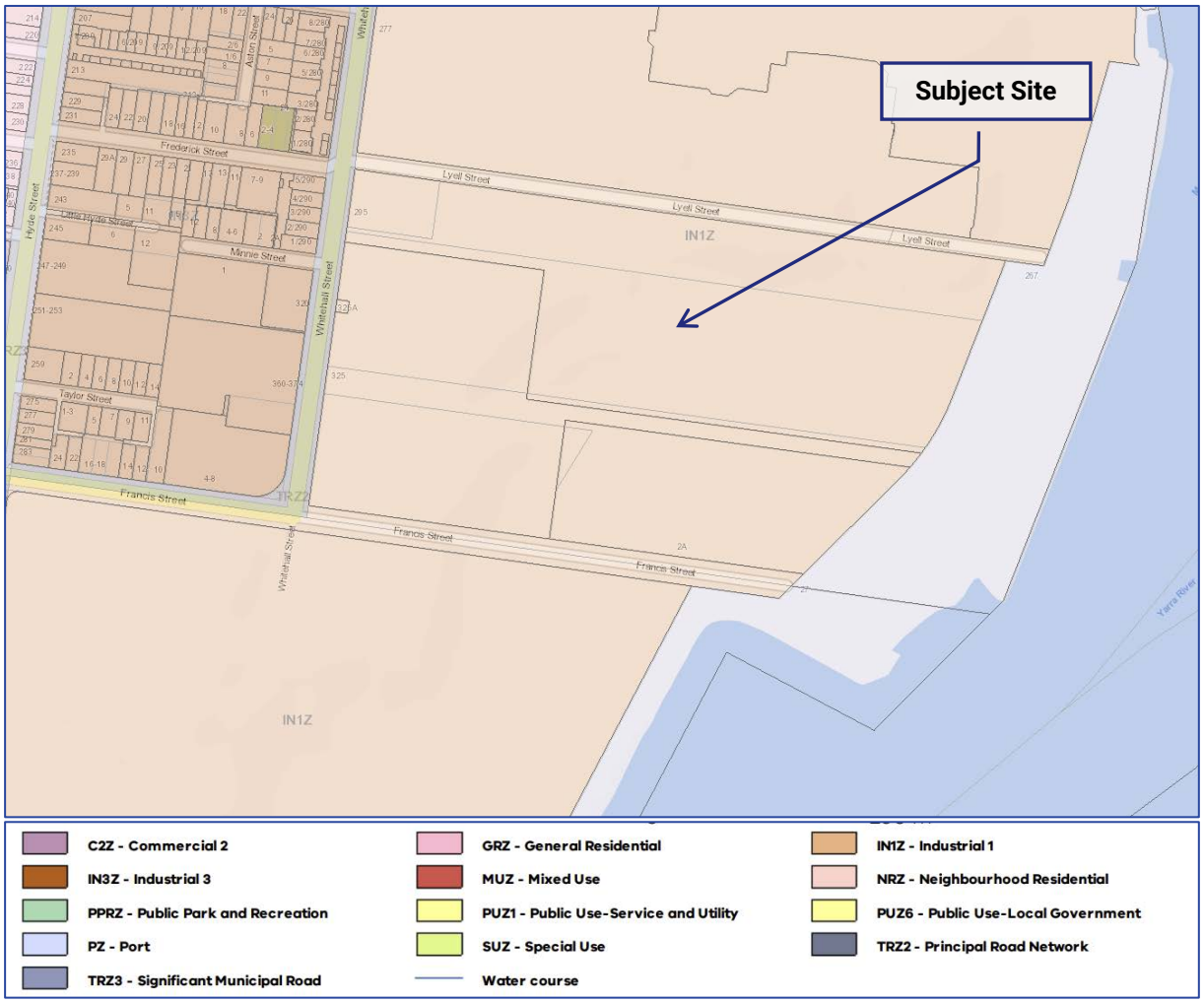


Figure 7: Land Use Zoning Map (Source: Planning Schemes Online)

3.2. Transport Network

3.2.1. Road Network

A summary of the local road network is provided in the table below.

Photographs of the surrounding road network are presented at Figure 8 to Figure 13.

Table 3: Local Road Network

Road Name	Agency	Classification	Transport Zone	Configuration	Speed Limit	On-Street Parking
Whitehall Street (Docklands Highway)	DoT	Arterial Road	TRZ2	12.2m sealed carriageway 2 traffic lanes with a divided carriageway	60km/h	No Stopping on both sides
Francis Street	Council (1)	Local Access Street	No	12.6m sealed carriageway and 6m sealed carriageway (2)	50km/h	Unrestricted on both sides

Notes:

1. Francis Street is a Council managed road between Whitehall Street and the dead-end in the east.
2. The carriageway of Francis Street has a sealed width of 12.6m between Whitehall Street to approximately 130m east of the intersection. This then narrows to a sealed carriageway of 6m with unsealed gravel verges on each site (road reserve unchanged).
3. The intersection of Whitehall Street and Francis Street is signalised with the site access to No. 29 Francis Street.

Figure 8: Whitehall Street – view north

Figure 9: Whitehall Street – view south

Figure 10: Francis Street, east of Whitehall Street – view east

Figure 11: Francis Street, east of Whitehall Street – view west

Figure 12: Francis Street, west of Whitehall Street – view east

Figure 13: Francis Street, west of Whitehall Street – view west

3.2.2. Existing Traffic Conditions

Traffix Group commissioned traffic counts of the Whitehall Street/Francis Street intersection and the site's vehicle access to Whitehall Street on Thursday 26th May, 2022, between the hours of 7am-7pm.

The surveys identified the following peak hours:

- AM peak – 8am-9am
- PM peak – 5pm-6pm
- Site Peak Hour – 11:45am-12:45pm

A summary of the peak hour traffic counts is presented in the figures below.

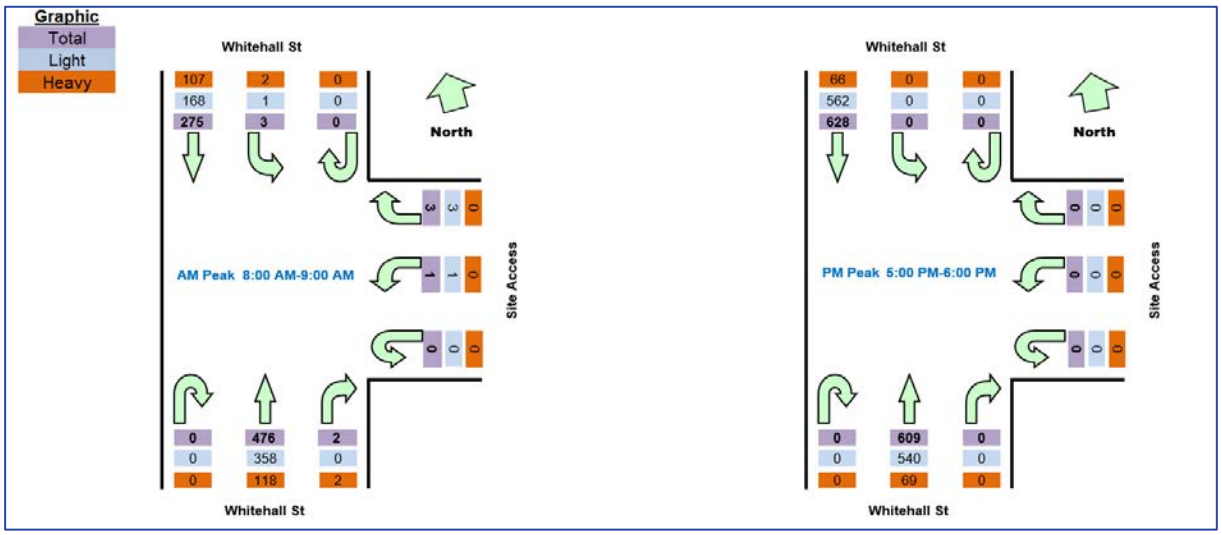


Figure 14: Existing Traffic Conditions – Peak Hours Whitehall Street and Site Access

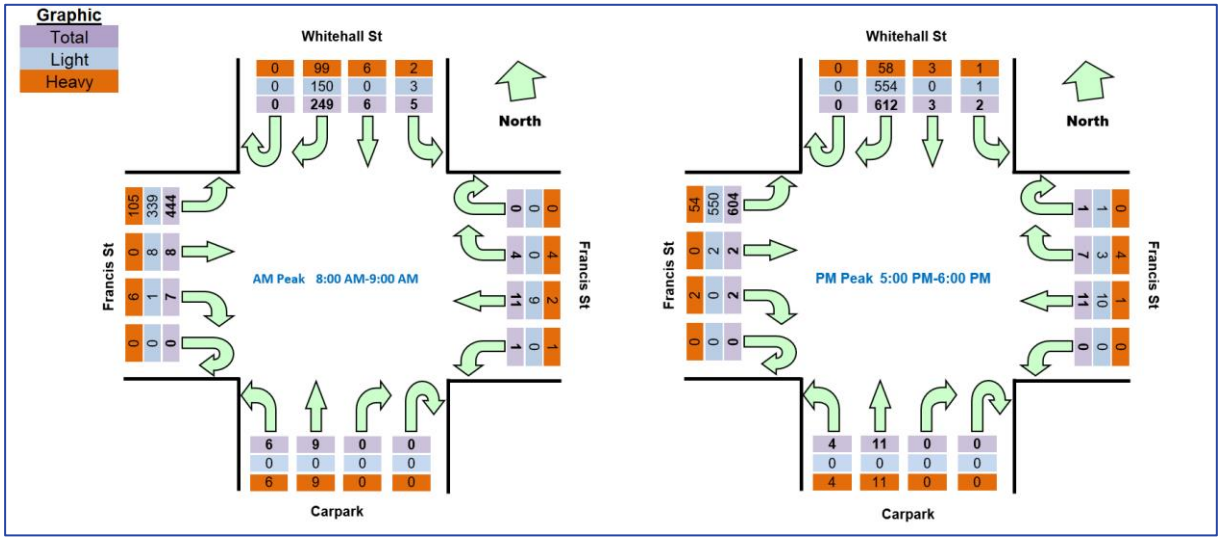


Figure 15: Existing Traffic Conditions – Peak Hours Whitehall Street and Francis Street

Site Access – Whitehall Street

The site has vehicle access to Whitehall Street under existing conditions. Over the 12 hour survey period a total of 87 trips were recorded at this site access. These movements were split approximately 75/25 between entry and exit movements, with essentially all exit movements associated with passenger vehicles.

The site peak hour at this access point occurred between 11:45am-12:45pm when a total of 14 movements were recorded.

A review of the hourly volumes at the site access from Whitehall Street is detailed in the following figure.

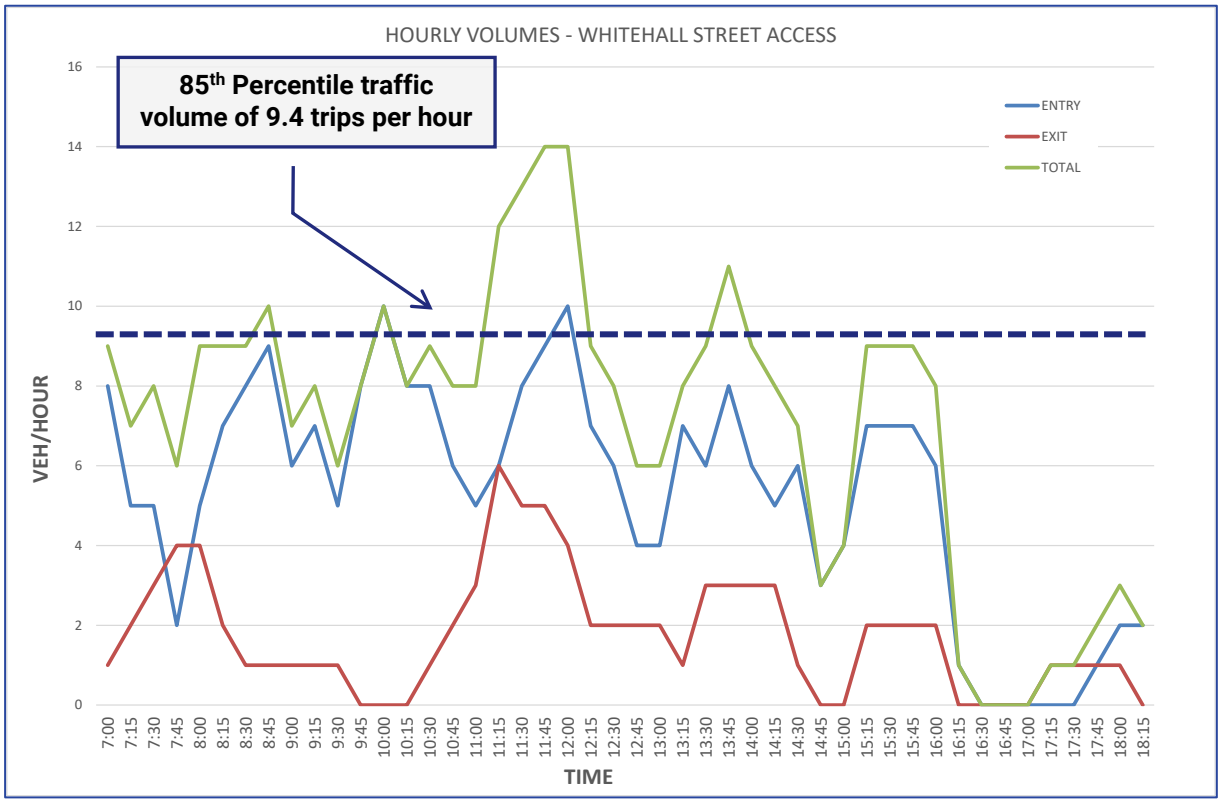


Figure 16: Existing Traffic Conditions – Peak Hours Whitehall Street and Site Access

3.2.3. Client Provided Truck Movement Profile

Weekly Traffic Profile

Details of the typical truck movements from the site associated with deliveries or outgoing goods were recorded by the client for the existing conditions over 2021 calendar year. Rigid trucks and b-double vehicles were recorded separately.

Graphs which identify the typical daily truck movements over the week are provided in the following figures. Noted that the data relates to individual trucks and as each truck would record a separate entry and exit movement.

The data identifies:

- Average of 80-90 rigid trucks (160-180 veh/movements) during Mon-Fri

- Average of 41-50 b-double trucks (82-100 veh/movements) during Mon-Fri
- Significantly lower volumes were recorded on Saturdays and Sundays.

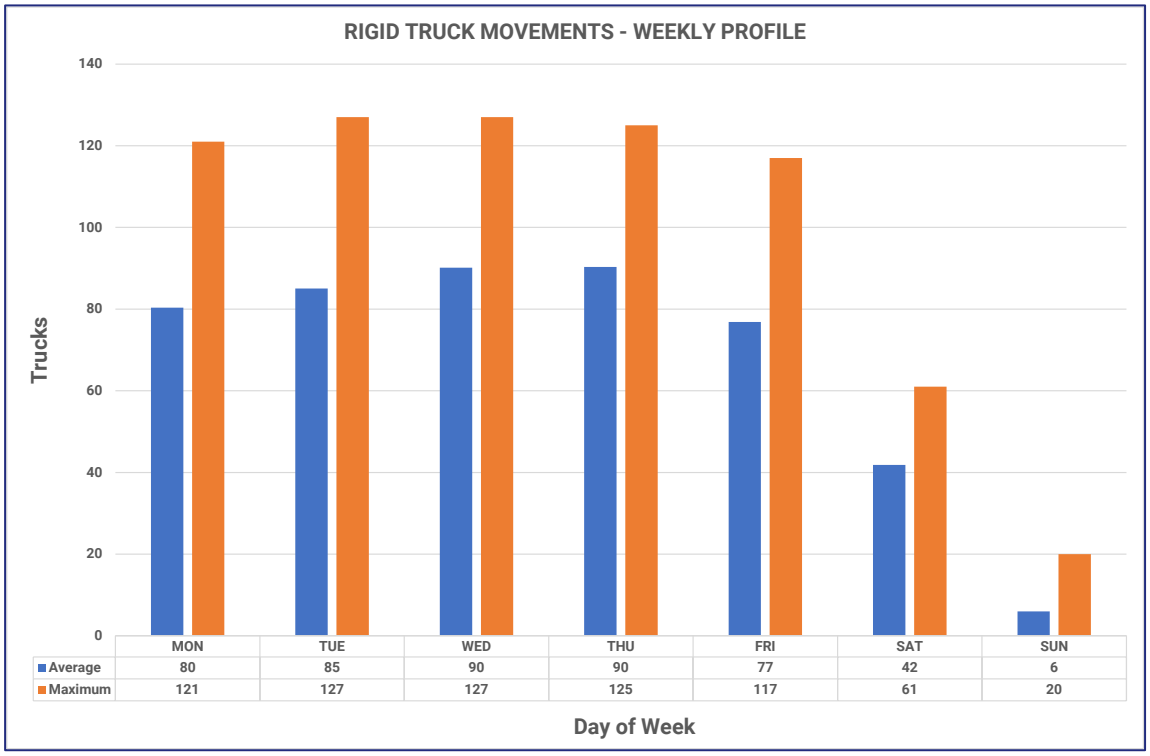


Figure 17: Weekly Profile – Existing Rigid Truck Movements

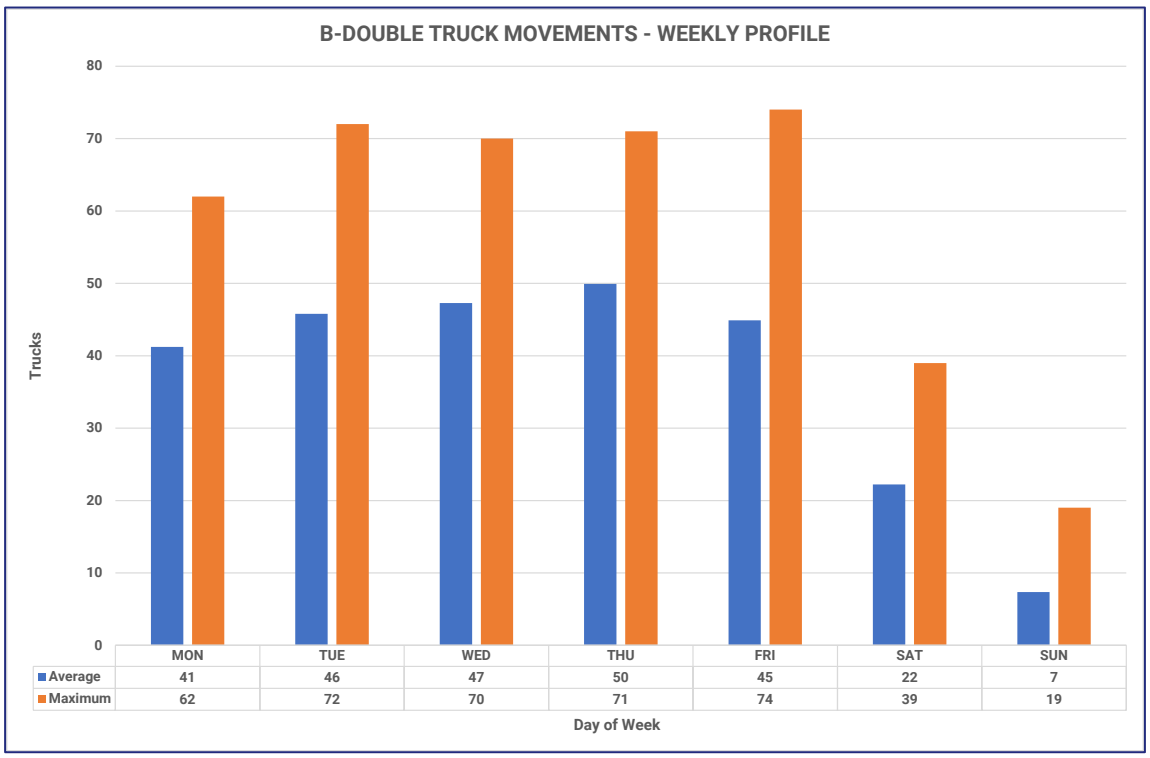


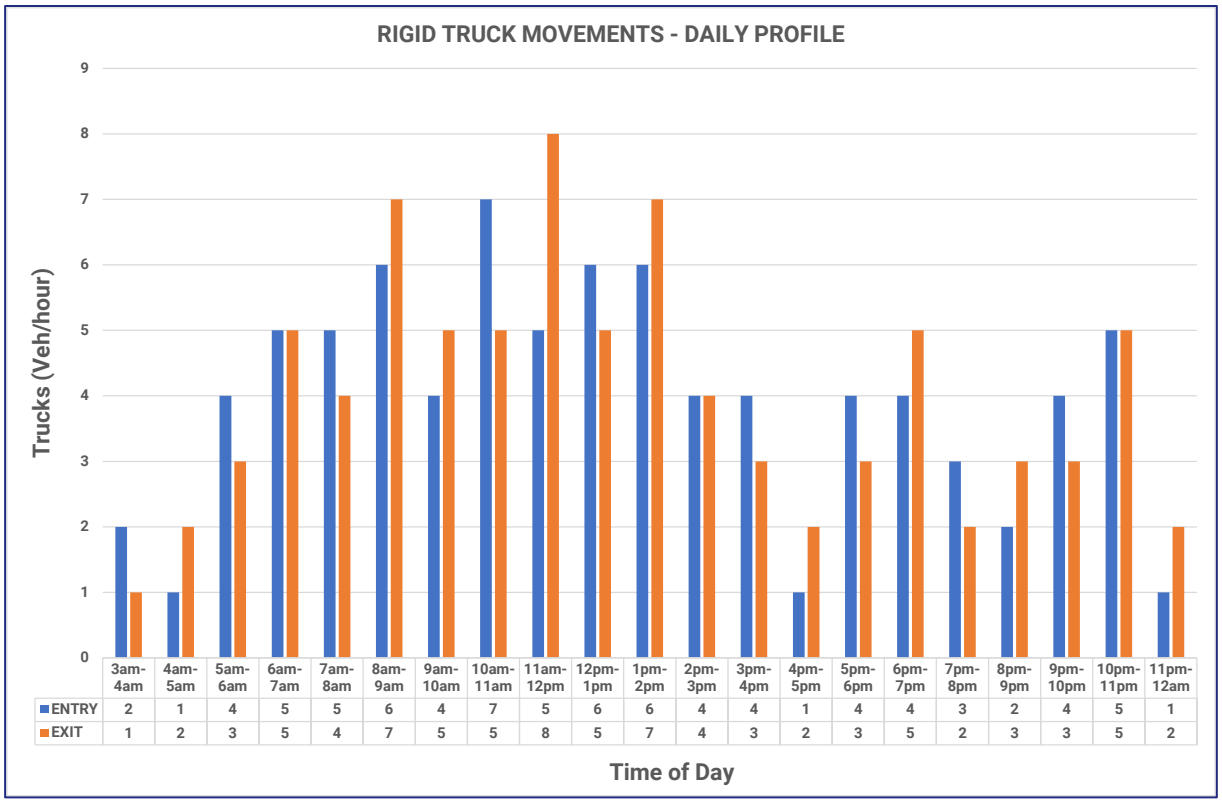
Figure 18: Weekly Profile – Existing B-Double Truck Movements

Daily Traffic Profile

Using the same client provided data previously described, a review of the typical daily profile of traffic movements was undertaken for a typical weekday (i.e. weekday that included the average truck movements per day).

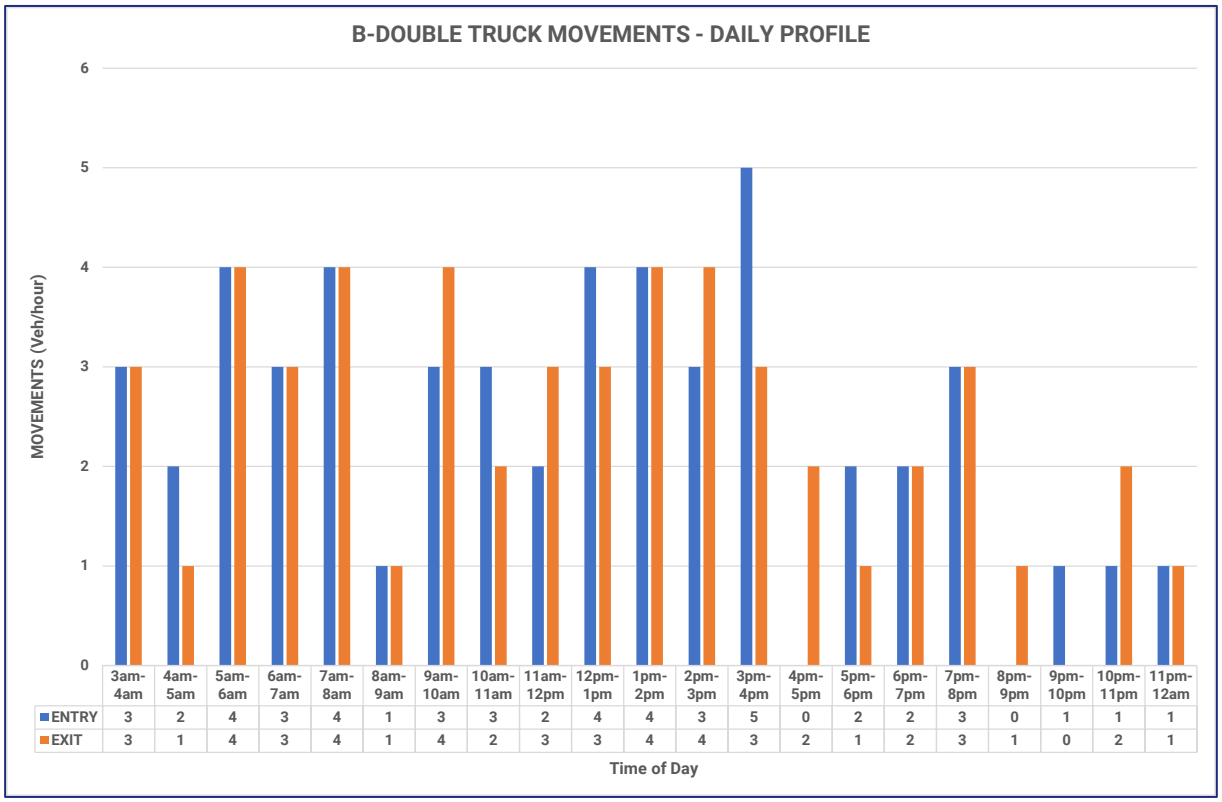
Graphs which identify the typical hourly truck movements over a typical weekday is provided as follows.

The data identified that traffic movements were evenly distributed over the day with hourly movements typically representing 4-8% of the overall daily movements. A maximum of 10% of the daily movements were recorded in any hour for both the rigid and b-double movements.



	3am-4am	4am-5am	5am-6am	6am-7am	7am-8am	8am-9am	9am-10am	10am-11am	11am-12pm	12pm-1pm	1pm-2pm	2pm-3pm	3pm-4pm	4pm-5pm	5pm-6pm	6pm-7pm	7pm-8pm	8pm-9pm	9pm-10pm	10pm-11pm	11pm-12am
ENTRY	2	1	4	5	5	6	4	7	5	6	6	4	4	1	4	4	3	2	4	5	1
EXIT	1	2	3	5	4	7	5	5	8	5	7	4	3	2	3	5	2	3	3	5	2

Figure 19: Typical Daily Profile –Rigid Truck Movements



	3am-4am	4am-5am	5am-6am	6am-7am	7am-8am	8am-9am	9am-10am	10am-11am	11am-12pm	12pm-1pm	1pm-2pm	2pm-3pm	3pm-4pm	4pm-5pm	5pm-6pm	6pm-7pm	7pm-8pm	8pm-9pm	9pm-10pm	10pm-11pm	11pm-12am
ENTRY	3	2	4	3	4	1	3	3	2	4	4	3	5	0	2	2	3	0	1	1	1
EXIT	3	1	4	3	4	1	4	2	3	3	4	4	3	2	1	2	3	1	0	2	1

Figure 20: Typical Daily Profile –B-Double Truck Movements

3.2.4. Assessment of Existing Traffic Conditions

SIDRA 9.0 has been used to assess the performance of the Whitehall Street/Francis Street intersection based on the traffic volumes presented at Figure 15.

The intersection capacity analysis allows estimation of key operating parameters such as intersection Degree of Saturation (DoS), Level of Service (LoS) and 95th percentile queue, which are described below:

- **Degree of Saturation (DoS)** – measure of intersection performance expressed as a ratio of demand/capacity. A DOS greater than 0.95 is generally regarded as unsatisfactory for a signalised intersection, while a DOS greater than 0.90 is generally regarded as unsatisfactory for an unsignalised intersection. This is shown in the table below.
- **Level of Service (LoS)** – the level of service is based on the Degree of Saturation in this analysis.
- **95th Percentile Queue** – this is the length of queue in vehicles or meters which is exceed only 5% of the time over the analysis period (i.e. a peak hour).

Table 4: Description of Intersection Performance Levels

Level of Service		Intersection Degree of Saturation	
		Unsignalised Intersection	**Signalised Intersection**
A	Excellent	<= 0.60	**<= 0.60**
B	Very Good	0.60 – 0.70	**0.60 – 0.70**
C	Good	0.70 – 0.80	**0.70 – 0.90**
D	Acceptable	0.80 – 0.90	**0.90 – 0.95**
E	Poor	0.90 – 1.00	**0.95 – 1.00**
F	Very Poor	>= 1.0	**>= 1.0**

The SIDRA intersection diagram is presented in the figure below. It is a diagrammatic model only and is not drawn to scale.

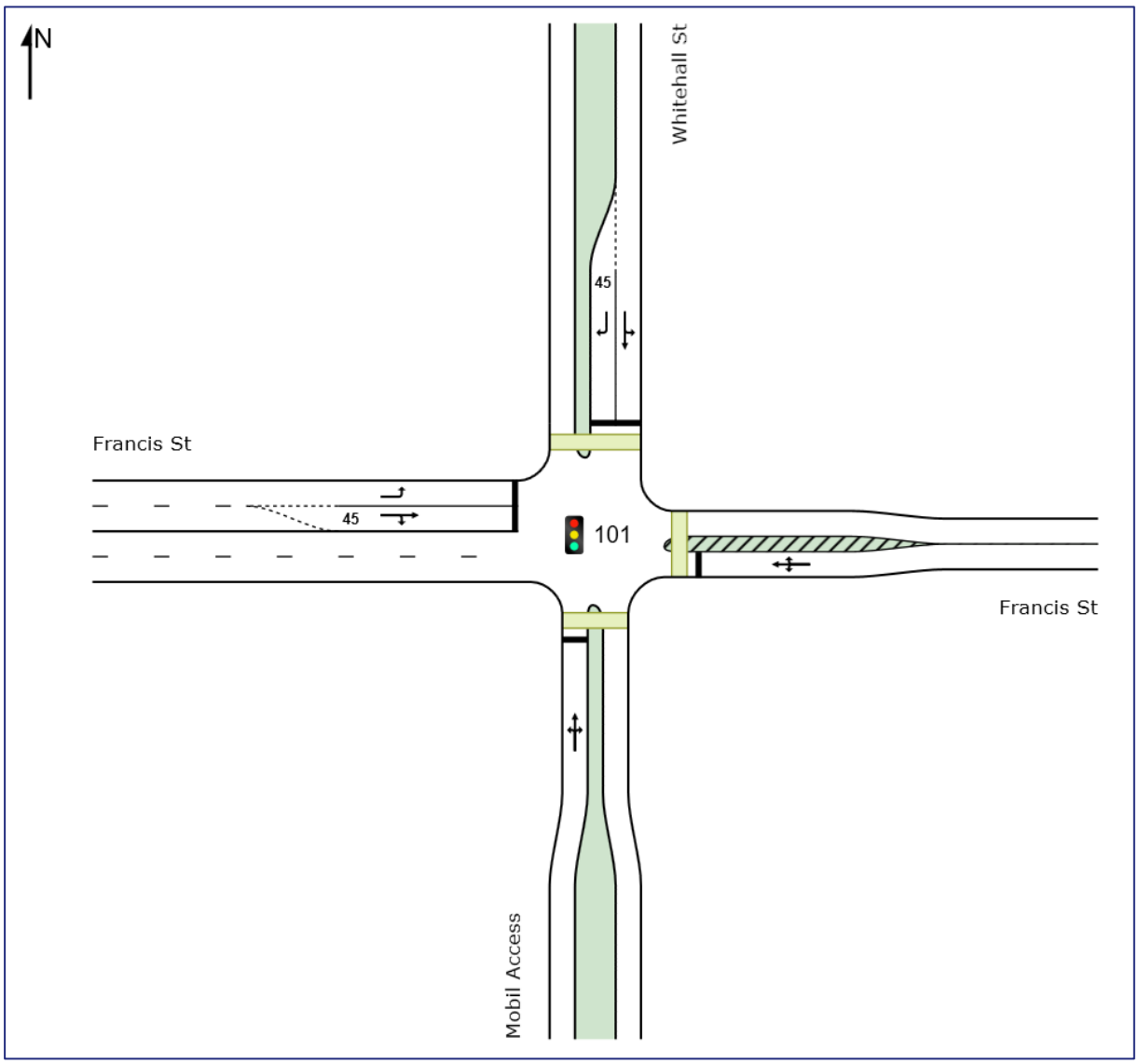


Figure 21: SIDRA Model

The following key inputs and assumptions were adopted in the SIDRA modelling:

- Traffic signal phasing at the intersection was adopted as per the VicRoads (now Department of Transport) operations sheets.
- A cycle time of 100 seconds has been adopted for the intersection based on observations during the site inspection.

The detailed SIDRA outputs and phasing diagrams are presented at Appendix B.

Figure 19 set out the Degree of Saturation for each lane within the model. The analysis indicates that:

- The intersection operates at an 'excellent' level of service for all movements during both peak hours, with exception to the right-turn movement of the northern leg (Whitehall Street) during the PM peak hour, which has a DoS of 0.64 ('very good' level of service).
- The delays and queues experienced at the intersection are minimal under existing conditions.

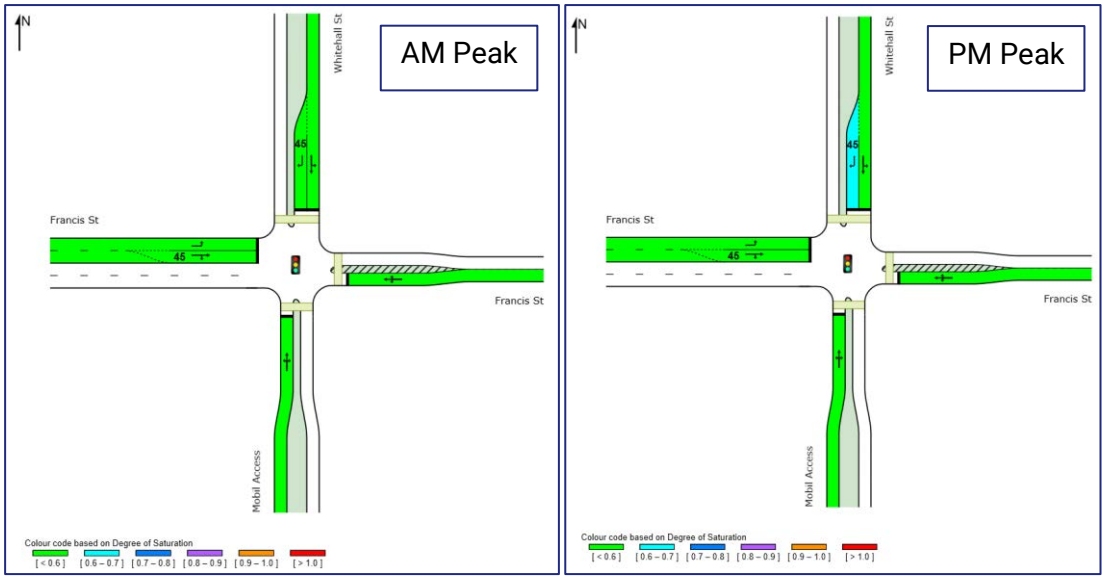


Figure 22: Peak Hour Degree of Saturation diagrams

3.2.5. Future Reduction in Traffic Volumes

A significant reduction in the traffic along Francis Street is expected under the future conditions as a result of the West Gate Tunnel Project. In particular 24 hour truck bans are proposed to be introduced on Francis Street, between Roberts Street and Hyde Street (https://bigbuild.vic.gov.au/library/west-gate-tunnel-project/fact-sheets/removing-trucks-from-inner-west-streets).

On the basis of the above, we expect that Francis Street would operate under improved conditions under the future conditions.

3.2.6. Road Safety Review

A review of the State Road Accident Records (Crashstats) has been undertaken in the vicinity of the site for the past 5 years of available data (01/07/2015 to 30/06/2020)[1]. The review area is shown in Figure 23. A summary of the crash history is provided in Table 5.

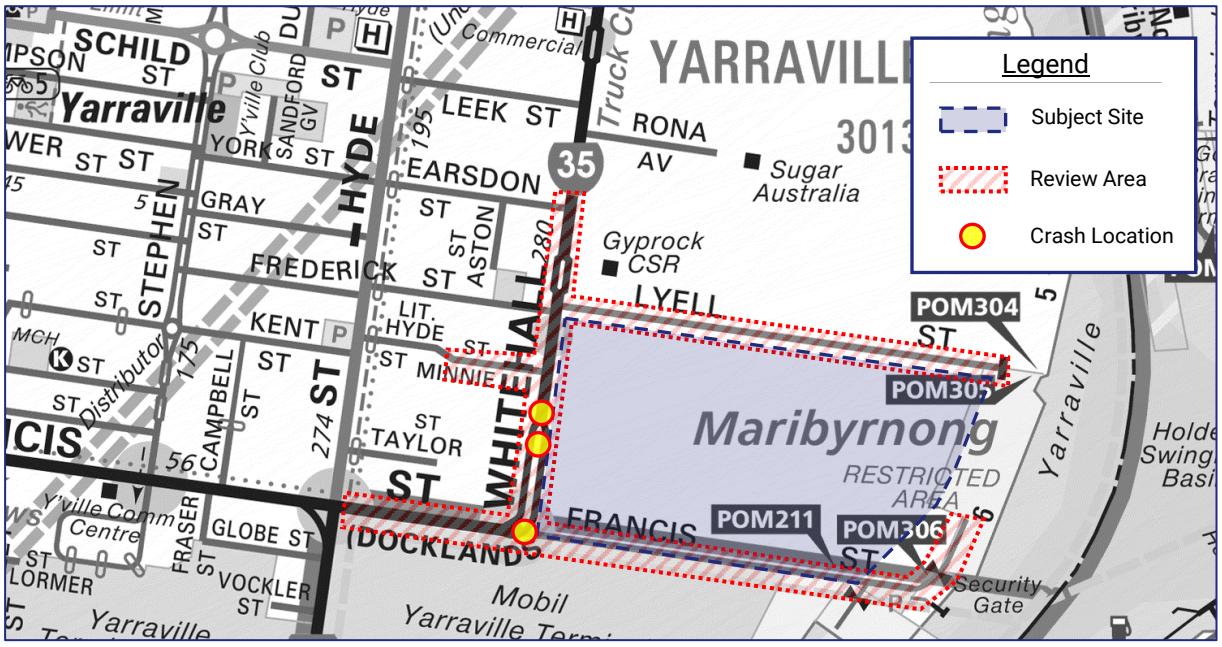


Figure 23: Crash History Investigation Area (Source: Melways Publishing Pty Ltd)

Table 5: Casualty Crash History

Location	Date	Time	Severity	Conditions	DCA Code	Type
Whitehall Street, 49m south of Minnie Street	Fri 14/04/2017	5:50 AM	SI	Dry, Clear, Dark (street lights on)	121 (M)	Right through
Whitehall Street, 63m south of Minnie Street	Mon 18/05/2020	4:30 PM	OI	Day, Clear, Dry	130	Rear end (vehicles in same lane)
Intersection of Whitehall Street and Francis Street	Sun 01/07/2018	2:30 PM	OI	Day, Clear, Dry	190 (M)	Fell in/from vehicle

LEGEND:

OI:	Other Injury	SI:	Serious Injury	F:	Fatality
(B):	Bicyclist	(M):	Motorcyclist	(P):	Pedestrian
(C):	Bus/Coach	(RT):	Rigid Truck	(ST):	Semi-trailer

[1] Casualty crash data is contained in the VicRoads' *Crashstats Internet Database* and includes all reported casualty crashes (i.e. injury crashes), which are classified into Fatal Injury, Serious Injury and Other Injury (i.e. minor injury) crashes. Property damage only or non-injury crashes are not included in the database.

The road safety review indicates there has been three casualty crashes reported within the review area, all occurring on Whitehall Street (Docklands Highway).

The three crashes above do not exhibit a discernible crash pattern and the number of crashes is not unusual in the context of an arterial road (i.e. higher incidence of crashes due to higher exposure).

Accordingly, we are satisfied that the local road network is not inherently unsafe.

3.3. Alternative Transport Modes

3.3.1. Public Transport

The site has access to public transport services, with train and bus routes available within walking distance. The site is located outside the Principal Public Transport Network area (PPTN).

A summary of the public transport services available is provided at Table 6 and map of the broader services is provided at Figure 24.

Table 6: Summary of Public Transport Services

Service	Between	Via
Yarraville Railway Station – Approximately 1.25km walking distance west of the site		
Yarraville Station	Werribee and Williamstown Lines	North Melbourne, Footscray, Newport and Laverton
Bus Route 431	Yarraville Station & Kingsville	Somerville Road
Bus Route 432	Newport & Yarraville	Altona Gate Shopping Centre
Hyde Street – Approximately 350m walking distance west of the site		
Bus Route 409	Yarraville & Highpoint Shopping Centre	Footscray

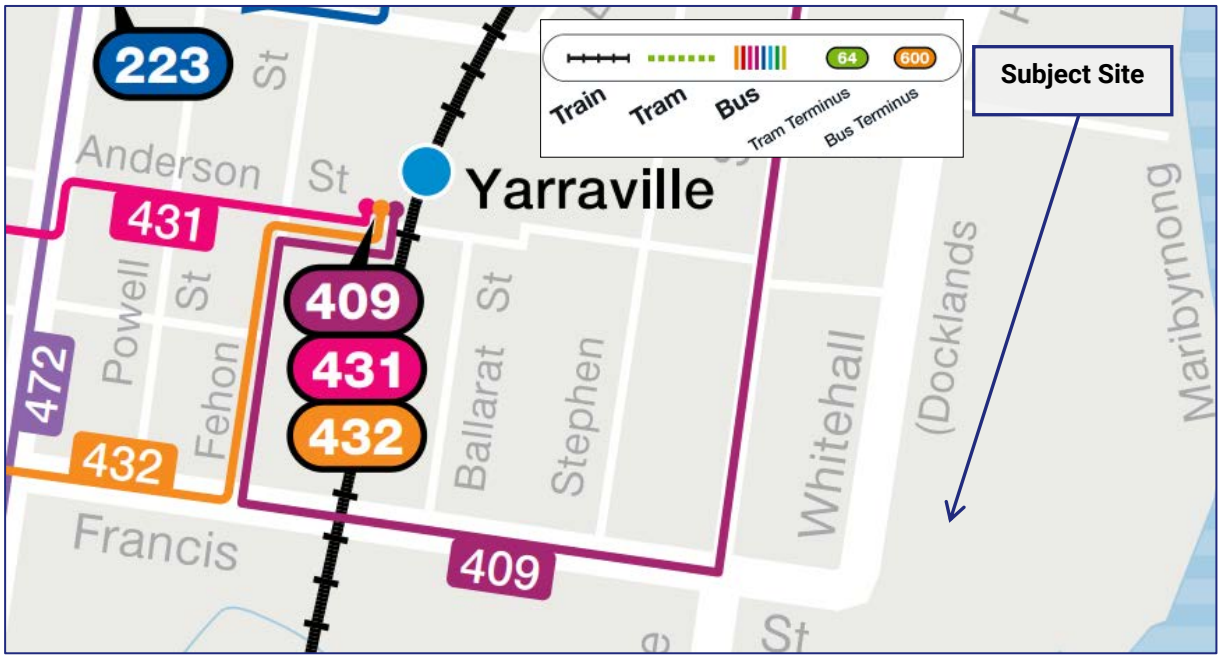


Figure 24: Public Transport Map (Source: PTV)

3.3.2. Bicycle Infrastructure

The site is well served by bicycle infrastructure with off-road trails, on-road bicycle lanes, and informal bicycle routes surrounding the site, as shown in the excerpt from the City of Maribyrnong as shown in Figure 25. These paths provide a connection between the site and nearby activity centres, including Footscray Major Activity Centre.

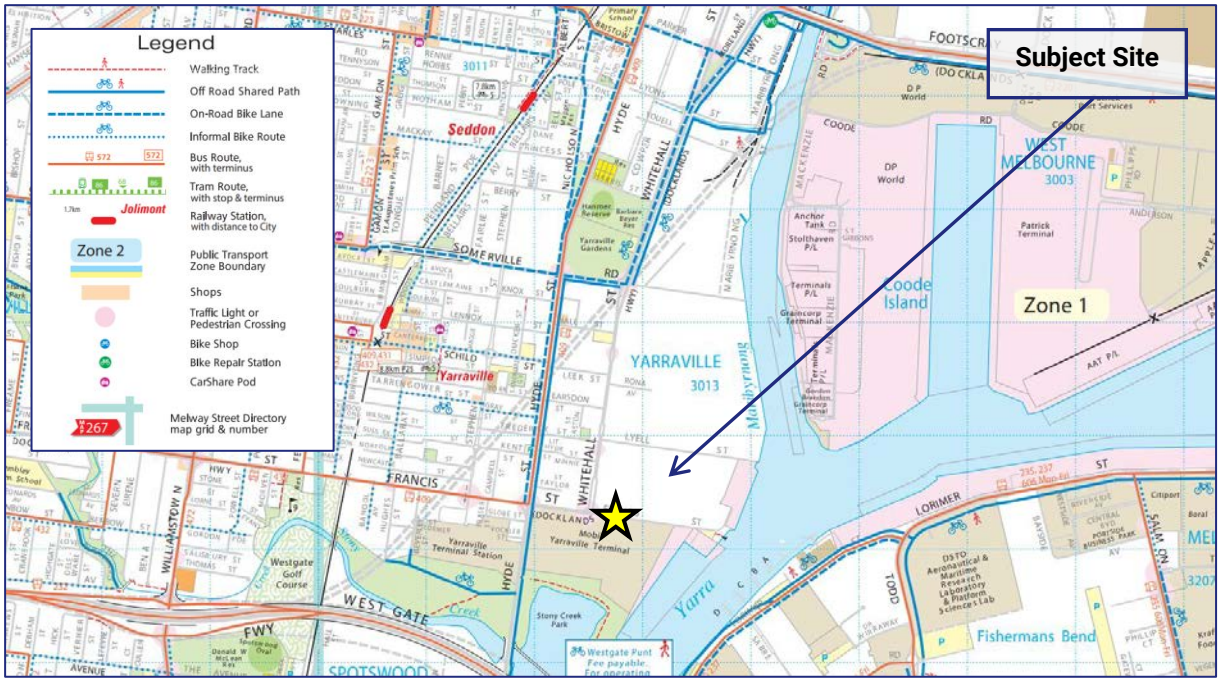


Figure 25: Sustainable Transport Infrastructure (Source: Maribyrnong City Council)

4. Traffic Engineering Assessment

Clause 18 of the Victorian Planning Provisions sets the state planning objectives and strategies in relation to the transport system. The key objectives of Clause 18 set out in the following table.

Table 7: Transport Objectives of the Victorian Planning Provisions

Clause	Objective
18.01-1S Land use and transport integration	*To facilitate access to social, cultural and economic opportunities by effectively integrating land use and transport.*
18.01-2S Transport system	*To facilitate the efficient, coordinated and reliable movement of people and goods by developing an integrated and efficient transport system*
18.01-3S Sustainable and safe transport	*To facilitate an environmentally sustainable transport system that is safe and supports health and wellbeing.*
18.02-1S Walking	*To facilitate an efficient and safe walking network and increase the proportion of trips made by walking.*
18.02-2S Cycling	*To facilitate an efficient and safe bicycle network and increase the proportion of trips made by cycling.*
18.02-3S Public transport	*To facilitate an efficient and safe public transport network and increase the proportion of trips made by public transport.*
18.02-4S Roads	*To facilitate an efficient and safe road network that integrates all movement networks and makes best use of existing infrastructure.*
18.02-5S Freight	*To facilitate an efficient, coordinated, safe and sustainable freight and logistics system that enhances Victoria's economic prosperity and liveability.*

This application has regard to Clause 18.02-5S, which relates to the role of freight to the movement network.

4.1. Statutory Car Parking Assessment

The proposed development falls under the land-use category of 'Industry' under Clause 73.03 of the Planning Scheme. The Planning Scheme sets out the parking requirements for new developments under Clause 52.06. The purpose of Clause 52.06 is:

- *To ensure that car parking is provided in accordance with the Municipal Planning Strategy and the Planning Policy Framework.*
- *To ensure the provision of an appropriate number of car parking spaces having regard to the demand likely to be generated, the activities on the land and the nature of the locality.*
- *To support sustainable transport alternatives to the motor car.*
- *To promote the efficient use of car parking spaces through the consolidation of car parking facilities.*
- *To ensure that car parking does not adversely affect the amenity of the locality.*
- *To ensure that the design and location of car parking is of a high standard, creates a safe environment for users and enables easy and efficient use.*

The statutory parking requirements are set out at Clause 52.06-5 of the Planning Scheme. Clause 52.06-5 states:

Column A applies unless Column B applies.

Column B applies if:

- *any part of the land is identified as being within the Principal Public Transport Network Area as shown on the Principal Public Transport Network Area Maps (State Government of Victoria, 2018); or*
- *a schedule to the Parking Overlay or another provision of the planning scheme specifies that Column B applies.*

Given the site is not located with the PPTN, the Column A rates apply.

Clause 52.06-5 goes on to state that:

Where an existing use is increased by the measure specified in Column C of Table 1 for that use, the car parking requirement only applies to the increase, provided the existing number of car parking spaces currently being provided in connection with the existing use is not reduced.

Accordingly, the car parking assessment is based on the increase in floor area only.

The statutory car parking assessment of the development is set out in Table 8 below.

Table 8: Statutory Car Parking Assessment – Column A of Clause 52.06-5

Use	Size / No.	Statutory Parking Rate (Column A)	Parking Requirement (1)	Parking Provision	Shortfall / Surplus
Industry	15,635m^2 (2)	2.9 car spaces per 100m^2 NFA	453	30 (3)	-423
TOTAL			**453**	**30 (3)**	**-423**

Notes:

1. Clause 52.06-5 specifies that where a car parking calculation results in a requirement that is not a whole number, then number of spaces should be rounded down to the nearest whole number.
2. The increase in floor area is a highly conservative assessment, as the areas included would not necessarily contribute to car parking demands (i.e. mills, storage areas, etc.).
3. The on-site car parking provision includes 9 linemarked spaces and various hardstand areas adjacent to the site office. For the purpose of our assessment, we have estimated a supply of approximately 30 car spaces in this area, inclusive of hard stand areas.

The proposal requires a significant car parking reduction when assessed against the statutory rates stipulated under Clause 52.06-5. The reduction is considered appropriate based on the operating characteristics of the site (staff parking only), which has been discussed in greater detail in the following sections. Accordingly, a car parking reduction is required under the decision guidelines of Clause 52.06-7.

Disabled Parking

Clause 52.06-9 states that:

> *The car parking requirement specified in Table 1 includes disabled car parking spaces. The proportion of spaces to be allocated as disabled spaces must be in accordance with Australian Standard AS2890.6-2009 (disabled) and the Building Code of Australia.*

One disabled car space is required under the NCC. Two disabled car space are proposed on-site under existing conditions, which is satisfactory.

4.1.1. Reducing the Requirement for Car Parking

Clause 52.06-7 allows for the statutory car parking requirement to be reduced (including to zero). An application to reduce (including reduce to zero) the number of car spaces required under Clause 52.06-5 or in a schedule to the Parking Overlay must be accompanied by a Car Parking Demand Assessment.

Clause 52.06-7 sets out that a Car Parking Demand Assessment must have regard to the following key factors:

- *The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use.*
- *The variation of car parking demand likely to be generated by the proposed use over time.*

- *The short-stay and long-stay car parking demand likely to be generated by the proposed use.*
- *The availability of public transport in the locality of the land.*
- *The convenience of pedestrian and cyclist access to the land.*
- *The provision of bicycle parking and end of trip facilities for cyclists in the locality of the land.*
- *The anticipated car ownership rates of likely or proposed visitors to or proposed occupants (residents or employees) of the land.*
- *Any empirical assessment or case study.*

Planning Practice Note 22 (June, 2015) specifies that the provisions for reducing the car parking requirement draw a distinction between the assessment of likely demand for car parking spaces (the Car Parking Demand Assessment), and whether it is appropriate to allow the supply of fewer spaces than assessed by the Car Parking Demand Assessment. These are two separate considerations, one technical while the other is more strategic. Different factors are taken into account in each consideration.

Accordingly, the applicant must satisfy the responsible authority that the provision of car parking is appropriate on the basis of a two-step process, which has regard to:

- *The car parking demand likely to be generated by the use.*
- *Whether it is appropriate to allow fewer spaces to be provided than the number likely to be generated by the site.*

An assessment of the appropriateness of reducing the car parking provision below the statutory requirement is set out below.

4.1.2. Car Parking Demand Assessment

We understand that the proposal will require additional staff associated with the increased floor areas. The operator has provided information that no more than 25 staff will be required on-site at any one time (i.e. increase of 9 staff compared to the existing conditions).

Due to the site's location and nature of the 24 hour operating hours, we have assumed that all staff drive to the site in a single-occupant vehicle. Accordingly, a maximum demand of 25 car spaces will not be exceeded at any time.

There will be occasional demands associated with visitors/customers/contractors to the site, however, these will infrequent and can be readily accommodated on-site.

Accordingly, we are satisfied that the car parking reduction is appropriate and that all car parking demands associated with the increase in floor area can be accommodated on-site at all times.

4.2. Bicycle Parking Provision

Clause 52.34 of the Planning Scheme specifies bicycle parking requirements for new developments. The purpose of Clause 52.34 is to:

- *To encourage cycling as a mode of transport.*
- *To provide secure, accessible and convenient bicycle parking spaces and associated shower and change facilities.*

The statutory bicycle parking requirement of the development under Clause 52.34 is set out in the table below.

Table 9: Statutory Bicycle Parking Assessment - Clause 52.34

Use	Size/No.	Statutory Bicycle Parking Requirement		No. Bicycle spaces required
		Employees	Customers	
Industry	15,635m^2	1 space to each 1,000m^2 of net floor area	-	16 employee
TOTAL				**16 spaces**

Based on the above, the proposal would require 16 bicycle spaces for staff. As the proposal does not include any additional formal bicycle parking areas, a reduction to the statutory bicycle parking requirement is required against the decision guidelines of Clause 52.34-4, which states that:

> *Before deciding on an application, in addition to the decision guidelines in Clause 65, the responsible authority must consider, as appropriate:*
>
> – *Whether the proposed number, location and design of bicycle facilities meets the purpose of this clause.*
>
> – *The location of the proposed land use and the distance a cyclist would need to travel to reach the land.*
>
> – *The users of the land and their opportunities for bicycle travel.*
>
> – *Whether showers and change rooms provided on the land for users other than cyclists are available to cyclists.*
>
> – *The opportunities for sharing of bicycle facilities by multiple uses, either because of variation of bicycle parking demand over time or because of efficiencies gained from the consolidation of shared bicycle facilities.*
>
> – *Australian Standard AS 2890.3 1993 Parking facilities Part 3: Bicycle parking facilities.*
>
> – *Any relevant bicycle parking strategy or equivalent.*

We do not anticipate many staff will cycle to the site. In particular the statutory requirement would suggest that more than 505 of staff cycle to the site.

Any staff who elect to cycle to the site can informally store bicycles in the various hardstand areas. We also understand that suitable end-of-trip facilities for staff are provided within the existing buildings across the site.

Based on the decision guidelines of Clause 52.34-4, we are satisfied that staff are not anticipated cycle to the site, that formal bicycle parking is not required on-site for the use, and that a reduction to the bicycle parking requirement is appropriate in this instance.

4.3. Review of Carpark Layout and Vehicle Access Arrangements

Traffix Group has provided design advice to the project architect to achieve a satisfactory carpark layout. The proposed parking layout has been assessed under the following guidelines:

- Clause 52.06-9 of the Planning Scheme (Design Standards for car parking),
- AS2890.1-2004 – Part 1: Off-Street Car Parking (where relevant),
- AS2890.2-2018 – Part 2: Off-Street Commercial Vehicle Facilities (where relevant), and
- AS2890.6-2009 – Part 6: Off-Street Car Parking for People with Disabilities.

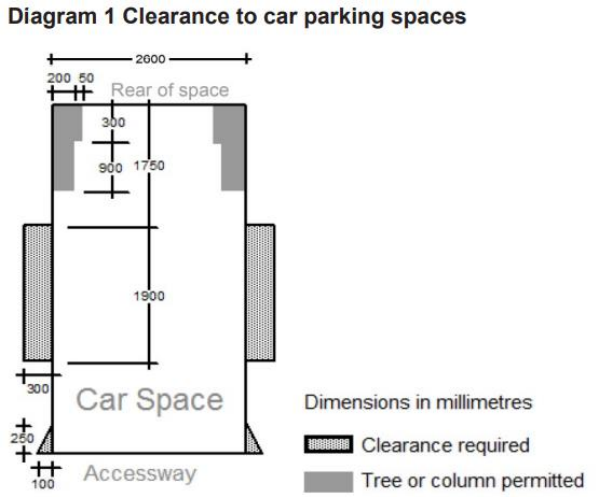
An assessment against the relevant design standards of the Planning Scheme and Australian Standards (where relevant) is provided in the table below.

Table 10: Carpark Layout and Access Assessment

Requirement	Assessment	Design Response
Clause 52.06-9 Design Standard 1 – Accessways		
Must be at least 3m wide	✓	Complies.
Have an internal radius of at least 4m at changes of direction or intersection or be at least 4.2m wide.	✓	Complies.
Allow vehicles parked in the last space of a dead-end accessway in public car parks to exit in a forwards direction with one manoeuvre.	N/A	Not applicable
Provide at least 2.1m headroom beneath overhead obstructions, calculated for a vehicle with a wheel base of 2.8m.	✓	Complies.
If the accessway serves four or more car spaces or connects to a road in a Transport Zone 2 or Transport Zone 3, the accessway must be designed so that cars can exit the site in a forward direction.	✓	Complies.

<table>
<tr><th>Requirement</th><th>Assessment</th><th>Design Response</th></tr>
<tr><td>Provide a passing area at the entrance at least 6.1m wide and 7m long if the accessway serves ten or more car parking spaces and is either more than 50m long or connects to a road in a Transport Zone 2 or Transport Zone 3.</td><td>✓</td><td>Complies.</td></tr>
<tr><td>Have a corner splay or area at least 50% clear of visual obstructions extending at least 2m along the frontage road from the edge of an exit lane and 2.5m along the exit lane from the frontage, to provide a clear view of pedestrians on the footpath of the frontage road. The area clear of visual obstructions may include an adjacent entry or exit lane where more than one lane is provided, or adjacent landscaped areas, provided the landscaping in those areas is less than 900mm in height.</td><td>✓</td><td>Complies.</td></tr>
<tr><td>If an accessway to four or more car parking spaces is from land in a Transport Zone 2 or Transport Zone 3, the access to the car spaces must be at least 6m from the road carriageway.</td><td>✓</td><td>Complies.</td></tr>
<tr><td>If entry to the car space is from a road, the width of the accessway may include the road.</td><td>N/A</td><td>Not applicable</td></tr>
<tr><td colspan="3">Clause 52.06-9 Design Standard 2 – Car Parking Spaces</td></tr>
<tr><td>Car parking spaces and accessways must have the minimum dimensions as outlined in Table 2 under Clause 52.06-9.
<table>
<tr><th>Angle of car spaces to accessway</th><th>Accessway width</th><th>Car park width</th><th>Car park length</th></tr>
<tr><td>Parallel</td><td>3.6 m</td><td>2.3 m</td><td>6.7 m</td></tr>
<tr><td>45°</td><td>3.5 m</td><td>2.6 m</td><td>4.9 m</td></tr>
<tr><td>60°</td><td>4.9 m</td><td>2.6 m</td><td>4.9 m</td></tr>
<tr><td>90°</td><td>6.4 m</td><td>2.6 m</td><td>4.9 m</td></tr>
<tr><td></td><td>5.8 m</td><td>2.8 m</td><td>4.9 m</td></tr>
<tr><td></td><td>5.2 m</td><td>3.0 m</td><td>4.9 m</td></tr>
<tr><td></td><td>4.8 m</td><td>3.2 m</td><td>4.9 m</td></tr>
</table>
Note to Table 2: Some dimensions in Table 2 vary from those shown in the Australian Standard AS2890.1-2004 (off street). The dimensions shown in Table 2 allocate more space to aisle widths and less to marked spaces to provide improved operation and access. The dimensions in Table 2 are to be used in preference to the Australian Standard AS2890.1-2004 (off street) except for disabled spaces which must achieve Australian Standard AS2890.6-2009 (disabled).</td><td>✓</td><td>Complies.

Car parking is either existing or in hard stand areas which have dimensions in accordance with Clause52.06.</td></tr>
</table>

Requirement	Assessment	Design Response
A wall, fence, column, tree, tree guard or any other structure that abuts a car space must not encroach into the area marked 'clearance required' on Diagram 1, other than: • A column, tree or tree guard, which may project into a space if it is within the area marked 'tree or column permitted' on Diagram 1. • A structure, which may project into the space if it is at least 2.1 metres above the space. **Diagram 1 Clearance to car parking spaces**  	✓	Complies.
Car spaces in garages/carports must be at least 6m long and 3.5m wide for a single space and 5.5m wide for a double space measured inside the garage/carport.	N/A	No garages proposed.
Where parking spaces are provided in tandem, an additional 0.5m in length must be provided between each space.	N/A	No tandem car spaces.
Where two or more car parking spaces are provided for a dwelling, at least one space must be under cover.	N/A	No residential car spaces.
Disabled car parking spaces must be designed in accordance with AS2890.6-2009 and the Building Code of Australia. Disabled car parking spaces may encroach into an accessway width specified in Table 2 by 0.5m. A minimum headroom of 2.5m is to be provided above the disabled car space in accordance with AS2890.6-2009.	✓	Complies.

<table>
<tr><th>Requirement</th><th>Assessment</th><th>Design Response</th></tr>
<tr><td colspan="3">Clause 52.06-9 Design Standard 3 - Gradients</td></tr>
<tr><td>Accessway grades must not be steeper than 1:10 (10 per cent) within 5 metres of the frontage to ensure safety for pedestrians and vehicles. The design must have regard to the wheelbase of the vehicle being designed for; pedestrian and vehicular traffic volumes; the nature of the car park; and the slope and configuration of the vehicle crossover at the site frontage.
This does not apply to accessways serving three dwellings or less.</td><td>✓</td><td rowspan="4">Complies.

Grades across the site are generally flat and consistent with existing conditions.</td></tr>
<tr><td>Ramps (except within 5 metres of the frontage) must have the maximum grades as outlined in Table 3 and be designed for vehicles travelling in a forward direction.
<table>
<tr><th>Type of car park</th><th>Length of ramp</th><th>Maximum grade</th></tr>
<tr><td rowspan="2">Public car parks</td><td>20 metres or less</td><td>1:5 (20%)</td></tr>
<tr><td>longer than 20 metres</td><td>1:6 (16.7%)</td></tr>
<tr><td rowspan="2">Private or residential car parks</td><td>20 metres or less</td><td>1:4 (25%)</td></tr>
<tr><td>longer than 20 metres</td><td>1:5 (20%)</td></tr>
</table></td><td>✓</td></tr>
<tr><td>Where the difference in grade between two sections of ramp or floor is greater that 1:8 (12.5 per cent) for a summit grade change, or greater than 1:6.7 (15 per cent) for a sag grade change, the ramp must include a transition section of at least 2 metres to prevent vehicles scraping or bottoming.</td><td>✓</td></tr>
<tr><td>Plans must include an assessment of grade changes of greater than 1:5.6 (18 per cent) or less than 3 metres apart for clearances, to the satisfaction of the responsible authority</td><td>✓</td></tr>
<tr><td colspan="3">Clause 52.06-9 Design Standard 4 – Mechanical Parking</td></tr>
<tr><td>At least 25 per cent of the mechanical car parking spaces can accommodate a vehicle height of at least 1.8 metres.</td><td>N/A</td><td rowspan="3">No mechanical car parking.</td></tr>
<tr><td>Car parking spaces that require the operation of the system are not allocated to visitors unless used in a valet parking situation.</td><td>N/A</td></tr>
<tr><td>The design and operation is to the satisfaction of the responsible authority.</td><td>N/A</td></tr>
</table>

Requirement	Assessment	Design Response
Clause 52.06-9 Design Standard 5 – Urban Design		
Ground level car parking, garage doors and accessways must not visually dominate public space.	N/A	These matters are more related to urban design, rather than specifically traffic engineering.
Car parking within buildings (including visible portions of partly submerged basements) must be screened or obscured where possible, including through the use of occupied tenancies, landscaping, architectural treatments and artworks.		
Design of car parks must take into account their use as entry points to the site.		
Design of new internal streets in developments must maximise on street parking opportunities.	N/A	No internal streets proposed.
Clause 52.06-9 Design Standard 6 – Safety		
Car parking must be well lit and clearly signed.	✓	To be addressed at detailed design stage.
The design of car parks must maximise natural surveillance and pedestrian visibility from adjacent buildings.	✓	We are satisfied that good sightlines are available across the site.
Pedestrian access to car parking areas from the street must be convenient.	✓	This design standard is not considered relevant to the application as staff vehicles will typically drive to the on-site parking areas.
Pedestrian routes through car parking areas and building entries and other destination points must be clearly marked and separated from traffic in high activity parking areas.	✓	This has been addressed under existing conditions. Any new buildings are to suitable provide pedestrian connections. Line marking can be installed as required.
Clause 52.06-9 Design Standard 7 - Landscaping		
The layout of car parking areas must provide for water sensitive urban design treatment and landscaping.	N/A	These requirements are not strictly related to

Requirement	Assessment	Design Response
Landscaping and trees must be planted to provide shade and shelter, soften the appearance of ground level car parking and aid in the clear identification of pedestrian paths.		traffic engineering matters.
Ground level car parking spaces must include trees planted with flush grilles. Spacing of trees must be determined having regard to the expected size of the selected species at maturity.		

4.3.1. Commercial Vehicle Access

Access throughout the site has been reviewed for the largest design vehicle anticipated to require access to the site and internal circulation areas (26m B-double).

Swept paths which demonstrate suitable vehicle access throughout are attached at Appendix C.

4.4. Land Adjacent to The Principal Road Network

Clause 52.29 applies to land adjacent to a Transport Zone 2, or a Public Acquisition Overlay.

The purpose of this clause is to:

- *To ensure appropriate access to identified roads.*
- *To ensure appropriate subdivision of land adjacent to identified roads.*

A permit is required to:

- *Create or alter access to:*
  - *A road in a Transport Zone 2.*
  - *Land in a Public Acquisition Overlay if a transport manager (other than a municipal council) is the acquiring authority and the acquisition is for the purpose of a road.*
- *Subdivide land adjacent to:*
  - *A road in a Transport Zone 2.*
  - *Land in a Public Acquisition Overlay if a transport manager (other than a municipal council) is the acquiring authority and the acquisition is for the purpose of a road.*

Whitehall Street (Docklands Hwy) is a road in a Transport Zone 2; however, the proposal does not seek to alter vehicle access to Whitehall Street. Accordingly, a permit is not required.

4.5. Loading and Waste Collection Arrangements

Clause 65.01 of the Planning Scheme states that the Responsible Authority must consider a number of matters as appropriate including:

- *The adequacy of loading and unloading facilities and any associated amenity, traffic flow and road safety impacts.*

4.5.1. Loading

The proposal does not include a specified singular on-site loading bay. Rather loading activities will be undertaken at various locations throughout the site including below the cement loading silos.

In this regard all loading activities will be readily accommodated on-site and will be managed by the site operator as required.

4.5.2. Waste Collection

Waste collection will be undertaken by private contractor as required and typically be consistent with the existing conditions. Suitable access is available for waste collection vehicles to access the relevant parts of the site as required.

Accordingly, we satisfied that the waste collection arrangements are acceptable.

4.6. Traffic Impact Assessment

4.6.1. Traffic Generation

Advice from the site operator/applicant has identified that the proposed expansion works at the development site will result in the following increase in traffic activity:

- Staffing Increase
  - Increase of 12 staff overall, of which a maximum of 9 on-site at any one time
  - Results in increase from 16 staff to 25 staff
  - Equates to 24 veh per day with approx. 9 veh hour during commuter peak periods (allowing for staff arrival or departure)
- Truck Movement Increase
  - Increase of approx. 185 trucks/day associated with additional deliveries and cement collection. These truck movements represent an additional 370 veh/movements per day in total (i.e. 185 entry and 185 exit movements).
  - Profile of the additional movements will generally follow the existing profile recorded at the site. On this basis is it assumed that a maximum of 19 entry and 19 exit movements may occur in any one hour (i.e. 10% of the daily)
- Overall
  - Based on the available information the proposed development is assessed as having the potential to result in an overall increase of 47 vehicle movements per hour consisting of 9 staff arrival or departure and 38 truck movements (evenly split between arrival and departure).

4.6.2. Distribution

Under the proposed circulation arrangements:

- All exiting traffic will occur via the connections to Francis Street
- Entering traffic will be evenly split between the existing crossover to Whitehall Street and the new access to Francis Street.

Figure 26 sets out the peak hourly traffic expected to be generated by the subject site. This figure conservatively adopts an AM scenario with staff arriving and PM scenario with staff departing. Distribution has been adopted as 50% of traffic from the north and 50% from the south

Overall, traffic generated by the development is modest, with only a limited number of trips undertaking any one movement. In particular:

- Whitehall Street/Site Access
  - Maximum of 7 additional turn movements over any hour, representing an average of 1 additional turning movement every 8.5 minutes.

- Francis Street/Whitehall Street
  - Maximum of 9-10 additional turn movements over any hour, representing an average of 1 additional turning movement every 6 minutes.

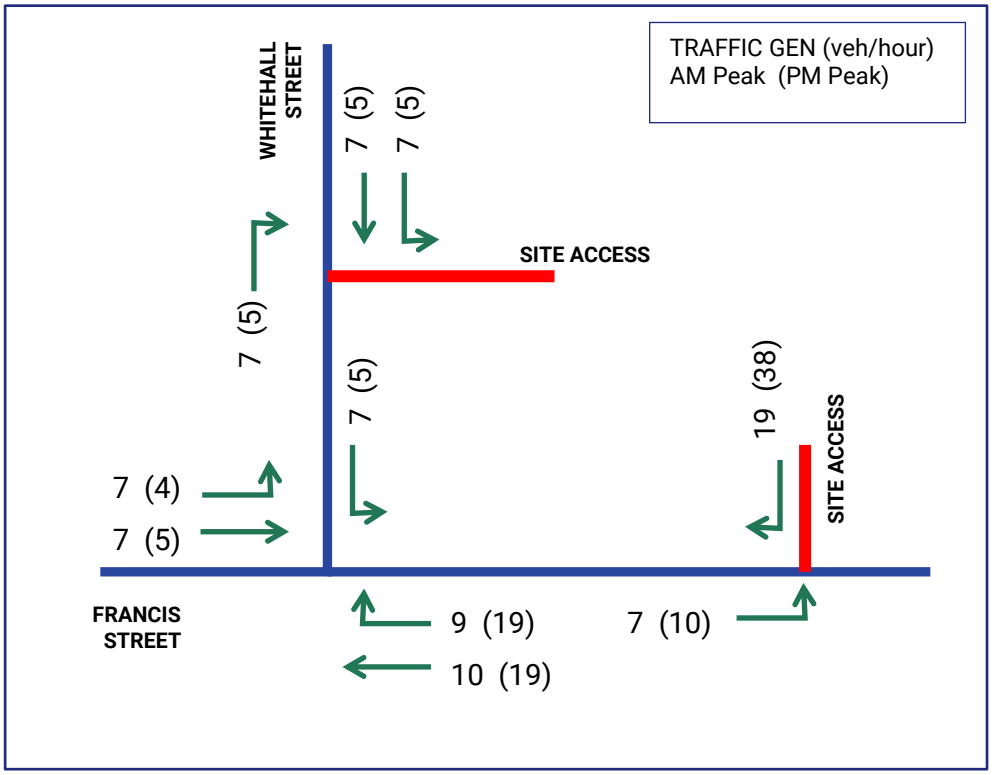


Figure 26: Development Traffic Generation

4.6.3. Traffic Modelling

SIDRA 9.0 has been used to assess the post development performance of the Whitehall Street/Francis Street intersection based on the peak hour traffic volumes presented at Figure 15 and the additional traffic impacts detailed at

The detailed SIDRA outputs and phasing diagrams are presented at Appendix B.

Figure 27 set out the Degree of Saturation for each lane within the model. The analysis indicates that:

- Negligible impacts compared to the existing conditions.
- The intersection operates at an 'excellent' level of service for all movements during both peak hours, with exception to the right-turn movement of the northern leg (Whitehall Street) during the PM peak hour, which has a DoS of 0.64 ('very good' level of service).
- The delays and queues experienced at the intersection are minimal under existing conditions.

	Approaches				Intersection
	South	East	North	West	
Degree of Saturation	0.25	0.28	0.31	0.43	0.43

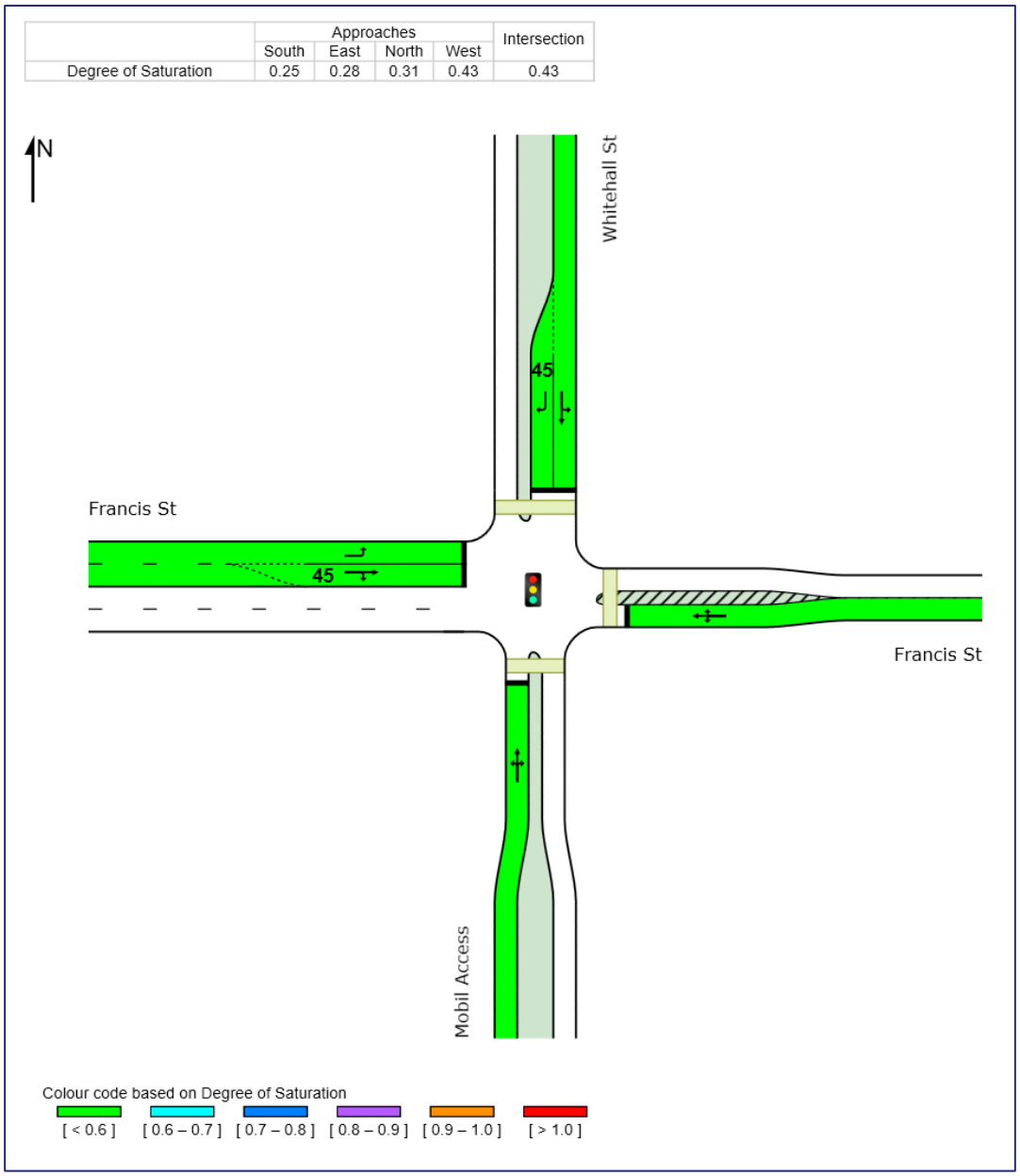


Figure 27: Peak Hour Degree of Saturation diagrams – AM Peak

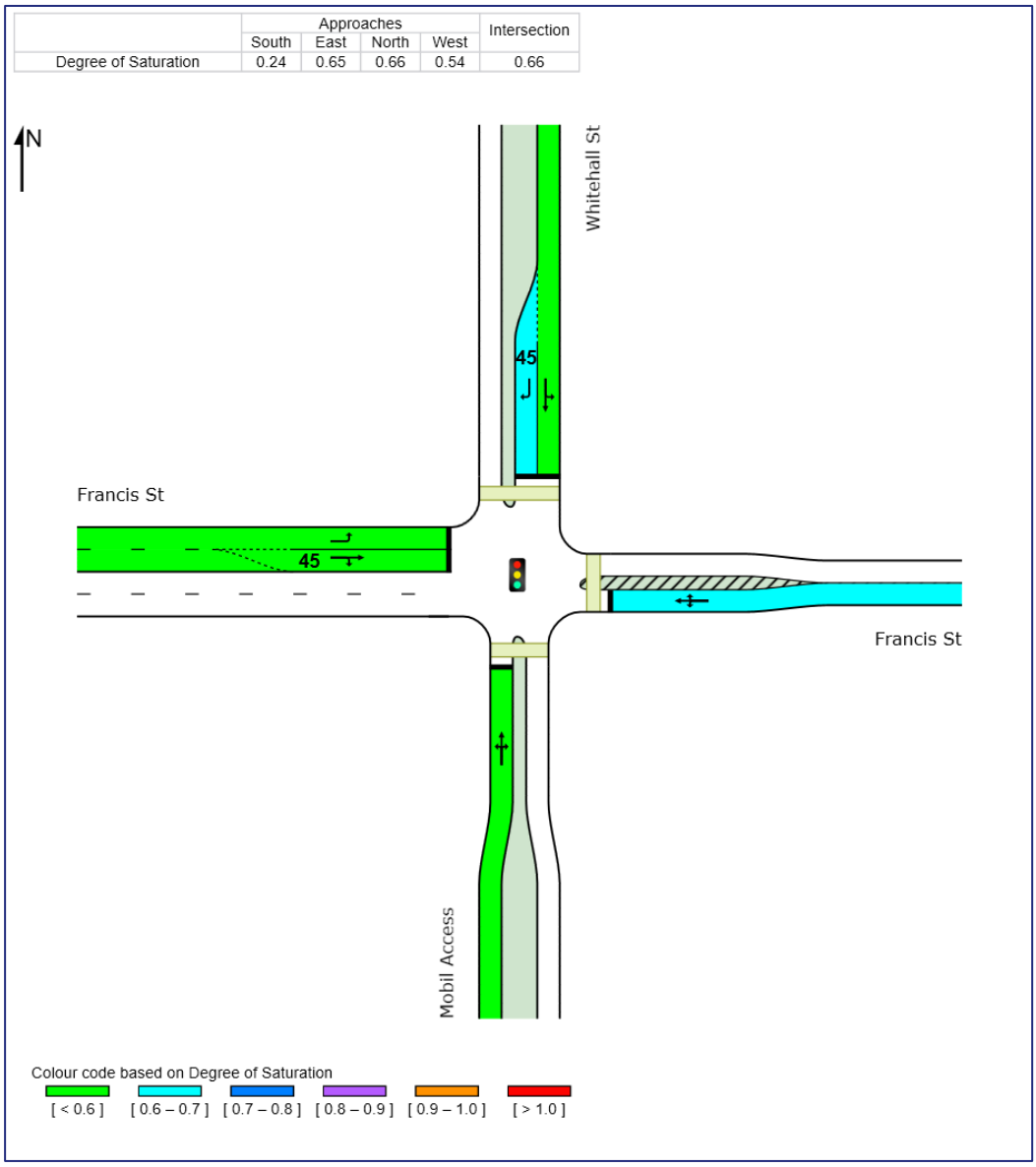


Figure 28: Peak Hour Degree of Saturation diagrams – PM Peak

Overall, we are satisfied that the traffic impacts associated with the site expansion can be readily accommodated and will not result in any impacts on the operation of the nearby road network.

5. Conclusions

Having undertaken a detailed traffic engineering assessment of the proposed expansion to the cement processing and distribution development at 265 Whitehall Street, Yarraville, we are of the opinion that:

a) the proposed development has a statutory car parking requirement of 453 car spaces under Clause 52.06-5,

b) the car parking reduction is supported on the basis of the anticipated staffing demands are significantly lower that the statutory car parking requirement and adequate car parking and hardstand areas are available through the site to accommodate the car parking demands,

c) the proposed parking layout and vehicle access arrangements accord with the requirements of the Planning Scheme, Australian Standards (where relevant) and current practice,

d) suitable access is available within the internal access aisles to accommodate movements associated with the largest design vehicle required to access the site (26m B-double),

e) new and modified vehicle crossovers to Francis Street will require formal engineering drawings to be prepared and submitted to Council for approve, this can occur as a condition of permit,

f) a reduction in the bicycle parking requirements under Clause 52.34 is supported on the basis of the low staffing requirements and proposed use of the site,

g) the level of traffic generated by the proposal can be accommodated without any adverse impacts to the operation of the local road network,

h) all loading and waste collection activity will be readily accommodated on-site, and

i) there are no traffic engineering reasons why a planning permit for the proposed amendments to the cement processing and distribution development at 265 Whitehall Street, Yarraville should be refused, subject to appropriate conditions.

Appendix A

Development Plans

FRONT VIEW
AJ160-00-GA-0000-000
SCALE (1:500)

REV	DESCRIPTION OF CURRENT REVISION	DRAWN:	APPROVED:	REVIEWED:	DATE:
REVISION HISTORY					
C	REDRAWN WITH BOTH MILLS PFEIFFER	JMack	AM	AM	22/02/2022
B	TOWERS, TRESTLES, GALLERIES AND AIR SLIDES ADDED	JMack	AM	AM	10/02/2022
A	INITIAL RELEASE	JMack	AM	AM	3/02/2022

SCALE	AS NOTED	DATE
DRAWN	JMack	3/02/2022
CHECKED	AM	3/02/2022
DESIGNED	JMack	3/02/2022
PM APRVD		

ammjohn Project Engineering

FOR DISCUSSION

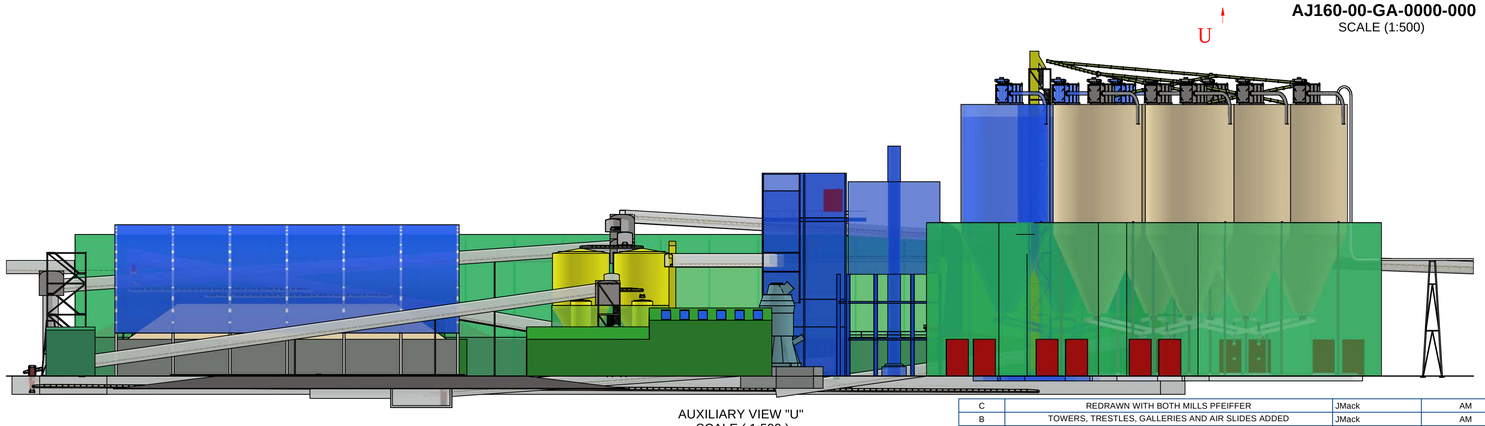
ICL YARRAVILLE
PROPOSED ADDITIONAL CLINKER STORAGE
FULL SITE LAYOUT

3rd Angle
A1

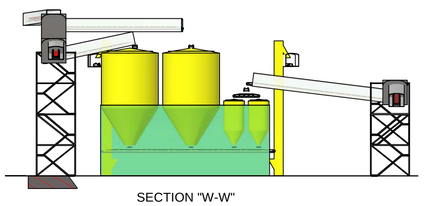
Job Number	Area	Type	Drawing	Sheet	Revision
AJ160 -	00 -	GA -	010 -	1 -	C

F:\ammjohn Pty Ltd\Ammjohn Site - ICL Yarraville - Glendenning\3D Models\Yarraville\AJ160\MODELS\South Block Option\DRAWINGS\AJ160-00-GA-010 - LIMEST-CLINK STORE MILLS WEST OF WB OPT 2.idw

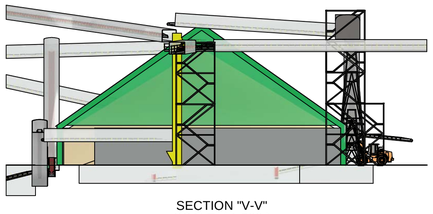
TOP VIEW
AJ160-00-GA-0000-000
SCALE (1:500)



AUXILIARY VIEW "U"
SCALE (1:500)



SECTION "W-W"
SCALE (1:500)



SECTION "V-V"
SCALE (1:500)

REV	DESCRIPTION OF CURRENT REVISION	DRAWN:	APPROVED:	REVIEWED:	DATE:
C	REDRAWN WITH BOTH MILLS PFEIFFER	JMack	AM	AM	22/02/2022
B	TOWERS, TRESTLES, GALLERIES AND AIR SLIDES ADDED	JMack	AM	AM	10/02/2022
A	INITIAL RELEASE	JMack	AM	AM	3/02/2022

REVISION HISTORY

SCALE	AS NOTED	DATE
DRAWN	JMack	3/02/2022
CHECKED	AM	3/02/2022
DESIGNED	JMack	3/02/2022
PM APRVD		

ammjohn Project Engineering

FOR DISCUSSION

ICL YARRAVILLE
PROPOSED ADDITIONAL CLINKER STORAGE
DETAIL OF PROPOSED MILLING FACILITY

3rd Angle
A1

Job Number	Area	Type	Drawing	Sheet	Revision
AJ160 -	00 -	GA -	010 -	2 -	C

F:\ammjohn Pty Ltd\Ammjohn Site - ICL Yarraville - Glendenning\3D Models\Yarraville\AJ160\MODEL\SSouth Block Option\DRAWINGS\AJ160-00-GA-010 - LIMEST-CLINK STORE MILLS WEST OF WB OPT 2.idw

Appendix B

Sidra Assessments

MOVEMENT SUMMARY

Site: 101 [Whitehall St/Francis St - Existing - AM Peak (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mobil Access														
1	L2	6	100.0	6	100.0	0.247	60.1	LOS A	0.9	11.3	0.98	0.70	0.98	29.4
2	T1	9	100.0	9	100.0	* 0.247	53.4	LOS A	0.9	11.3	0.98	0.70	0.98	31.2
3	R2	1	100.0	1	100.0	0.247	60.1	LOS A	0.9	11.3	0.98	0.70	0.98	29.1
Approach		16	100.0	17	100.0	0.247	56.3	LOS A	0.9	11.3	0.98	0.70	0.98	30.4
East: Francis St														
4	L2	1	100.0	1	100.0	0.193	58.7	LOS A	0.8	8.2	0.98	0.69	0.98	29.8
5	T1	11	20.0	12	20.0	* 0.193	52.0	LOS A	0.8	8.2	0.98	0.69	0.98	31.6
6	R2	4	100.0	4	100.0	0.193	58.7	LOS A	0.8	8.2	0.98	0.69	0.98	29.7
Approach		16	45.0	17	45.0	0.193	54.1	LOS A	0.8	8.2	0.98	0.69	0.98	31.0
North: Whitehall St														
7	L2	5	40.0	5	40.0	0.015	15.4	LOS A	0.2	2.7	0.44	0.46	0.44	48.1
8	T1	6	100.0	6	100.0	0.015	9.4	LOS A	0.2	2.7	0.44	0.46	0.44	50.7
9	R2	249	40.0	262	40.0	0.313	17.5	LOS A	6.5	61.3	0.55	0.74	0.55	44.4
Approach		260	41.4	274	41.4	0.313	17.3	LOS A	6.5	61.3	0.54	0.73	0.54	44.6
West: Francis St														
10	L2	444	25.0	467	25.0	* 0.424	12.6	LOS A	9.6	81.7	0.46	0.72	0.46	47.9
11	T1	8	0.0	8	0.0	0.178	51.9	LOS A	0.8	7.4	0.98	0.69	0.98	32.2
12	R2	7	85.0	7	85.0	0.178	58.4	LOS A	0.8	7.4	0.98	0.69	0.98	30.4
Approach		459	25.5	483	25.5	0.424	14.0	LOS A	9.6	81.7	0.48	0.72	0.48	47.1
All Vehicles		751	33.0	791	33.0	0.424	16.9	LOS A	9.6	81.7	0.52	0.72	0.52	45.2

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* 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	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mobil Access												
P1	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02
East: Francis St												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02

North: Whitehall St											
P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.7	1.02

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.

MOVEMENT SUMMARY

Site: 101 [Whitehall St/Francis St - Existing - PM Peak (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mobil Access														
1	L2	4	100.0	4	100.0	0.244	60.0	LOS A	0.9	11.3	0.98	0.70	0.98	29.6
2	T1	11	100.0	12	100.0	* 0.244	53.3	LOS A	0.9	11.3	0.98	0.70	0.98	31.4
3	R2	1	100.0	1	100.0	0.244	60.0	LOS A	0.9	11.3	0.98	0.70	0.98	29.3
Approach		16	100.0	17	100.0	0.244	55.4	LOS A	0.9	11.3	0.98	0.70	0.98	30.8
East: Francis St														
4	L2	1	100.0	1	100.0	0.224	58.7	LOS A	1.1	9.3	0.98	0.70	0.98	29.9
5	T1	11	10.0	12	10.0	* 0.224	52.0	LOS A	1.1	9.3	0.98	0.70	0.98	31.8
6	R2	8	50.0	8	50.0	0.224	58.1	LOS A	1.1	9.3	0.98	0.70	0.98	30.5
Approach		20	30.5	21	30.5	0.224	54.8	LOS A	1.1	9.3	0.98	0.70	0.98	31.2
North: Whitehall St														
7	L2	2	50.0	2	50.0	0.007	15.4	LOS A	0.1	1.2	0.44	0.43	0.44	48.1
8	T1	3	100.0	3	100.0	0.007	9.3	LOS A	0.1	1.2	0.44	0.43	0.44	51.0
9	R2	612	10.0	644	10.0	* 0.644	20.6	LOS B	20.9	158.5	0.72	0.82	0.72	43.5
Approach		617	10.6	649	10.6	0.644	20.5	LOS B	20.9	158.5	0.72	0.81	0.72	43.5
West: Francis St														
10	L2	604	10.0	636	10.0	0.524	13.2	LOS A	14.5	110.2	0.51	0.75	0.51	47.9
11	T1	2	0.0	2	0.0	* 0.050	50.8	LOS A	0.2	2.1	0.97	0.63	0.97	31.7
12	R2	2	100.0	2	100.0	0.050	57.5	LOS A	0.2	2.1	0.97	0.63	0.97	29.7
Approach		608	10.3	640	10.3	0.524	13.5	LOS A	14.5	110.2	0.52	0.75	0.52	47.8
All Vehicles		1261	11.9	1327	11.9	0.644	18.1	LOS B	20.9	158.5	0.63	0.78	0.63	44.9

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* 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	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mobil Access												
P1	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02
East: Francis St												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02

North: Whitehall St											
P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.7	1.02

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.

MOVEMENT SUMMARY

Site: 101 [Whitehall St/Francis St - POST - AM Peak (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mobil Access														
1	L2	6	100.0	6	100.0	0.247	60.1	LOS A	0.9	11.3	0.98	0.70	0.98	29.4
2	T1	9	100.0	9	100.0	* 0.247	53.4	LOS A	0.9	11.3	0.98	0.70	0.98	31.2
3	R2	1	100.0	1	100.0	0.247	60.1	LOS A	0.9	11.3	0.98	0.70	0.98	29.1
Approach		16	100.0	17	100.0	0.247	56.3	LOS A	0.9	11.3	0.98	0.70	0.98	30.4
East: Francis St														
4	L2	1	100.0	1	100.0	0.281	59.9	LOS A	1.1	12.4	0.99	0.71	0.99	29.0
5	T1	10	50.0	11	50.0	* 0.281	53.2	LOS A	1.1	12.4	0.99	0.71	0.99	30.8
6	R2	9	100.0	9	100.0	0.281	59.9	LOS A	1.1	12.4	0.99	0.71	0.99	28.9
Approach		20	75.0	21	75.0	0.281	56.6	LOS A	1.1	12.4	0.99	0.71	0.99	29.8
North: Whitehall St														
7	L2	7	40.0	7	40.0	0.018	15.4	LOS A	0.3	3.1	0.44	0.49	0.44	47.8
8	T1	6	100.0	6	100.0	0.018	9.4	LOS A	0.3	3.1	0.44	0.49	0.44	50.3
9	R2	249	40.0	262	40.0	0.313	17.5	LOS A	6.5	61.3	0.55	0.74	0.55	44.4
Approach		262	41.4	276	41.4	0.313	17.3	LOS A	6.5	61.3	0.54	0.73	0.54	44.6
West: Francis St														
10	L2	451	25.0	475	25.0	* 0.430	12.7	LOS A	9.8	83.6	0.46	0.72	0.46	47.9
11	T1	15	50.0	16	50.0	0.285	52.9	LOS A	1.2	12.6	0.99	0.71	0.99	31.9
12	R2	7	85.0	7	85.0	0.285	59.4	LOS A	1.2	12.6	0.99	0.71	0.99	30.1
Approach		473	26.7	498	26.7	0.430	14.6	LOS A	9.8	83.6	0.49	0.72	0.49	46.7
All Vehicles		771	34.4	812	34.4	0.430	17.5	LOS A	9.8	83.6	0.53	0.72	0.53	44.8

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* 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	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mobil Access												
P1	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02
East: Francis St												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02

North: Whitehall St											
P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.7	1.02

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.

MOVEMENT SUMMARY

Site: 101 [Whitehall St/Francis St - POST - PM Peak (Site Folder: General)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 100 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND 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	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Mobil Access														
1	L2	4	100.0	4	100.0	0.244	60.0	LOS A	0.9	11.3	0.98	0.70	0.98	29.6
2	T1	11	100.0	12	100.0	* 0.244	53.3	LOS A	0.9	11.3	0.98	0.70	0.98	31.4
3	R2	1	100.0	1	100.0	0.244	60.0	LOS A	0.9	11.3	0.98	0.70	0.98	29.3
Approach		16	100.0	17	100.0	0.244	55.4	LOS A	0.9	11.3	0.98	0.70	0.98	30.8
East: Francis St														
4	L2	1	100.0	1	100.0	0.649	61.1	LOS B	3.2	34.2	1.00	0.83	1.15	29.4
5	T1	30	40.0	32	40.0	* 0.649	54.4	LOS B	3.2	34.2	1.00	0.83	1.15	31.3
6	R2	27	80.0	28	80.0	0.649	60.9	LOS B	3.2	34.2	1.00	0.83	1.15	29.6
Approach		58	59.7	61	59.7	0.649	57.6	LOS B	3.2	34.2	1.00	0.83	1.15	30.4
North: Whitehall St														
7	L2	7	65.0	7	65.0	0.015	16.1	LOS A	0.2	2.5	0.45	0.54	0.45	46.6
8	T1	3	100.0	3	100.0	0.015	9.8	LOS A	0.2	2.5	0.45	0.54	0.45	49.9
9	R2	612	10.0	644	10.0	* 0.660	21.4	LOS B	21.4	162.4	0.74	0.82	0.74	43.1
Approach		622	11.1	655	11.1	0.660	21.2	LOS B	21.4	162.4	0.73	0.82	0.73	43.2
West: Francis St														
10	L2	608	10.0	640	10.0	0.535	13.8	LOS A	15.2	115.2	0.53	0.75	0.53	47.6
11	T1	7	70.0	7	70.0	* 0.124	52.0	LOS A	0.5	5.5	0.97	0.67	0.97	31.4
12	R2	2	100.0	2	100.0	0.124	58.7	LOS A	0.5	5.5	0.97	0.67	0.97	29.5
Approach		617	11.0	649	11.0	0.535	14.3	LOS A	15.2	115.2	0.54	0.75	0.54	47.2
All Vehicles		1313	14.2	1382	14.2	0.660	20.0	LOS B	21.4	162.4	0.66	0.79	0.66	43.9

Site Level of Service (LOS) Method: Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on degree of saturation per movement.
Intersection and Approach LOS values are based on worst degree of saturation for any vehicle movement.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* 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	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Mobil Access												
P1	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02
East: Francis St												
P2	Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	206.2	210.6	1.02

North: Whitehall St											
P3 Full	1	1	44.2	LOS E	0.0	0.0	0.94	0.94	208.7	213.9	1.02
All Pedestrians	3	3	44.2	LOS E	0.0	0.0	0.94	0.94	207.0	211.7	1.02

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.

Appendix C

Swept Path Reviews

Appendix C