

Appendix E

Transport Impact Assessment

Transport Impact Assessment

Lot 37 Montario Quarter



Prepared for
Iris Residential

12 October 2018

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1

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Document Information

Prepared for	Iris Residential
Project Name	Lot 37 Montario Quarter
Site Name	Montario Quarter, Shenton Park
Client Reference	Iris Residential
Project No.	CW1024800
Document Title	Transport Impact Assessment
Discipline Code	Traffic & Transport
Document Type	Report
Document Sequence	001
Date	12 October 2018
Revision Number	E

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Document History

Revision	Date	Description of Revision	Prepared by:	Reviewed by:
A	11 May 2018	For Issue	Edmond Hoang	Ray Cook/Jacob Martin
B	24 July 2018	For Issue	Edmond Hoang	Ray Cook/Jacob Martin
C	24 July 2018	For Issue	Edmond Hoang	Ray Cook/Jacob Martin
D	4 October 2018	For Issue	Edmond Hoang	Ray Cook/Jacob Martin
E	12 October 2018	For Issue	Edmond Hoang	Ray Cook/Jacob Martin

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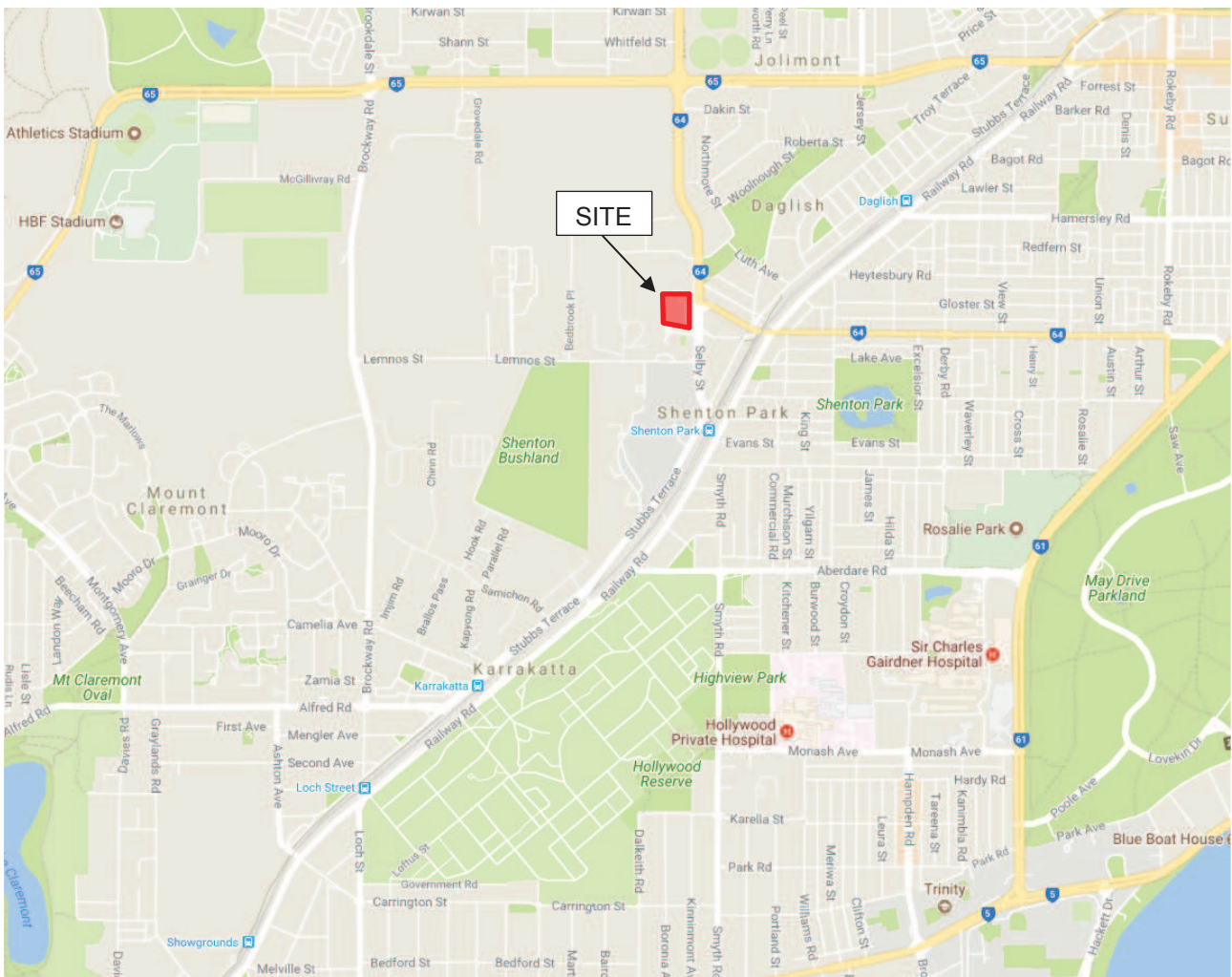
1 Introduction

1.1 Background

Cardno has been commissioned by Iris Residential ('the Client') to prepare a *Transport Impact Assessment* (TIA) for the proposed mixed use development ('the Site') located at Lot 37 Montario Quarter, Shenton Park, City of Nedlands. The Site location is shown in **Figure 1-1**.

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines: Volume 4 – Individual Developments (2016)* and the checklist is included at **Appendix A**.

Figure 1-1 Proposed Development Locality



Source: Nearnmap (2018)

2 Existing Transport Network

2.1 Existing Site Context

The existing surrounding land uses are shown in **Figure 2-1**. The Site is bounded by Selby Street to the east, Nash Road to the northeast and Lemnos Street to the south.

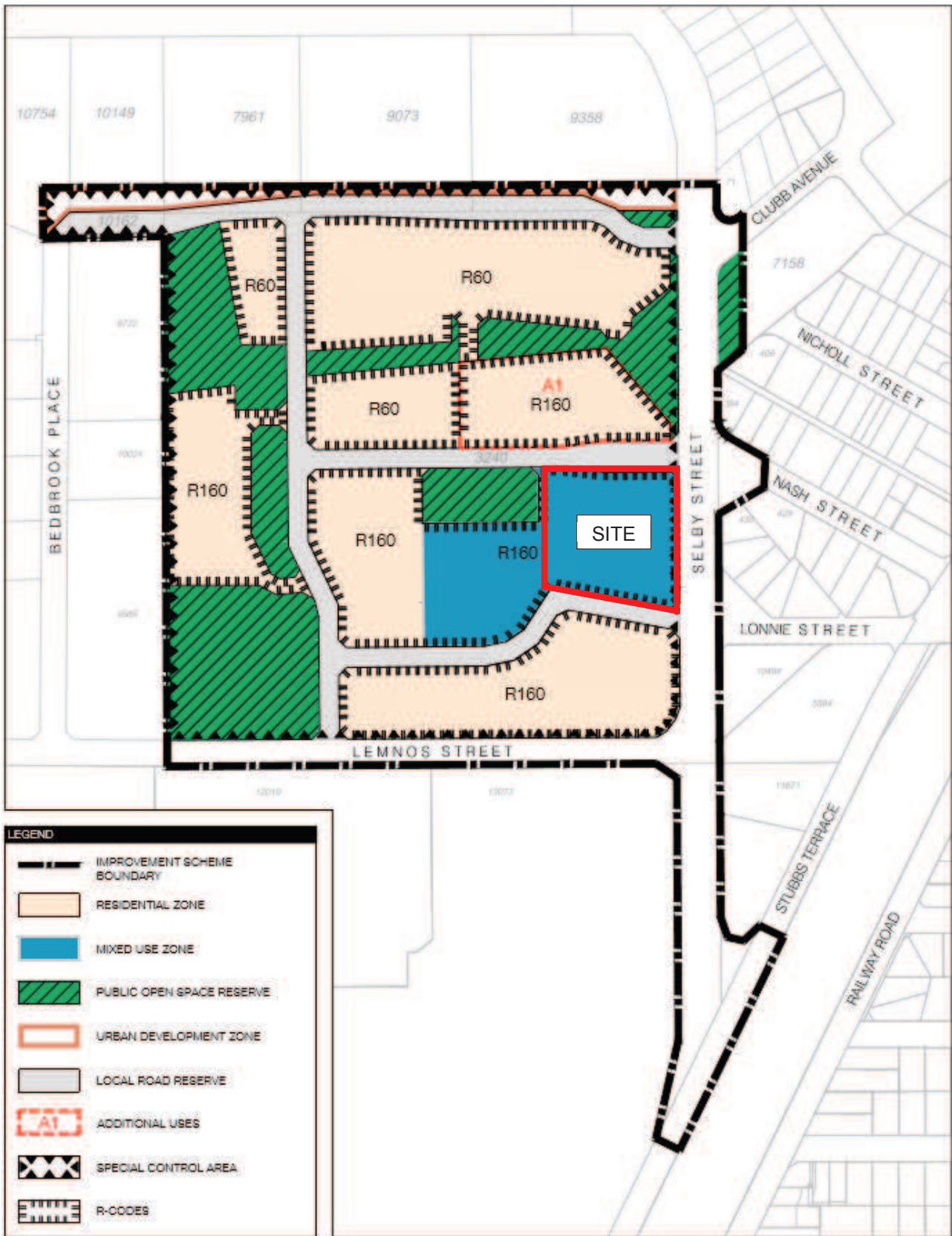
Figure 2-1 Site Location



Source: Nearthmap (2018)

Figure 2-2 shows the *Shenton Park Hospital Redevelopment Improvement Scheme* map where the Site is zoned as mixed use/residential.

Figure 2-2 Shenton Park Hospital Redevelopment Improvement Scheme



Source: Shenton Park Hospital Redevelopment Improvement Scheme (2017)

2.2 Existing Development

There is currently no development at the Site location; it is currently a vacant land.

2.3 Existing Road Network

The road hierarchy classification for the local road network as defined by the *Nedlands Functional Road Hierarchy* and the *Main Roads WA Functional Road Hierarchy*. However, both documents provide different classifications of the surrounding road network which have been summarised in **Table 2-1**.

Table 2-1 Road Hierarchy Classifications

Road Name	Main Roads WA Functional Road Hierarchy	Nedlands Functional Road Hierarchy
Selby Street	Distributor A/B	Distributor A
Lemnos Street	Local Distributor	Distributor B
Nash Street	Distributor B	Not within the City of Nedlands LGA

The following discusses the characteristics of the surrounding road network:

- > **Lemnos Street** is an undivided two-lane road with a kerb to kerb width of approximately 10m. 1.5m sealed shoulder bicycle lanes are provided on both sides of the road. Lemnos Street has a posted speed limit of 60km/h (40km/h during the school peak periods).
- > **Selby Street** is a four lane median divided carriageway with a kerb to kerb width of approximately 19m. Selby Street has a posted speed limit of 60km/h (40km/h during the school peak periods).
- > **Nash Street** is an undivided two-lane road with a kerb to kerb width of approximately 12m and a posted speed limit of 50km/h.

2.4 Existing Intersections

The following discusses the intersections in the proximity of the development:

- > **Lemnos Street/Selby Street**, located approximately 100m south of the development site, is a stop priority-controlled T-junction. The configuration of the intersection are as follows:
 - Western approach: One approaching lane (split into left and right turn movements) and one departure lane. The left turn movement comprises of a continuous slip lane.
 - Northern approach: Three approach lanes (for one right turn and two through movements) and two-departure lanes.
 - Southern approach: Two approach lanes (for left turn and through movements) and two departure lanes. The left turn movement consists of a give-way controlled slip turn.

The intersection layout is as shown in **Figure 2-3**.

Figure 2-3 Lemnos Street/Selby Street Intersection Layout



Source: Nearmap (2018)

- > **Selby Street/Nash Street**, located east of the development site, is a signal-controlled T-junction. The configuration of the intersection are as follows:
 - Northern approach: Two approach lanes (for left turn and through movements) and two departure lanes.
 - Eastern approach: Two approach lanes (for right turn movements) and one departure lane. The left turn movement consists of a give-way controlled slip turn.
 - Southern approach: Three approach lanes (for one right turn and two through movements) and two departure lanes.

The intersection layout is as shown in **Figure 2-4**.

Figure 2-4 Selby Street/Nash Street Intersection Layout



Source: Nearmap (2018)

2.5 Existing Mid-Block Traffic Volumes

Existing weekday mid-block traffic volumes were obtained from Main Roads Western Australia for key road sections in the vicinity of the site as shown in **Table 2-2**.

Table 2-2 Existing Weekday Mid-Block Traffic Volumes

Location	Year	Average Weekday Traffic Volumes (two-way)		
		Daily	AM Peak	PM Peak
Selby Street (north of Nash Street)	2016	14,161	1,312	1,186
Selby Street (north of Stubbs Terrace)	2012	12,407	1,007	1,039
Lemnos Street	2018	5,979	505	477

Source: Main Roads Western Australia (2018)

2.6 Existing Pedestrian/Cycle Networks

The existing pedestrian/cycle networks in the area surrounding the development site are illustrated in **Figure 2-5**. The site is located within close proximity to the Fremantle Railway Principal Shared Path (PSP).

Footpaths and bicycle lanes are available on both sides of the road for Lemnos Street. Selby Street has footpaths available on both sides of the road for the section fronting the Montario Quarter development.





























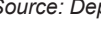



Convenient access across the railway line has also been provide through the existing underpass at Shenton Park Station.

Overall, the Site has excellent acces to the existing pedestrian and cycling network with a safe crossing point across the railway line.

Figure 2-5 Existing Pedestrian and Cycle Facilities



Legend

	Principal Shared Path (PSP)		Bike Pump Station
	High Quality Shared Path		Road Bridge, Foot Bridge, Underpass
	Other Shared Path (Shared by Pedestrians & Cyclists)		Railway
	Good Road Riding Environment		Underground Railway
	Perth Bicycle Network (PBN) - Continuous Signed Routes		Freight Railway, Railway Crossing
	Bicycle Boulevard		Train Transfer, Train and Bus Transfer
	Gradient Arrow		Train Station, Special Events Station
	Bicycle Lanes or Sealed Shoulder Either Side		Bus Station, Ferry Terminus
	Contra Flow Bike Lane		Petrol Station
	Traffic Direction, Traffic Light		Public Toilets, Accessible Toilet
	Bike Shop		Pleasant Rest Area, Post Office
	Bike Hire		Walking Trail
	Bike Locker		Shopping Area
	Bike Shelter		Parks, Ovals and / or Bushland
	Bike Parking		Industrial Area
	Bike Repair Station		Point of Interest

Source: Department of Transport (Perth, Fremantle and Stirling – Comprehensive Bike Map)

2.7 Existing Public Transport Services

Train and bus services that are located within close proximity of the Site are shown in the public transport map in **Figure 2-6**. The Site is well serviced by public transport, with bus routes 998 and 999 operating along Selby Street and Bus Route 27 servicing along Lemnos Street.

The Site is also within close walking distance to the Shenton Park train station, which provides quick and convenient access to the Perth CBD, serviced by the Fremantle Line.

The frequencies of buses and trains are summarised in **Table 2-3** and **Table 2-4** respectively.

Overall, the public transport amenity within the vicinity of the Site is excellent with a high frequency of bus and train services within walking distance.

Figure 2-6 Surrounding Public Transport



Source: Transperth (2018)

Table 2-3 Bus Service Frequency

Bus Route	Weekday (Peak)	Weekday (Off-Peak)	Saturday	Sunday & Public Holiday
998	15 mins	30 mins	30 mins	30 mins
999	15 mins	30 mins	30 mins	30 mins
27	10 mins	30 mins	60 mins	60 mins

Source: Transperth (2018)

Table 2-4 Train Service Frequency

Train Route	Weekday (Peak)	Weekday (Off-Peak)	Saturday	Sunday & Public Holiday
Fremantle Line	10-15 min	15-30 mins	15-30 mins	15-30 mins

Source: Transperth (2018)

2.8 Crash Assessment

Crash data for the five-year period between January 2012 and December 2016 has been obtained from Main Roads WA (MRWA) for nearby intersections and roads. These are summarised and presented in **Table 2-5** through **Table 2-9**.

Table 2-5 Crash Statistics at Selby St/Nash St Intersection

	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Rear End	-	1	2	8	3	14
Right Angle	-	-	-	-	1	1
Total	-	1	2	8	4	15

Table 2-6 Crash Statistics at Selby St/Clubb Ave Intersection

	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Angle	-	-	-	2	-	2
Sideswipe Same Direction	-	-	-	1	1	2
Right Turn Thru	-	-	-	-	1	1
Total	-	-	-	3	2	5

Table 2-7 Crash Statistics at Selby St/Lemnos St Intersection

	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Right Turn Thru	-	-	1	2	-	3
Total	-	-	1	2	-	3

Table 2-8 Crash Statistics Selby St Midblock (between Lemnos St and Clubb Ave)

	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Sideswipe Same Direction	-	-	-	-	1	1
Total	-	-	-	-	1	1

Table 2-9 Crash Statistics Lemnos St Midblock (between Selby St and Bedbrook PI)

	Fatal	Hospital	Medical	Major Property Damage	Minor Property Damage	Total Crashes
Hit Pedestrian	-	1	-	-	-	1
Parking Manoeuvre	-	-	-	-	1	1
Total	-	1	-	-	1	2

A summary of crash data is as follows:

- > Selby St/Nash St Intersection recorded 14 rear end crashes of which 2 required medical treatment and 1 requiring hospitalisation.
- > A total of 2 crashes required hospitalisation and 3 crashes required medical attention within the surrounding roads network.
- > Overall, there is a moderately low volume of crashes within the area.

3 Proposed Development

3.1 Proposed Land Uses

The proposed development plan, included in **Appendix B**, comprises the land use elements summarised in **Table 3-1**.

Table 3-1 Proposed Land Uses

Land Use	Yield
Residential Apartments	157 apartment units
Medical	265m ²
Supermarket	2,583m ²
Pharmacy	253m ²
Liquor Store	213m ²
Hairdresser	98m ²
Café	173m ²
Patisserie	81m ²
Restaurant x3	341m ²
Gym	79m ²
Service/Office x2	277m ²
Newsagent	65m ²
Undetermined Tenancy	106m ²

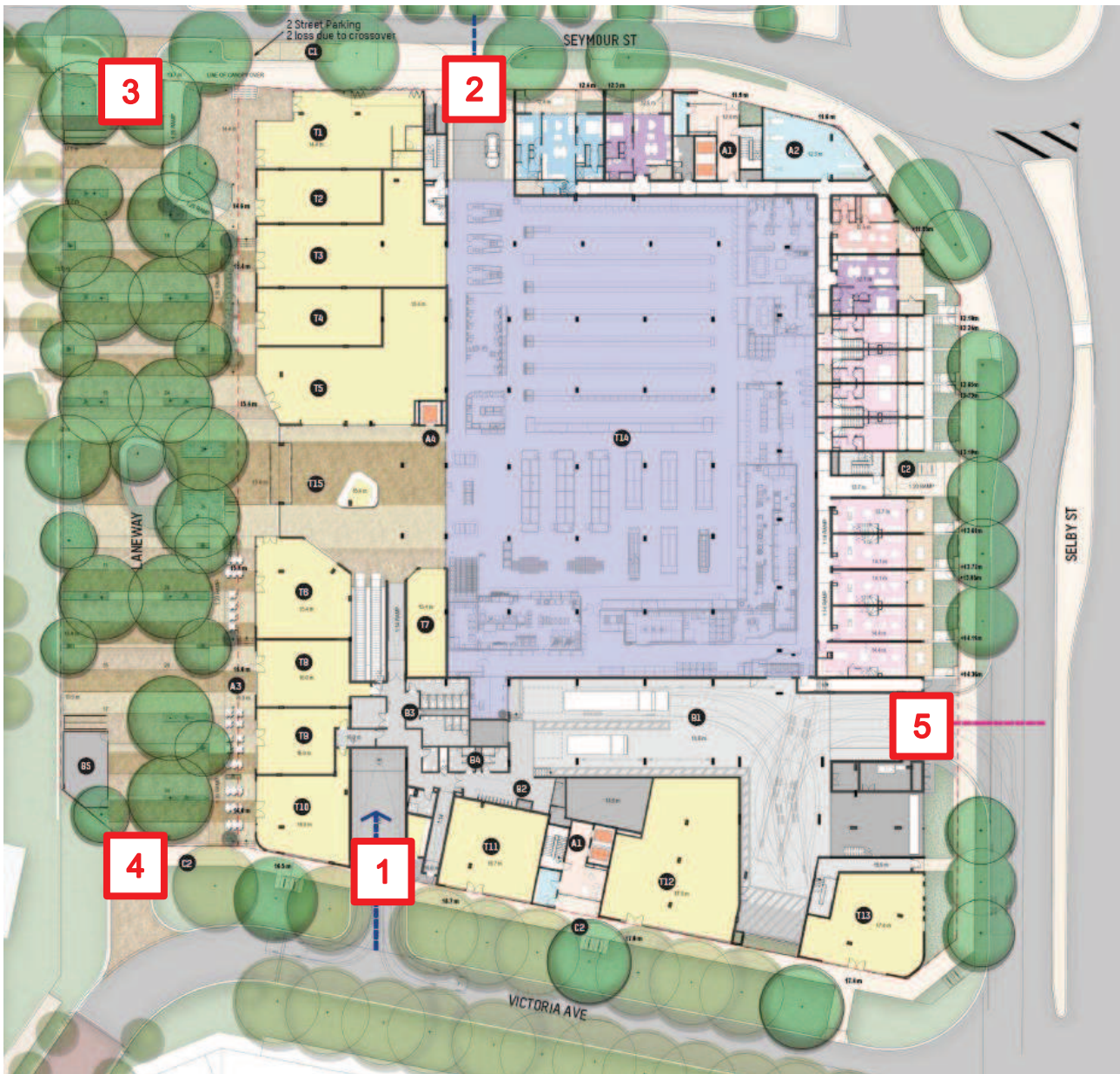
3.2 Access Arrangements

The Site accesses are shown in **Figure 3-1** and are described below.

1. Residential Access onto Victoria Avenue – full movement
2. Commercial/Supermarket Access onto Seymour Street – left in and left out only
3. Laneway Entry – left in and right in only
4. Laneway Exit – left out and right out only
5. Service Access onto Selby Street – left in and left out only

A north-south arrangement is proposed laneway. Additional detail regarding why this arrangement was chosen is provided in **Appendix D**.

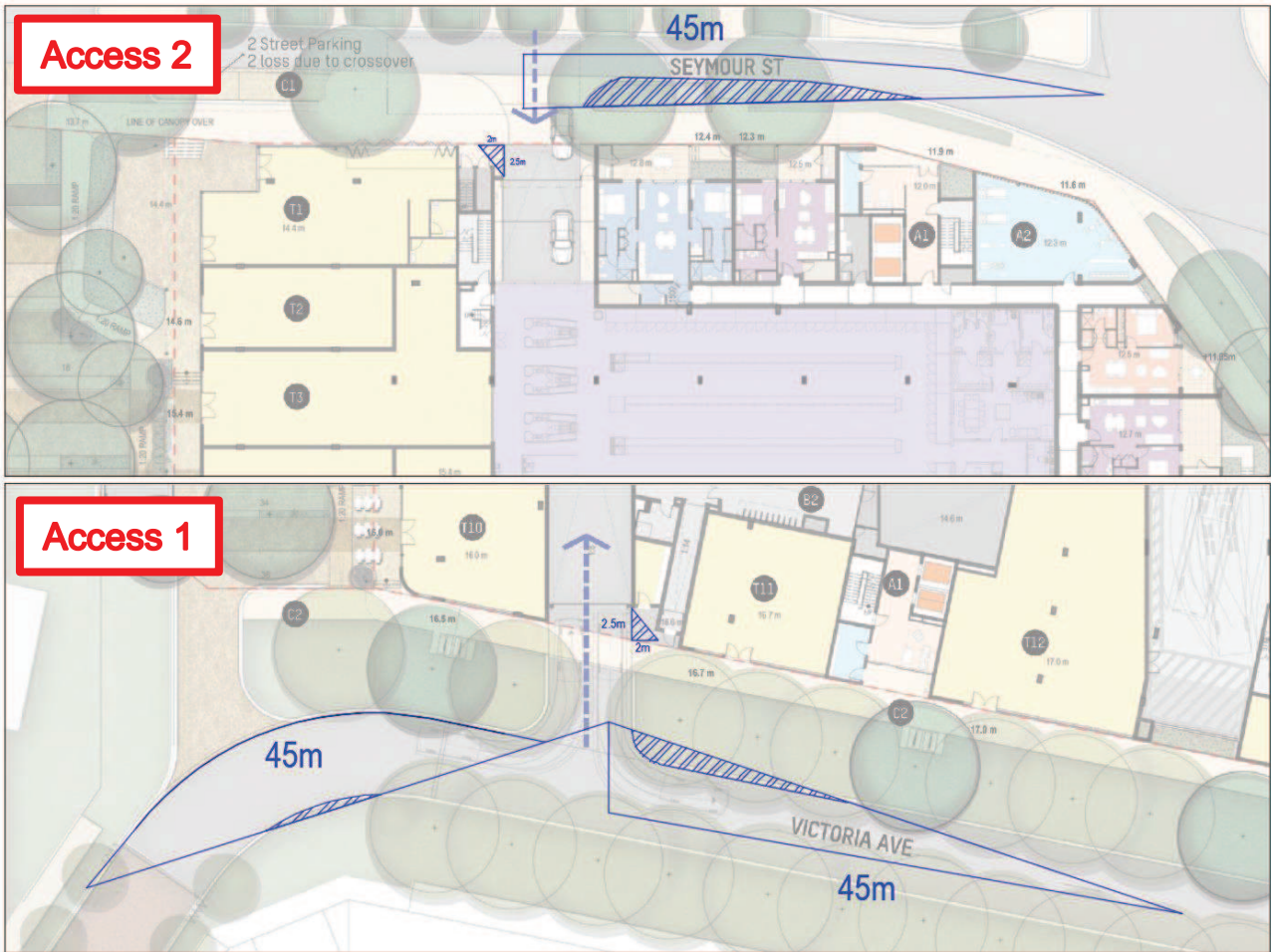
Figure 3-1 Site Access Locations



Source: Cameron Chisholm Nicol (2018)

A sightline assessment has been conducted in accordance to AS2890.1 requirements and shown in **Figure 3-2**. The assessment shows no visibility issues at the residential car park access and the basement commercial/supermarket car park. Any proposed landscaping elements should be made highly visually permeable.

Figure 3-2 Sightline Assessment



3.3 Parking Provision

The statutory requirements as defined by the *Shenton Park Hospital Redevelopment Improvement Scheme No. 1* have been considered in the context of the proposed development and are summarised in **Table 3-2**.

Table 3-2 Car Parking Requirements

Development Classification	Yield	Minimum Parking Requirement	Minimum Parking Permitted	Maximum Parking Requirement	Maximum Parking Permitted	Carpark Provision
Multiple dwellings (per dwellings)	157 dwellings	0.75 bays per dwelling	118	2 bays per dwelling	314	260 (including tandem bays) 10 residential visitor bays on level 1 107 bays in basement level 35 bays along Site laneway
Visitor Bays (per dwellings)	157 dwellings	0.25 bays per dwelling, minimum 1 bay	1	Maximum parking of 10 bays	10	
Shop, Convenience Store	547m ² NLA	2 bays per 100m ² NLA	12	4 bays per 100m ² NLA	23	
Restaurant/ Café	448m ² NLA	2 bays per 100m ² NLA	9	1 bay per 4 seats	23***	
Supermarket	1,940m ² NLA	2 bays per 100m ² NLA	39	4 bays per 100m ² NLA	78	
Office	206m ² NLA	1.5 bays per 100m ² NLA	4	3 bays per 100m ² NLA	7	
Medical Centre (3 practitioners)	3 practitioners**	2 bays per practitioner	6	4 spaces / practitioner	12	
Total			189		467	

Source: *Shenton Park Hospital Redevelopment Improvement Scheme No. 1*

* For the purpose of this assessment, the NLA is assumed to be 75% of the GFA.

** The *Shenton Park Hospital Redevelopment Improvement Scheme No. 1* defines "medical centre" as a premise other than a hospital used by 3 or more health practitioners. Therefore, 3 health practitioners will be assumed for the medical land use.

*** For the purpose of this assessment, the space for one seat is assumed to occupy 5m² of the NLA.

From **Table 3-2**, it is shown that the Site parking provision satisfies the *Shenton Park Hospital Redevelopment Improvement Scheme No. 1* requirements by providing sufficient parking to meet the minimum parking requirements without exceeding the maximum allowable parking on-site.

Motorcycle parking has also been provided on-site. 8 motorcycle bays are available on the lower ground car park and 9 residential motorcycle bay are available on levels 1 and 2 (a total of 18 residential motorcycle bays).

3.4 Bicycle Parking and End-of-Trip (EoT) Facilities

The statutory requirement of bicycle parking and end-of-trip facilities for the proposed development is provided by the *Shenton Park Hospital Redevelopment Improvement Scheme No.1* and *Green Star* with the numbers are summarised below in **Table 3-3**.

Table 3-3 Bicycle Parking and End-of-Trip Requirements

Land Use	Shenton Park Hospital Improvement Scheme	Shenton Park Hospital Improvement Scheme (with justification)	4.0 Green Star (self-assessed)
Residential Component			
Residential bicycle bays	51	51	101*
Visitor bicycle bays	16	16	8*
Commercial Component			
Visitor bicycle bays	N/A	N/A	3*
Staff long-term bicycle bays	46	30*	12
Staff short-term bicycle bays	69	35*	-
Staff Showers	13	6*	4
Staff Lockers	46	60*	14

* incorporated in current design

Secure bicycle storage has been provided for residents in dedicated bike storage rooms, including bike racks, with facilities located in the level 1 and 2 car parks.

For commercial tenants and visitors, bicycle racks have also been provide on the ground floor. Storage lockers and end-of-trip facilities are also available for commercial tenants.

3.5 Provision for Service Vehicles

Access for all delivery and waste vehicles will be provided off the proposed access along Selby Street. All loading and unloading activity will be conducted within the Site. A review of the Selby Street loading dock and an independent RSA has also been conducted and included in **Appendix E** and **Appendix F** respectively.

In addition, the City of Subiaco (where the section of Selby Street is located along) requires all delivery and waste vehicles to enter and exit the Site in forward gear only with all turning manoeuvres to be conducted within the Site boundaries.

A swept path analysis has been undertaken for the largest design vehicle (12.5m HRV) and an 8m bulk waste vehicle entering and exiting the Site and shown in **Figure 3-3** through **Figure 3-6**. Higher resolution plans are also provided in **Appendix B**.

The entering bulk waste vehicle requires the supermarket loading area to be clear of other service/delivery vehicles; which will be ensured through scheduling. Overall, the results of the swept path show that the 12.5m HRV and bulk waste vehicle is able to safely enter and exit the loading dock area, avoiding any structural elements.

Figure 3-3 12.5m HRV Inbound Movement

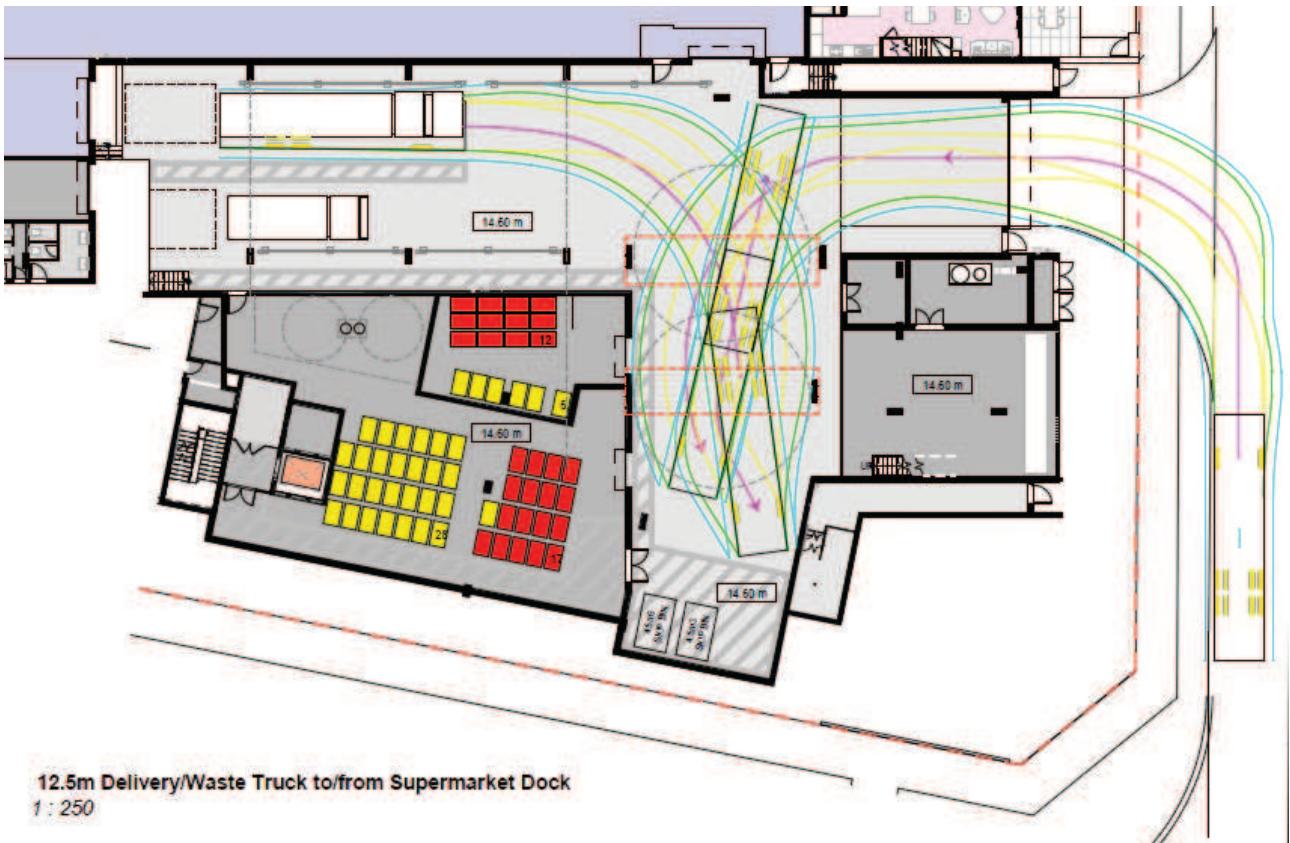


Figure 3-4 12.5 HRV Outbound Movement

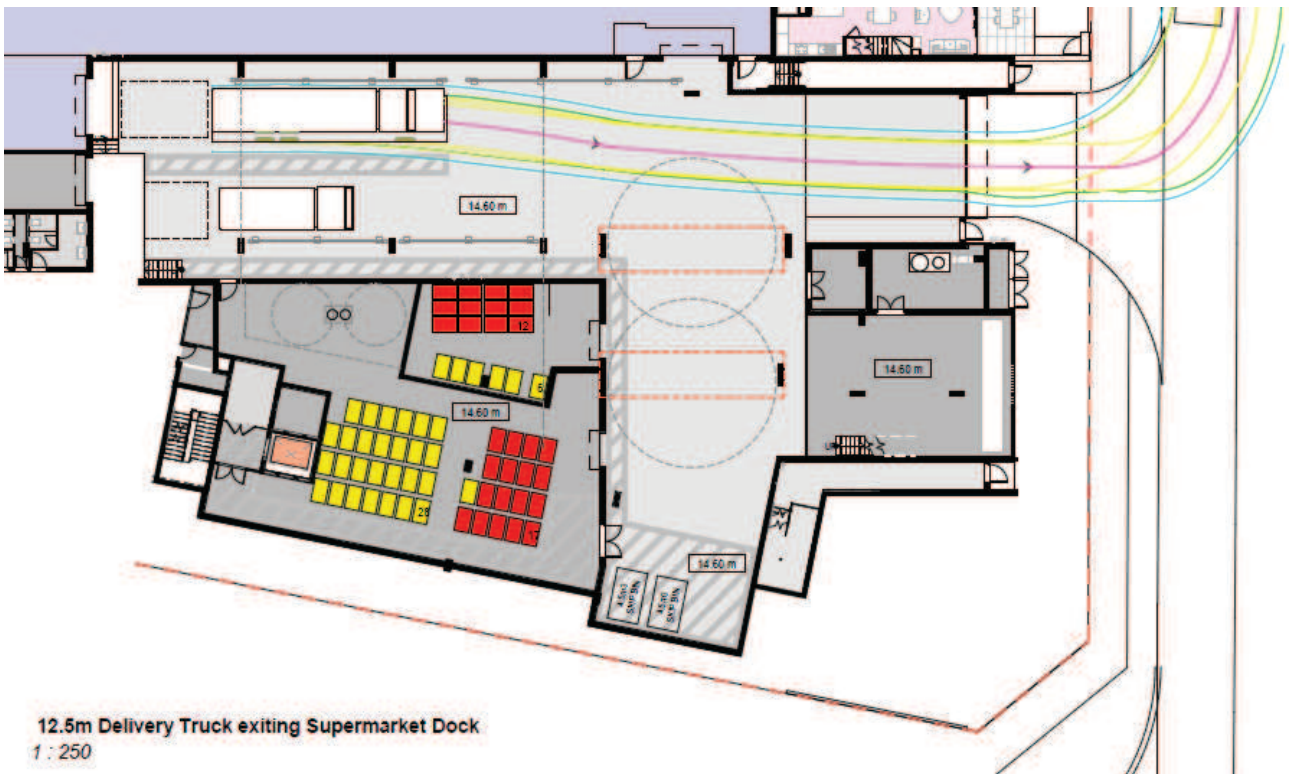


Figure 3-5 8m Bulk Waste Inbound Movement

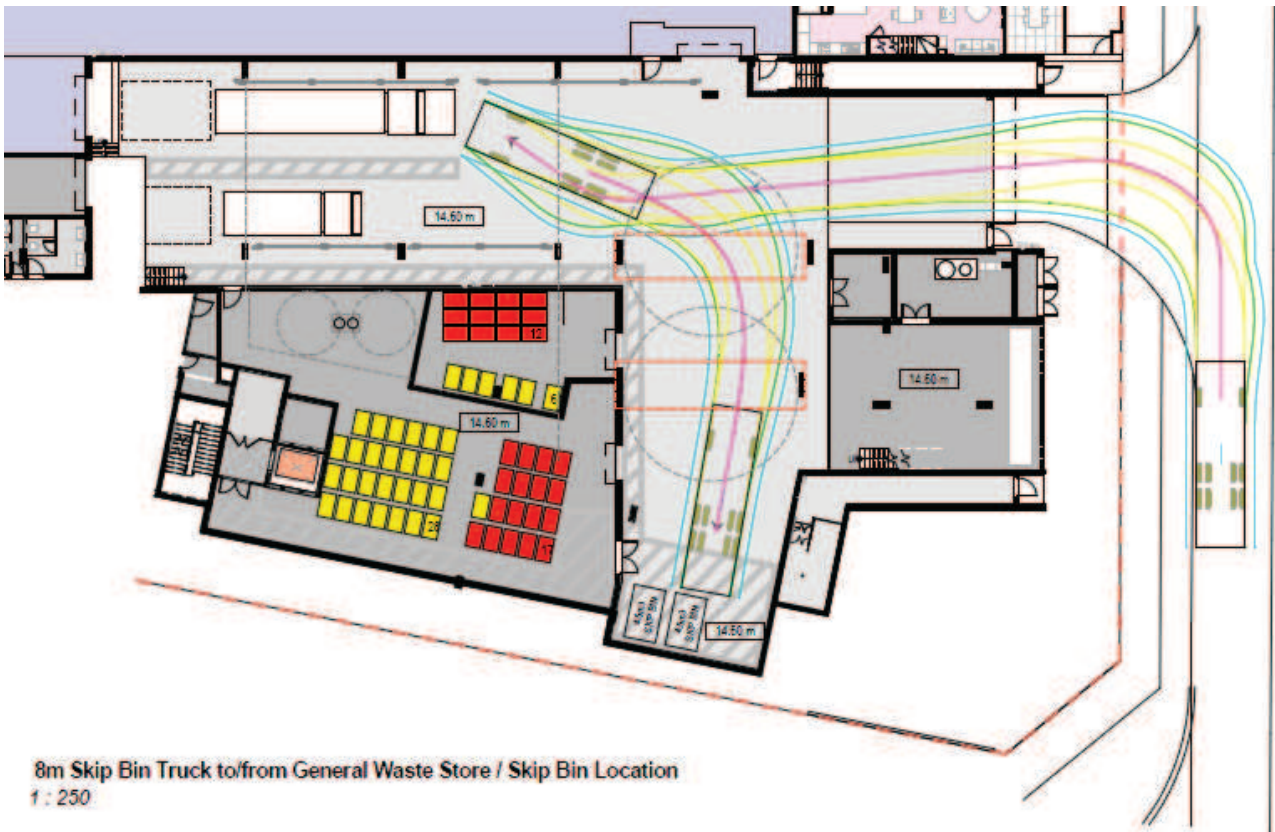
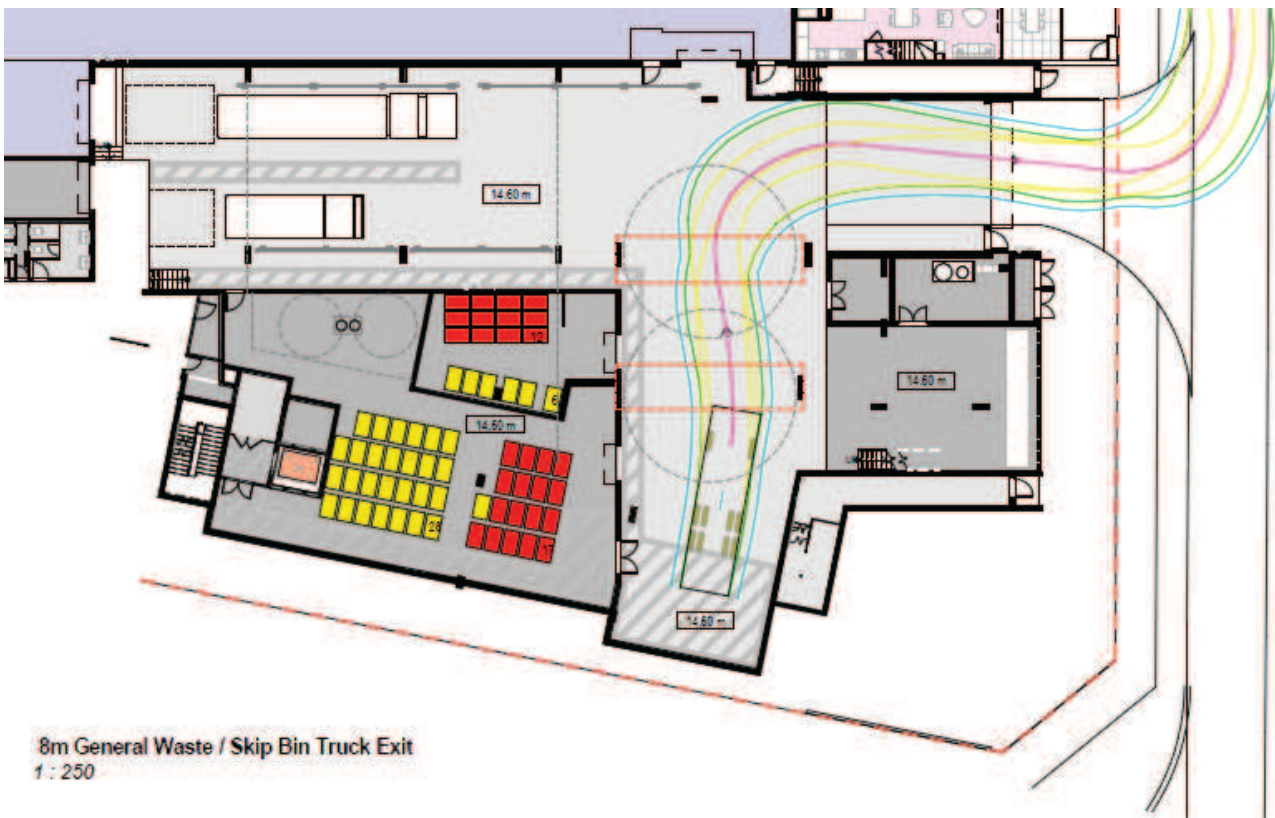


Figure 3-6 8m Bulk Waste Outbound Movement



3.6 Parking Layout

AS2890.1 specifies a maximum of 1 in 20 (5%) between edge of frontage road and the property line, building alignment or pedestrian path and for at least the first 6m into the car park. While the proposed residential ramp geometry (**Figure 3-7**) is proposed to be 1 in 8, this is not considered to represent an operational or safety concern in this location for the following reasons.

- > The provision of a 1 in 20 gradient for the first 6m into the car park is primarily to ensure that exiting vehicles have clear visibility of pedestrians. A steep **upgrade** can angle the vehicle in such a way that visibility may be limited by the hood of the car. The proposed residential car park ramp is a downgrade ramp which does not have this issue.
- > Appropriate truncations have been provided in accordance to AS2890.1 requirements to ensure that clear pedestrian visibility is provided.
- > The proposed 1 in 8 ramp gradient is still well below the maximum allowable gradient of 1 in 4 as specified in AS2890.1. Vehicles can therefore approach the lot boundary slowly and in full control.

Overall, the proposed 1 in 8 ramp will not result in any safety or accessibility issues.

Figure 3-7 Pedestrian Ramp Gradient



4 Changes to Surrounding Road Networks

4.1 Road Network

4.1.1 Selby Street and Nash Street Roundabout and Seymour Street

The signalised intersection at Selby Street and Nash Street is currently being converted to a roundabout including the construction of an additional western leg (Seymour Street). **Figure 4-1** shows the proposed layout of the roundabout. Construction works for this upgrade have commenced and will be completed prior to the opening of the development.

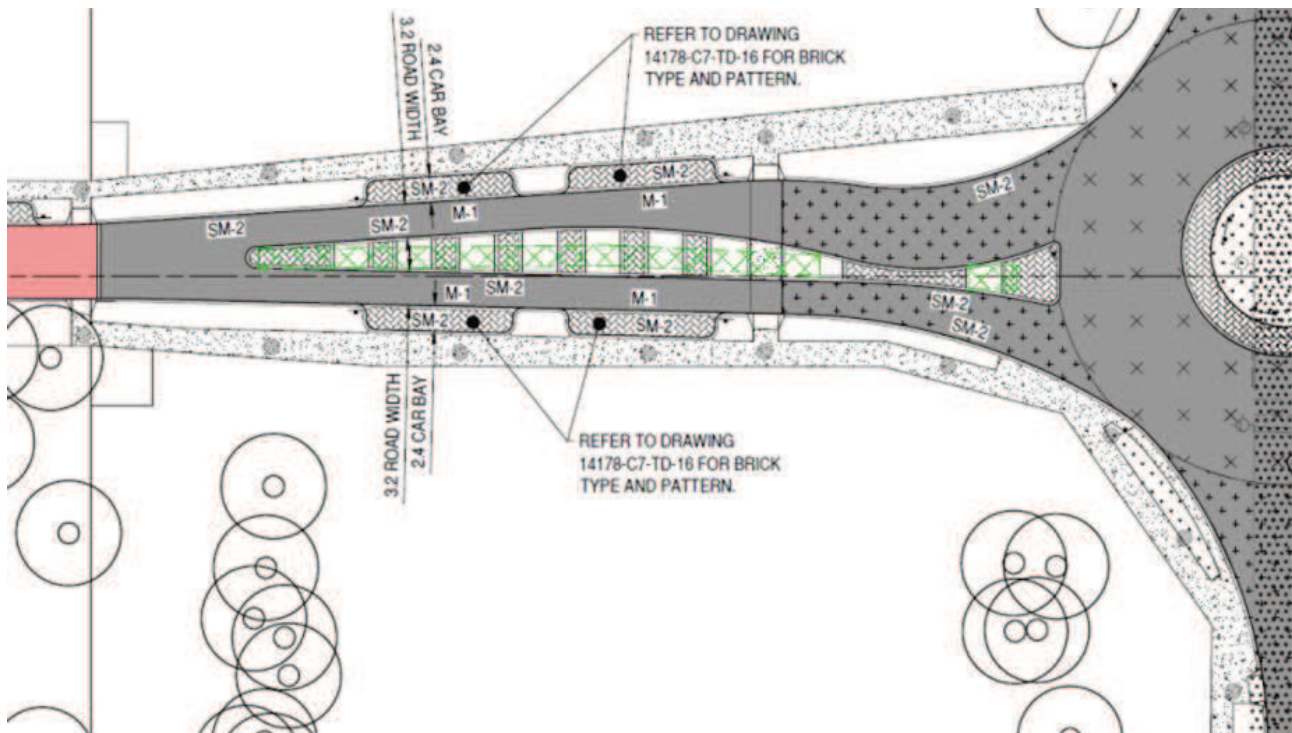
Figure 4-1 Concept of Selby Street/Nash Street Roundabout



Current plans of the northern boundary road (Seymour Street) suggests the provision of 4 kerbside bays along the Site frontage (**Figure 4-2**). However with the provision of the Commercial/Supermarket Access (marked as access 2 in **Figure 3-1**), only three car bays can be feasibly provided. A fourth bay would be located too close to the roundabout, which could possibly create a hazard or obstruct traffic on the departure side of the roundabout, given its high-speed geometry.

In addition, the Montario Estate design guidelines provide for a crossover to be located on this northern side so the loss of a street-side car bay is an obvious and necessary outcome of this (P38 'Multiple Dwelling and Mixed Use Design Guidelines').

Figure 4-2 Northern Boundary Road (Seymour Street) Kerbside Parking



Source: Landcorp

4.2 Changes to Pedestrian/Cycle Networks

A Principal Shared Path was proposed by the Western Australian Bicycle Network Plan (2014-2031), at the nearby station of Shenton Park to Loch Street. This was completed in December 2015, with no further changes or additions planned to the network. The area is provided with bike paths and pedestrian walkways and no changes are anticipated during the construction of the project.

4.3 Public Transport

Discussions with the PTA suggest that there is unlikely to be any changes with the surrounding public transport network or services in the short term.

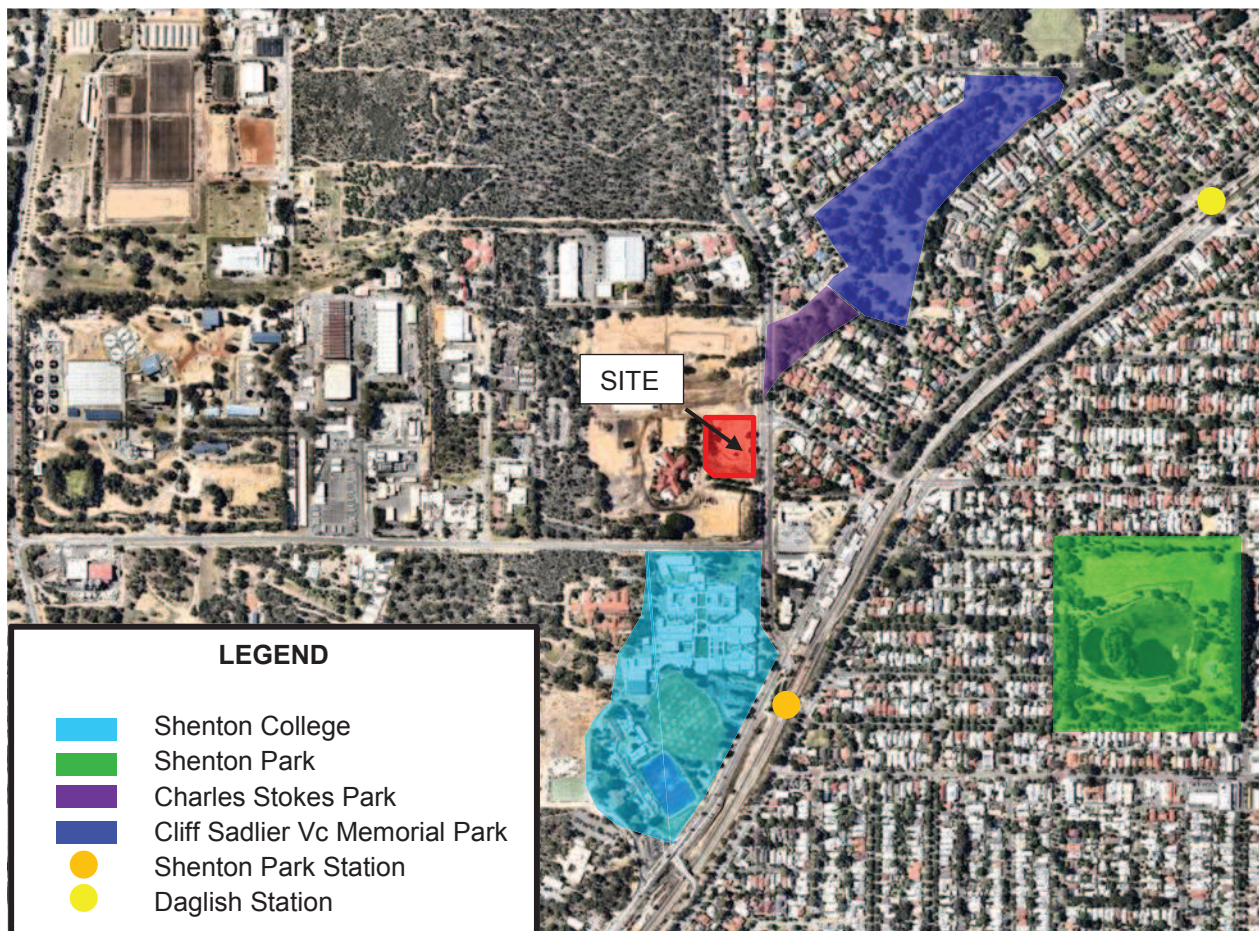
5 Integration with Surrounding Area

5.1 Surrounding Major Attractors/Generators

The major attractors/generators surrounding the development are shown in **Figure 5-1**. Key attractors/generators includes:

- > Shenton College
- > Shenton Park
- > Charles Stokes Park
- > Cliff Sadlier Vc Memorial Park
- > Shenton Park Station
- > Dalglish Station

Figure 5-1 Major Attractors/Generators



It is likely that trips from the Site to these major attractors will be undertaken by foot due to their close proximity.

5.2 Proposed Changes to Surrounding Land Uses

The *Shenton Park Hospital Redevelopment Improvement Scheme* details the planning framework within the area surrounding the Site. Proposed land uses within the surrounding area include mixed use and residential development for the lots within the block of Selby and Lemnos Street. **Figure 5-2** shows the proposed ultimate build out within the vicinity of the Site.

Figure 5-2 Montario Quarter Landscape Masterplan



Source: Landcorp (2018)

6 Analysis of Transport Networks

6.1 Analysis Overview

6.1.1 Key Intersections

A SIDRA analysis has been undertaken for the following intersections to assess the potential impact of Site-generated traffic on the surrounding road network.

- > Selby Street/Nash Street
- > Selby Street/Victoria Avenue
- > Selby Street/Lemnos Street

6.1.2 Assessment Years

As identified in the WAPC's *Transport Impact Assessment Guidelines: Individual Developments* (August 2016), it is recommended that, for analysis purposes, the appropriate assessment years include the year of full opening of the development and 10 years after full opening.

A conservative growth rate of 1.5% per annum has been adopted based on recorded traffic volumes on Selby Street.

6.1.3 Assessment Scenarios

The exact opening year has not been confirmed, however for the purpose of this assessment, it is assumed to occur in the year 2021. Therefore three scenario years background (2018), opening year of development (2021) and opening year of the development + 10 year horizon (2031) have been selected.

6.1.4 Signal Phasings

Signal phasing and timings for Selby Street/Nash Street intersection have been based on the current signal phasing provided by MRWA through IDM (Intersection Diagnostics Monitor) data. The signal phasing will only apply to the existing scenario as this intersection will be converted to a roundabout in the future assessment scenarios.

6.2 Development Trip Generation

Trip generation has been calculated for the Site, utilising the trip generation rates from the *RTA Guide to Traffic Generating Developments* and Institute of transportation Engineering (ITE) "Trip Generation" 10th Ed.

Table 6-1 shows the trip generation, **Table 6-2** shows the directional distribution of the traffic and **Table 6-3** presents the total potential trip generation of the proposed development for the full development buildout.

Table 6-1 Trip Generation Rates

Land Use	ITE Code/Source	AM Peak	PM Peak
Residential (Mid Rise)	221	0.32 trips per dwelling	0.41 trips per dwelling
Medical	630	5.62 trips per 100m ²	4.99 trips per 100m ²
Supermarket	850	8.99 trips per 100m ²	13.53 trips per 100m ²
Pharmacy	880	8.3 trips per 100m ²	11.92 trips per 100m ²
Liquor Store	899	4.9 trips per 100m ²	18.43 trips per 100m ²
Hairdresser	918	1.3 trips per 100m ²	2.12 trips per 100m ²
Office + Newsagent + Undetermined Tenancy	710	1.58 trips per 100m ²	1.53 trips per 100m ²
Café + Patisserie	RTA	5 trips per 100m ²	5 trips per 100m ²
Restaurant	RTA	5 trips per 100m ²	5 trips per 100m ²

Table 6-2 Directional Distribution

Land Use	AM Peak		PM Peak	
	In	Out	In	Out
Residential (Mid Rise)	27%	73%	60%	40%
Medical	58%	42%	46%	54%
Supermarket	54%	46%	49%	51%
Pharmacy	50%	50%	50%	50%
Liquor Store	51%	49%	50%	50%
Hairdresser	50%	50%	38%	62%
Office + Newsagent + Undetermined Tenancy	88%	12%	18%	82%
Café + Patisserie	51%	49%	50%	50%
Restaurant	57%	43%	52%	48%

Source: ITE "Trip Generation" 10th Ed

Table 6-3 Estimated Net Trip Generation of the Proposed Development

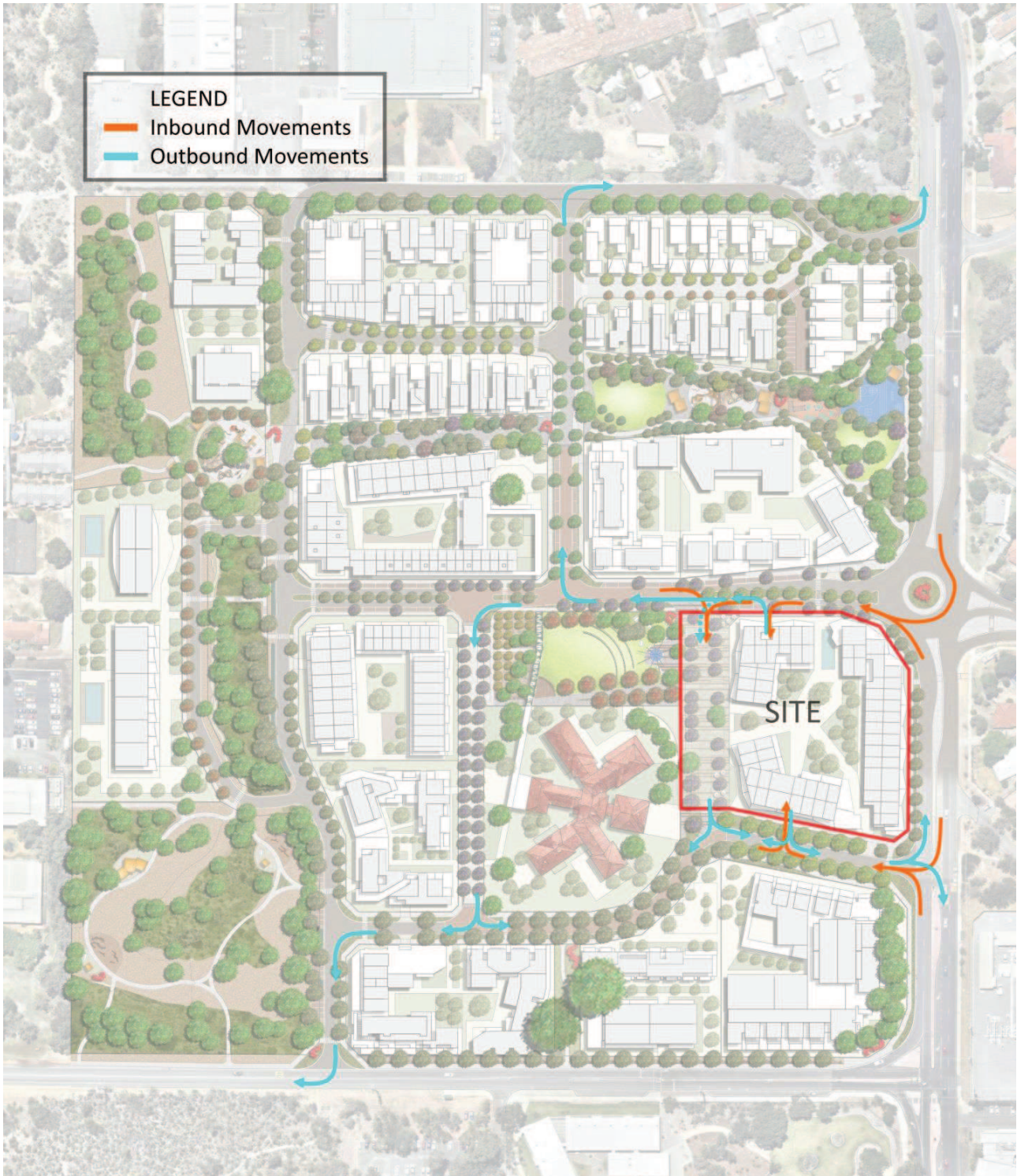
Land Use	AM Peak		PM Peak	
	In	Out	In	Out
Residential (Mid Rise)	14	37	39	26
Medical	9	7	7	8
Supermarket	126	107	172	179
Pharmacy	11	11	16	16
Liquor Store	6	6	20	20
Hairdresser	1	1	1	2
Office + Newsagent + Undetermined Tenancy	7	1	2	6
Café + Patisserie	7	7	7	7
Restaurant	10	8	9	9
Total	191	185	273	273

The proposed redevelopment represents a two-way trip generation of approximately 376 vehicles in the AM peak and 546 vehicles in the PM peak hour for the full development buildout.

6.3 Development Traffic Distribution

Development traffic distribution for the weekday AM and PM has been derived from the existing distribution flow of Selby Street, Lemnos Street and Nash Street as sourced from SCATS data and traffic counts. In addition, consideration has also been given to the expected origin and destination of each trip in the context of the surrounding area. **Figure 6-1** shows the anticipated traffic movements within the surrounding road network.

Figure 6-1 Development Traffic Movement within the Road Network



The distribution of Site generated traffic onto the Site accesses are as follows:

- > Residential Access onto Victoria Avenue – 100% of all inbound and outbound residential traffic
- > Commercial/Supermarket Access onto Seymour Street - 70% of commercial/supermarket inbound and outbound traffic
- > Laneway Entry – 30% of commercial/supermarket inbound traffic
- > Laneway Exit – 30% of commercial/supermarket outbound traffic

6.4 Background Traffic

Background traffic volumes have been sourced from existing SCATS data from Main Roads Western Australia and on-site traffic counts.

> Year 2018

- Traffic surveys were conducted on 01/05/2018 to obtain turning movements at the Selby Street/Lemnos Road intersection.
- Background traffic volumes and turning counts for the Selby Street/Nash Street intersection were sourced from SCATS data and information received from Main Roads Western Australia (MRWA).
- Signal operation (phasings, timings) at the Selby Street/Nash Street intersection were obtained from MRWA.

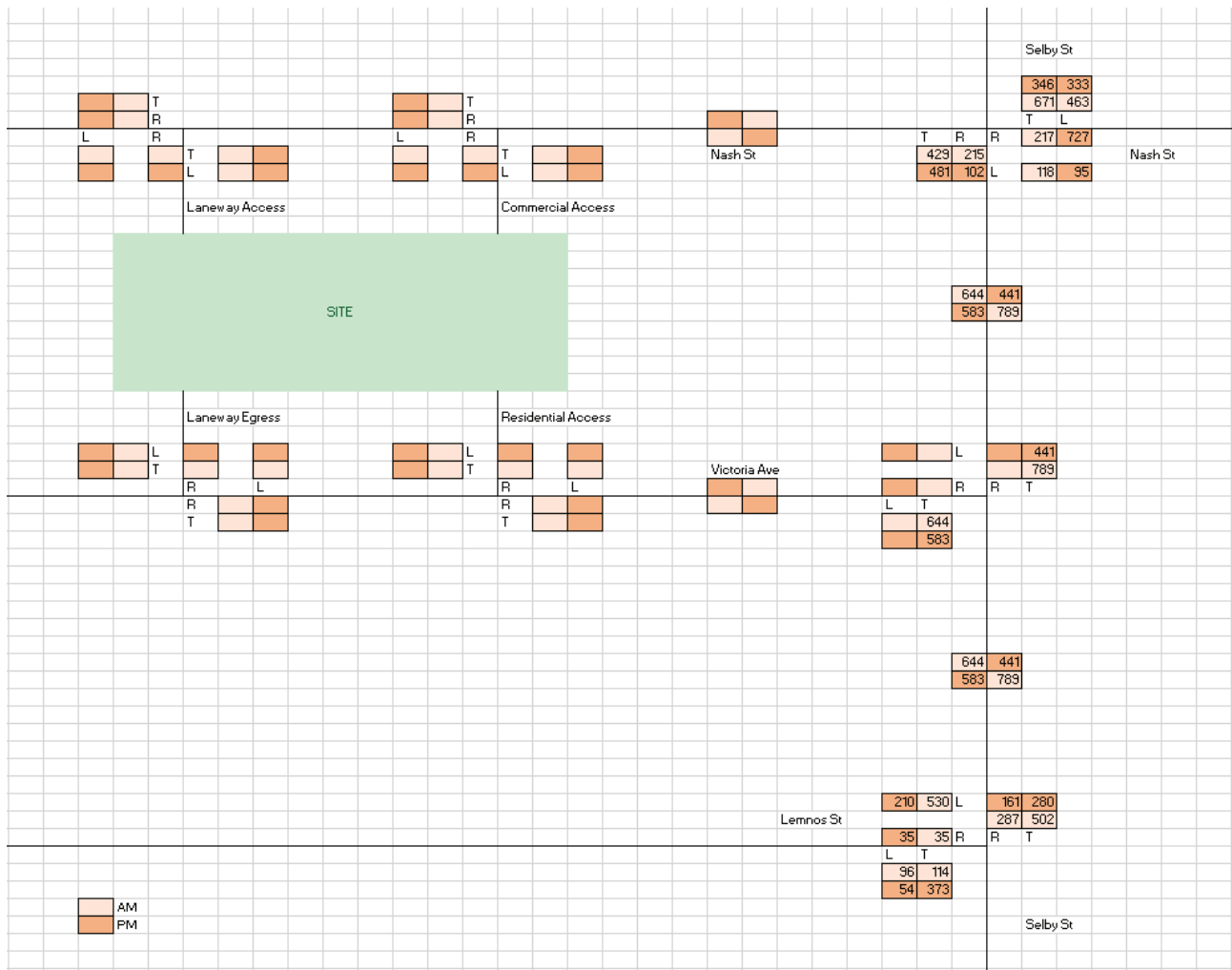
> Year 2021

- To derive the background traffic volumes for the year 2021 a conservative 1.5% growth rate has been applied to the background traffic to estimate the traffic volumes in the year 2021.
- The Selby Street/Nash Street intersection will have been converted to a roundabout for year 2021.

> Year 2031

- To derive the background traffic volumes for the year 2031 a conservative 1.5% growth rate has been applied to the background traffic to estimate the traffic volumes in the year 2031.
- The Selby Street/Nash Street intersection will have been converted to a roundabout for year 2031.

Figure 6-2 shows the background traffic volumes within the vicinity of the Site for the existing (2018) year.

Figure 6-2 Background Traffic 2018 – Weekday AM and PM Peak


6.5 Background and Development Traffic

Background with development traffic adopted for the assessment are shown in **Figure 6-3** and **Figure 6-4**.

Figure 6-3 Opening Year of Development (2021) – Weekday AM and PM Peak

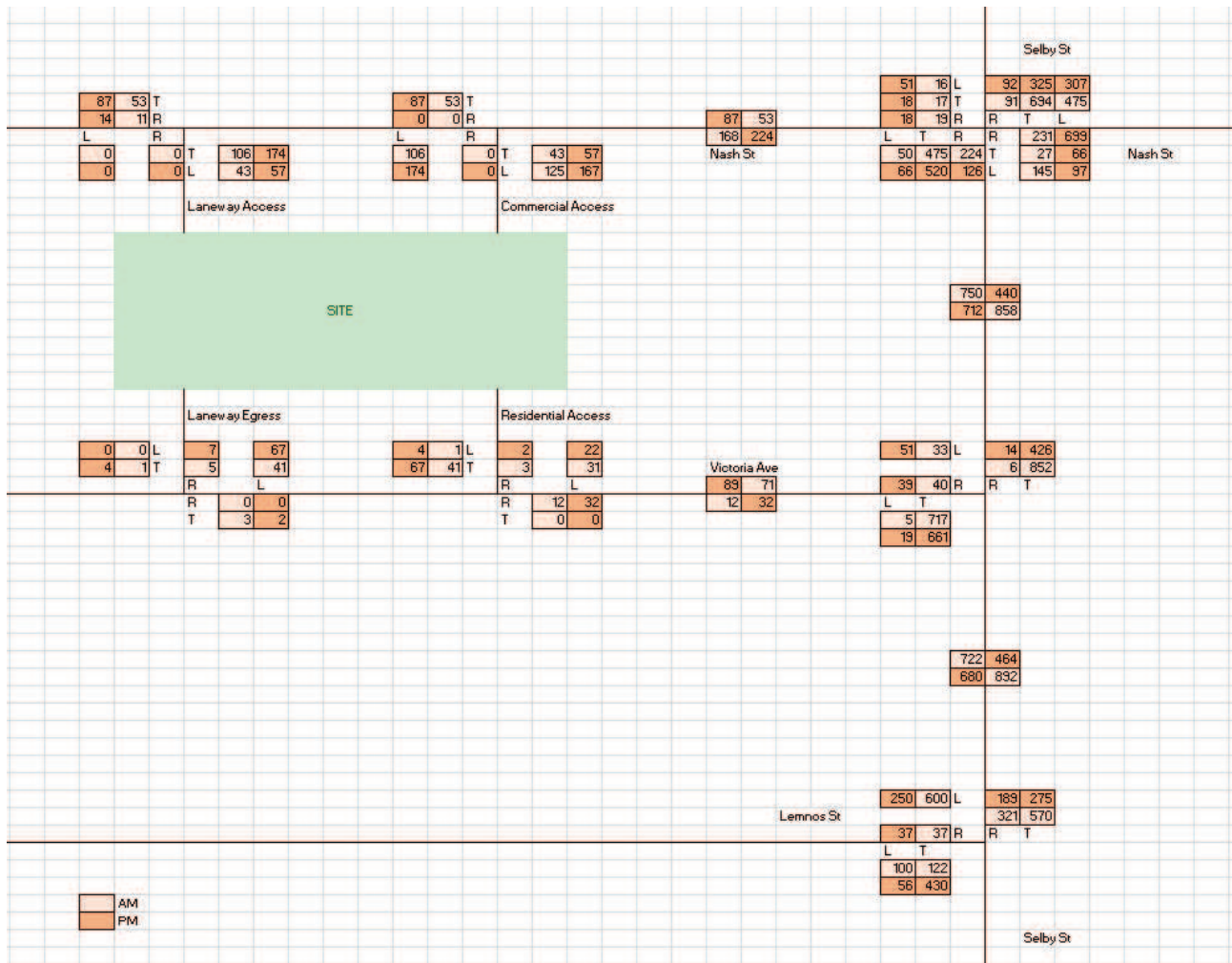
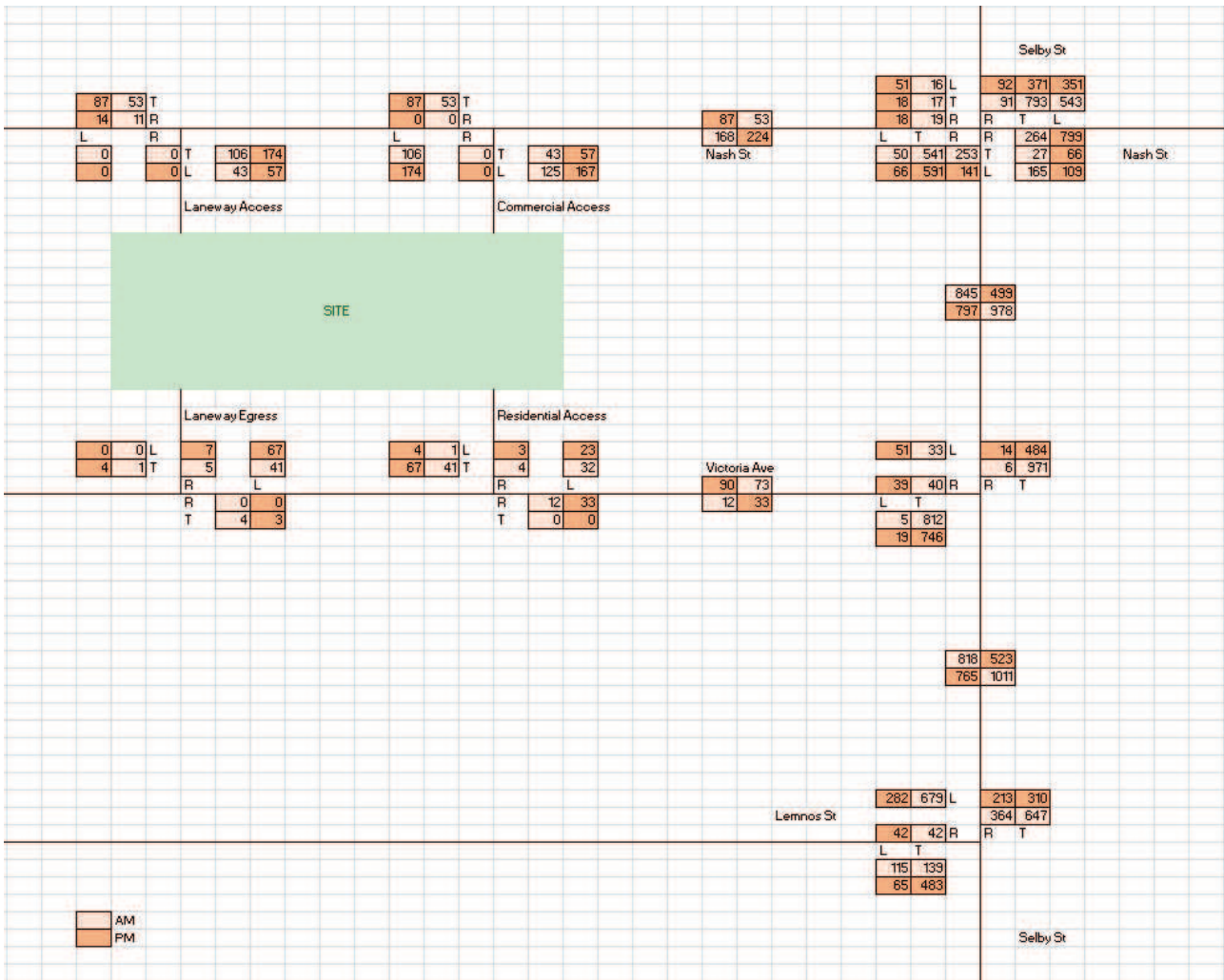


Figure 6-4 Opening Year of the Development + 10 Year Horizon (2031) – Weekday AM and PM Peak


6.6 Intersection Performance

Analysis of the traffic impacts of the proposed development has been carried out for the following intersections:

- > Selby Street/Nash Street
- > Selby Street/Victoria Avenue
- > Selby Street/Lemnos Street

The Site accesses have not been assessed as the traffic volumes at the accesses are relatively low with the resulting impact having a negligible effect at these access points. Additionally, for the purpose of a robust assessment, it is assumed that the majority of development traffic will be accessing/egressing the Site via Selby Street.

The identified intersections and accesses have been analysed for the three scenarios using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an un-signalized intersection where $DOS > 0.80$;

95% Queue: is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;

Average Delay: is the average of all travel time delays for vehicles through the intersection. An un-signalised intersection can be considered to be operating at capacity where the average delay exceeds 40 seconds for any movement; and

Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 6-4**.

Table 6-4 Level of Service (LoS) Performance Criteria

LOS	Description	Signalised Intersection	Unsignalised Intersection
A	Free-flow operations (best condition)	≤10 sec	≤10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

A DOS exceeding these values indicates that the intersection is exceeding its practical capacity. Above these values, users of the intersections are likely to experience unsatisfactory queuing and delays during the peak hour periods. All SIDRA outputs referenced herein are included at **Appendix C**.

6.6.2 Background (2018)

6.6.2.1 Selby Street/Nash Street

The following presents the results of the analysis of the Selby Street/Nash Street intersection for both scenarios. **Figure 6-5** is a SIDRA layout representation of the intersection. **Table 6-5** shows the results of the analysis.

Figure 6-5 SIDRA Layout for Selby Street/Nash Street (signalised)

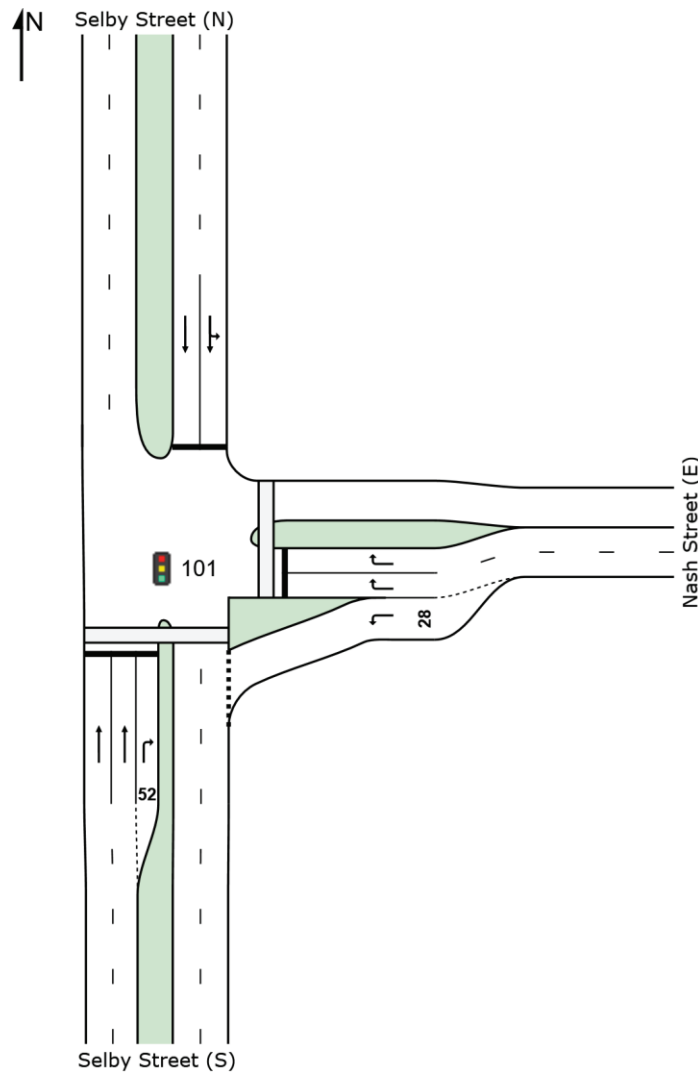


Table 6-5 Selby Street/Nash Street (Background 2018)

Intersection Approach	Background 2018 (AM)				Background 2018 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	T	0.169	6	A	24.7	0.242	10.4	B	33.5
	R	0.589	41.5	D	62	0.41	38.3	D	24.8
Nash Street (E)	L	0.123	11.1	B	12.5	0.082	8.1	A	5.9
	R	0.292	38.8	D	29	0.692	30	C	87.7
Selby Street (N)	L	0.763	30	C	145.8	0.618	10.2	B	31.7
	T	0.763	25.7	C	154.9	0.61	24.6	C	76.9

6.6.2.2 Selby Street/Lemnos Street

The following presents the results of the analysis of the Selby Street/Lemnos Street intersection for both scenarios. **Figure 6-6** is a SIDRA layout representation of the intersection. **Table 6-6** shows the results of the analysis.

Figure 6-6 SIDRA Layout for Selby Street/Lemnos Street

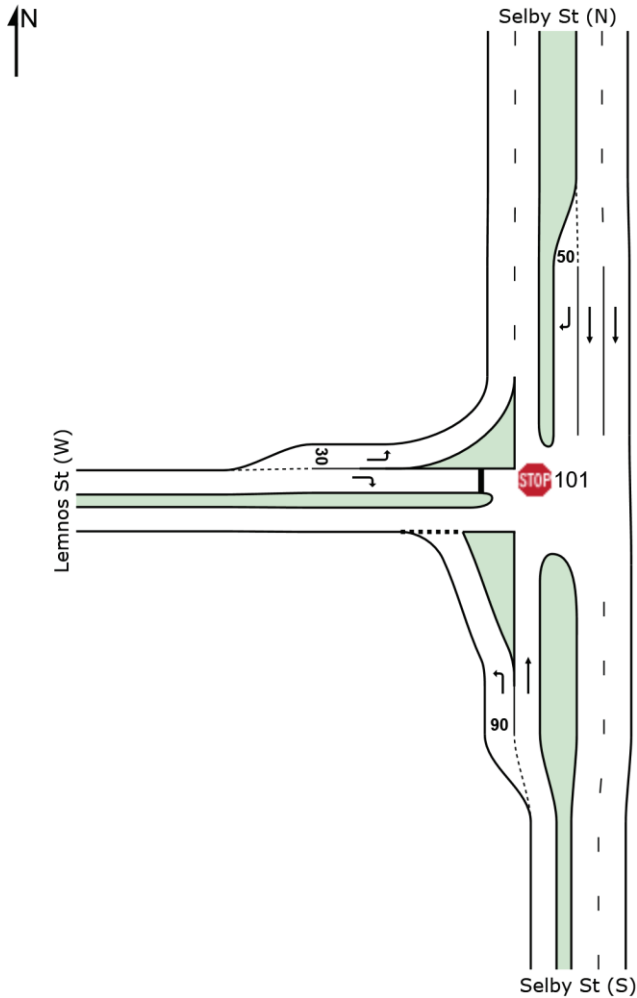


Table 6-6 Selby Street/Lemnos Street (Background 2018)

Intersection Approach	Background 2018 (AM)				Background 2018 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.079	6.7	A	2.3	0.039	6.2	A	1.1
	T	0.057	0	A	0	0.188	0	A	0
Selby Street (N)	T	0.133	0	A	0.0	0.060	0	A	0
	R	0.180	6	A	6.7	0.132	7.1	A	4.3
Lemnos Street (W)	L	0.294	5.7	A	0	0.116	5.7	A	0
	R	0.066	21.3	C	1.7	0.079	20.9	C	2

6.6.3 Opening Year of Development (2021)

6.6.3.1 Selby Street/Nash Street

The following presents the results of the analysis of the Selby Street/Nash Street intersection for both scenarios. **Figure 6-7** is a SIDRA layout representation of the intersection. **Table 6-7** shows the results of the analysis.

Figure 6-7 SIDRA Layout for Selby Street/Nash Street (roundabout)

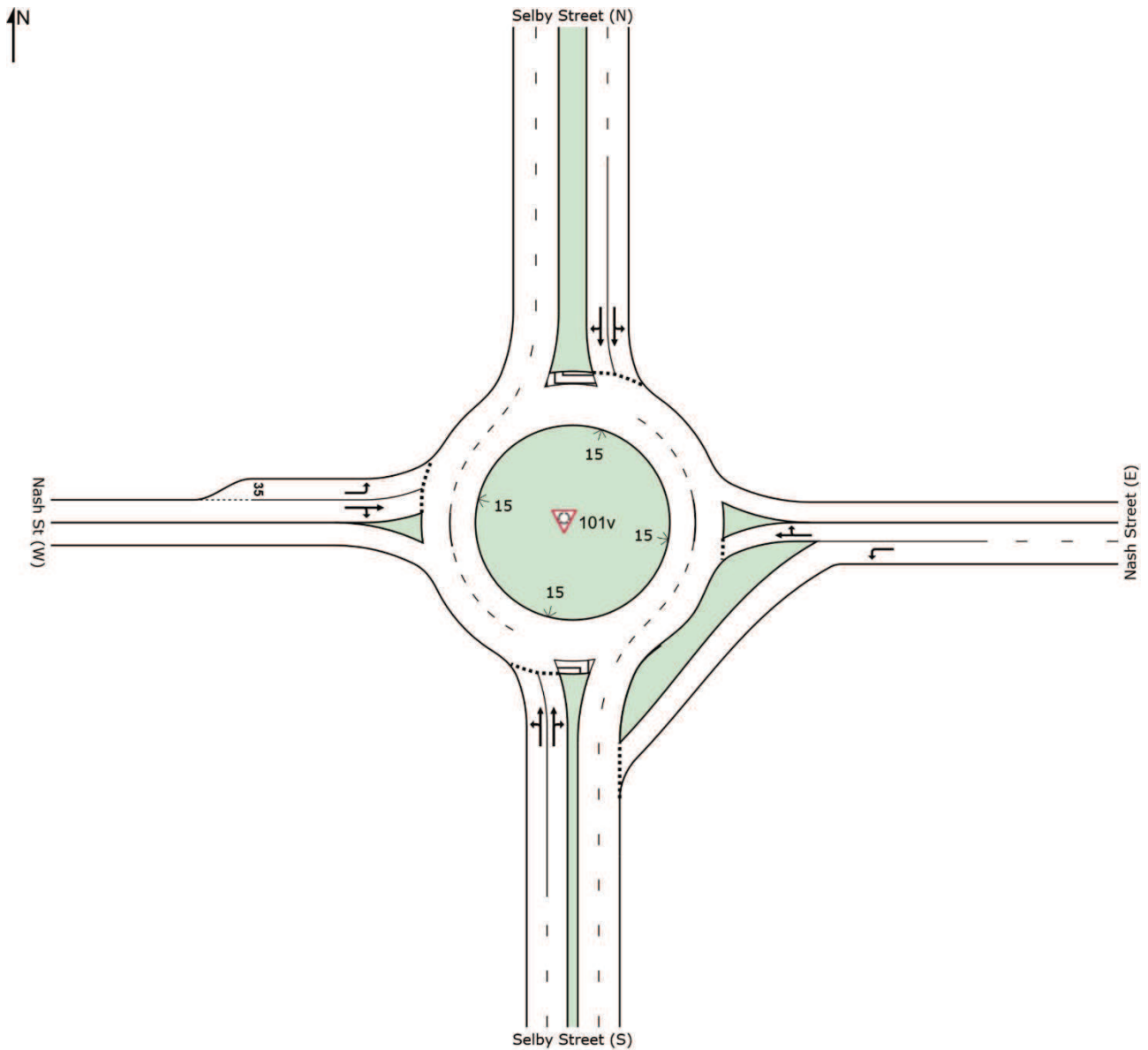


Table 6-7 Selby Street/Nash Street (Opening Year of Development 2021)

Intersection Approach	Opening Year of Development 2021 (AM)				Opening Year of Development 2021 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.359	6.6	A	19.2	0.642	17.7	B	55.3
	T	0.359	6.7	A	19.2	0.642	18.8	B	55.3
	R	0.359	11.1	B	18.4	0.642	24.7	C	49.1
Nash Street (E)	L	0.178	6.7	A	6.5	0.091	5.4	A	3
	T	0.338	7.9	A	13.6	0.756	10.4	B	63.2
	R	0.338	11.9	B	13.6	0.756	14.4	B	63.2
Selby Street (N)	L	0.544	6.3	A	35	0.288	5.3	A	15.5
	T	0.544	6.6	A	35	0.288	5.5	A	15.5
	R	0.544	10.8	B	33.7	0.288	9.5	A	15
Nash Street (W)	L	0.028	8.1	A	0.8	0.088	9.6	A	3.3
	T	0.046	7	A	1.4	0.079	10.7	B	2.7
	R	0.046	11	B	1.4	0.079	14.8	B	2.7

6.6.3.2 Selby Street/Victoria Avenue

The following presents the results of the analysis of the Selby Street/Victoria Avenue intersection for both scenarios. **Table 6-8** shows the results of the analysis.

Table 6-8 Selby Street/Victoria Avenue (Opening Year of Development 2021)

Intersection Approach	Opening Year of Development 2021 (AM)				Opening Year of Development 2021 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.189	5.6	A	0	0.177	5.6	A	0
	T	0.189	0.0	A	0	0.177	0	A	0
Selby Street (N)	T	0.223	0.0	A	0	0.111	0	A	0
	R	0.01	9.7	A	0.3	0.022	9.4	A	0.6
Victoria Ave (W)	L	0.147	9.9	A	3.6	0.164	9.5	A	4.1
	R	0.147	20.6	C	3.6	0.164	17.8	C	4.1

6.6.3.3 Selby Street/Lemnos Street

The following presents the results of the analysis of the Selby Street/Lemnos Street intersection for both scenarios. **Table 6-9** shows the results of the analysis.

Table 6-9 Selby Street/Lemnos Street (Opening Year of Development 2021)

Intersection Approach	Opening Year of Development 2021 (AM)				Opening Year of Development 2021 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.085	6.9	A	2.5	0.042	6.3	A	1.2
	T	0.064	0	A	0	0.225	0	A	0
Selby Street (N)	T	0.149	0	A	0	0.072	0	A	0
	R	0.205	6.1	A	7.7	0.168	7.5	A	5.5
Lemnos Street (W)	L	0.332	5.7	A	0	0.138	5.7	A	0
	R	0.076	22.2	C	1.9	0.099	24.4	C	2.4

6.6.4 Opening Year of Development + 10 Year Horizon (2031)

6.6.4.1 Selby Street/Nash Street

The following presents the results of the analysis of the Selby Street/Nash Street intersection for both scenarios. **Table 6-10** shows the results of the analysis.

Table 6-10 Selby Street/Nash Street (Opening Year of Development + 10 Year Horizon 2031)

Intersection Approach	Opening Year of Development 2021 (AM)				Opening Year of Development 2021 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.421	6.9	A	23.9	0.908	59.2	E	152.8
	T	0.421	7.1	A	23.9	0.908	61.5	E	152.8
	R	0.421	11.5	B	22.7	0.908	69.7	E	126.8
Nash Street (E)	L	0.221	7.2	A	8.5	0.111	6	A	3.7
	T	0.42	9	A	19.1	0.916	20.3	C	141
	R	0.42	13	B	19.1	0.916	23.8	C	141
Selby Street (N)	L	0.636	7.2	A	48.6	0.328	5.9	A	18.3
	T	0.636	7.9	A	48.8	0.328	5.9	A	18.3
	R	0.636	12.1	B	48.8	0.328	9.4	A	17.8
Nash Street (W)	L	0.031	8.6	A	0.9	0.109	11.8	B	4.1
	T	0.051	7.3	A	1.6	0.099	13.1	B	3.4
	R	0.051	11.4	B	1.6	0.099	16.6	B	3.4

6.6.4.2 Selby Street/Victoria Avenue

The following presents the results of the analysis of the Selby Street/Victoria Avenue intersection for both scenarios. **Table 6-11** shows the results of the analysis.

Table 6-11 Selby Street/Victoria Avenue (Opening Year of Development + 10 Year Horizon 2031)

Intersection Approach	Opening Year of Development + 10 Year Horizon 2031 (AM)				Opening Year of Development + 10 Year Horizon 2031 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.214	5.6	A	0	0.2	5.6	A	0
	T	0.214	0.0	A	0	0.2	0.0	A	0
Selby Street (N)	T	0.254	0	A	0	0.126	0.0	A	0
	R	0.011	10.7	B	0.3	0.024	10.2	B	0.6
Victoria Ave (W)	L	0.17	11	B	4.1	0.186	10.4	B	4.6
	R	0.17	23.4	C	4.1	0.186	19.6	C	4.6

6.6.4.3 Selby Street/Lemnos Street

The following presents the results of the analysis of the Selby Street/Lemnos Street intersection for both scenarios. **Table 6-12** shows the results of the analysis.

Table 6-12 Selby Street/Lemnos Street (Opening Year of Development + 10 Year Horizon 2031)

Intersection Approach	Opening Year of Development 2031 (AM)				Opening Year of Development 2031 (PM)				
	DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)	
Selby Street (S)	L	0.103	7.1	A	3	0.05	6.4	A	1.4
	T	0.073	0	A	0	0.243	0	A	0
Selby Street (N)	T	0.169	0	A	0	0.081	0	A	0
	R	0.236	6.2	A	9.1	0.203	7.9	A	6.7
Lemnos Street (W)	L	0.376	5.7	A	0	0.156	5.7	A	0
	R	0.096	23.5	C	2.4	0.131	26.4	D	3.2

6.6.5 SIDRA Analysis Summary

The results of the SIDRA analysis are summarised below;

The results above show that the Selby Street/Nash Street intersection can accommodate the additional traffic generated by the Site for all scenarios. For the PM peak period, the movements along the southern leg of the roundabout (particularly the right run movement) becomes busier as the intersection approaches capacity. This can be attributed to the volume of right turn movements from Nash Street heading north of Selby Street, which reduces available gaps for vehicles approaching from the south. However, delays remain within acceptable limits and all queuing is contained within the storage available.

The results above show that the Selby Street/Victoria Avenue intersection can accommodate the additional traffic generated by the Site for all scenarios. All legs are performing satisfactorily at LOS C or better for all scenarios, with minimal delay.

The results above show that the Selby Street/Lemnos Street intersection can accommodate the additional traffic generated by the Site for all scenarios. All legs are performing satisfactorily at LOS D or better for all scenarios, with minimal delay.

7 Summary

Cardno has been commissioned by Iris Residential ('the Client') to prepare a *Transport Impact Assessment* (TIA) for the proposed mixed use development ('the Site') located at Lot 37 Montario Quarter, Shenton Park, City of Nedlands.

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines: Volume 4 – Individual Developments (2016)* for lodgement with the development application. Specifically, this report aims to outline the transport aspects of the proposed redevelopment, with a focus on accessibility, traffic operation, circulation and car parking.

The following conclusions have been made in regards to the proposed development:

The Site will have a peak two-way traffic generation of approximately 376 vehicle trips in the AM peak and 546 vehicle trips in the PM peak hour (arrivals plus departures) for the full development buildout.

- > SIDRA results for the intersections located within the vicinity of the Site show that they will operate satisfactorily for the three assessment scenarios with delays and queue lengths within acceptable levels.
- > The Site parking provision satisfies the *Shenton Park Hospital Redevelopment Improvement Scheme No. 1*. requirements by providing sufficient parking to meet the minimum parking requirements without exceeding the maximum allowable parking on-site.
- > A swept path analysis has been undertaken for the largest design vehicle used for the Site (12.5m HRV). This analysis shows that the 12.5m HRV can effectively access and egress the site in forward gear.
- > The Site has excellent access to the existing pedestrian and cycling network with the Fremantle Railway PSP located within walking distance.
- > The public transport amenity within the vicinity of the Site is excellent with a high frequency of bus and trains services within walking distance from the Site.

Lot 37 Montario Quarter

APPENDIX

A

WAPC CHECKLIST

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1

Item	Provided	Comments/Proposals
Summary		
Introduction/Background		
name of applicant and consultant	Included in Section 1	
development location and context	Included in Section 2	
brief description of development proposal	Included in Section 3	
key issues	N/A	
background information	Included in Section 1	
Existing situation		
existing site uses (if any)	Included in Section 2	
existing parking and demand (if appropriate)	Included in Section 2	
existing access arrangements	N/A	
existing site traffic	Included in Section 2	
surrounding land uses	Included in Section 5	
surrounding road network	Included in Section 2	
traffic management on frontage roads	Included in Section 2	
traffic flows on surrounding roads (usually am and pm peak hours)	Included in Section 2	
traffic flows at major intersections (usually am and pm peak hours)	Included in Section 6	
operation of surrounding intersections	Included in Section 6	
existing pedestrian/cycle networks	Included in Section 2	
existing public transport services surrounding the development	Included in Section 2	
Crash data	Included in Section 2	
Development proposal		
regional context	Included in Section 3	
proposed land uses	Included in Section 3	
table of land uses and quantities	Included in Section 3	
access arrangements	Included in Section 3	
parking provision	Included in Section 3	
end of trip facilities	Included in Section 3	
any specific issues	Included in Section 6	
road network	Included in Section 4	
intersection layouts and controls	Included in Section 3	
pedestrian/cycle networks and crossing facilities	Included in Section 4	

Item	Provided	Comments/Proposals
public transport services	Included in Section 4	
Integration with surrounding area	Included in Section 5	
surrounding major attractors/generators	Included in Section 5	
committed developments and transport proposals	Included in Section 5	
proposed changes to land uses within 1200 metres	Included in Section 5	
travel desire lines from development to these attractors/generators	Included in Section 5	
adequacy of existing transport networks	Included in Section 2	
deficiencies in existing transport networks	Included in Section 2	
remedial measures to address deficiencies	Included in Section 2	
Analysis of transport networks		
assessment years	Included in Section 6	
time periods	Included in Section 6	
development generated traffic	Included in Section 6	
distribution of generated traffic	Included in Section 6	
parking supply & demand	Included in Section 3	
base and "with development" traffic flows	Included in Section 6	
analysis of development accesses	Included in Section 6	
impact on surrounding roads	Included in Section 6	
impact on intersections	Included in Section 6	
impact on neighbouring areas	Included in Section 6	
road safety	Included in Section 2	
public transport access	Included in Section 2	
pedestrian access / amenity	Included in Section 2	
cycle access / amenity	Included in Section 2	
analysis of pedestrian / cycle networks	Included in Section 2	
safe walk/cycle to school (for residential and school site developments only)	Included in Section 2	
Traffic management plan (where appropriate)	N/A	

Lot 37 Montario Quarter

APPENDIX

B

SITE PLANS, SWEEPED PATHS & SIGHT DISTANCE ASSESSMENT

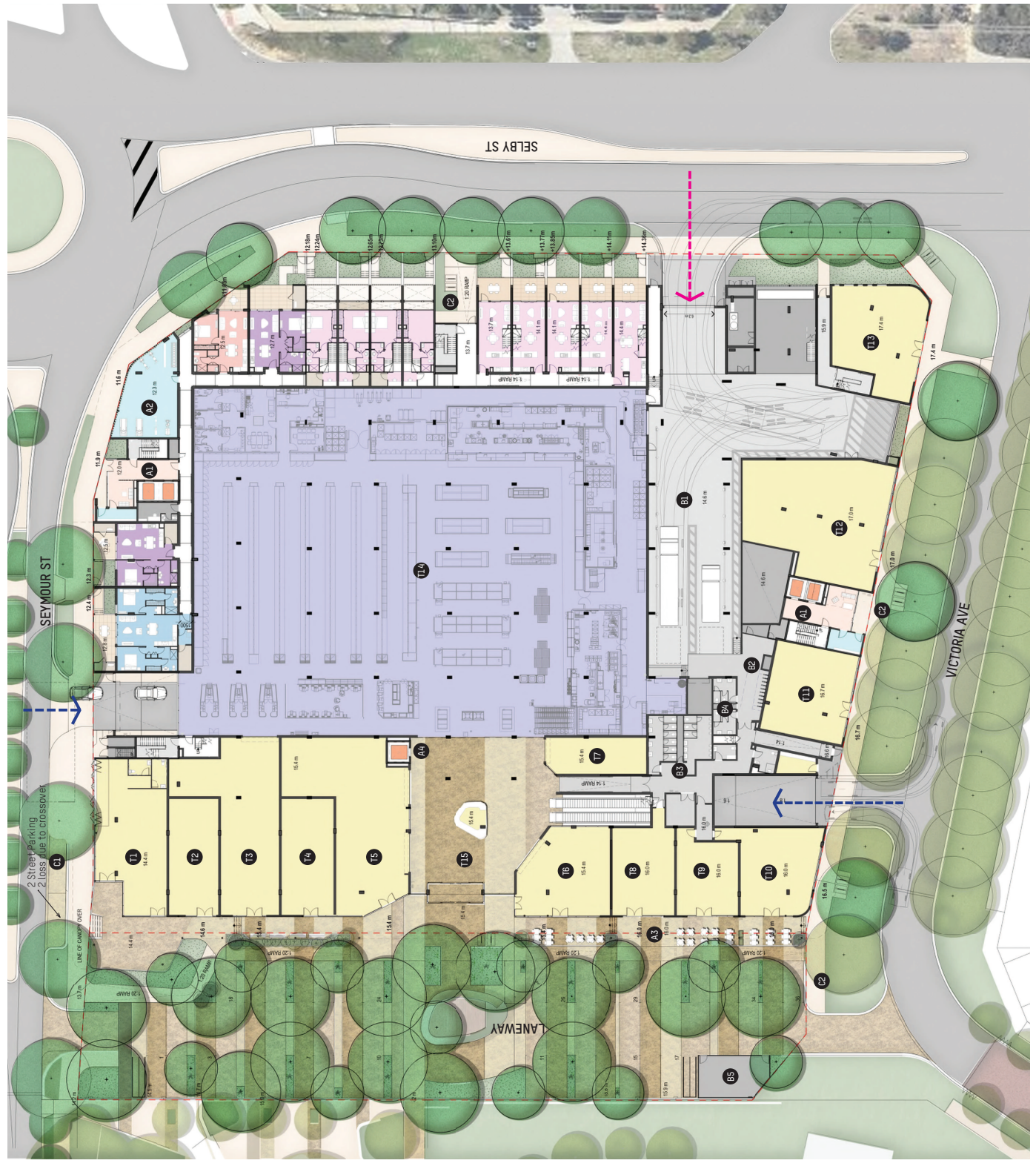
DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1

- LEGEND**
- 1 x 1 TOWNHOUSE
 - 1 x 1 STUDIO APARTMENT
 - 2 x 2 APARTMENT
 - RESIDENTS FACILITIES
 - COMMERCIAL SERVICES
 - SUPERMARKET
 - RESIDENTS LOBBY
 - TREES RETAINED
 - TREES NEW
 - VEHICULAR ACCESS
 - SERVICE ACCESS

- T1 Café
- T2 Hairdresser
- T3 Liquor Store
- T4 TBA
- T5 Pharmacy
- T6 Restaurant
- T7 Newsagency
- T8 Restaurant
- T9 Patisserie
- T10 Restaurant
- T11 Service/Office
- T12 Medical
- T13 Service/Office
- T14 Supermarket
- T15 Kiosk

*Tenancy types shown are the desired indicative mix. The final tenancy types will be subject to final leasing requirements.

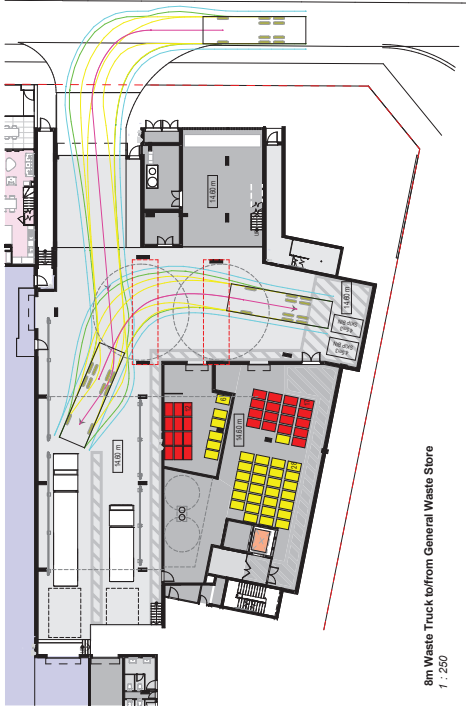
- A1 Resident's Lobby
- A2 Gym
- A3 Alfresco
- A4 Retail Lift Connecting Level 1 & 2
- B1 Loading Dock
- B2 EOT
- B3 Visitors Toilets
- B4 Staff Toilets
- B5 Substation
- C1 Street Parking
- C2 Bicycle Parking
- V Void



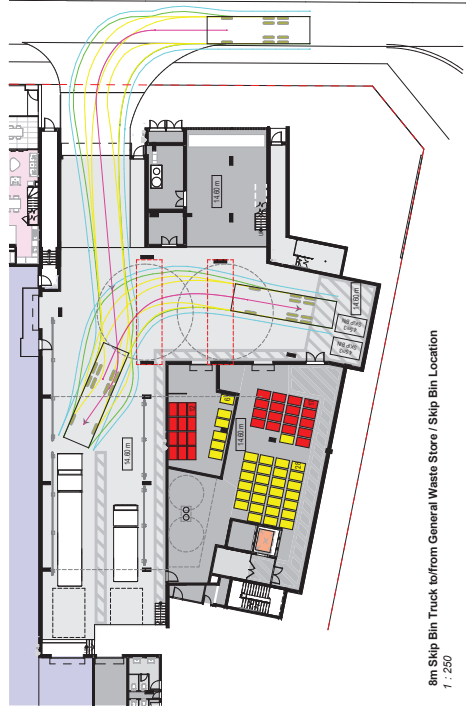
DEPARTMENT OF PLANNING, LANDS AND HERITAGE
DATE 16-Nov-2018 FILE 08-50167-1



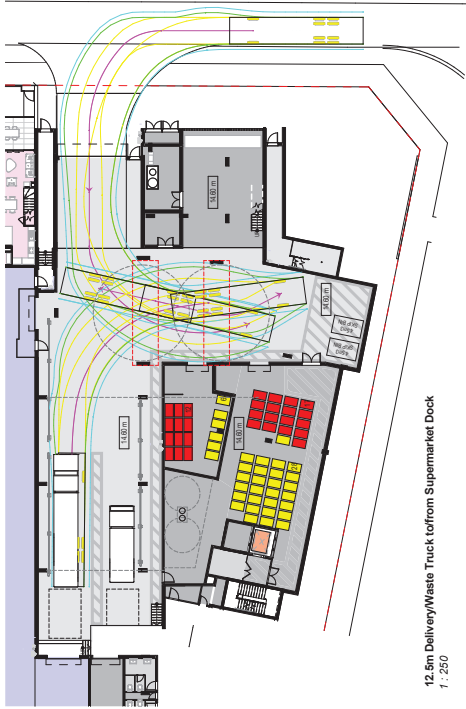
GROUND



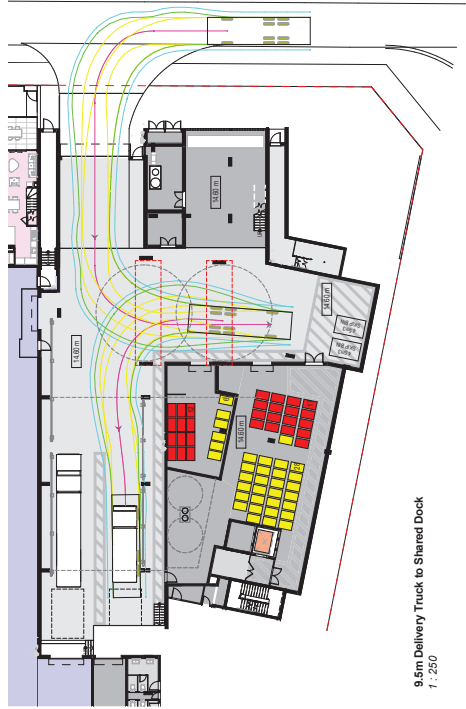
8m Waste Truck to/from General Waste Store
1 : 250



8m Skip Bin Truck to/from General Waste Store / Skip Bin Location
1 : 250



12.5m Delivery/Waste Truck to/from Supermarket Dock
1 : 250

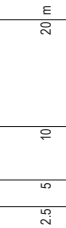


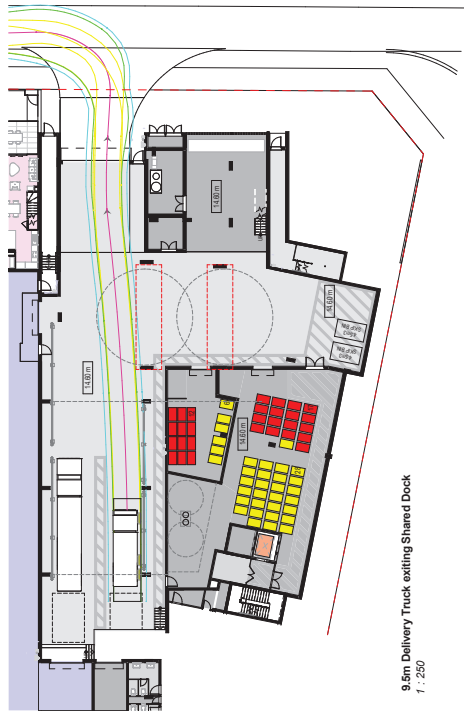
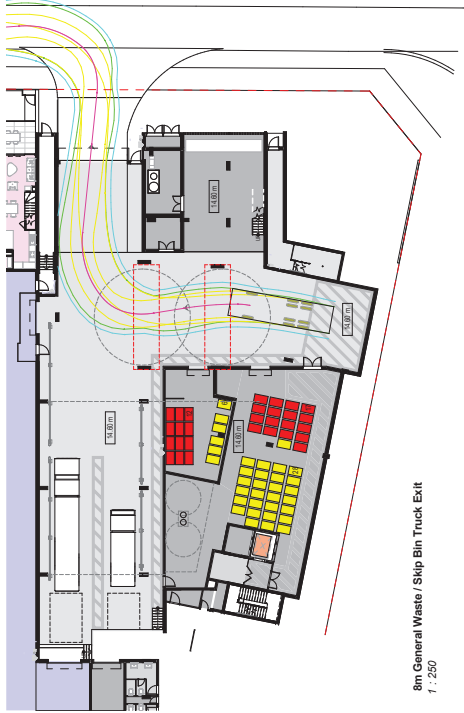
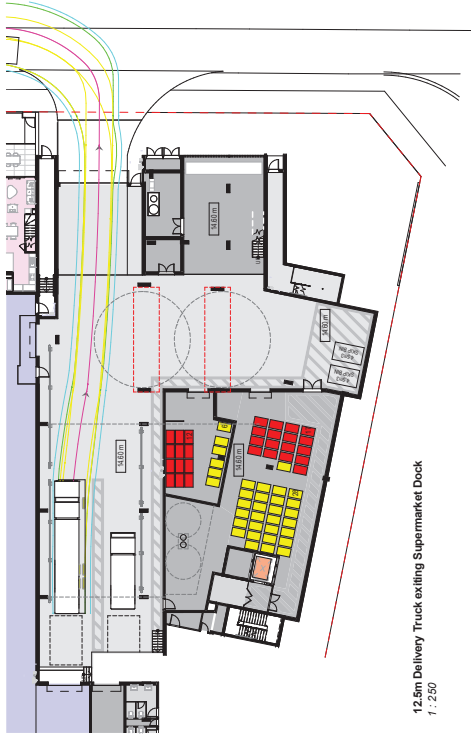
9.5m Delivery Truck to Shared Dock
1 : 250

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
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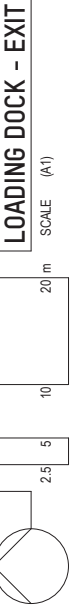
LOADING DOCK - ENTRY

SCALE (A1)





DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
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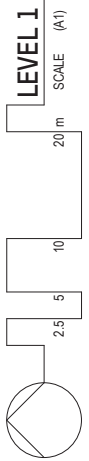


LOADING DOCK - EXIT

- LEGEND**
- STUDIO APARTMENT
 - 1 X 1 APARTMENT
 - 2 X 1 APARTMENT
 - 2 X 2 APARTMENT
 - 3 X 2 APARTMENT
 - SERVICES
 - RESIDENTS FACILITIES
 - STORES
 - AL Residents lobby
 - RL Lift connecting ground floor retail
 - B1 Bin store
 - B2 Bin holding room
 - C1 Motorcycle parking
 - C2 Residents car parking
 - C3 Bicycle parking
 - V Void
 - RV Residents visitor car parking



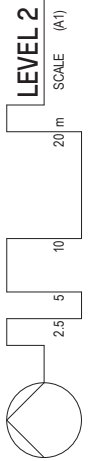
DEPARTMENT OF PLANNING, LANDS
 AND HERITAGE
 DATE 16-Nov-2018 FILE 08-50167-1



- LEGEND**
- STUDIO APARTMENT
 - 1 X 1 APARTMENT
 - 2 X 1 APARTMENT
 - 2 X 2 APARTMENT
 - 3 X 2 APARTMENT
 - SERVICES
 - RESIDENTS FACILITIES
 - STORES
 - A1 Residents lobby
 - A2 Lift connecting ground floor retail
 - A3 Solartube skylight above
 - B1 Bin store
 - B2 Pool plant room
 - C1 Motorcycle parking
 - C2 Residents car parking
 - C3 Bicycle parking
 - C4 Bicycle workshop
 - C5 Carwash bay



DEPARTMENT OF PLANNING, LANDS
 AND HERITAGE
 DATE 16-Nov-2018 FILE 08-50167-1





COMMERCIAL & RESIDENTIAL YIELD

REF (#)	LOT 37 PROPOSED LAND USE	GFAIM ²	YIELD (#)
COMMERCIAL			
1	Café	173	1 unit
2	Hairdresser	98	1 unit
3	Liquor Store	213	1 unit
4	TBA	106	1 unit
5	Pharmacy	253	1 unit
6	Restaurant	128	1 unit
7	Newsagency	65	1 unit
8	Restaurant	99	1 unit
9	Patisserie	81	1 unit
10	Restaurant	114	1 unit
11	Service/Office	126	1 unit
12	Medical	265	1 unit
13	Service/Office	151	1 unit
14	Supermarket	2583	1 unit
15	Kiosk	15	1 unit
TOTAL COMMERCIAL:		4470m²	
RESIDENTIAL			
1	Car park Level 1	3788	
2	Car park Level 2	3502	
3	Ramp from Ground to Level 1	214	
4	Lower Ground	424	
5	Ground	209	
6	Mezzanine	898	
7	Level 1	2021	
8	Level 2	2071	
9	Level 3	2201	
10	Level 4	2201	
11	Level 5	2201	
12	Level 6	2201	
TOTAL RESIDENTIAL:		22,011m²	
GRAND TOTAL:		26,481m²*	* Basement (3521m ²) and Laneway parking not included in total GFA for plot ratio calculation.
SITE AREA:		10,098m²	
PLOT RATIO:		2.0	PERMITTED (20,196m²)
			SEEKING 31% BONUS PLOT RATIO.

LOCATION	Studio	APARTMENT TYPE						Total
		1x1	1x1 TH	2x1	2x2	3x2	3x2	
Lower Gr	1	2	4		1		8	
Ground			5				5	
Mezz	2	2		4			8	
Level 1	3	10	2	8	3		26	
Level 2	1	10	2	10	3		26	
Level 3				12	9		21	
Level 4				12	9		21	
Level 5				12	9		21	
Level 6				12	9		21	
TOTAL	7	24	9	4	71	42	157	
	4%	15%	6%	3%	45%	27%	100%	

PARKING YIELD

LOCATION	PARKING TYPE	NUMBER OF BAYS
Laneway	Public	34 + 1 ACROD
Basement	Commercial	105 + 2 ACROD
L1	Residents' parking + Visitors' parking	127 + 10 Resident Visitors
L2	Residents' parking	133 + 1 Carwash

EOT CALCULATION

	SHENTON PARK HOSPITAL IMPROVEMENT SCHEME	SHENTON - PARK HOSPITAL IMPROVEMENT SCHEME (WITH JUSTIFICATION)	4.0 GREEN STAR (SELF-ASSESSED)
RESIDENTIAL COMPONENT			
Resident bicycle bays	51	51	101*
Visitor bicycle bays	16	16	8*
COMMERCIAL COMPONENT			
Visitor bicycle bays	n/a	n/a	3*
Staff long-term bicycle bays	46	30*	12
Staff short-term bicycle bays	69	35*	
Staff showers	13	6*	4
Staff lockers	46	60*	14

*Incorporated in current design

Lot 37 Montario Quarter

APPENDIX

C

SIDRA ASSESSMENT

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1



Cardno[®]
Shaping the Future

MOVEMENT SUMMARY



Site: 101 [Selby St-Lemnos St AM (staged)]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	96	5.0	0.079	6.7	LOS A	0.3	2.3	0.37	0.59	52.8
2	T1	108	5.0	0.057	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		204	5.0	0.079	3.2	LOS A	0.3	2.3	0.17	0.28	56.4
NorthEast: Dummy leg											
24a	L1	35	5.0	0.031	9.1	LOS A	0.1	0.7	0.28	1.05	51.5
Approach		35	5.0	0.031	9.1	LOS A	0.1	0.7	0.28	1.05	51.5
North: Selby St (N)											
8	T1	509	5.0	0.133	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	287	5.0	0.180	6.0	LOS A	0.9	6.7	0.24	0.55	52.7
Approach		796	5.0	0.180	2.2	NA	0.9	6.7	0.09	0.20	57.1
West: Lemnos St (W)											
10	L2	530	4.0	0.294	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
12	R2	35	4.0	0.066	12.2	LOS B	0.2	1.7	0.51	0.94	49.4
Approach		565	4.0	0.294	6.1	LOS A	0.2	1.7	0.03	0.55	54.4
All Vehicles		1600	4.6	0.294	3.8	NA	0.9	6.7	0.08	0.35	55.9

MOVEMENT SUMMARY



Site: 101 [Selby St-Lemnos St PM (staged)]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	54	5.0	0.039	6.2	LOS A	0.2	1.1	0.26	0.53	53.2
2	T1	359	5.0	0.188	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		413	5.0	0.188	0.8	LOS A	0.2	1.1	0.03	0.07	59.0
NorthEast: Dummy leg											
24a	L1	35	4.0	0.027	8.6	LOS A	0.1	0.6	0.18	1.08	51.6
Approach		35	4.0	0.027	8.6	LOS A	0.1	0.6	0.18	1.08	51.6
North: Selby St (N)											
8	T1	229	5.0	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	161	5.0	0.132	7.1	LOS A	0.6	4.3	0.45	0.65	52.0
Approach		390	5.0	0.132	2.9	NA	0.6	4.3	0.19	0.27	56.4
West: Lemnos St (W)											
10	L2	210	4.0	0.116	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
12	R2	35	4.0	0.079	13.8	LOS B	0.3	2.0	0.57	0.98	48.4
Approach		245	4.0	0.116	6.8	LOS A	0.3	2.0	0.08	0.59	53.8
All Vehicles		1083	4.7	0.188	3.2	NA	0.6	4.3	0.10	0.29	56.5

MOVEMENT SUMMARY

 Site: 101 [Selby St-Lemnos St AM (staged) 2021]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	100	5.0	0.085	6.9	LOS A	0.3	2.5	0.39	0.60	52.7
2	T1	123	5.0	0.064	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		223	5.0	0.085	3.1	LOS A	0.3	2.5	0.18	0.27	56.5
NorthEast: Dummy leg											
24a	L1	37	5.0	0.033	9.2	LOS A	0.1	0.8	0.30	1.05	51.4
Approach		37	5.0	0.033	9.2	LOS A	0.1	0.8	0.30	1.05	51.4
North: Selby St (N)											
8	T1	570	5.0	0.149	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	321	5.0	0.205	6.1	LOS A	1.1	7.7	0.27	0.55	52.6
Approach		891	5.0	0.205	2.2	NA	1.1	7.7	0.10	0.20	57.1
West: Lemnos St (W)											
10	L2	600	4.0	0.332	5.7	LOS A	0.0	0.0	0.00	0.53	54.7
12	R2	37	4.0	0.076	13.0	LOS B	0.3	1.9	0.54	0.96	48.9
Approach		637	4.0	0.332	6.1	LOS A	0.3	1.9	0.03	0.55	54.4
All Vehicles		1788	4.6	0.332	3.9	NA	1.1	7.7	0.09	0.35	55.9

MOVEMENT SUMMARY

 Site: 101 [Selby St-Lemnos St PM (staged) 2021]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	56	5.0	0.042	6.3	LOS A	0.2	1.2	0.28	0.54	53.1
2	T1	429	5.0	0.225	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		485	5.0	0.225	0.7	LOS A	0.2	1.2	0.03	0.06	59.1
NorthEast: Dummy leg											
24a	L1	37	4.0	0.029	8.7	LOS A	0.1	0.7	0.20	1.07	51.6
Approach		37	4.0	0.029	8.7	LOS A	0.1	0.7	0.20	1.07	51.6
North: Selby St (N)											
8	T1	275	5.0	0.072	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	189	5.0	0.168	7.5	LOS A	0.8	5.5	0.51	0.69	51.9
Approach		464	5.0	0.168	3.1	NA	0.8	5.5	0.21	0.28	56.4
West: Lemnos St (W)											
10	L2	250	4.0	0.138	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
12	R2	37	4.0	0.099	15.7	LOS C	0.3	2.4	0.64	1.00	47.3
Approach		287	4.0	0.138	7.0	LOS A	0.3	2.4	0.08	0.59	53.7
All Vehicles		1273	4.7	0.225	3.2	NA	0.8	5.5	0.11	0.29	56.6

MOVEMENT SUMMARY

 Site: 101 [Selby St-Lemnos St AM (staged) 2031]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	115	5.0	0.103	7.1	LOS A	0.4	3.0	0.42	0.63	52.6
2	T1	139	5.0	0.073	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		254	5.0	0.103	3.2	LOS A	0.4	3.0	0.19	0.29	56.4
NorthEast: Dummy leg											
24a	L1	42	5.0	0.039	9.4	LOS A	0.1	0.9	0.33	1.05	51.4
Approach		42	5.0	0.039	9.4	LOS A	0.1	0.9	0.33	1.05	51.4
North: Selby St (N)											
8	T1	646	5.0	0.169	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	364	5.0	0.236	6.2	LOS A	1.3	9.1	0.30	0.56	52.5
Approach		1010	5.0	0.236	2.2	NA	1.3	9.1	0.11	0.20	57.0
West: Lemnos St (W)											
10	L2	679	4.0	0.376	5.7	LOS A	0.0	0.0	0.00	0.53	54.7
12	R2	42	4.0	0.096	14.1	LOS B	0.3	2.4	0.58	1.00	48.2
Approach		721	4.0	0.376	6.2	LOS A	0.3	2.4	0.03	0.55	54.3
All Vehicles		2027	4.6	0.376	3.9	NA	1.3	9.1	0.10	0.35	55.8

MOVEMENT SUMMARY

 Site: 101 [Selby St-Lemnos St PM (staged) 2031]

New Site
Stop (Two-Way)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
		Total veh/h	HV %				Vehicles veh	Distance m			
South: Selby St (S)											
1	L2	65	5.0	0.050	6.4	LOS A	0.2	1.4	0.30	0.55	53.0
2	T1	483	5.0	0.253	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		548	5.0	0.253	0.8	LOS A	0.2	1.4	0.04	0.07	59.0
NorthEast: Dummy leg											
24a	L1	42	4.0	0.034	8.7	LOS A	0.1	0.8	0.21	1.07	51.6
Approach		42	4.0	0.034	8.7	LOS A	0.1	0.8	0.21	1.07	51.6
North: Selby St (N)											
8	T1	309	5.0	0.081	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	213	5.0	0.203	7.9	LOS A	0.9	6.7	0.55	0.73	51.7
Approach		522	5.0	0.203	3.2	NA	0.9	6.7	0.22	0.30	56.3
West: Lemnos St (W)											
10	L2	281	4.0	0.156	5.7	LOS A	0.0	0.0	0.00	0.53	54.8
12	R2	42	4.0	0.131	17.7	LOS C	0.4	3.2	0.70	1.00	46.2
Approach		323	4.0	0.156	7.2	LOS A	0.4	3.2	0.09	0.59	53.5
All Vehicles		1435	4.7	0.253	3.4	NA	0.9	6.7	0.12	0.30	56.5

MOVEMENT SUMMARY

Site: 101 [Selby St-Victoria Ave AM (staged) 2021]

Selby St-Victoria Ave
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby St (S)												
1	L2	5	5.0	0.189	5.6	LOS A	0.0	0.0	0.00	0.01	58.0	
2	T1	717	5.0	0.189	0.0	LOS A	0.0	0.0	0.00	0.00	59.9	
Approach		722	5.0	0.189	0.1	NA	0.0	0.0	0.00	0.00	59.9	
North: Selby St (N)												
8	T1	852	5.0	0.223	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
9	R2	6	5.0	0.010	9.7	LOS A	0.0	0.3	0.57	0.69	50.2	
Approach		858	5.0	0.223	0.1	NA	0.0	0.3	0.00	0.00	59.9	
NorthWest: dummy leg												
29a	R1	39	0.0	0.063	8.0	LOS A	0.2	1.3	0.55	0.78	52.2	
Approach		39	0.0	0.063	8.0	LOS A	0.2	1.3	0.55	0.78	52.2	
West: Victoria Ave (W)												
10	L2	32	0.0	0.147	9.9	LOS A	0.5	3.6	0.63	0.84	49.4	
12	R2	39	0.0	0.147	12.6	LOS B	0.5	3.6	0.63	0.84	49.2	
Approach		71	0.0	0.147	11.4	LOS B	0.5	3.6	0.63	0.84	49.3	
All Vehicles		1690	4.7	0.223	0.7	NA	0.5	3.6	0.04	0.06	59.2	

MOVEMENT SUMMARY

Site: 101 [Selby St-Victoria Ave PM (staged) 2021]

Selby St-Victoria Ave
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby St (S)												
1	L2	18	5.0	0.177	5.6	LOS A	0.0	0.0	0.00	0.03	57.8	
2	T1	660	5.0	0.177	0.0	LOS A	0.0	0.0	0.00	0.02	59.8	
Approach		678	5.0	0.177	0.2	NA	0.0	0.0	0.00	0.02	59.8	
North: Selby St (N)												
8	T1	426	5.0	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
9	R2	14	5.0	0.022	9.4	LOS A	0.1	0.6	0.56	0.71	50.4	
Approach		440	5.0	0.111	0.3	NA	0.1	0.6	0.02	0.02	59.6	
NorthWest: dummt leg												
29a	R1	38	0.0	0.040	5.7	LOS A	0.1	0.8	0.35	0.59	53.8	
Approach		38	0.0	0.040	5.7	LOS A	0.1	0.8	0.35	0.59	53.8	
West: Victoria Ave (W)												
10	L2	51	0.0	0.164	9.5	LOS A	0.6	4.1	0.60	0.83	49.9	
12	R2	38	0.0	0.164	12.1	LOS B	0.6	4.1	0.60	0.83	49.8	
Approach		89	0.0	0.164	10.6	LOS B	0.6	4.1	0.60	0.83	49.9	
All Vehicles		1245	4.5	0.177	1.1	NA	0.6	4.1	0.06	0.09	58.7	

MOVEMENT SUMMARY

Site: 101 [Selby St-Victoria Ave AM (staged) 2031]

Selby St-Victoria Ave
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby St (S)												
1	L2	5	5.0	0.214	5.6	LOS A	0.0	0.0	0.00	0.01	58.0	
2	T1	813	5.0	0.214	0.0	LOS A	0.0	0.0	0.00	0.00	59.9	
Approach		818	5.0	0.214	0.1	NA	0.0	0.0	0.00	0.00	59.9	
North: Selby St (N)												
8	T1	971	5.0	0.254	0.0	LOS A	0.0	0.0	0.00	0.00	59.9	
9	R2	6	5.0	0.011	10.7	LOS B	0.0	0.3	0.62	0.73	49.5	
Approach		977	5.0	0.254	0.1	NA	0.0	0.3	0.00	0.00	59.9	
NorthWest: dummy leg												
29a	R1	39	0.0	0.072	9.0	LOS A	0.2	1.5	0.61	0.81	51.5	
Approach		39	0.0	0.072	9.0	LOS A	0.2	1.5	0.61	0.81	51.5	
West: Victoria Ave (W)												
10	L2	32	0.0	0.170	11.0	LOS B	0.6	4.1	0.69	0.87	48.4	
12	R2	39	0.0	0.170	14.4	LOS B	0.6	4.1	0.69	0.87	48.3	
Approach		71	0.0	0.170	12.9	LOS B	0.6	4.1	0.69	0.87	48.3	
All Vehicles		1905	4.7	0.254	0.7	NA	0.6	4.1	0.04	0.05	59.2	

MOVEMENT SUMMARY

Site: 101 [Selby St-Victoria Ave PM (staged) 2031]

Selby St-Victoria Ave
Giveaway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby St (S)												
1	L2	18	5.0	0.200	5.6	LOS A	0.0	0.0	0.00	0.03	57.8	
2	T1	746	5.0	0.200	0.0	LOS A	0.0	0.0	0.00	0.01	59.8	
Approach		764	5.0	0.200	0.2	NA	0.0	0.0	0.00	0.01	59.8	
North: Selby St (N)												
8	T1	484	5.0	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	60.0	
9	R2	14	5.0	0.024	10.2	LOS B	0.1	0.6	0.60	0.75	49.8	
Approach		498	5.0	0.126	0.3	NA	0.1	0.6	0.02	0.02	59.6	
NorthWest: dummt leg												
29a	R1	38	0.0	0.042	6.0	LOS A	0.1	0.8	0.38	0.61	53.7	
Approach		38	0.0	0.042	6.0	LOS A	0.1	0.8	0.38	0.61	53.7	
West: Victoria Ave (W)												
10	L2	51	0.0	0.186	10.4	LOS B	0.7	4.6	0.65	0.85	49.2	
12	R2	38	0.0	0.186	13.6	LOS B	0.7	4.6	0.65	0.85	49.0	
Approach		89	0.0	0.186	11.7	LOS B	0.7	4.6	0.65	0.85	49.1	
All Vehicles		1389	4.5	0.200	1.1	NA	0.7	4.6	0.06	0.09	58.7	

MOVEMENT SUMMARY

 **Site: 101 [Selby Nash 2018 AM]**

New Site

Signals - Actuated Isolated Cycle Time = 87 seconds (User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby Street (S)												
2	T1	429	5.0	0.169	6.0	LOS A	3.4	24.7	0.39	0.33	54.7	
3	R2	215	5.0	0.589	41.5	LOS D	8.5	62.0	0.93	0.81	35.4	
Approach		644	5.0	0.589	17.8	LOS B	8.5	62.0	0.57	0.49	46.3	
East: Nash Street (E)												
4	L2	118	5.0	0.123	11.1	LOS B	1.7	12.5	0.42	0.66	50.0	
6	R2	217	5.0	0.292	38.8	LOS D	4.0	29.0	0.86	0.76	36.0	
Approach		335	5.0	0.292	29.1	LOS C	4.0	29.0	0.71	0.73	40.0	
North: Selby Street (N)												
7	L2	463	5.0	0.763	30.0	LOS C	20.0	145.8	0.88	0.84	39.8	
8	T1	671	5.0	0.763	25.7	LOS C	21.2	154.9	0.91	0.81	41.9	
Approach		1134	5.0	0.763	27.5	LOS C	21.2	154.9	0.89	0.82	41.0	
All Vehicles		2113	5.0	0.763	24.8	LOS C	21.2	154.9	0.77	0.71	42.3	

MOVEMENT SUMMARY

 **Site: 101 [Selby Nash 2018 PM]**

New Site

Signals - Actuated Isolated Cycle Time = 71 seconds (User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Flows		Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
		Total veh/h	HV %				Vehicles veh	Distance m				
South: Selby Street (S)												
2	T1	481	5.0	0.242	10.4	LOS B	4.6	33.5	0.57	0.48	51.3	
3	R2	102	5.0	0.410	38.3	LOS D	3.4	24.8	0.93	0.77	36.6	
Approach		583	5.0	0.410	15.3	LOS B	4.6	33.5	0.63	0.53	47.9	
East: Nash Street (E)												
4	L2	95	5.0	0.082	8.1	LOS A	0.8	5.9	0.34	0.63	52.1	
6	R2	727	5.0	0.692	30.0	LOS C	12.0	87.7	0.90	0.83	39.5	
Approach		822	5.0	0.692	27.5	LOS C	12.0	87.7	0.84	0.81	40.6	
North: Selby Street (N)												
7	L2	333	5.0	0.618	10.2	LOS B	4.3	31.7	0.39	0.68	50.0	
8	T1	346	5.0	0.610	24.6	LOS C	10.5	76.9	0.89	0.76	42.8	
Approach		679	5.0	0.618	17.5	LOS B	10.5	76.9	0.65	0.72	46.1	
All Vehicles		2084	5.0	0.692	20.8	LOS C	12.0	87.7	0.72	0.70	44.2	

MOVEMENT SUMMARY



Site: 101v [Selby Nash Roundabout 2021 AM]

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total Flows veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Selby Street (S)												
1	L2	51	5.0	0.359	6.6	LOS A	2.6	19.2	0.64	0.64	51.9	
2	T1	475	5.0	0.359	6.7	LOS A	2.6	19.2	0.64	0.66	52.9	
3	R2	223	5.0	0.359	11.1	LOS B	2.5	18.4	0.65	0.72	51.5	
Approach		749	5.0	0.359	8.0	LOS A	2.6	19.2	0.64	0.68	52.4	
East: Nash Street (E)												
4	L2	145	5.0	0.178	6.7	LOS A	0.9	6.5	0.64	0.75	53.1	
5	T1	27	5.0	0.338	7.9	LOS A	1.9	13.6	0.73	0.89	50.8	
6	R2	231	5.0	0.338	11.9	LOS B	1.9	13.6	0.73	0.89	50.6	
Approach		403	5.0	0.338	9.8	LOS A	1.9	13.6	0.70	0.84	51.4	
North: Selby Street (N)												
7	L2	475	5.0	0.544	6.3	LOS A	4.8	35.0	0.66	0.64	52.2	
8	T1	694	5.0	0.544	6.6	LOS A	4.8	35.0	0.68	0.66	53.0	
9	R2	91	5.0	0.544	10.8	LOS B	4.6	33.7	0.68	0.66	52.4	
Approach		1260	5.0	0.544	6.8	LOS A	4.8	35.0	0.67	0.65	52.6	
West: Nash St (W)												
10	L2	16	0.0	0.028	8.1	LOS A	0.1	0.8	0.63	0.73	52.0	
11	T1	17	0.0	0.046	7.0	LOS A	0.2	1.4	0.62	0.74	52.2	
12	R2	20	0.0	0.046	11.0	LOS B	0.2	1.4	0.62	0.74	52.0	
Approach		53	0.0	0.046	8.8	LOS A	0.2	1.4	0.62	0.74	52.1	
All Vehicles		2465	4.9	0.544	7.7	LOS A	4.8	35.0	0.67	0.69	52.4	

MOVEMENT SUMMARY



Site: 101v [Selby Nash Roundabout 2021 PM]

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Selby Street (S)												
1	L2	66	5.0	0.642	17.7	LOS B	7.6	55.3	1.00	1.13	45.6	
2	T1	520	5.0	0.642	18.8	LOS B	7.6	55.3	1.00	1.14	45.8	
3	R2	126	5.0	0.642	24.7	LOS C	6.7	49.1	1.00	1.16	44.0	
Approach		712	5.0	0.642	19.7	LOS B	7.6	55.3	1.00	1.15	45.4	
East: Nash Street (E)												
4	L2	96	5.0	0.091	5.4	LOS A	0.4	3.0	0.44	0.58	53.8	
5	T1	65	5.0	0.756	10.4	LOS B	8.7	63.2	0.84	0.98	49.1	
6	R2	699	5.0	0.756	14.4	LOS B	8.7	63.2	0.84	0.98	48.9	
Approach		860	5.0	0.756	13.1	LOS B	8.7	63.2	0.79	0.94	49.4	
North: Selby Street (N)												
7	L2	307	5.0	0.288	5.3	LOS A	2.1	15.5	0.44	0.54	53.0	
8	T1	325	5.0	0.288	5.5	LOS A	2.1	15.5	0.46	0.55	53.7	
9	R2	92	5.0	0.288	9.5	LOS A	2.1	15.0	0.46	0.56	53.1	
Approach		724	5.0	0.288	5.9	LOS A	2.1	15.5	0.45	0.55	53.3	
West: Nash St (W)												
10	L2	51	0.0	0.088	9.6	LOS A	0.5	3.3	0.78	0.84	50.9	
11	T1	18	0.0	0.079	10.7	LOS B	0.4	2.7	0.77	0.88	50.0	
12	R2	18	0.0	0.079	14.8	LOS B	0.4	2.7	0.77	0.88	49.9	
Approach		87	0.0	0.088	10.9	LOS B	0.5	3.3	0.78	0.85	50.5	
All Vehicles		2383	4.8	0.756	12.8	LOS B	8.7	63.2	0.75	0.88	49.2	

MOVEMENT SUMMARY

 Site: 101v [Selby Nash Roundabout 2031 AM]

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Selby Street (S)												
1	L2	51	5.0	0.421	6.9	LOS A	3.3	23.9	0.70	0.68	51.6	
2	T1	541	5.0	0.421	7.1	LOS A	3.3	23.9	0.70	0.70	52.6	
3	R2	253	5.0	0.421	11.5	LOS B	3.1	22.7	0.71	0.76	51.2	
Approach		845	5.0	0.421	8.4	LOS A	3.3	23.9	0.71	0.72	52.1	
East: Nash Street (E)												
4	L2	165	5.0	0.221	7.2	LOS A	1.2	8.5	0.70	0.81	52.8	
5	T1	27	5.0	0.420	9.0	LOS A	2.6	19.1	0.80	0.96	50.0	
6	R2	264	5.0	0.420	13.0	LOS B	2.6	19.1	0.80	0.96	49.8	
Approach		456	5.0	0.420	10.7	LOS B	2.6	19.1	0.76	0.90	50.8	
North: Selby Street (N)												
7	L2	543	5.0	0.636	7.2	LOS A	6.7	48.6	0.76	0.71	51.9	
8	T1	793	5.0	0.636	7.9	LOS A	6.7	48.8	0.78	0.74	52.5	
9	R2	91	5.0	0.636	12.1	LOS B	6.7	48.8	0.79	0.75	51.9	
Approach		1427	5.0	0.636	7.9	LOS A	6.7	48.8	0.77	0.73	52.2	
West: Nash St (W)												
10	L2	16	0.0	0.031	8.6	LOS A	0.1	0.9	0.67	0.76	51.6	
11	T1	17	0.0	0.051	7.3	LOS A	0.2	1.6	0.66	0.77	52.0	
12	R2	20	0.0	0.051	11.4	LOS B	0.2	1.6	0.66	0.77	51.8	
Approach		53	0.0	0.051	9.2	LOS A	0.2	1.6	0.66	0.77	51.8	
All Vehicles		2781	4.9	0.636	8.5	LOS A	6.7	48.8	0.75	0.75	52.0	

MOVEMENT SUMMARY



Site: 101v [Selby Nash Roundabout 2031 PM]

New Site
Roundabout

Movement Performance - Vehicles												
Mov ID	OD Mov	Demand Total Flows veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h	
South: Selby Street (S)												
1	L2	66	5.0	0.908	59.2	LOS E	20.9	152.8	1.00	1.73	30.1	
2	T1	590	5.0	0.908	61.5	LOS E	20.9	152.8	1.00	1.71	29.8	
3	R2	140	5.0	0.908	69.7	LOS E	17.4	126.8	1.00	1.67	28.5	
Approach		796	5.0	0.908	62.7	LOS E	20.9	152.8	1.00	1.70	29.6	
East: Nash Street (E)												
4	L2	109	5.0	0.111	6.0	LOS A	0.5	3.7	0.47	0.63	53.1	
5	T1	65	5.0	0.916	20.3	LOS C	19.3	141.0	1.00	1.36	43.4	
6	R2	799	5.0	0.916	23.8	LOS C	19.3	141.0	1.00	1.36	43.1	
Approach		973	5.0	0.916	21.5	LOS C	19.3	141.0	0.94	1.27	44.0	
North: Selby Street (N)												
7	L2	351	5.0	0.328	5.9	LOS A	2.5	18.3	0.48	0.56	52.3	
8	T1	371	5.0	0.328	5.9	LOS A	2.5	18.3	0.49	0.58	53.1	
9	R2	92	5.0	0.328	9.4	LOS A	2.4	17.8	0.50	0.58	52.5	
Approach		814	5.0	0.328	6.3	LOS A	2.5	18.3	0.49	0.57	52.7	
West: Nash St (W)												
10	L2	51	0.0	0.109	11.8	LOS B	0.6	4.1	0.83	0.90	49.0	
11	T1	18	0.0	0.099	13.1	LOS B	0.5	3.4	0.82	0.93	48.3	
12	R2	18	0.0	0.099	16.6	LOS B	0.5	3.4	0.82	0.93	48.0	
Approach		87	0.0	0.109	13.1	LOS B	0.6	4.1	0.83	0.91	48.6	
All Vehicles		2670	4.8	0.916	28.9	LOS C	20.9	152.8	0.82	1.18	40.3	

Lot 37 Montario Quarter

APPENDIX

D

LANEWAY REVIEW

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1

Technical Memorandum

Title	Lot 37 Montario Quarter Laneway Review	Project No	CW1024800
Client	Iris – PW No.1 2017 Pty Ltd	Status	For Issue
Date	10/07/2018	Discipline	Traffic and Transport
Author	Edmond Hoang	Office	Perth
Reviewer	Jacob Martin		

1 Introduction

Iris – PW No.1 2017 Pty Ltd has commissioned Cardno to prepare a Technical Memorandum to investigate options for the laneway which runs along the western boundary of Lot 37 Montario Quarter.

The following options have been considered:

- > One-way southbound (currently proposed arrangement)
- > One-way northbound
- > Two-way movement

This Review provides a summary of the advantages and disadvantages associated with each of the arrangements, including safety, movement, pedestrian impact and accessibility.

Mitigation measures have been recommended to offset the identified disadvantages from a particular option.

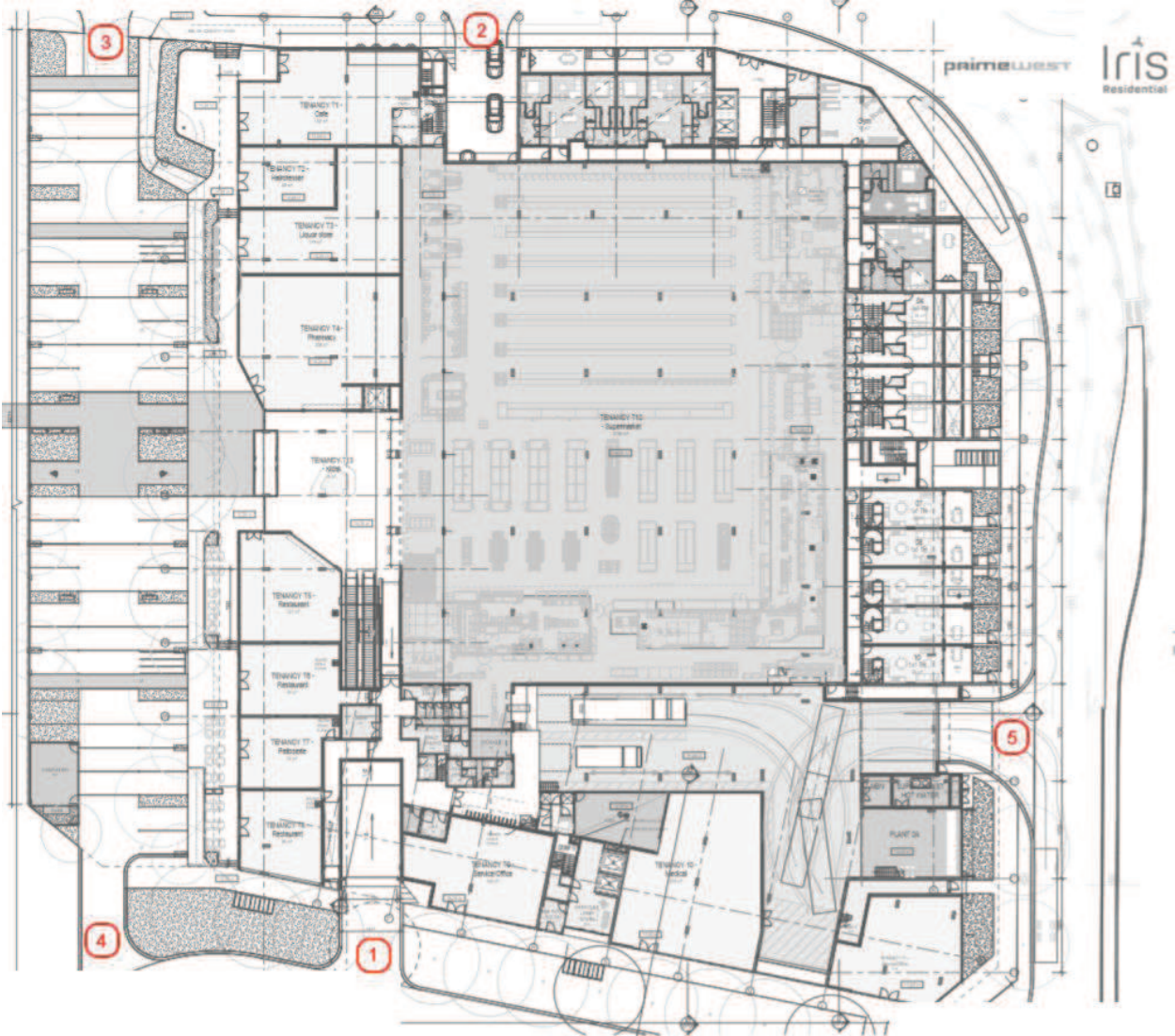
2 Background

The current Site accesses arrangement is shown in **Figure 1** and described below.

1. Residential Access onto Victoria Avenue – full movement
2. Commercial Access onto Nash Street – left in and left out only
3. Laneway Entry – left in and right in only
4. Laneway Exit – left out and right out only
5. Service Access onto Selby Street – left in and left out only

A central median island has been proposed extending west from the Selby Street roundabout to limit access to Access 2 to lift-in/left-out.

Figure 1 Site Access Locations



3 Laneway Review

3.1 One-way Southbound

The one-way southbound arrangement is currently proposed arrangement for the development. An approach/departure route diagram for this option is shown in **Figure 2** below.

Figure 2 One-way Southbound Laneway Option – Inbound and Outbound Routes



Pro	Con
Excellent commercial visitor wayfinding to Centre parking. Can be supplemented through wayfinding signage (if required) to direct all inbound traffic to Nash Street.	Potential flow path from basement parking to Selby St southbound via laneway. This could increase traffic use of the laneway, with an impact on pedestrian Level of Service. Mitigation: slow speed treatments and parking movements in the laneway reduce the attractiveness of this route. Likely result is that traffic relocates to alternative routes west of the Site.
Simplified path from basement parking to laneway parking; circulation from laneway parking to basement enabled via left-turn movements	
Minimises potential for conflict and congestion at the laneway access.	
Reduced traffic volumes: Victoria Street inbound	Higher traffic volumes: Victoria Street outbound

Traffic assessment confirms that both Victoria Avenue/Selby Street and Selby Street/Nash Street intersections will operate satisfactorily with development traffic.

In regards to accessibility, it is expected that the majority of the development traffic will be arriving from the north along Selby Street and from the east along Nash Street. The southbound arrangement provides easy access via the Selby Street/Nash Street roundabout.

Overall, this arrangement provides good accessibility to the Site with no critical impact to the surrounding roads and intersections.

3.2 One-way Northbound

The inbound and outbound routes for the one-way northbound laneway option is shown in **Figure 3** below.

Figure 3 One-way Northbound Laneway Option – Inbound and Outbound Routes



Pro	Con
Commercial visitor access to Centre parking split between Nash Street and Victoria Street.	Laneway access to convenience parking and F&B is not supported through passive wayfinding measures (roundabout gateway etc). This may have an impact on commercial performance. Mitigation: Higher intervention wayfinding to reassign inbound traffic to Victoria Street.
Reduced traffic along laneway and corresponding improvement in pedestrian Level of Service.	Compromised path between laneway and basement. Transition requires a significant deviation into Montario Quarter (basement to laneway); or a series of right-turn movements (laneway to basement). Mitigation: Higher intervention wayfinding to increase use of basement parking.
	Additional conflict between outbound movements from the laneway and through traffic westbound on Nash. Potential for additional delays on egress.
Reduced traffic volumes: Victoria Street outbound	Higher traffic volumes: Victoria Street inbound

Traffic assessment confirms that both Victoria Avenue/Selby Street and Selby Street/Nash Street intersections will operate satisfactorily with development traffic.

In regards to accessibility, it is expected that the majority of the development traffic will be arriving from the north along Selby Street and from the east along Nash Street. The northbound arrangement reduces the efficiency of the inbound route to the laneway visitor parking.

This arrangement is not considered to result in any additional impact to the surrounding roads and intersections. However, accessibility is reduced (when compared with the southbound laneway alignment) due to the poor relationship between the 'gateway' roundabout and the laneway.

There is expected to be a minor improvement to pedestrian Level of Service, but since the treatment proposed for this laneway will create a slow-speed environment that is generally unattractive for traffic through movements, this is not expected to be significant.

3.3 Two-way Movement

Introducing two-way movements along the laneway will provide a high level of accessibility to and from the laneway as shown in the route diagram below (Figure 4).

Figure 4 Two-way Laneway Option – Inbound and Outbound Routes



Pro	Con
Maximum flexibility for traffic to access the site from all directions.	Increased traffic along laneway and corresponding reduction in pedestrian Level of Service.
	Two-way traffic movements within the laneway compromise pedestrian safety by requiring pedestrians to account for vehicles in both directions.
	Maximises the potential for conflicts between movements at the Nash Street/Laneway intersection. Potential for additional delays on egress.

Pro	Con
Reduced traffic volumes: Victoria Street outbound	Higher traffic volumes: Victoria Street inbound

Traffic distribution at the Victoria Avenue/Selby Street and Selby Street/Nash Street intersections will be more evenly distributed with the additional route options. This results in slight improvements to operation for both intersections. Improved accessibility to the laneway may result in a higher volume of traffic using the laneway.

Two-way movement along the laneway does not provide the same level of pedestrian safety compared to the one-way options. For the one-way options, vehicular traffic is predictable and pedestrians only need to consider traffic come from one direction, the introduction of two-way traffic increases the potential for conflict. This is somewhat mitigated by the slower speeds anticipated for traffic, but this factor is not anticipated to overcome the intrinsic negative impact resulting from higher volumes of two-way traffic.

Overall, the two way arrangement provides excellent accessibility options for the Centre, with impacts on the operation and safety of the laneway.

4 Conclusion

In regards to the three assess laneway options, each arrangement offers different advantages and disadvantages. The two way option provides excellent accessibility to the Site but at the cost of pedestrian amenity and potentially higher volumes along the laneway. For this reason, the two-way option is considered to be the least beneficial for the Precinct.

Functionally, both northbound and southbound one-way options operate in a similar manner, with some minor differences. The treatment proposed for the laneway will tend to reduce the attractiveness of the laneway for egress through-movements under the southbound scenario. In contrast, the reduced accessibility under the northbound scenario can only be addressed through wayfinding signage, potentially with limited success.

Therefore, Cardno's recommendation is that the proposed laneway, consisting of a one-way southbound alignment, be retained.

Lot 37 Montario Quarter

APPENDIX

E

SELBY ST SERVICE ACCESS REVIEW

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1



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Shaping the Future

Technical Memorandum

Title	Lot 37 Montario Quarter Selby Street Service Access Review		
Client	Cameron Chisholm Nicol	Project No	CW1024800
Date	09/04/2018	Status	Revision B
Author	Edmond Hoang	Discipline	Traffic and Transport
Reviewer	Jacob Martin	Office	Perth

1 Introduction

Cameron Chisholm Nicol has commissioned Cardno to prepare this Technical Memorandum to review the two proposed service access options, including any traffic and safety concerns associated with these access locations.

2 Traffic and Safety Assessment

2.1 Existing Crossovers

Figure 1 shows the existing crossovers along Selby Street located near the Site. These include the accesses to Shenton College (1), Dalglish Fire Station (2) and Autism WA (3).

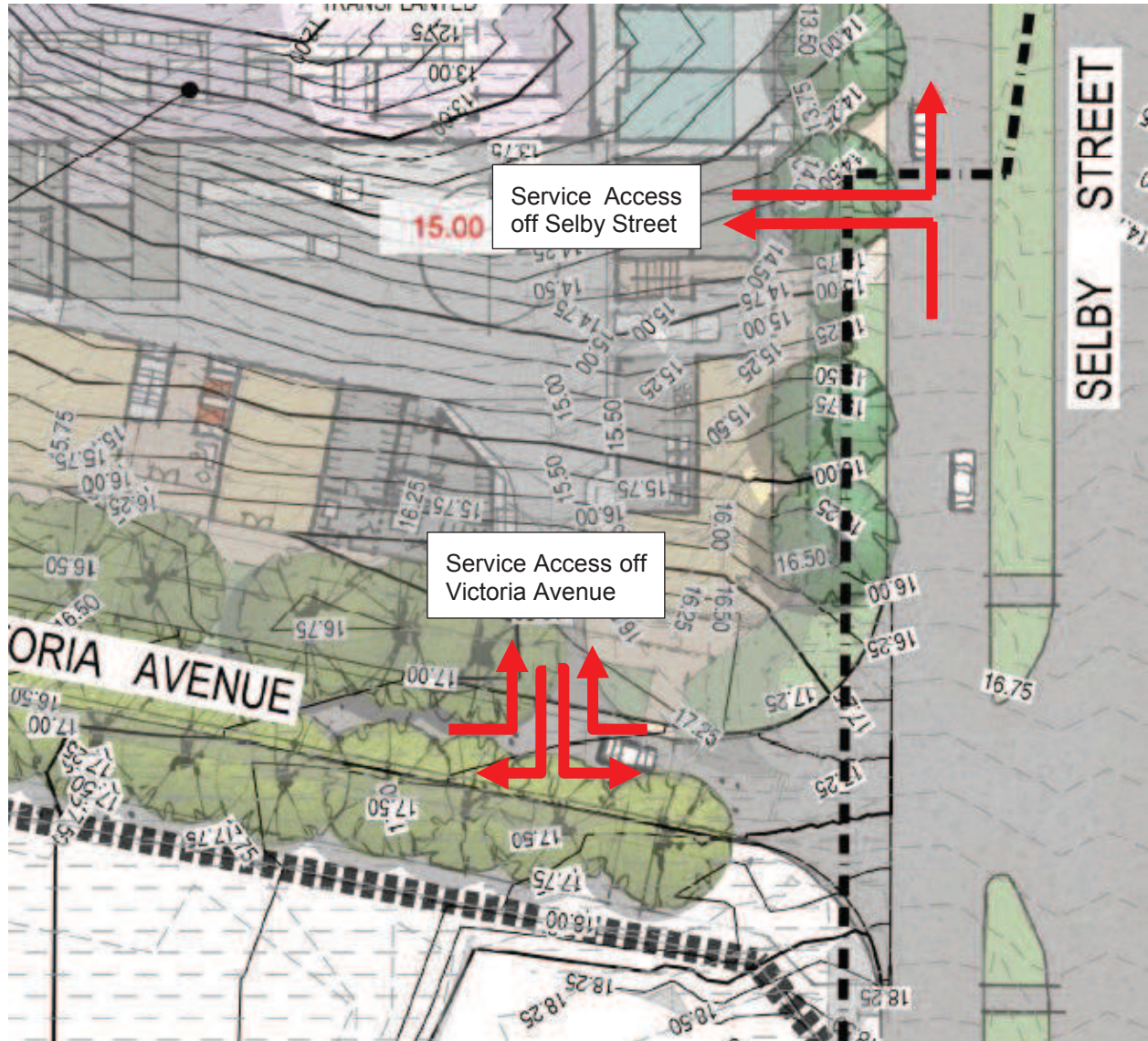
Figure 1 Existing Access Crossovers along Selby Street



2.2 Site Service Access Options

Figure 2 shows the two potential options for the location of the service vehicle access.

Figure 2 Service Access Locations



There are concerns that the location of the Victoria Avenue access is too close to the Selby Street/Victoria Avenue intersection which is a potential safety issue. The Selby Street access is located sufficiently away from other nearby intersections and/or crossovers including the Selby Street/Victoria Avenue intersection.

2.3 Road Levels

As illustrated in Figure 2, there is a large level difference between the loading dock (15.00) and Victoria Avenue (17.00); and over a very short distance. A service access on Victoria Avenue would therefore require substantial modifications to the road level to achieve the required access grade under AS2890.1. This would result in irreparable damage to the heritage flora, and is therefore considered to be infeasible.

The level difference of the proposed access location on Selby Street (14.50) and the loading dock (15.00) is minimal and a proposed access at this location can be achieved without modification to the road level. In addition, the flat access grade eliminates any potential height clearance issues at the access crossover location.

2.4 Road Function

Selby Street is defined to be a Distributor A road under the City of Nedlands *Functional Road Hierarchy*. The proposed service access aligns with the function of this category of road, as the *Main Roads Functional Hierarchy* Classification supports limited commercial access onto Distributor A roads.

Victoria Avenue is likely to be a local access road and is likely to have a higher volume of pedestrian movements due to the commercial tenancies and the apartment lobby being located along this road resulting in a higher potential for pedestrian conflicts.

2.5 Indicative Delivery Schedule

The indicative delivery schedule for service vehicle access to the site is as follows:

- > Delivery, supermarket: 12.5m HRV maximum, approx. 3 trucks / day
- > Delivery, others: 8.8-12.5m HRV (occasional only)
- > Rubbish, supermarket: 3-4 trucks per week
- > Rubbish, Residential: 1-2 trucks per week

Based on the schedule above, the usage of the loading dock will be relatively low, with a negligible impact on the traffic operation for both service access options.

2.6 Sight Distances

There are concerns that the location of the heritage trees may potentially cause visibility issues for exiting service vehicles and pedestrians for the Victoria Avenue access option. Due to the heritage significance of the trees along Victoria Avenue, they are unable to be removed.

As Selby Street is divided by a central median, exiting trucks would only need to be able to observe northbound traveling vehicles. The location of permanent obstructions such trees could potentially affect vehicle sightlines. However, the existing verge landscaping is likely to be removed and any new landscaping elements can be located further away from the service access or made to be highly visually permeable, ensuring no significant obstruction to sightlines. Provision will be made to ensure that pedestrian visibility is retained, consistent with Australian Standards: AS2890.

The design of the loading area supports forward-in/forward out movements, with all turning manoeuvres taking place within a controlled area.

2.7 Traffic Volumes and Speeds

Based on the SCATS data obtained from Main Roads WA, the volume of northbound vehicles during the peak hours along Selby Street is approximately 600-700 vehicles, well below the link capacity. In any respect, deliveries to the Site are likely to avoid peak network periods. The posted speed limit for Selby Street is 60km/h.

Traffic along Victoria Avenue is likely to be local traffic only which will be low volume. It is anticipated that posted speed limit of Victoria Avenue will similar to other access roads located within the area (50km/h).

2.8 Heavy Vehicle Access and Movement

The proposed access along Victoria Avenue is likely to be full movement including full movements at the Victoria Avenue/Selby Street intersection. The proximity of the Victoria Avenue service access and the Victoria Avenue/Selby Street intersection could result in manoeuvrability issues, especially for larger vehicles.

The proposed access along Selby Street will be left in, left out only. Vehicles will enter and exit from this access in a forward motion with turning movements contained within the loading dock areas. The proposed movement arrangement is intended to minimise traffic impacts on Selby Street.

3 Conclusion

Based on the analysis above, the proposed service access along Selby Street is unlikely to have any traffic and safety impacts and is considered a better option in regards to Site accessibility and amenity.

Lot 37 Montario Quarter

APPENDIX

F

ROAD SAFETY AUDIT

DEPARTMENT OF PLANNING, LANDS AND HERITAGE	
DATE	FILE
16-Nov-2018	08-50167-1

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