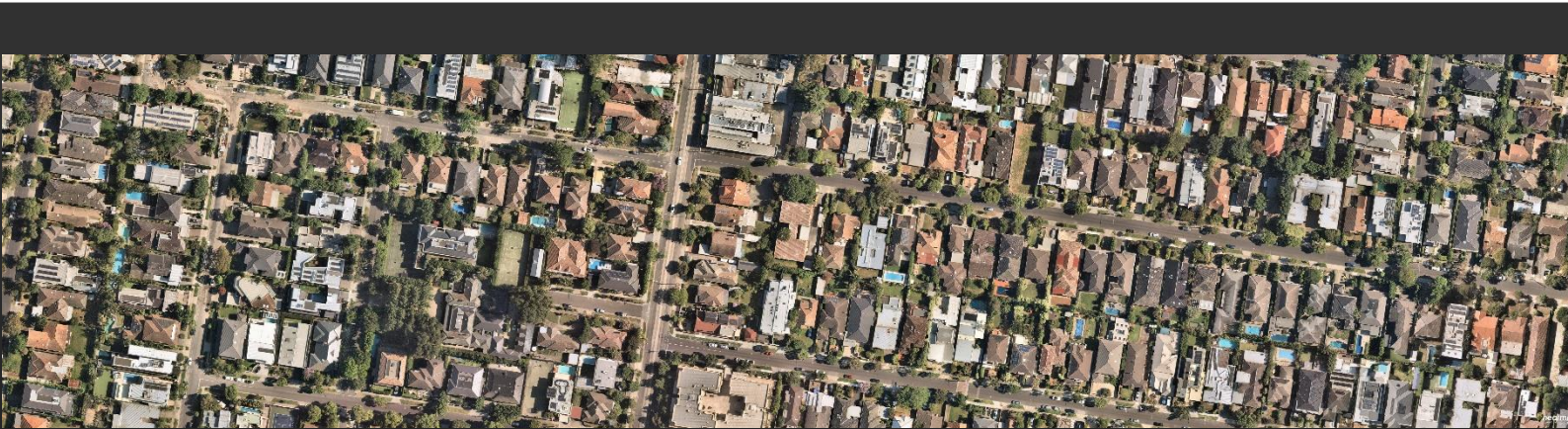


139-141 Hawthorn Rd, Caulfield North

Transport Impact Assessment



220906TIA001C-F.docx

21 July 2023

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APPENDICES

APPENDIX A SWEPT PATH DIAGRAMS

1 INTRODUCTION

onemilegrid has been requested by DO Architects to undertake a Transport Impact Assessment of the proposed residential development at 139-141 Hawthorn Rd, Caulfield North.

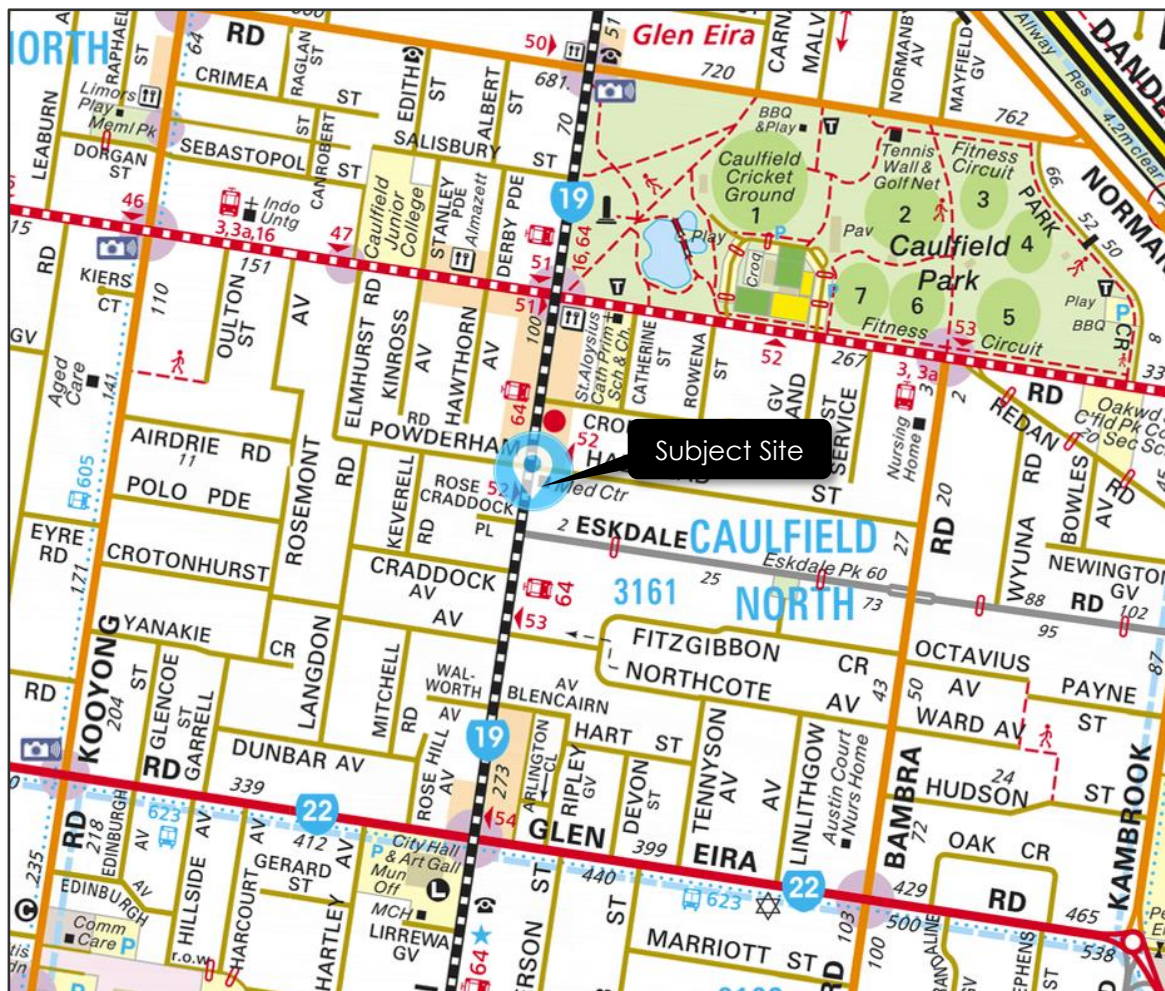
As part of this assessment the subject site has been inspected with due consideration of the development proposal, traffic and parking data has been sourced and relevant background reports have been reviewed.

2 EXISTING CONDITIONS

2.1 Site Location

The [subject site](#) is located on the eastern side of Hawthorn Road approximately 260 metres south of Balaclava Road and is addressed as 139-141 Hawthorn Rd, Caulfield North, as shown in Figure 1.

Figure 1 Site Location



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The site is rectangular in shape with a frontage of approximately 29 metres to Hawthorn Road and an abuttal of approximately 44m to Halstead Street.

The site is currently occupied by Caulfield Park Medical Clinic at 139 Hawthorn Road, and a hair salon at 141 Hawthorn Road.

The medical clinic features a car parking area on the eastern portion of the site, with vehicle access provided by a double width crossover to Halstead Street. Access to the hair salon is provided via a single width crossover to Hawthorn Road, located in the southwest corner of the site.

Land use in the immediate vicinity of the site is typically residential and commercial in nature, with a number of retail and business services directly north of the site.

An aerial view of the subject site is provided in Figure 2.

Figure 2 Site Context (3 December 2022)

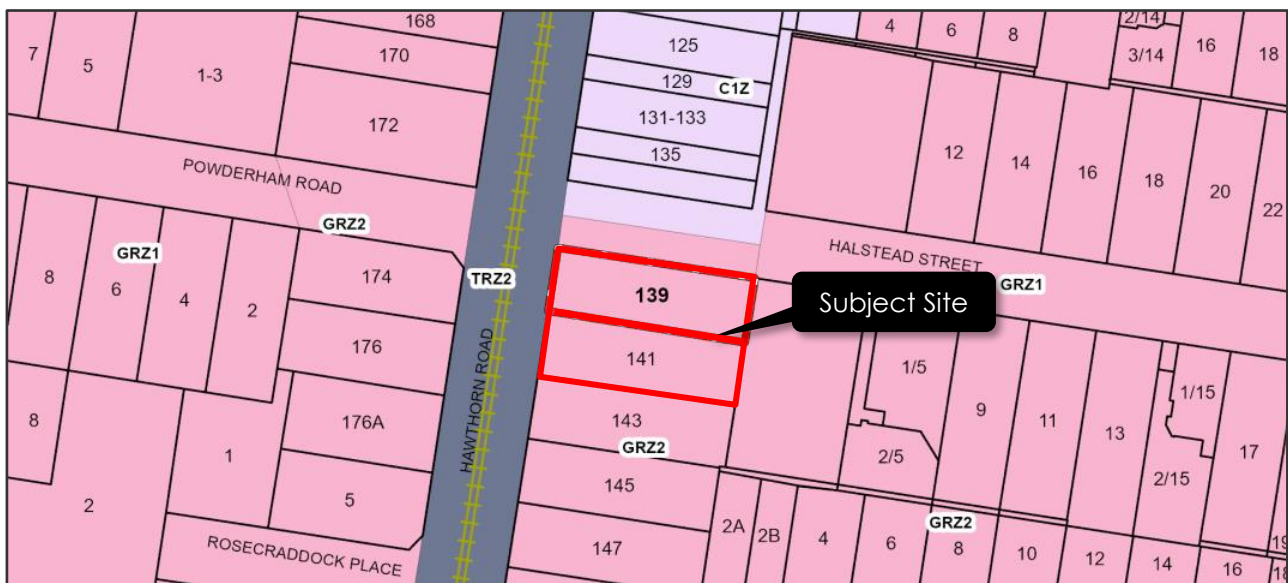


Copyright Nearmap

2.2 Planning Zones and Overlays

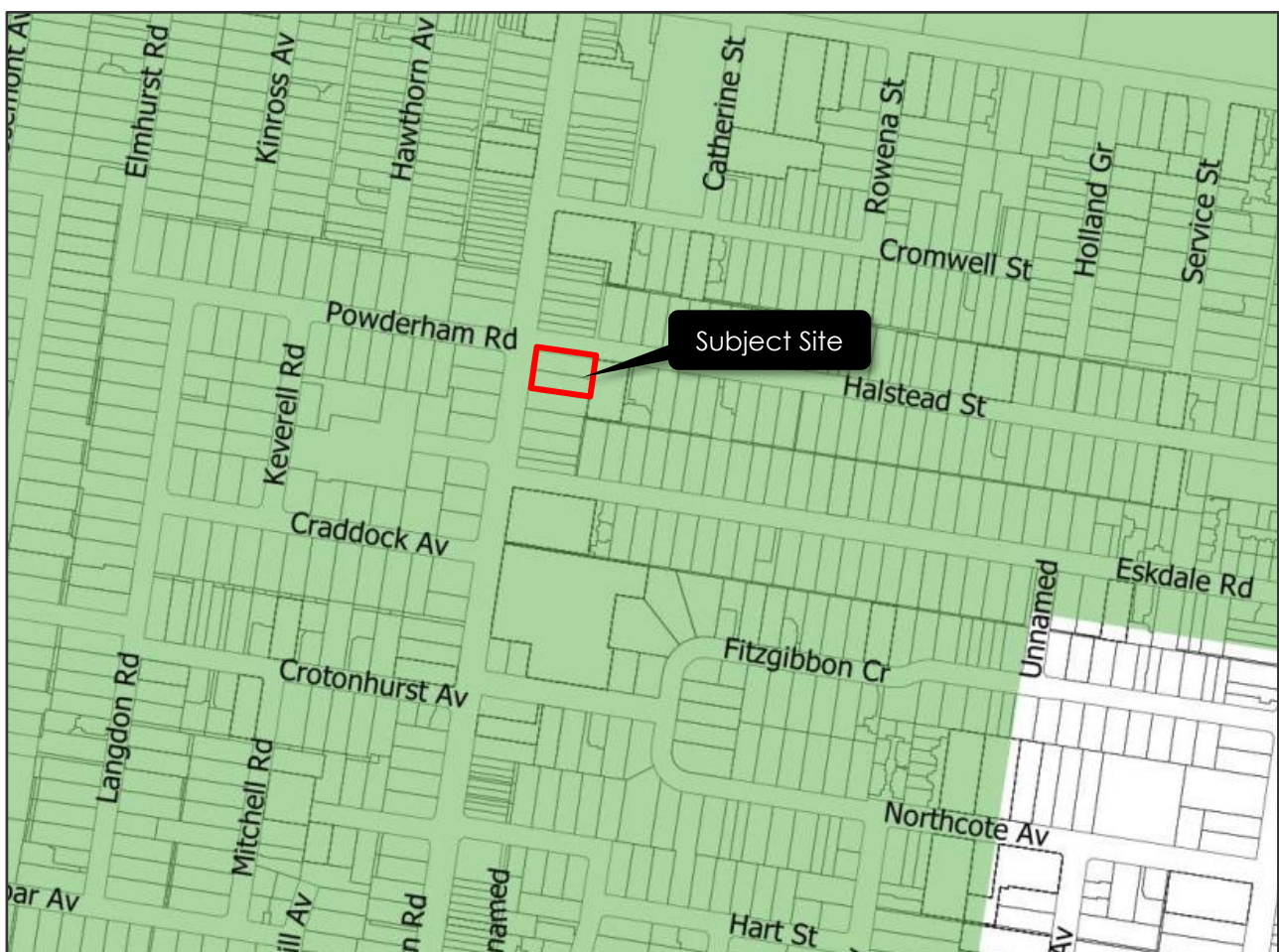
It is shown in Figure 3 that the site is located within a General Residential Zone (GRZ2). It is noted that the site abuts Hawthorn Road, which is within a Transport Zone 2 – Principal Road Network (TRZ2). Additionally, a Parking Overlay (PO2) applies to the subject site, which does not impose any restrictions in relation to the proposed development.

Figure 3 Planning Scheme Zones



The site falls within the Principal Public Transport Network Area, as shown in Figure 4.

Figure 4 Principal Public Transport Network Area Map



2.3 Road Network

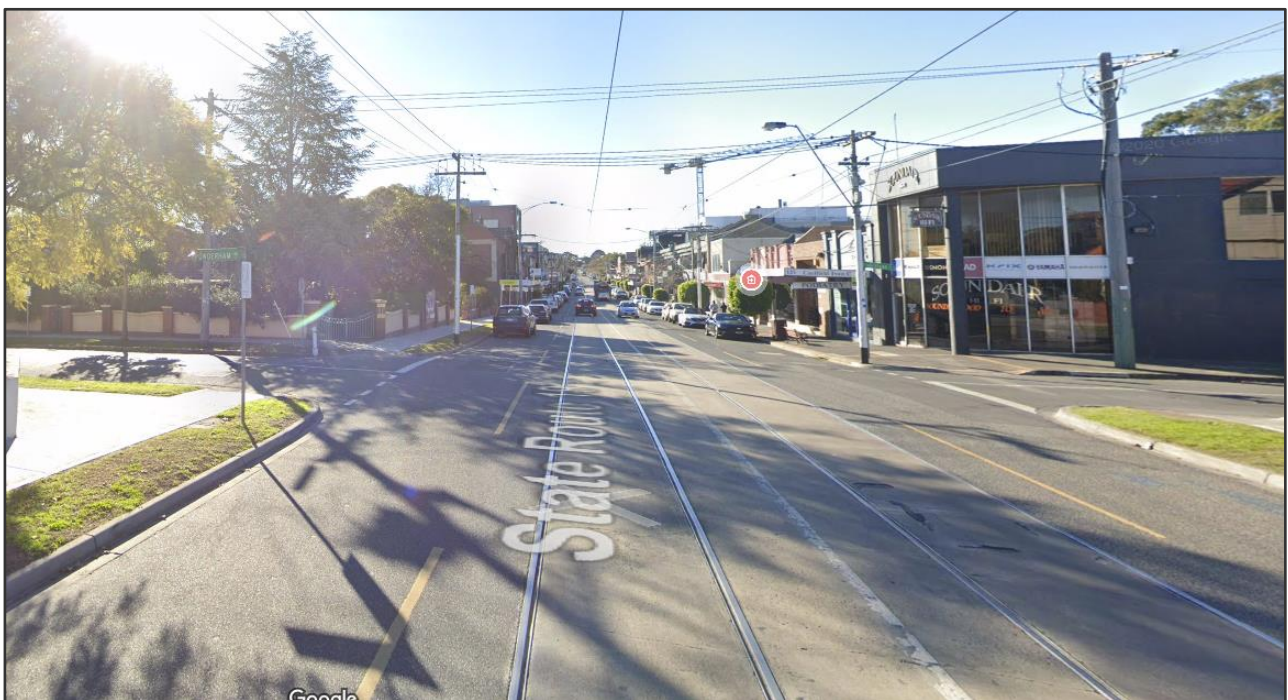
2.3.1 Hawthorn Road

Hawthorn Road is an arterial road generally aligned north-south, running between Princes Highway in the north, and Nepean Highway in the south. Hawthorn Road provides two traffic lanes with a shared central tramway in each direction adjacent to the site. Kerbside parking is provided on both sides of the road, generally restricted to 2-hour parking between 8:00am and 6:00pm, Monday to Friday, and 8:00am to 12:00pm on Saturday on the east side adjacent the site, and unrestricted on the west side.

A 60km/h speed limit applies to Hawthorn Road in the vicinity of the site.

The cross-section of Hawthorn Road at the frontage of the site is shown in Figure 5.

Figure 5 Hawthorn Road, looking north from adjacent to the subject site



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2.3.2 Halstead Street

Halstead Street is a local road generally aligned east-west, running between Hawthorn Road in the west and Bambra Road in the east. Halstead Street provides a single traffic lane in each direction along the northern boundary of the site. Kerbside parking is provided along the southern side of the road, generally restricted to 2-hour parking between 8am and 6pm, Monday to Friday.

The default 50km/h speed limit applies to Halstead Street in the vicinity of the site.

The cross-section of Halstead Street at the frontage of the site is shown in Figure 6.

Figure 6 Halstead Street, looking east from adjacent to the subject site



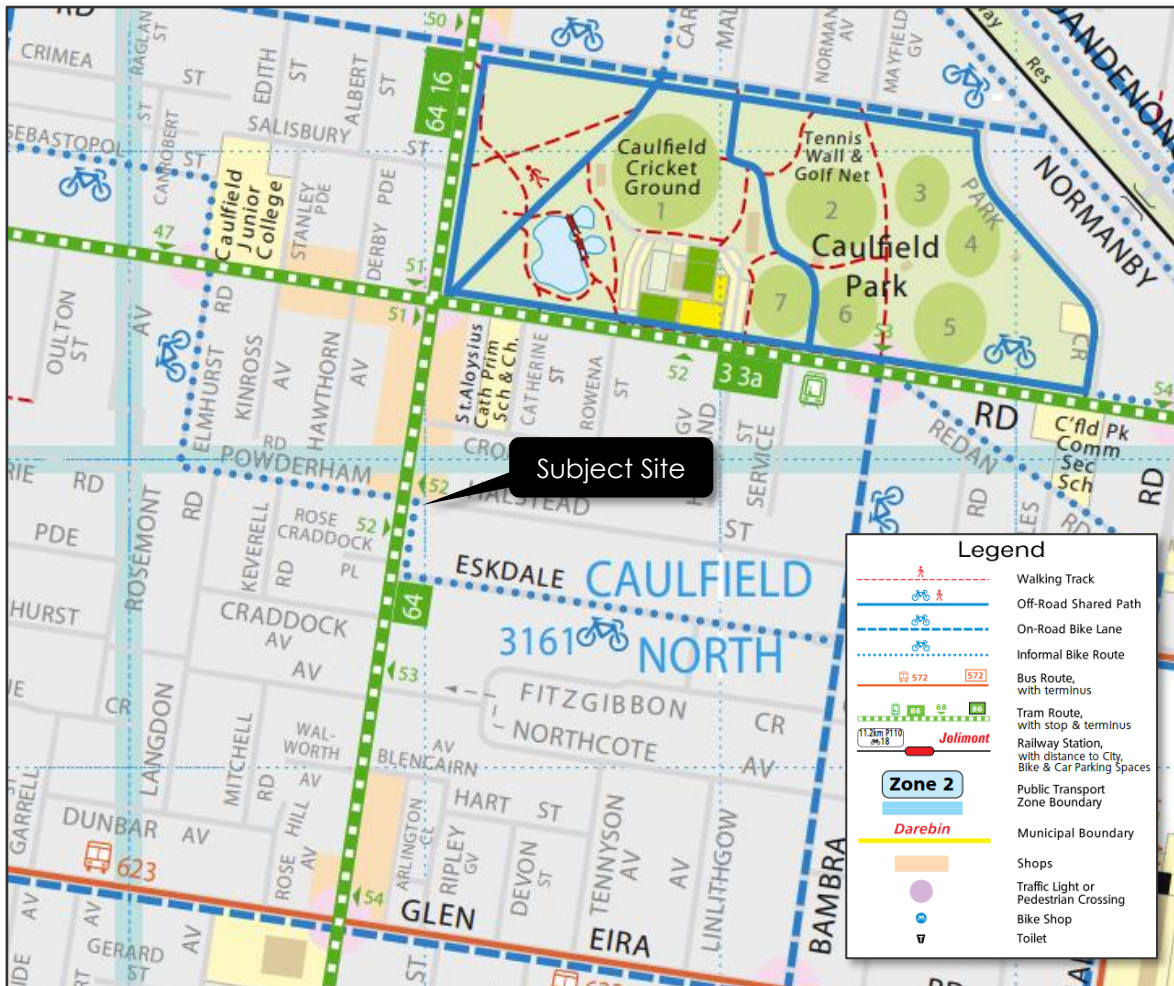
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2.4 Sustainable Transport

2.4.1 General

An extract of the TravelSmart Map for the City of Glen Eira is shown in Figure 7, highlighting the public transport, bicycle and pedestrian facilities in the area.

Figure 7 TravelSmart Map



2.4.2 Public Transport

The full public transport provision in the vicinity of the site is shown in Figure 8 and detailed in Table 1.

The site has good public transport accessibility, with multiple transport routes servicing the vicinity of the site. Tram route 64 provides direct service to/from Melbourne University and passes through the CBD, stopping at Federation Square and Melbourne Central Station. The nearest tram stop is located directly adjacent to the site, at the intersection of Halstead Street and Hawthorn Road. In addition, Malvern and Caulfield train stations are located approximately 1.1km north and 1.5 km east of the site respectively, providing excellent access to the Cranbourne, Frankston and Pakenham train line services.

Figure 8 Public Transport Provision

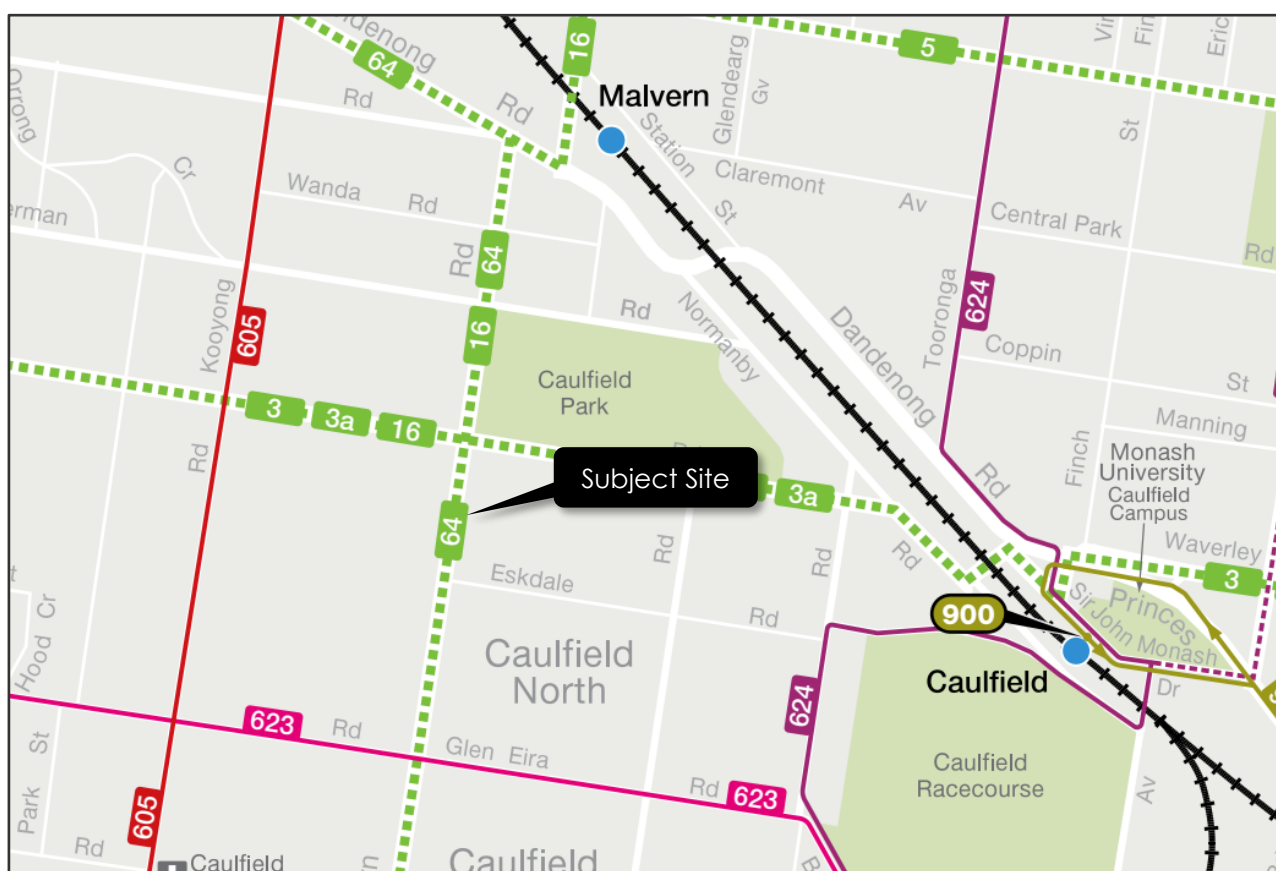


Table 1 Public Transport Provision

Mode	Route No.	Route Description	Nearest Stop/Station
Train		Cranbourne Line	Malvern Station
		Frankston Line	Malvern Station
		Pakenham Line	Malvern Station
Tram	64	Melbourne University - East Brighton	Halstead Street/Hawthorn Road
	16	Melbourne University - Kew via St Kilda Beach	Hawthorn Road/Balaclava Road

3 DEVELOPMENT PROPOSAL

3.1 General

It is proposed to develop the subject site for the purposes of a four-story residential development, to accommodate 26 apartments, as shown in Table 2. The existing two buildings on site are to be demolished to allow for construction of the apartment building.

Table 2 Proposed Development

Component	No/Area
1-Bedroom Apartment	12
2-Bedroom Apartment	14
Total Apartments	26

3.2 Car Parking and Vehicular Access

Vehicle access to the site will be provided via a single width crossover from Halstead Street, in the northeast corner of the site. A 3.6 metre wide ramp is proposed to provide access to the basement level car park.

The existing crossovers to Halstead Street and Hawthorn Road will be removed, and the kerb and channel reinstated.

The basement level includes 22 car spaces, along with designated storage and service areas.

A security gate and traffic light system will be installed within the basement to indicate when vehicles are entering the site. The system will provide inbound priority, and require outbound vehicles in the basement to wait until the ramp is clear to exit.

3.3 Bicycle Parking

A total of twelve bicycle spaces are proposed for the development, comprising seven bicycle spaces within the basement car park, and four visitor spaces on the ground floor at the entrance to the building.

The resident bicycle parking will be provided in a mix of both horizontal and vertically mounted spaces on the basement level, with the remaining four spaces provided via on ground bicycle hoops, available for visitor use.

4 DESIGN ASSESSMENT

4.1 Glen Eira Planning Scheme – Clause 52.06

onemilegrid has undertaken an assessment of the car parking layout and access for the proposed development with due consideration of the Design Standards detailed within Clause 52.06-9 of the Planning Scheme. A review of those relevant Design Standards is provided in the following sections.

4.1.1 Design Standard 1: Accessways

A summary of the assessment for Design Standard 1 is provided in Table 3.

Table 3 Clause 52.06-9 Design Assessment – Design Standard 1

Requirement	Comments
Be at least 3 metres wide.	Satisfied – minimum width of ramp is 3.6 metres
Have an internal radius of at least 4 metres at changes of direction or intersection or be at least 4.2 metres wide.	Satisfied – changes of direction are between accessways of more than 4.2m wide
Allow vehicles parked in the last space of a dead-end accessway in public car parks to exit in a forward direction with one manoeuvre.	N/a – private car park
Provide at least 2.1 metres headroom beneath overhead obstructions, calculated for a vehicle with a wheel base of 2.8 metres.	Satisfied – a minimum height clearance of 2.2 metres is provided along the ramp
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.	Satisfied
Provide a passing area at the entrance at least 6.1 metres wide and 7 metres long if the accessway serves ten or more car parking spaces and is either more than 50 metres long or connects to a road in a Transport Zone 2 or Transport Zone 3.	N/a – does not connect to a Transport Zone
Have a corner splay or area at least 50 per cent clear of visual obstructions extending at least 2 metres along the frontage road from the edge of an exit lane and 2.5 metres 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.	Satisfied
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 6 metres from the road carriageway.	N/a – does not connect to a Transport Zone

4.1.2 Design Standard 2: Car Parking Spaces

All car spaces on-site are proposed with a minimum width of 2.6 metres, length of 4.9 metres and are accessed from aisles of no less than 6.4 metres. Spaces adjacent to walls have been suitably widened in accordance with Design Standard 2 of the Planning Scheme.

A 1 metre aisle extension has been provided at the end of the dead-end aisles, in accordance with the Australian Standard for Off-street Parking.

4.1.3 Design Standard 3: Gradients

A summary of the assessment for Design standard 3 is provided in Table 4.

Table 4 Clause 52.06-9 Design Assessment – Design Standard 3

Requirement	Comments
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.	Satisfied – A maximum grade of 1:10 is proposed for the first 5 metres from the property boundary
Ramps (except within 5 metres of the frontage) must have the maximum grades as outlined in Table 3 (of Design standard 3) and be designed for vehicles travelling in a forward direction.	Satisfied – a maximum grade of 1:4.5 is proposed
Where the difference in grade between two sections of ramp or floor is greater than 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.	Satisfied – change in grade does not exceed 12.5 %

The first 5 metres at the top of the ramp has been provided with a grade of 1:10 while the maximum grade of the remainder of the ramp is no more than 1:4.5, in accordance with the requirements of Design Standard 3. Transitions are provided where changes of grade exceed 12.5%, and transition lengths have been designed to prevent potential scraping.

4.2 Waste Collection

Waste collection will be undertaken by a private contractor, with bins stored in a dedicated bin storage area within the basement. Swept paths are attached in Appendix A showing a 6.4m mini-loader waste collection vehicle circulating the site.

Refer to the Waste Management Plan for further information.

4.3 Bicycle Parking

A total of seven bicycle spaces are proposed within the basement level of the development, in the dedicated bike storage space. Bicycle parking is proposed to be provided in a mixture of vertically mounted bicycle racks and on-ground bicycle hoops. Additionally, four visitor bicycle spaces are provided via two on ground bicycle hoops at the front entrance of the building.

The vertical mounted racks have been designed in accordance with the Australian Standards; specifically, they are located at 500 mm centres, with an envelope of 1.2 metres provided for bicycles and a 1.5 metre access aisle.

The bicycle hoop has been designed in accordance with the Australian Standards; specifically, it is provided with 500mm clearance on each side, with an envelope of 1.8 metres provided for bicycles and a 1.5 metre access aisle.

4.4 Clause 52.29 – Land Adjacent to the Principal Road Network

The development proposal is subject to the requirements of Clause 52.29 of the Glen Eira Planning Scheme which applies to land adjacent to the Principal Road Network (Hawthorn Road) and aims to ensure appropriate access is provided to identified roads.

Relevant to the proposed development, the Clause states that a permit is required to create or alter access to a road in a Transport Zone 2, and that the proposal is to be referred to the relevant referral authority (in this case VicRoads).

The proposed development does not propose any vehicle access to Hawthorn Road (though removes an existing crossover and access point), is anticipated to have no impact on the operation of Hawthorn Road along the site frontage, and it is therefore considered that the proposed development will satisfy the requirements of Clause 52.29.

5 LOADING

Clause 65 (Decision Guidelines) of the Glen Eira Planning Scheme identifies that “Before deciding on an application or approval of a plan, the responsible authority must consider, as appropriate: The adequacy of loading and unloading facilities and any associated amenity, traffic flow and road safety impacts.”

In relation to the proposed residential development, loading facilities will only be required for occasional removalist vehicles, which may utilise the existing on-street parking along Halstead Street, or the basement car park for smaller vehicles.

The provision for loading is therefore considered appropriate for the proposed use.

6 BICYCLE PARKING

The bicycle parking requirements for the subject site are identified in Clause 52.34 of the Glen Eira Planning Scheme, which specifies the following requirements for the proposed development.

Table 5 Clause 52.34 – Bicycle Parking Requirements

Component	No/Area	Requirement	Total
Dwelling (four or more storeys)	26 dwellings	1 space per 5 dwellings for residents	5
		1 space per 10 dwellings for visitors	3
Total			8

Based on the above calculations, a total of eight bicycle parking spaces are required for the proposed development.

It is proposed to provide a total of eleven bicycle parking spaces across the development, available for both resident and visitor use.

The provision for bicycle parking exceeds the requirements of the Planning Scheme and is therefore considered acceptable.

7 CAR PARKING

7.1 Statutory Car Parking Requirements

7.1.1 Car Parking Requirements – Clause 52.06

The car parking requirements for the subject site are identified in Clause 52.06 of the Glen Eira Planning Scheme. As the site is located within the Principle Public Transport Network area, the Column B car parking rates of Clause 52.06 apply to the proposed development, as shown below.

Table 6 Clause 52.06 - Car Parking Requirements

Use	No/Area	Rate	Car Parking Measure	Total
Dwelling	26	1	to each one or two bedroom dwelling, plus	26
	26	0	for visitors to every 5 dwellings for developments of 5 or more dwellings	0

Based on the above calculations, a total of 26 parking spaces are required for the proposed development.

7.1.2 Proposed Car Parking Provision

It is proposed to provide a total of 22 car parking spaces on-site, which equates to a shortfall of 4 spaces when compared to the Planning Scheme requirements.

Clause 52.06-7 of the Glen Eira Planning Scheme indicates that an application to reduce (including reduce to zero) the requirement for car spaces must be accompanied by a Car Parking Demand Assessment. The Assessment must assess the car parking demand likely to be generated by the proposed development, having consideration to:

- 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 occupants (residents or employees) of the land.
- Any empirical assessment or case study.

An assessment of the likely parking demands and the appropriateness of reducing the car parking provision below them is set out below.

7.2 Car Parking Demand Assessment

7.2.1 2016 Census Data – Australian Bureau of Statistics

It is proposed to provide one car space to each of the 2-bedroom apartments, and one car space to eight of the 1-bedroom apartments, with no parking provided for the remaining four 1-bedroom apartments. In this regard, car ownership data from the 2016 and 2021 Census for the City of Glen Eira was sourced from the Australian Bureau of Statistics (ABS).

Table 7 provides a summary of car ownership data for one bedroom units in apartment buildings of four or more stories in the City of Glen Eira.

Table 7 2016 / 2021 Census Car Ownership – City of Glen Eira

<i>Dwelling Type</i>	<i>Year</i>	<i>Average Car Ownership (veh/dwelling)</i>	<i>Percentage Ownership = 0</i>
One bedroom apartment in a four or more storey apartment building	2016	0.78	31.8%
One bedroom apartment in a four to eight storey apartment building	2021	0.87	23%

It should be recognised that this data covers the entire municipality, including areas that do not enjoy the same level of public transport connectivity as the subject site. Also, it should be noted that the 2021 data was impacted by COVID-19, with a number of municipalities experiencing increased car ownership, which may not be long lasting.

Regardless, the above demonstrates that residents of between 23% and 32% of one-bedroom dwellings did not own or otherwise park a vehicle at their place of residence. This is equivalent to approximately 3 or 4 one-bedroom dwellings with no need for a car parking space.

Furthermore, it should be recognised that resident parking demands are, in part, dependent on car parking provisions, insofar as an owner/tenant with the need to park a vehicle is unlikely to occupy a dwelling that does not provide a car parking space. This is particularly true in areas where on-street parking is restricted to short durations, or in high demand, meaning on-street parking is not a viable alternative to on-site parking for residents.

7.2.2 Alternative Modes of Transport

As indicated in Section 2.4, the site has excellent access to public transport, with numerous train, tram and bus services in the immediate vicinity. The provision of excellent public transport ensures that residents of the one-bedroom dwellings with no parking will have good access to alternate transportation modes.

7.2.3 Bicycle Parking and End-of-trip Facilities

It is proposed to provide bicycle parking in excess of the Planning Scheme requirements, and consequently, residents will be encouraged to utilise bicycles, and will have a reduced need for a private motor vehicle.

A reduction in resident car parking demand can therefore be expected.

7.2.4 Anticipated Parking Demand

Based on the above, with excellent access to public transport, good bicycle facilities, and given the existing car ownership data, it is considered appropriate that a proportion of 1-bedroom apartments are not provided with a car parking space.

The provision of four 1-bedroom apartments with no parking spaces is within the range suggested by the 2016 and COVID affected 2021 data, therefore, given the existing car parking restrictions and observed demand in the area surrounding the site, it is reasonable to expect that the car parking demand generated by the proposed development will not exceed the proposed provision.

The provision of car parking is therefore expected to be appropriate.

8 TRAFFIC

8.1 Traffic Generation

Surveys undertaken by other traffic engineering firms at residential dwellings have shown that the daily traffic generation rates vary depending on the size, location and type of the dwelling, the parking provision and proximity to local facilities and public transport.

Medium to high density dwellings in inner areas generate traffic with rates between 3.0 and 6.0 movements per dwelling. Considering the location of the subject site in relation to public transport and other services, and noting the size of the proposed apartments (1 and 2-bedroom), it is expected that generation rates will be towards the middle of the range.

For the purposes of the following analysis, a traffic generation rate of 5.0 movements per day per dwelling will be adopted with 10% occurring during the peak hours.

Application of the above daily traffic generation to the proposed 26 apartments equates to a daily traffic generation of 130 movements per day.

Traffic generated by residential uses are typically tidal, with the majority of movements generated during AM peak hour occurring in the outbound direction and the majority of movements during the PM peak hour occurring in the inbound direction.

For the purposes of this assessment, the following directional splits will be adopted:

- AM Peak Hour: 80% outbound and 20% inbound; and
- PM Peak Hour: 40% outbound and 60% inbound.

Application of the above rates to the proposed 26 dwellings equates to the following volumes detailed in Table 8.

Table 8 Anticipated Peak Hour Trip Generation

<i>Period</i>	<i>Inbound</i>	<i>Outbound</i>	<i>Total</i>
AM Peak	3	10	13
PM Peak	8	5	13

8.2 Traffic Impact

The above traffic volumes equate to less than one vehicle every minute during the peak periods and will be easily accommodated by the existing road network in the vicinity.

Furthermore, a portion of the site currently operates as a medical clinic which has approximately 8 parking spaces on-site, whilst the remainder of the site currently operates with as a hair salon. The existing conditions are expected to generate consistent vehicle movements during the day, with patients and customers frequently arriving and leaving appointments. Additionally, peak vehicle movements during the morning and evening periods are anticipated when staff arrive and depart the clinic. Accordingly, given the medical centre and associated traffic is to be removed, the anticipated traffic generation for the apartments is not expected to surpass the existing traffic levels across the site.

Noting the above, the proposed residential development is therefore expected to have a negligible impact on the surrounding road network.

8.3 One-Lane Ramp Operation

The proposed development includes a one-lane ramp to service the car parking area. To ensure the appropriate operation of the one-lane ramp, it is recommended that the ramp is controlled by traffic signals, with the following operation.

- Signal displays are provided at each end of the one-lane ramp, and include a simple red light display;
- Detector loops (or other detection system) are provided at each end of the one-lane ramp to detect a vehicle entering or exiting the car parking area;
- The default display is showing a **red light to the car parking area**, with no display (blank) to the Halstead Street frontage;
- Vehicles entering from Halstead Street will pass over a detector loop at the site access, which will ensure the red display to the car parking area is maintained until such time as the entering vehicle reaches the car parking area;
- Vehicles wishing to exit the car parking area will need to pass over the detector loop at the entrance to the one-lane section of ramp. Once the exiting vehicle is detected (and assuming a vehicle has not already been detected at the Halstead Street entry point) the red display will present to Halstead Street. After a short clearance time, the red display will then turn off at the car park end of the one-lane ramp, allowing vehicles to exit;
- Once the exiting vehicle has had sufficient time to clear the ramp, the red display at the car park end of the one-lane ramp will be displayed, and the red display will be cleared to Halstead Street, with the same clearance time.

Through the above operation, traffic from Halstead Street entering the site has priority, and will typically not be delayed on entry to the site.

Furthermore, a convex mirror is proposed at the bottom of the ramp to improve visibility of vehicles entering and exiting the basement car park.

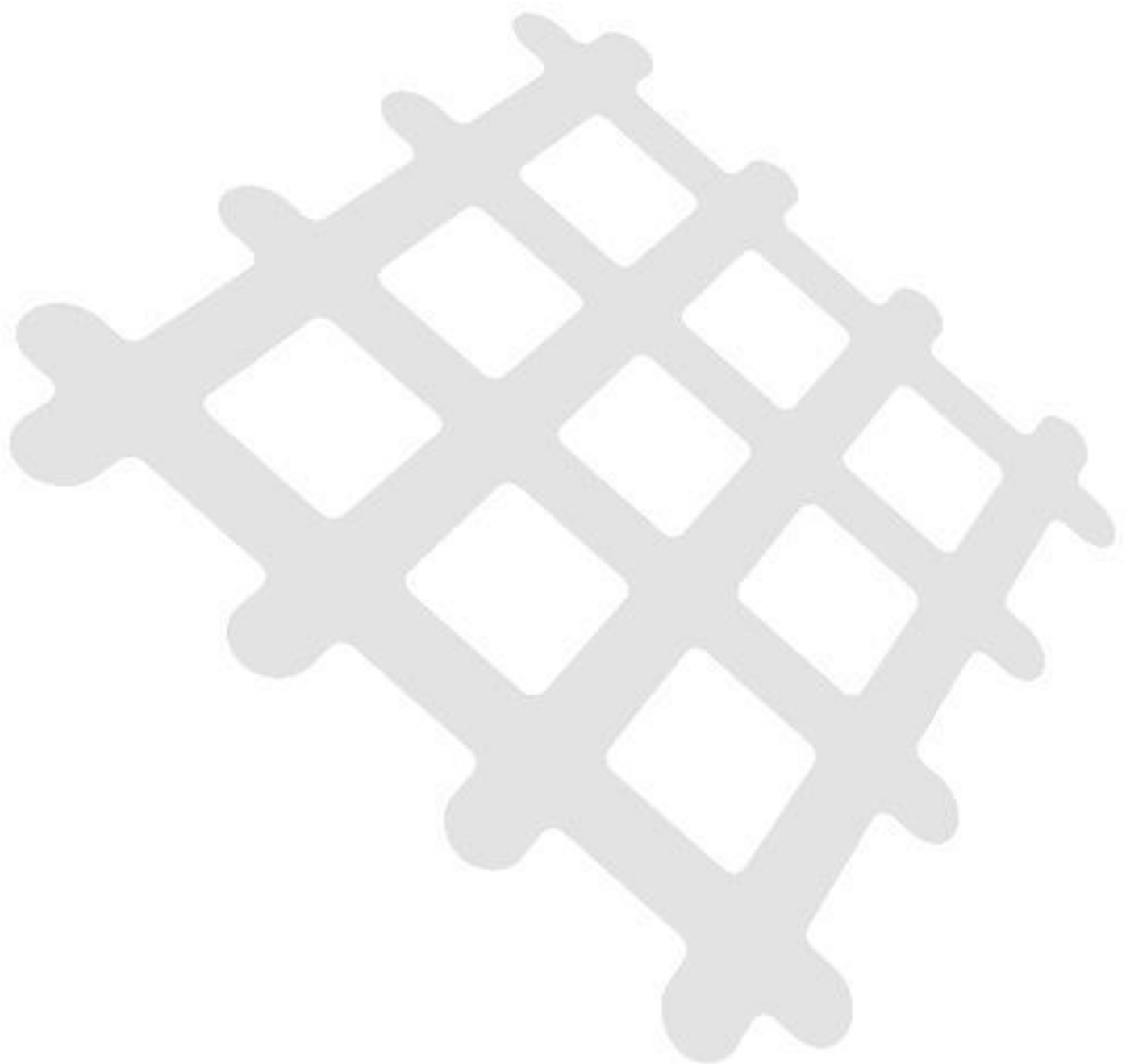
9 CONCLUSIONS

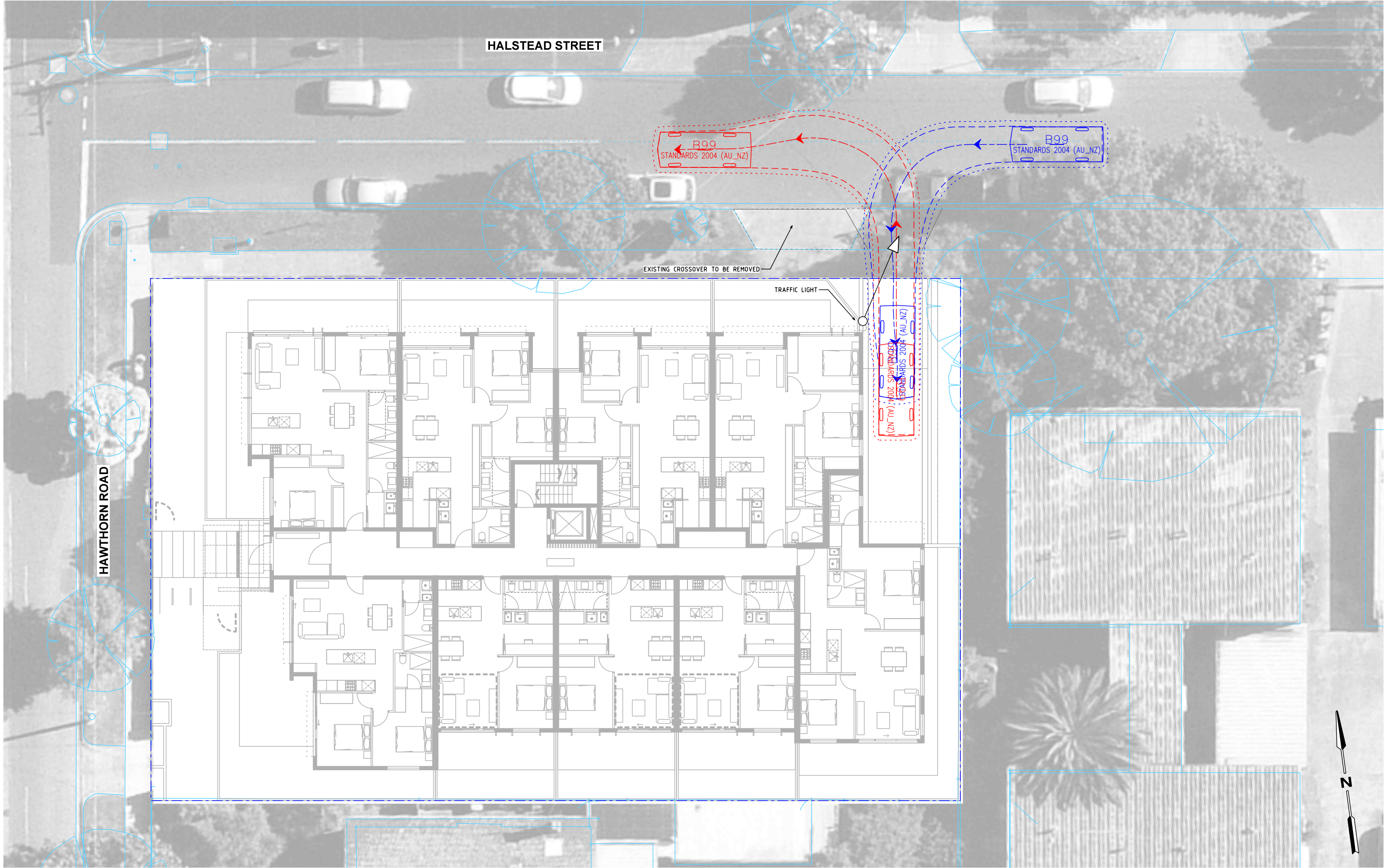
It is proposed to develop the subject site for the purposes of a residential building comprising 26 apartments, with a total of 22 car parking spaces provided in the basement.

Considering the analysis presented above, it is concluded that:

- The proposed car parking, bicycle parking and access design is considered appropriate;
- The proposed provision of bicycle parking exceeds the requirements of the Planning Scheme, and is therefore considered appropriate;
- The provision of car parking is considered appropriate; and
- the proposed residential development is therefore expected to have a negligible impact on the surrounding road network.

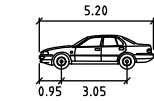
Appendix A Swept Path Diagrams





SWEPT PATH LEGEND

--- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
----- 300mm CLEARANCE ENVELOPE SHOWN DOTTED



B99
Width : 1.94
Track : 1.84
Lock to Lock Time : 6.0
Steering Angle : 33.9

meters
: 1.94
: 1.84
: 6.0
: 33.9

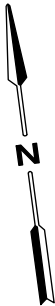
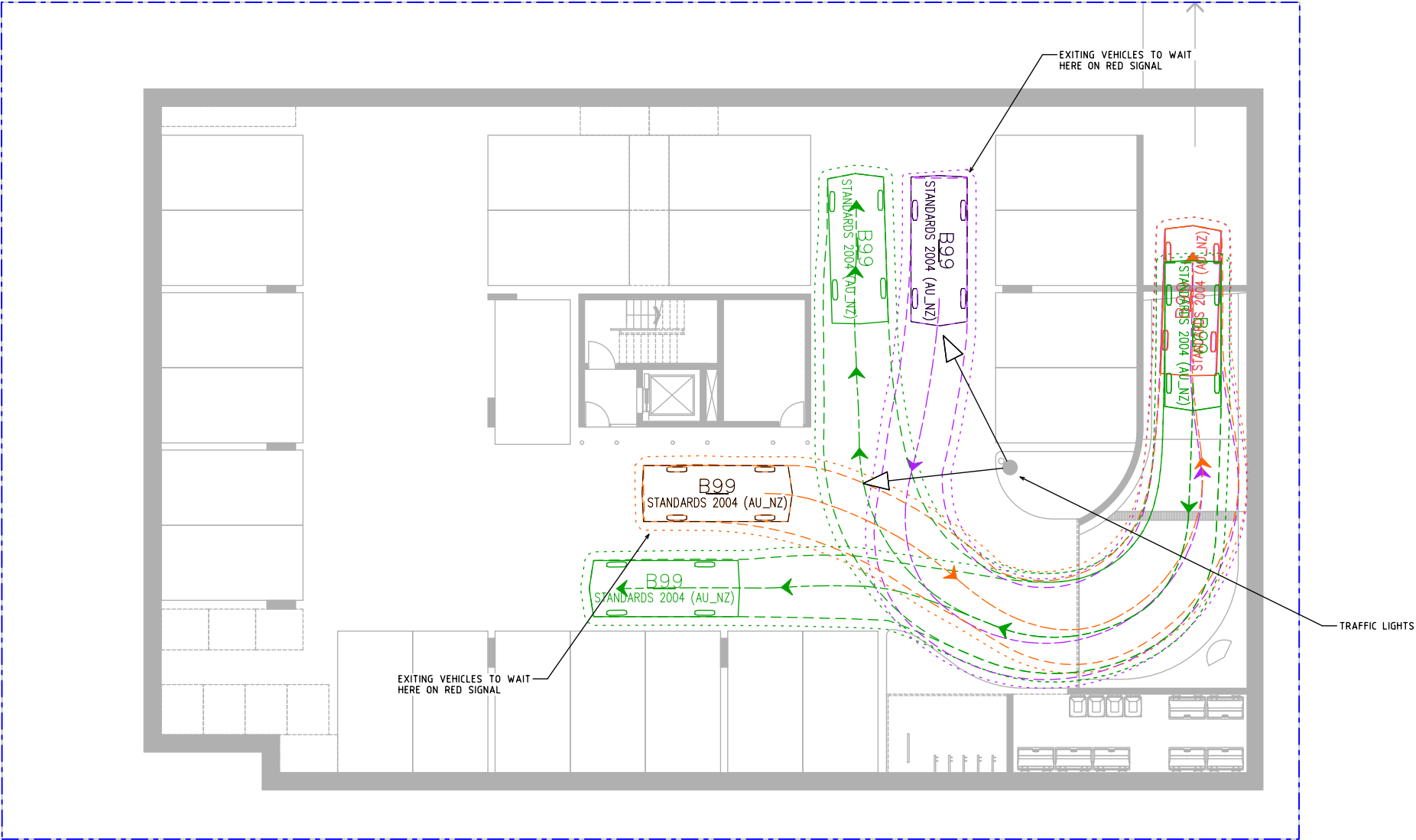


Scale
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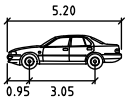
Drawing Title
139-141 HAWTHORN ROAD, CAULFIELD NORTH
VEHICLE SITE ACCESS - GROUND
SWEPT PATH ANALYSIS

Designed CM	Approved JS	Melway Ref 68 A1
Project Number 220906	Drawing Number SPA101	Revision B



SWEPT PATH LEGEND

- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
- 300mm CLEARANCE ENVELOPE SHOWN DOTTED



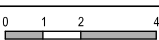
B99
Width : 1.94
Track : 1.84
Lock to Lock Time : 6.0
Steering Angle : 33.9

meters



Wurundjeri Woiwurrung Country
56 Down Street, Collingwood, VIC 3066
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Phone (03) 9939 8250

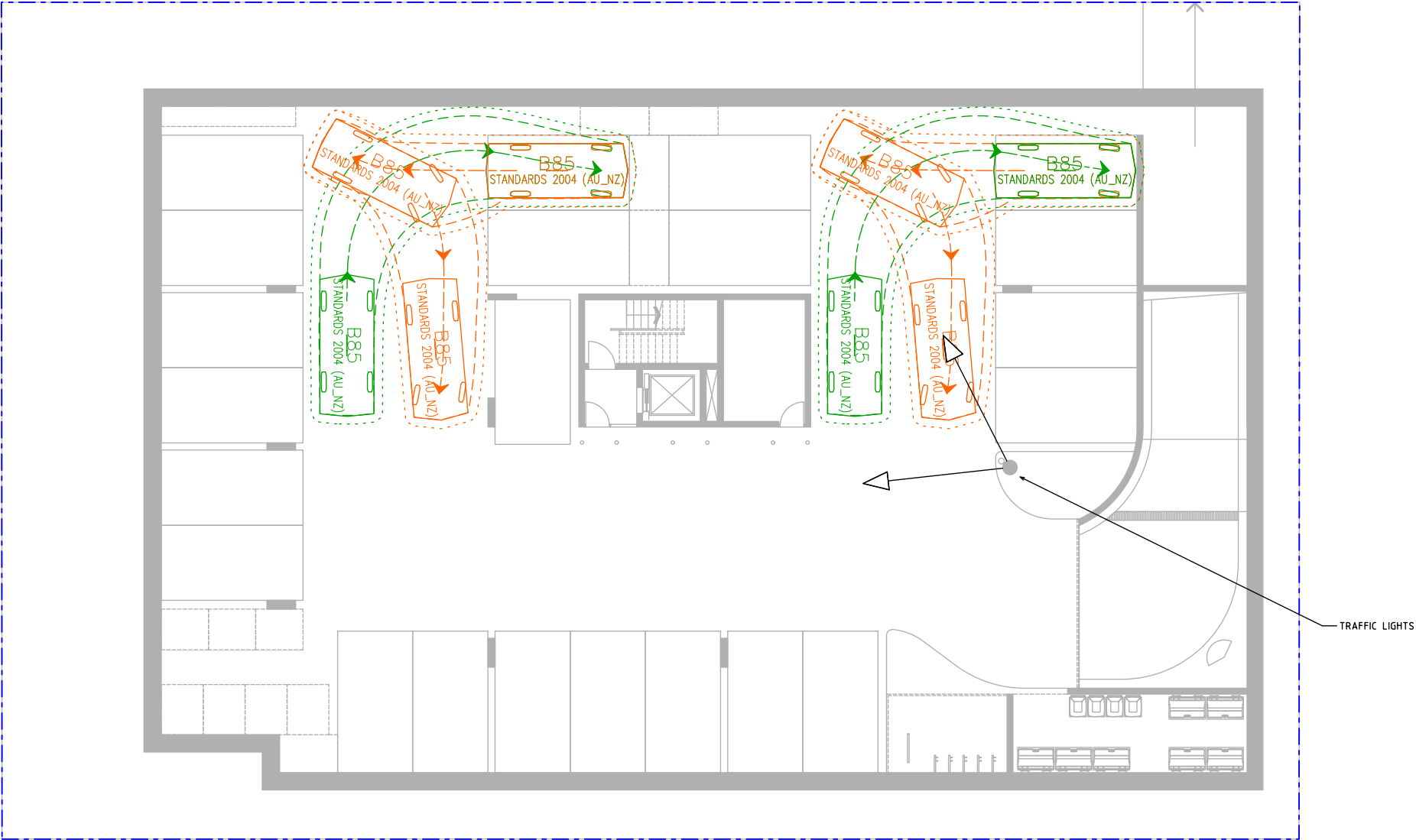
Scale
1:200 @ A3



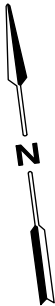
Drawing Title
139-141 HAWTHORN ROAD, CAULFIELD NORTH
VEHICLE SITE ACCESS - BASEMENT
SWEPT PATH ANALYSIS

Designed CM	Approved JS	Melway Ref 68 A1
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Project Number 220906	Drawing Number SPA202	Revision B
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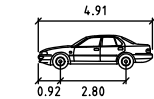


TRAFFIC LIGHTS



SWEPT PATH LEGEND

--- DESIGN VEHICLE SWEEP PATHS SHOWN DASHED
----- 300mm CLEARANCE ENVELOPE SHOWN DOTTED

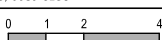


B85
Width : 1.87
Track : 1.77
Lock to Lock Time : 6.0
Steering Angle : 34.1

meters



Scale
1:200 @ A3



Drawing Title
139-141 HAWTHORN ROAD, CAULFIELD NORTH
VEHICLE SITE ACCESS
SWEPT PATH ANALYSIS

Designed	Approved	Melway Ref
CM	JS	68 A1

Project Number	Drawing Number	Revision
220906	SPA203	B