44 – 52 Anderson Street, Chatswood

Transport Impact Assessment

Prepared for:

Bridgestone Projects

23 October 2024

PROJECT INFORMATION

Project Name:	**44 – 52 Anderson Street, Chatswood**
Client:	Bridgestone Projects
Project Number:	2236
Prepared By:	JMT Consulting

DOCUMENT HISTORY

Document Title	Revision	Date issued	Author
Transport Impact Assessment - 44-52 Anderson Street	Draft	30.09.24	JM
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1 Introduction

1.1 Background

Bridgestone Projects engaged JMT Consulting to carry out a traffic and transport assessment of the State Significant Development Application (SSDA) for the site 44 – 52 Anderson Street, Chatswood (the site). The proposal would facilitate a mixed use development comprising of residential apartments with ground floor commercial and retail uses – all in close proximity to existing and future transport services.

The proposed development (**SSD-75408008**) seeks approval to construct 33-storey mixed use shop top housing, including in-fill affordable housing.

Specifically, this SSDA seeks approval for:

- Site preparation works including demolition of existing structures on the site, tree and vegetation clearing, and bulk earthworks;
- Construction of a 33-storey mixed use shop top housing development comprising:
    - A two-storey non-residential podium, with commercial/retail floor space, and
    - Two residential towers, with 123 apartments,
    - Construction of an eight-level shared basement car parking for 296 carparking spaces including:
- 256 residential spaces (including 25 accessible spaces);
    - 22 commercial and retail spaces (including 1 accessible space);
    - 18 visitor spaces;
- Vehicular access from Day Street,
- Communal open space on Level 2 including shared outdoor spaces, swimming pool and associated amenities, sauna and BBQ area and a green spine running between the two towers;
- Associated landscaping and public domain works, and
- Services and infrastructure improvements, as required.

1.2 Site location

The subject site is located at 44-52 Anderson Street, Chatswood and is bounded by O'Brien Street to the north, Anderson Street to the east, Day Street to the south and a pedestrian path to the west. The Chatswood transport interchange is located just over 400m south of the site as shown in Figure 1.

Figure 1 Site location

1.3 Report purpose

This report has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) for SSD- 75408008 relevant to traffic and transport as summarised in Table 1 below.

Table 1 SEARs requirements

Item	Description of Requirement - SSD- 75408008	Relevant Section of Report
10. Traffic, Transport and Accessibility	*Provide a transport and accessibility impact assessment that includes the following:*	This report
	• an analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, and existing performance levels of nearby intersections.	Section 2
	• details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearances), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-upzone(s) and bus bays (if applicable), and provisions for servicing and loading/unloading.	Section 3
	• analysis of the impacts of the proposed development during construction and operation (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict) and any cumulative impact from surrounding approved developments	Section 3.8, 3.9
	• measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with relevant standards.	Section 3.9, 4
	• proposals to promote sustainable travel choices for employees, residents, guests and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high quality end-of-trip facilities, and implementing a Green Travel Plan.	Section 4

Item	Description of Requirement - SSD- 75408008	Relevant Section of Report
10. Traffic, Transport and Accessibility	• Provide a Construction Traffic Management Plan detailing predicted construction vehicle movements, routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.	Section 5

1.4 Transport for NSW consultation

Consultation was undertaken with Transport for NSW (TfNSW) in September 2024 to discuss the proposal. TfNSW noted the following in their email correspondence dated 10 September 2024

"*Noting that the site is not located in proximity to a classified road and the traffic generation of the subject development, TfNSW does not have any additional requirements beyond the standard Planning Secretary's Environmental Assessment Requirements.*"

2 Existing Transport Conditions

2.1 Existing site uses

The existing site comprises of three separate medium density residential flat buildings consisting of 31 dwellings. On-site parking is provided for these residences, with vehicle access obtained from either O'Brien Street or Day Street.

2.2 Travel behaviours

Travel behaviours for residents and employees within the area surrounding the site[1] has been analysed using 2016 Journey to Work Census data. The data demonstrates a high proportion of people travelling to and from Chatswood use public transport, accounting for over half of all trips in the case of residents travelling to work. This reflects the strong availability and accessibility of public transport in this area, which will only improve following the completion of the Sydney Metro network. A high proportion of residents walk to work, which reflects the likelihood that future residents of the site will choose to work in the Chatswood CBD. Only 12% of residents noted that they travelled to work using their own vehicle, demonstrating that the site has a very low car reliance making it suitable for future residential development.

Mode of travel	**Proportion of trips**	
	Residents travelling to work from Chatswood	*Employees travelling into Chatswood for work*
Car driver	12%	36%
Car passenger	2%	1%
Bus	4%	9%
Train	49%	41%
Walk	32%	11%
Other	1%	2%
Total	**100%**	**100%**

[1] SA1, code 12101139862

2.3 Road network

To manage the extensive network of roads for which councils are responsible under the Roads Act 1993, Transport for NSW (TfNSW) in partnership with local government established an administrative framework of *State, Regional,* and *Local Road* categories. State Roads are managed and financed by TfNSW and Regional and Local Roads are managed and financed by councils.

Regional Roads perform an intermediate function between the main arterial network of State Roads and council controlled Local Roads. Key State and Regional roads which provide access to the site are illustrated in Figure 2 and include the following:

Pacific Highway (State Road)

Pacific Highway is a classified State road which serves as a major north-south arterial link, providing connectivity between the Warringah Freeway and M1 Pacific Motorway. The Pacific Highway is situated approximately 150m west of the subject site and is generally configured with a total of six traffic lanes.

Fullers Road (State Road)

Fullers Road is a classified State road that provides east-west connectivity between the Pacific Highway at Chatswood and North Ryde.

Albert Avenue and Archer Street (Regional Roads)

Albert Avenue forms part of the regional road network that provides access into the Chatswood CBD. Generally these roads are comprised of four lanes of traffic with parking permitted at certain locations and times of day.

Anderson Street (Local Road)

Anderson Street forms the eastern frontage to the site and consists of one travel lane and one parking lane in each direction. There is an existing on-road cycle path on either side of Anderson Street starting from Macintosh Street to Ashley Street where it connects to the cycle path on Ashley Street.

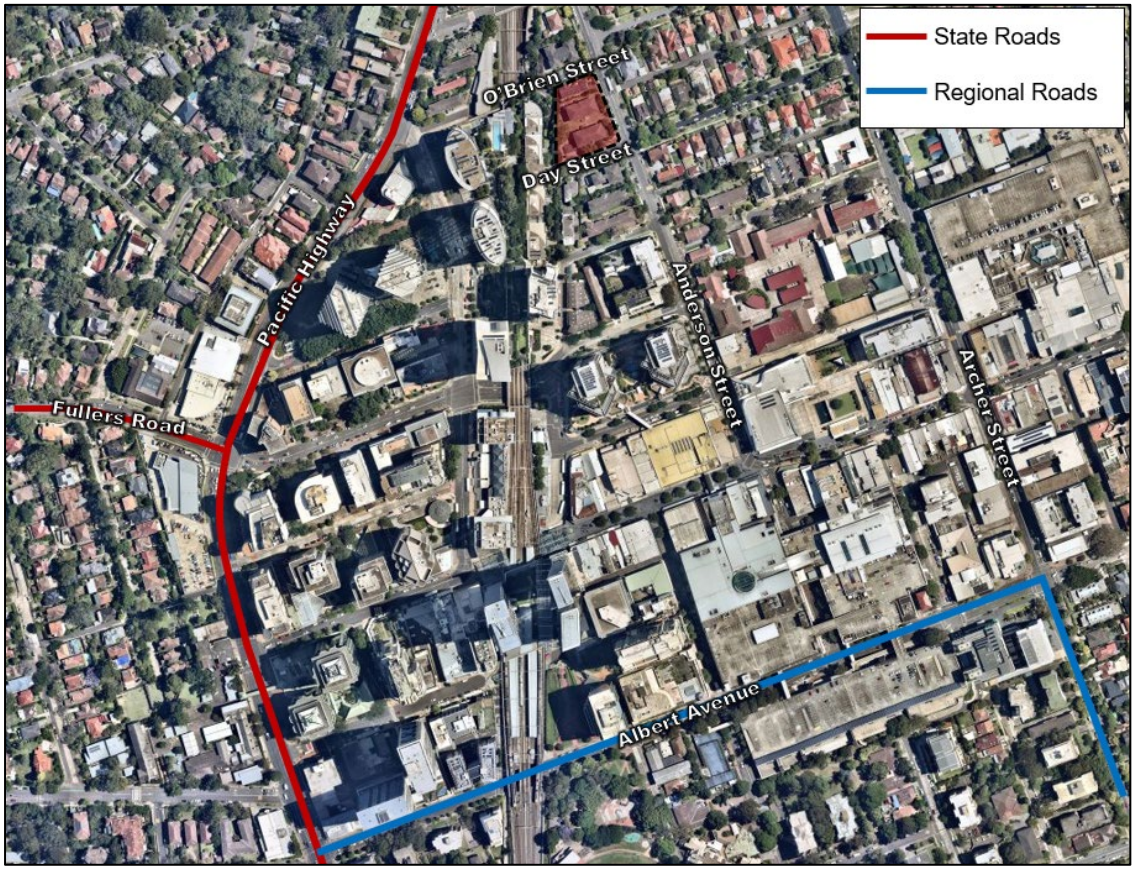


Figure 2 Road network serving the site

2.4 Existing traffic volumes

Traffic counts were undertaken at the key intersection of Anderson Street and Day Street immediately surrounding the site during the morning and afternoon peak hour periods in February 2024 – with this existing traffic data indicated in the figure below. This traffic data has formed the basis for the road network analysis undertaken in later sections of this document.

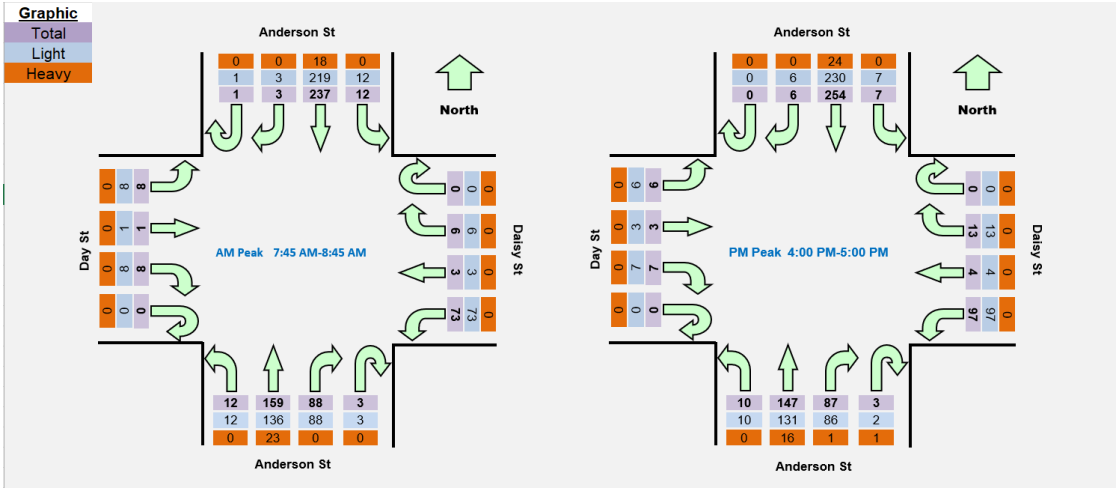


Figure 3 Traffic counts – Anderson Street / Day Street

2.5 Public transport

The site is located just over 400m or approximately five minute walk away from the Chatswood transport interchange. The Chatswood Interchange provides a number of high frequency public transport services for heavy rail, metro and bus services.

The heavy rail service provides frequent train services for T1 North Shore, Northern, and Western Line. During peak hours, T1 trains travel from Chatswood to the Sydney CBD, northern and western suburbs arrive at the station approximately every two minutes.

A significant number of bus routes service the Chatswood transport interchange which include both local and regional services. Bus stops are available at the interchange itself or on adjacent streets including adjacent to the site on Anderson Street, Victoria Avenue and the Pacific Highway.

The Sydney Metro northwest service commenced operations in May 2019 and provides a connection between Chatswood and Tallawong via Epping. Services operate every five to ten minutes throughout the day and provide a high quality public transport option for people travelling to and from the north-west of Sydney.

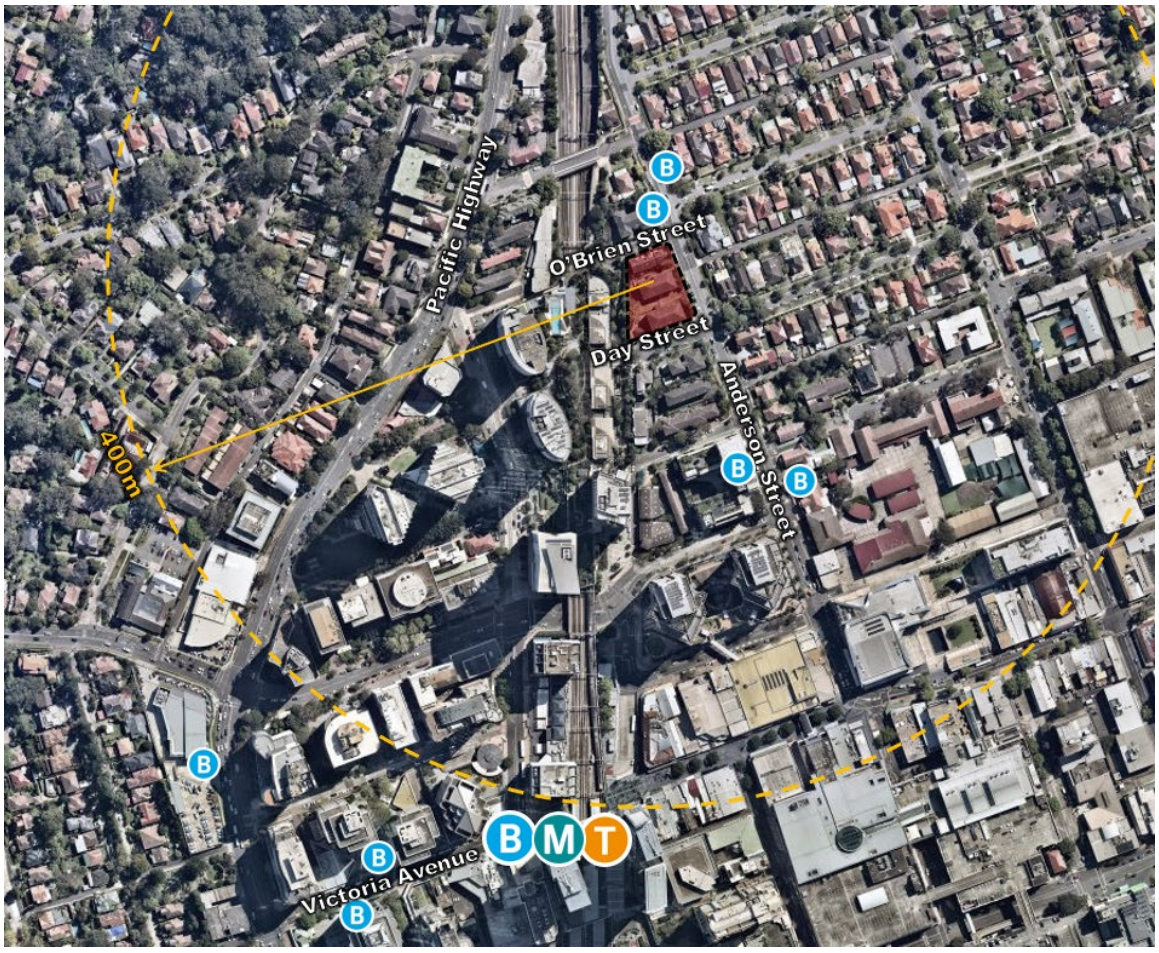


Figure 4 Public transport availability near the site

Sydney Metro is a major public transport infrastructure project currently in the construction phase within proximity of the subject site. The Sydney Metro City and Southwest metro line which opened in August 2024 provides for significantly improved connectivity from the southwest and Sydney CBD to Chatswood and the northwest. The expansion of the Sydney Metro network has further enhanced public transport accessibility to the site and reduced car reliance for residents and employees of the Chatswood CBD.

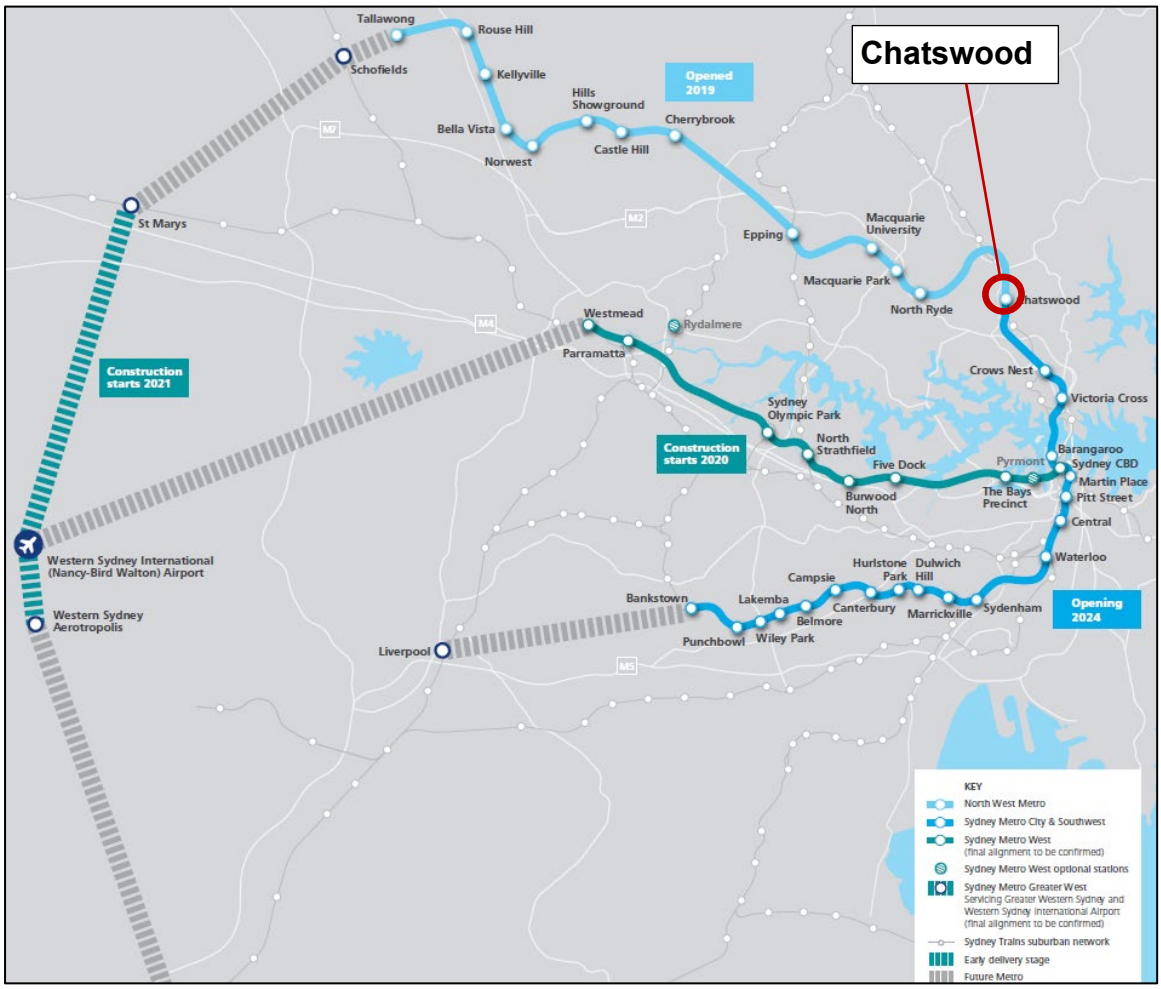


Figure 5 Sydney Metro network

Source: Transport for NSW

2.6 Pedestrian and cycling network

There is a well established network of pedestrian facilities in the vicinity of the site, with paved footpaths provided on both sides of all adjacent roads. The site also benefits from being surrounded by a number of on and off-road bicycle routes as shown in Figure 6 below. This includes an on-road bicycle route along Anderson Street adjacent to the site which provides a connection through to the Chatswood transport interchange.

Figure 6 Existing cycling routes

3 Transport Assessment

3.1 Vehicle site access

Under the SSDA a single point of access to the site would be provided by Day Street at the south-western end of the site as shown in Figure 7 – complying with the requirements of the site specific DCP. This access point has been selected to minimise conflicts with pedestrians and general traffic along Anderson Street, as well as to not impact a proposed future enhancement by Council of the Anderson Street cycleway.

The vehicle access would be via a single driveway, facilitating independent two-way traffic movements and allowing access into the basement of the site from which the loading dock and car park can be accessed. This complies with the site specific DCP and objectives of Council's 2036 CBD Planning and Urban Design Strategy, which recommends that vehicle entry points to a site are to be rationalised to minimise streetscape impact.

The vehicle access point has been designed in accordance with the design requirements set out in the relevant Australian Standard, namely AS2890.1:2004 and AS2890.2:2018. Vehicle swept paths indicating the entry and exit of vehicles from the site is provided on the following pages. This demonstrates the design makes appropriate provision for a 10.5m long Council waste truck to pass a B99 passenger vehicle entering and exiting the site.

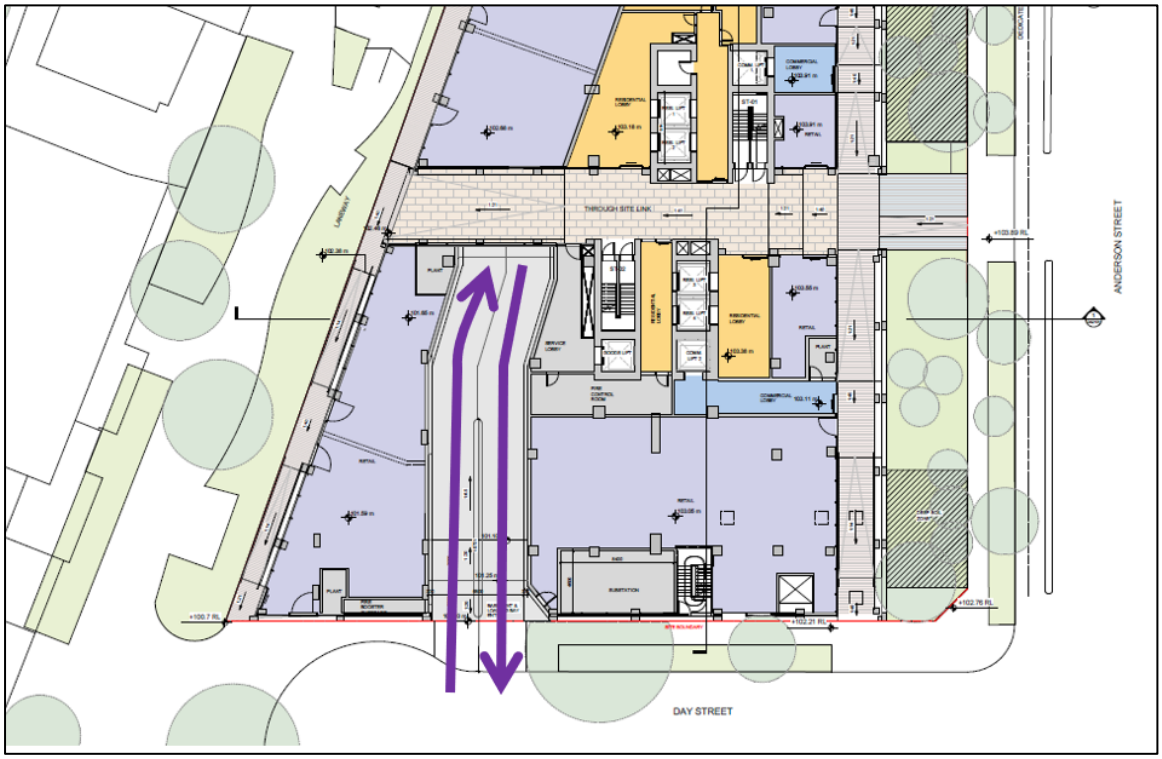


Figure 7 Proposed vehicle site access point

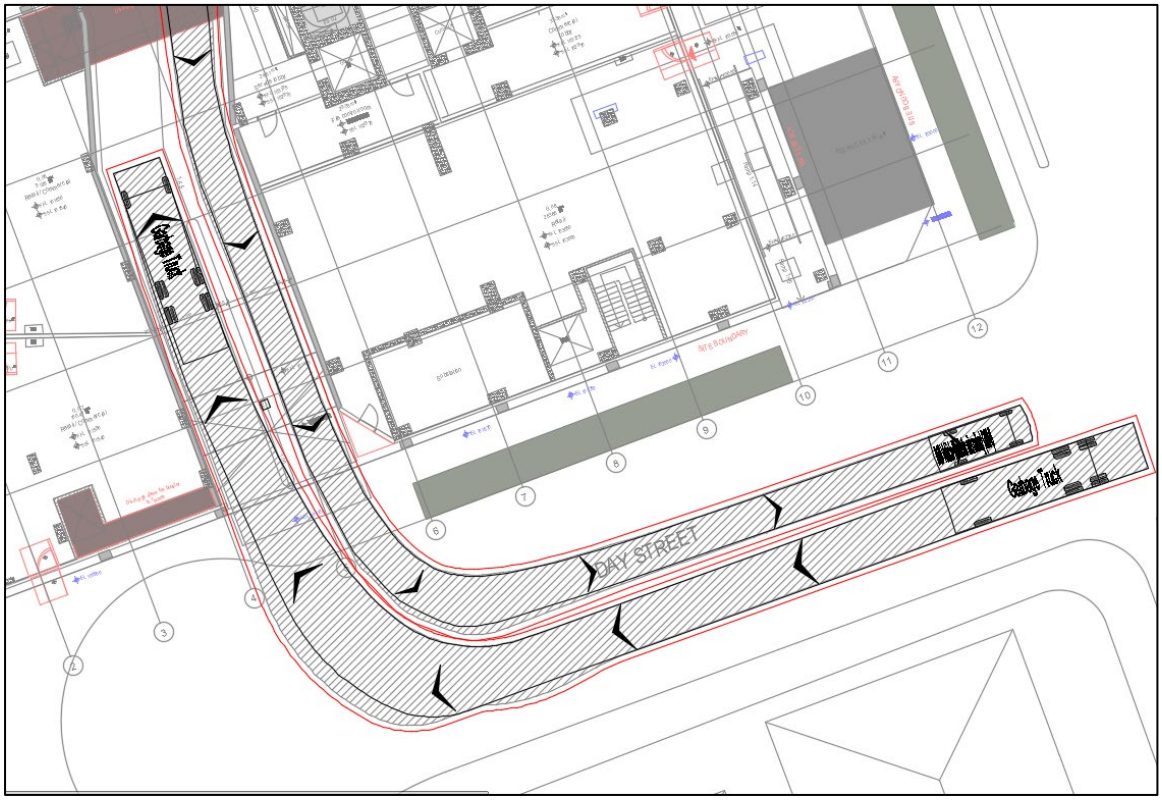


Figure 8 Swept paths – Council waste truck passing B99 passenger car

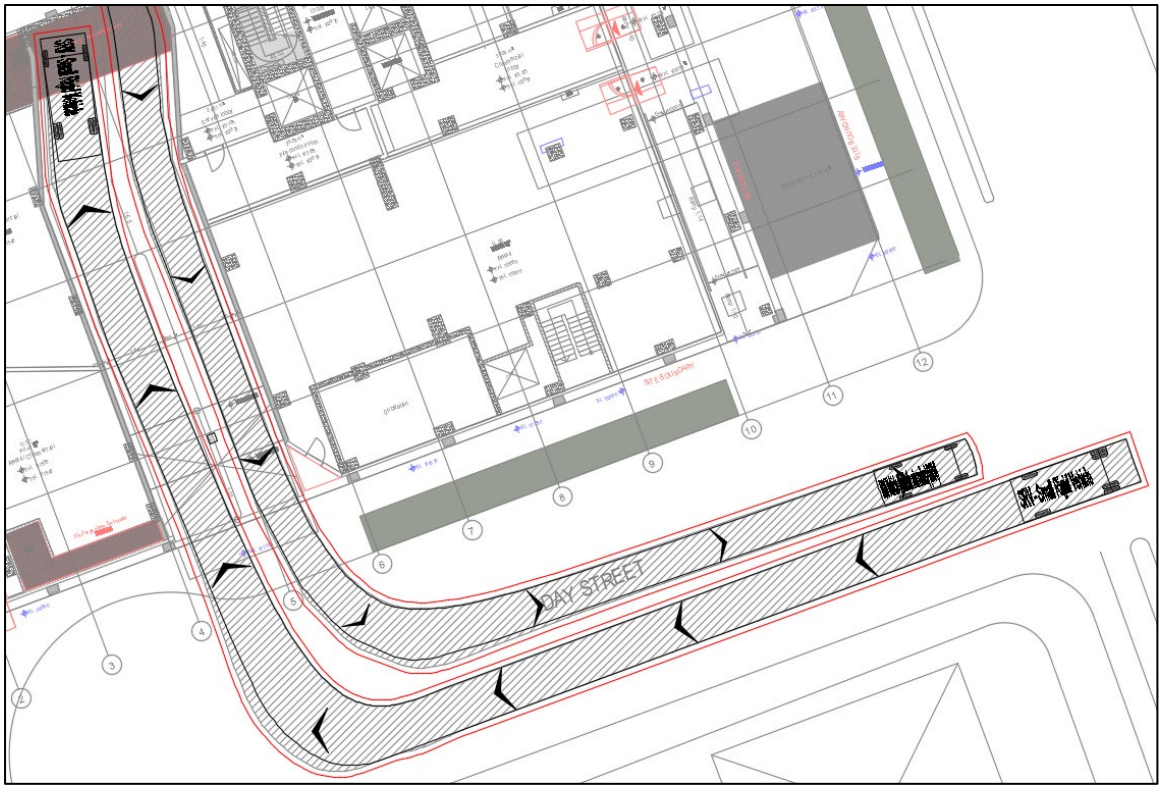


Figure 9 Swept paths – SRV passing B99 passenger car

3.2 Car park design

The car park has been designed in accordance with AS2890.1 with respect to ramp gradients, circulation aisle widths and car space dimensions. A review of the plans has found that the car park layout complies with the requirements of AS2890.1-2004 for all uses. Relevant dimensions provided include:

- Residential parking areas - aisles minimum 5.8 metres wide with parking spaces 2.4 metres wide by 5.4 metres long
- Residential visitor / commercial parking areas - aisles minimum 5.8 metres wide with parking spaces 2.5 metres wide by 5.4 metres long

The main entry ramp has a 5% gradient for the first 6m beyond the property boundary in accordance with AS2890.1. The following vehicle clearance heights will be provided in the on-site car parking areas to accommodate the safe movement of vehicles:

- 4.5m clearance height within the loading dock to accommodate a range of delivery vehicles including a Council waste collection vehicle.
- 2.2m clearance height within the basement levels, as per the requirements of AS2890.1. The exception to this will be a 2.5m clearance height above accessible car parking spaces and adjoining shared areas as required under AS2890.6.

Swept path analysis indicating the arrangements for internal vehicle circulation at basement level is provided in Figure 10.

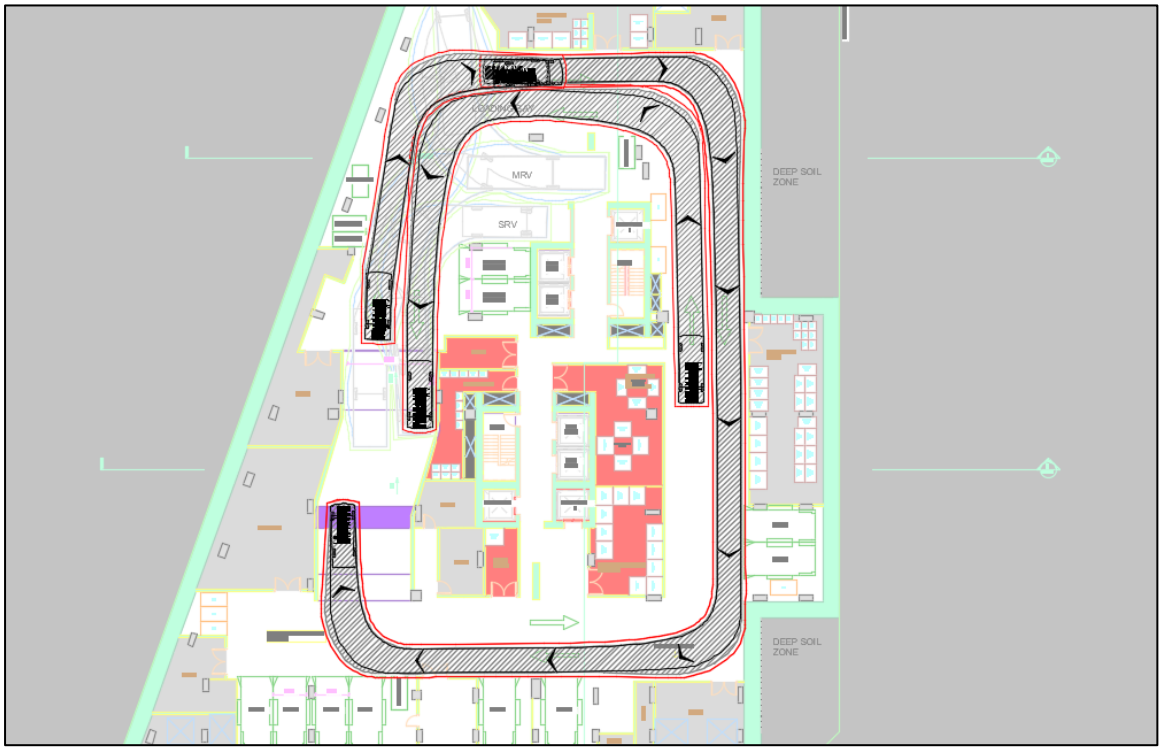


Figure 10 Vehicle swept path analysis – basement level 01

3.3 Loading dock

The proposal includes an on-site loading dock which can accommodate a 10.5m Council Waste collection vehicle, Small Rigid Vehicle (SRV) and two vans/utes parked at any one time. The loading area will have a height clearance sufficient to meet the requirements of Council's waste collection vehicle. Following discussions with Council the loading dock has been designed to accommodate Council's large waste collection of 10.5m in length, which has the ability to enter and exit the site in a forwards direction. This loading provision is considered suitable to accommodate the needs of the site based on the proposal, as well as being consistent with the requirements outlined in the site specific DCP.

The loading dock is located in the basement of the building and has been designed to comply with the objectives of Council's 2036 CBD Planning and Urban Design Strategy, notably:

- All vehicles are to enter and exit the site in a forwards direction
- All commercial and residential loading / unloading is to occur on-site and not in public streets
- Floor space at ground level is to be maximised, with supporting functions such as car parking and loading located in basement levels
- The design does not rely on a mechanical solution (e.g. turntable) for loading and unloading, with vehicles able to efficiently manoeuvre within the site.

Vehicle swept paths have been developed to confirm the suitability of the design to accommodate the movement of MRVs and 10.5m waste collection vehicles within the basement of the building, with these swept paths provided on the following page of this document.

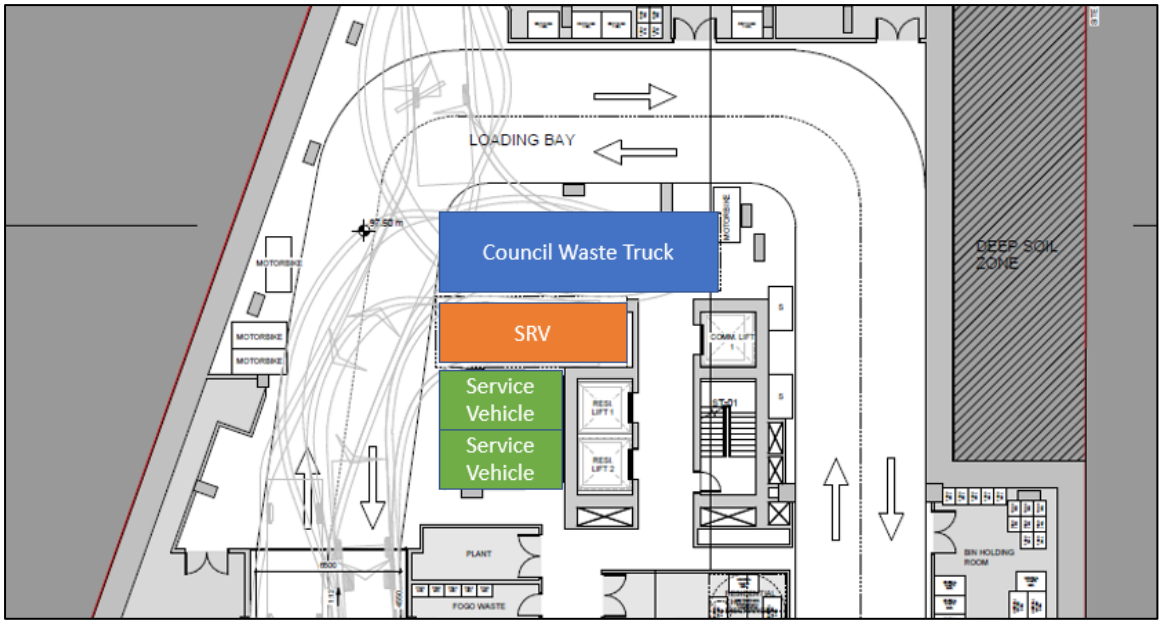


Figure 11 On-site loading dock

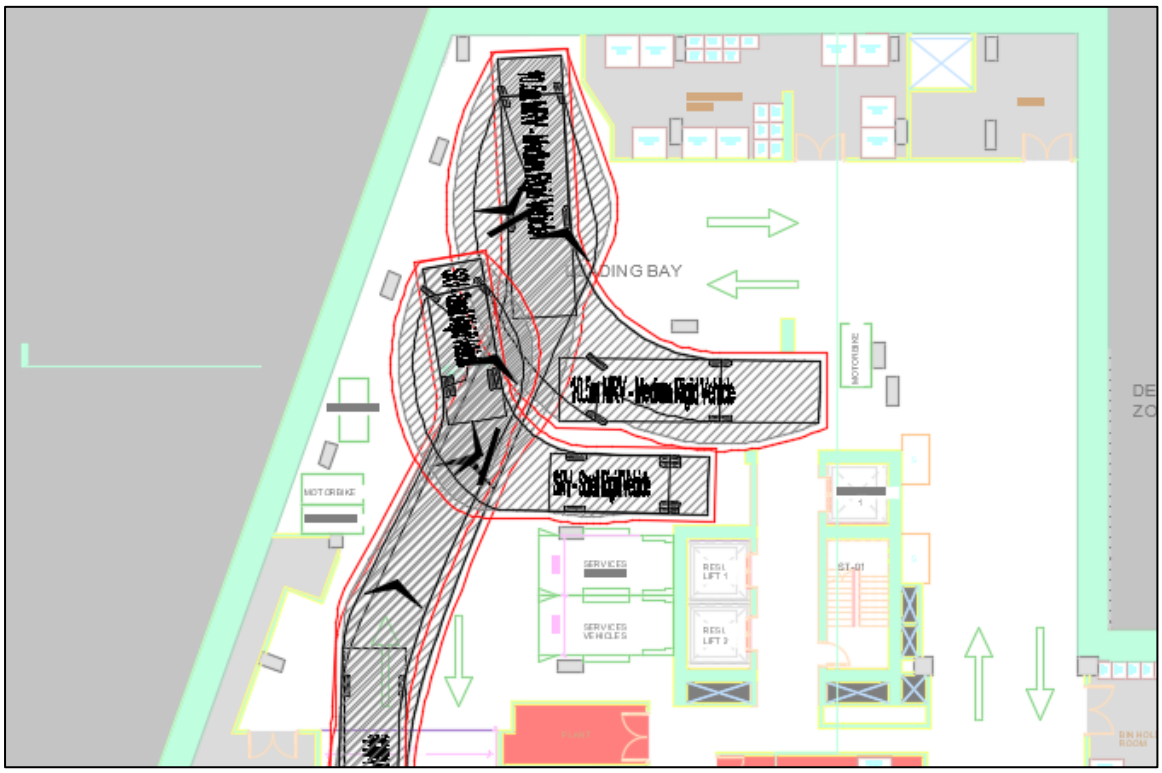


Figure 12 Loading dock swept paths -truck entry

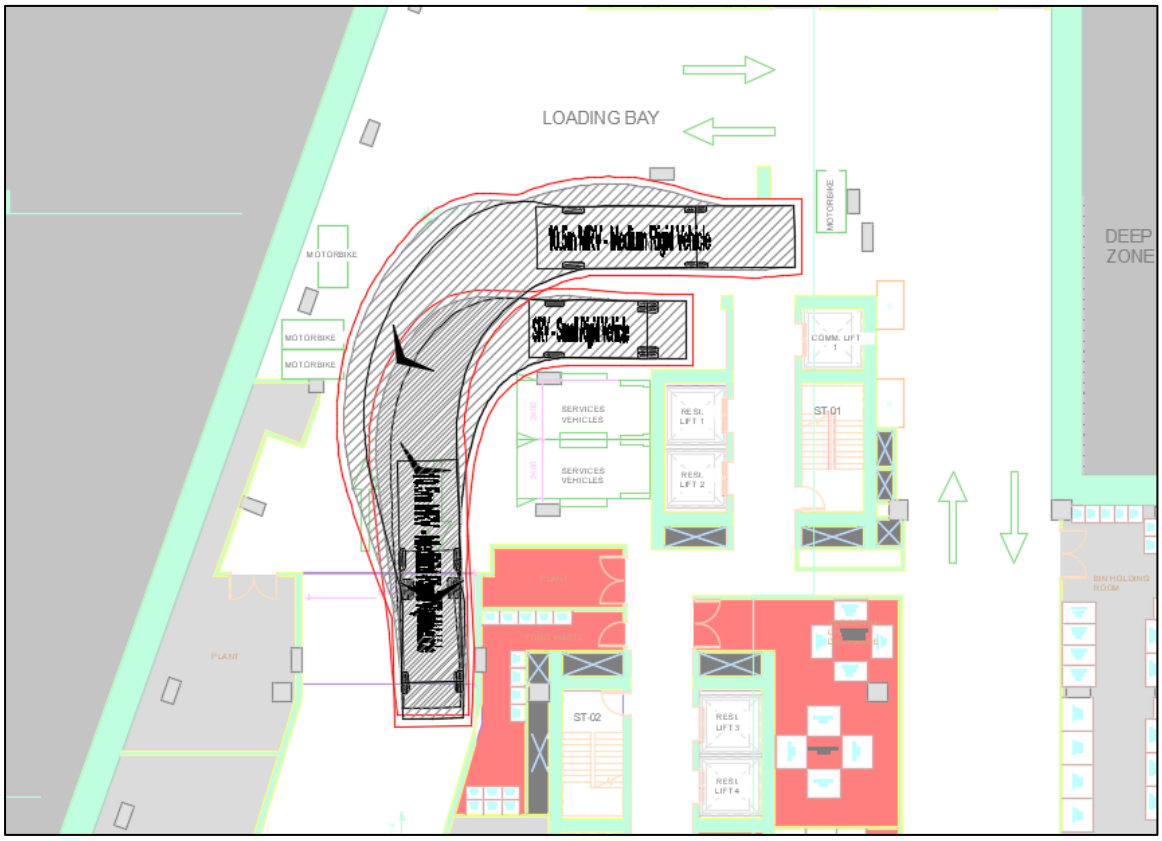


Figure 13 Loading dock swept paths – truck exit

3.4 Car parking supply

3.4.1 Residents

Based guidance for in-fill affordable housing noted in Part 2, Division 1 of the Housing SEPP 2021, a consent authority may not refuse an in-fill affordable housing development, if the following **minimum** parking requirements met:

(i) For dwellings used for affordable housing

- For each dwelling containing 1 bedroom – at least 0.4 parking spaces
- For each dwelling containing 2 bedrooms – at least 0.5 parking spaces
- For each dwelling containing at least 3 bedrooms – at least 1 parking space

(ii) For dwellings not used for affordable housing

- For each dwelling containing 1 bedroom – at least 0.5 parking spaces
- For each dwelling containing 2 bedrooms – at least 1 parking spaces
- For each dwelling containing at least 3 bedrooms – at least 1.5 parking spaces.

Car parking for residential uses is to be provided in accordance with the minimum parking rates noted in the SEPP as summarised below in Table 2. This demonstrates that the proposed residential car parking provision is compliant with the minimum parking requirements for in-fill affordable housing noted in Part 2, Division 1 of the Housing SEPP 2021.

Table 2 Car parking – residential uses

Type		No. of units	Parking Requirements		Proposed Parking
			Minimum Parking Rate	Minimum No. of Spaces	
Non-Affordable Housing	1 bed	0	0.5	131	**256**
	2 bed	0	1.0		
	3/4 bed	87	1.5		
Affordable Housing	1 bed	9	0.4	22	
	2 bed	18	0.5		
	3/4 bed	9	1.0		
Total		**123**	**-**	**153**	

The proposed parking provision exceeds the minimum Housing SEPP requirements for residents. This higher car parking provision is considered acceptable from a traffic impact perspective for the following reasons:

- Rates of car ownership for residents of Chatswood have been steadily increasing over the past 15 years, rising between 2001 and 2016. At the same time however private vehicle use for journey to work trips has decreased. This trend, as shown in Figure 14, indicates that car ownership does not necessarily lead to car usage in the busy commuter peak periods for areas well served by public transport such as Chatswood, particularly given that the subject site is located close to the Chatswood transport interchange. It can therefore be applied that the majority of cars within the development will only generate trips occasionally and be generally on a discretionary basis - mostly outside of commuter peak periods and will not impact the operation of the road network during the busiest times of the day.

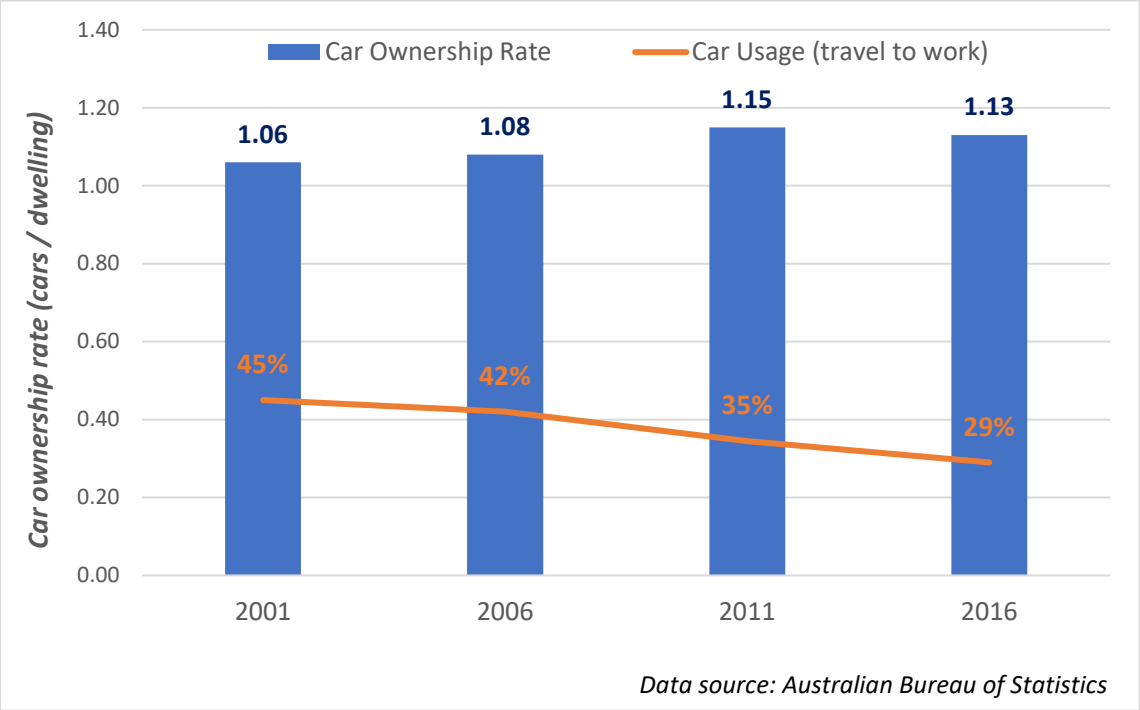


Figure 14 Car ownership vs car usage - residents of Chatswood

- The majority of residents will use their cars on a discretionary basis and undertake trips outside of busy road network periods. Recent surveys undertaken by TfNSW for high density residential developments across Sydney demonstrate this is the case, with no relationship at all between the rate of car parking and the rate of traffic generation. If more car spaces did equate to more traffic movements there should be a linear relationship on the graph shown in Figure 15 – instead the marker points are scattered with no direct relationship between car parking rates and traffic movements. his data, based on independent surveys of residential buildings in Sydney, provides evidence to reinforce the idea that car parking spaces for residential uses with good public transport access do not adversely impact the surrounding road network.

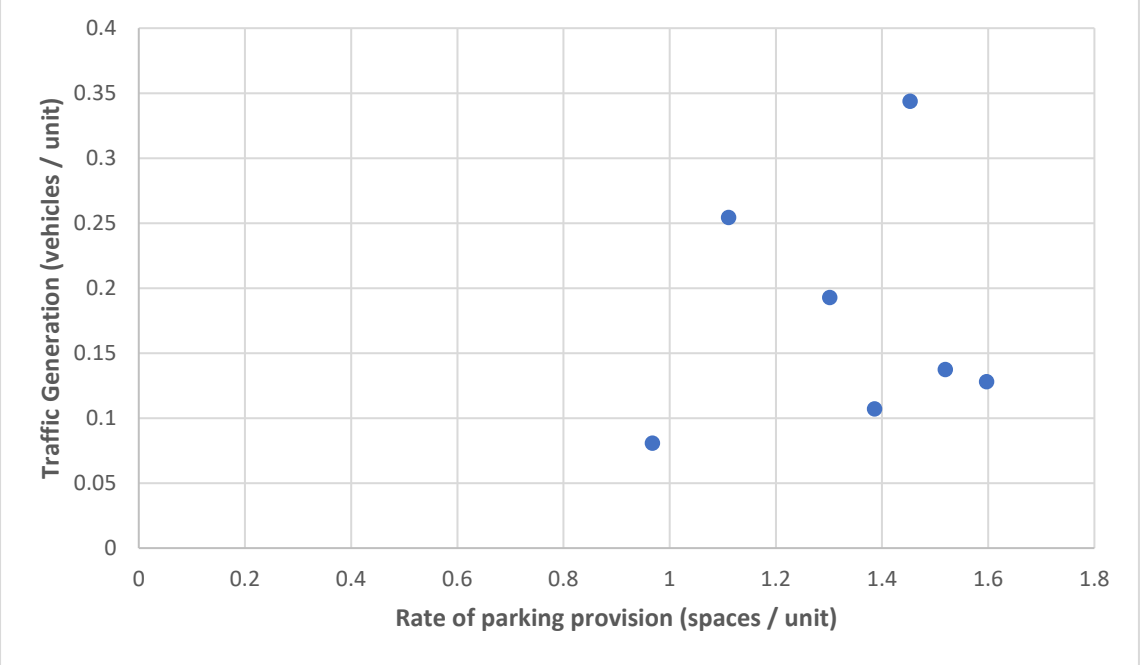


Figure 15 Traffic movements vs car parking provision – sites in Sydney

Source: Transport for NSW

- The site is located adjacent to Chatswood transport interchange which provides frequent and fast services, which will encourage public transport use to and from the site during the busy road network peak hours.
- A reduced parking provision, lower than the demand generated by future residents, may result in overflow parking impacts on local streets in the surrounding area and limit the available parking supply for adjacent residents and businesses. Residents forced to park on local streets creating additional traffic circulation and congestion within Chatswood as they drive around local streets in search of an available parking space.

3.4.2 Residential visitors

The Willoughby DCP specifies a maximum car parking rate for residential visitors of one space per 7 apartments. Based on the 123 apartments to be provided the development should provide between 0 and 18 residential visitor parking spaces. The proposal complies with this requirement by providing for 18 parking spaces for residential visitors.

3.4.3 Non-residential uses

Car parking for the non-residential uses within the site is provided in accordance with the maximum car parking rates identified in the Willoughby DCP as follows:

- Commercial: 1 space per 400m^2 GFA
- Retail: 1 space per 70m^2 GFA

22 parking spaces for the retail and commercial uses are provided which complies with the maximum parking rates in the Willoughby DCP.

3.5 Motorcycle parking

The Willoughby Council DCP requires that motorcycle parking be provided at a rate of one space per 25 car parking spaces. It is proposed to comply with this requirement by providing for 10 motorcycle parking spaces in the basement.

3.6 Cycling

The site specific DCP outlines minimum bicycle parking requirements for the subject site. Table 3 summarises the bicycle parking provision based on the proposed development yields. The proposal includes bicycle parking consistent with the requirements of the site specific DCP for all site users. Bicycle parking for residents is provided in individual storage cages for each unit, consistent with the requirements of Class 1 bicycle parking facilities identified in AS2890.3.

Table 3 Bicycle parking requirements

Land Use	No. of units / GFA	Bicycle parking rate	Bicycle parking requirement	Spaces provided
Residential	123 units	1 / unit	123	123
Commercial / Retail	2741m^2	1 / 100m^2	27	27
Total			**150**	**150**

It is noted that Council are currently investigating upgrading the existing cycleway along Anderson Street adjacent to the site. This would take the form of a separated bi-directional cycleway on the western side of Anderson Street including a potential widening of Anderson Street to support provision of acceptable widths for kerbside parking, bicycle lanes and traffic lanes. The design, by providing for vehicle access from Day Street and no vehicle access from Anderson Street, ensures that any future cycleway would not be impacted.

3.7 Accessible car parking

The proposal provides for accessible car parking spaces within the basement of the building. These accessible spaces have been designed in accordance with AS2890.6 including the provision of adjacent shared areas with clearance heights of 2.5m.

A minimum of one accessible car parking space has been allocated to each adaptable dwelling – exceeding the minimum requirements of the Willoughby DCP and aligning with best practice for accessible car parking. The provision of one accessible space per adaptable dwelling aligns with requirements in nearby Local Government Areas such as North Sydney and City of Sydney.

3.8 Forecast traffic generation

Transport for NSW (formerly Roads and Maritime) published a Technical Direction that described vehicular trip rates for residential developments. These surveys highlighted those developments in the Chatswood area demonstrated one of the lower traffic generation rates during the morning and evening peak hours. In this regard, the associated residential traffic generation rates adopted for the assessment are as follows:

Residential

- AM Peak hour: 0.14 trips per unit
- PM Peak hour: 0.12 trips per unit

Commercial

- AM Peak hour: 0.31 trips per parking space
- PM Peak hour: 0.24 trips per parking space

Retail

- AM Peak hour: 0.5 trips per parking space
- PM Peak hour: 1.0 trips per parking space

The analysis has also considered the traffic movements arising from the existing 31 medium density residential apartments on the site.

The forecast traffic generation arising from the development application is summarised in Table 4 below.

Table 4 Forecast traffic generation

Use	Number	Unit	Rate (per unit or parking space)		Vehicle trips	
			AM peak hour	*PM peak hour*	*AM peak hour*	*PM peak hour*
Future Residential	123	Apartments	0.14	0.12	17	15
Future Commercial	4	Parking spaces	0.31	0.24	1	1
Future retail	18	Parking spaces	0.50	1.0	9	18
Existing site	31	Units	0.40	0.40	-12	-12
Net trips generated					**15**	**22**

3.9 Road network impacts

As indicated in Figure 16 the expected traffic generation arising from the current proposal is considerably less than that envisaged at the time of the Planning Proposal submission and approval for the site. This confirms that the Development Application will not result in any additional impacts on the surrounding road network compared with that contemplated at the time of the Planning Proposal.

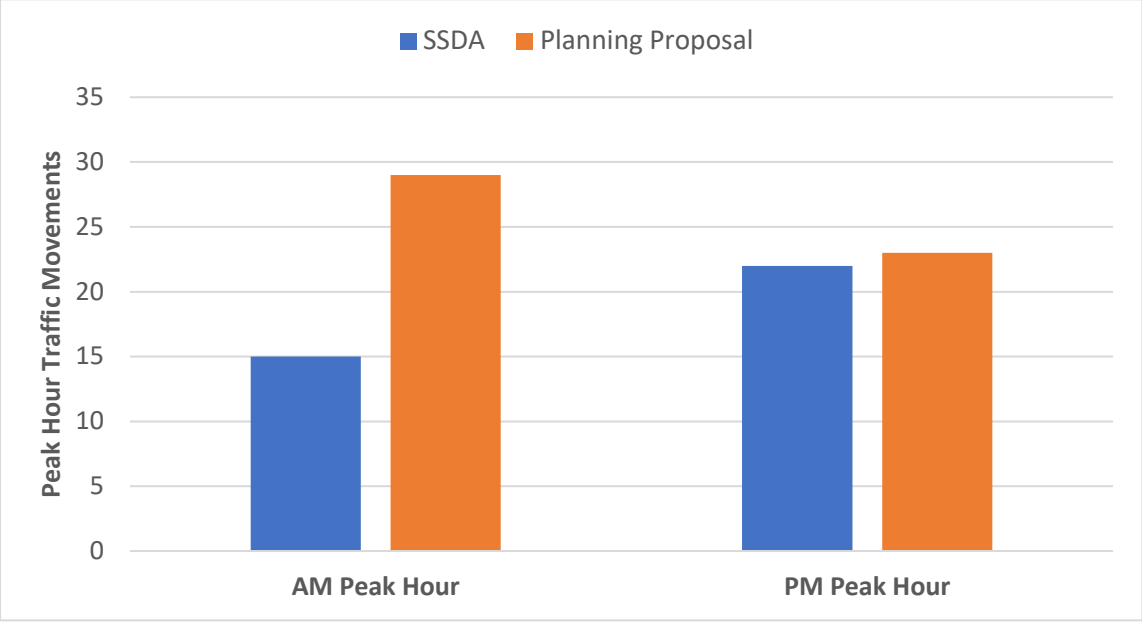


Figure 16 Traffic generation comparison

It is also important to recognise that the site at 44-52 Anderson Street was considered as part of a broader strategic transport strategy undertaken to support the Chatswood CBD Planning and Urban Design Strategy (CCPUDS). The strategic transport study, undertaken by Arup on behalf of Willoughby City Council, considered potential new development within the Chatswood CBD consistent with the planning controls proposed in the CCPUDS. This included a Floor Space Ratio (FSR) of 6:1 for the subject site, consistent with the controls included as part of this Planning Proposal.

Detailed traffic analysis was undertaken to support the strategic transport study utilising Transport for NSW's Strategic Travel Model. This analysis was undertaken for both the future years 2026 and 2036, taking into consideration the level of development envisaged in the CBD as permissible under the proposed planning controls. The study concluded that "*most links are operating with a LoS C or better*" and "*generally internal links within the CBD have acceptable Levels of Service*".

As indicated in Figure 17, Anderson Street adjacent to the subject site is forecast to operate at between 39% and 71% of its capacity in the future year 2036 following the full development of the CBD. Importantly the strategy did not identify that the future development planned for the Chatswood CBD would have a detrimental impact on the road network.

Notwithstanding that the traffic impacts of the proposal have been considered acceptable as part of the site specific planning proposal, further traffic analysis has been undertaken at the intersection of Anderson Street and Day Street to understand the potential traffic impacts. This analysis considers:

- Existing conditions (based on traffic counts undertaken in February 2024)
- Future conditions without the development
- Future conditions with the development. A higher rate of traffic generation, taking into consideration the proposed level of car parking, has been accounted for in this scenario.

The outcomes of the analysis are presented in Appendix A and demonstrate the Anderson Street / Day Street will continue to operate at a strong **Level of Service A** following the introduction of the proposal and allowing for background traffic growth on the surrounding road network of 2% per annum over a 10 year period.

The proposal is forecast to generate only 10 additional vehicle trips in the AM peak hour and 16 vehicle trips in the PM peak hour. In this context, combined with the traffic modelling findings indicating the Day Street / Anderson Street intersection continuing to perform at Level of Service A, no traffic mitigation measures are considered necessary. Traffic modelling outputs are provided as Appendix A of this document.

In this context the road network impacts of the proposal are considered acceptable with no further mitigation measures required..

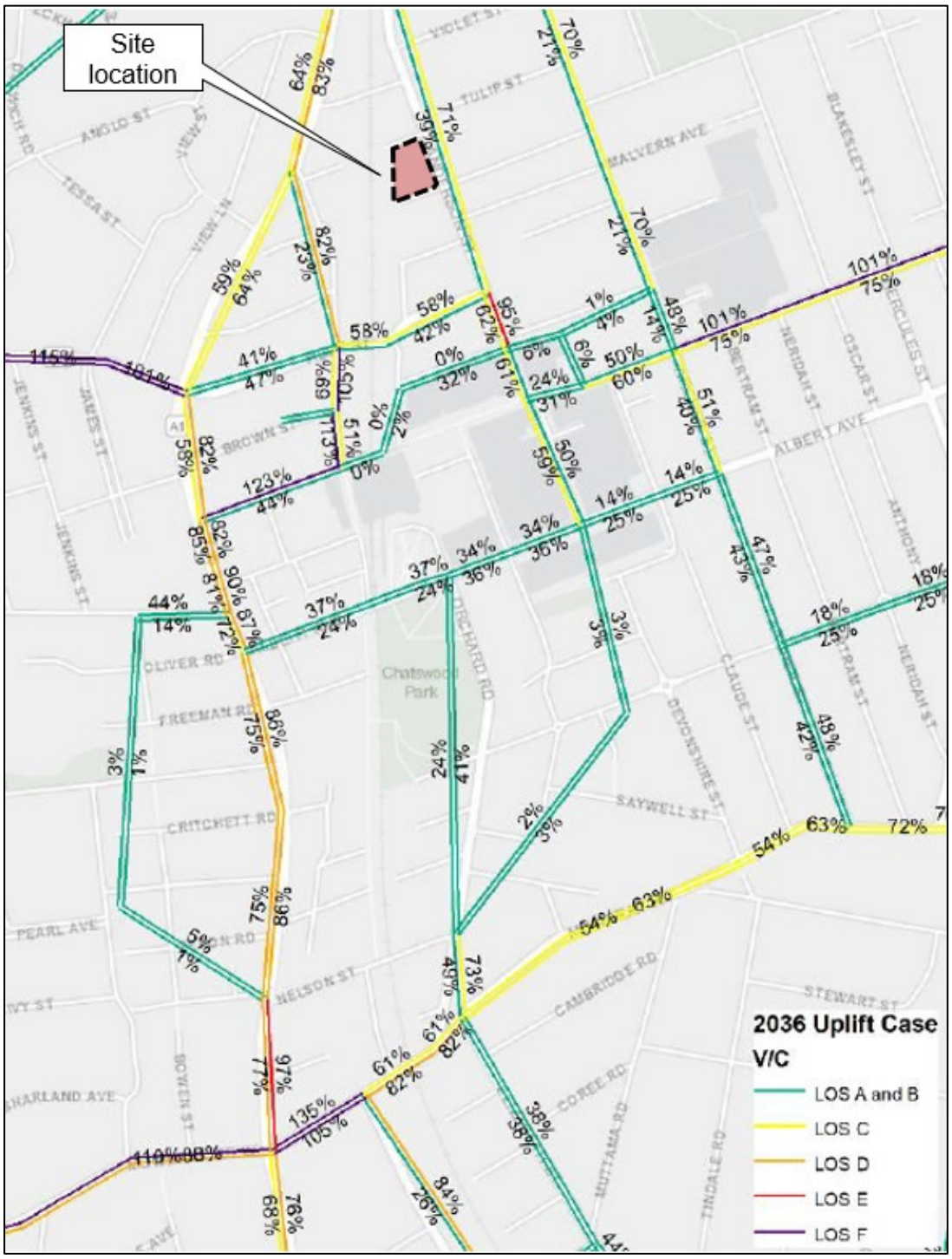


Figure 17 Future (2036) road network performance

Image source: Chatswood CBD strategic transport study (2020), modified by JMT Consulting

4 Preliminary Green Travel Plan

4.1 GTP purpose

This report includes a preliminary Green Travel Plan (GTP) identifying some key items that could be included in a more detailed plan to be completed prior to the initial opening of the development. A more detailed GTP will be prepared prior to occupancy which reflects the needs of the users of the building and outlines contemporary transport conditions. The requirement for the preparation of a detailed GTP prior to occupation is commonplace in major developments such as the subject site and can be reinforced through an appropriately worded condition of consent.

4.2 GTP overview

A Green Travel Plan is a package of measures put in place by the development occupants to try and encourage more sustainable travel. It is a means for a development to demonstrate a commitment and take a pro-active step towards improving the environmental sustainability of its activities.

More generally, the principles of a GTP are applied to all people travelling to and from a site. Government authorities are placing increasing emphasis on the need to reduce the number and lengths of motorised journeys and in doing so encourage greater use of alternative means of travel with less negative environmental impacts than the car.

4.3 GTP objectives

A GTP is a package of measures aimed at promoting and encouraging sustainable travel and reducing reliance on the private car. The GTP for the site will assist in reducing car reliance by promoting alternative, sustainable modes of travel. The GTP aims to encourage and support the broader use of sustainable travel options by the community in carrying out their daily activities.

Sustainable travel options include active transport (including travel by foot, bicycle and other non-motorised vehicles) and public transport. The GTP focuses on minimising the impact of events on the local and wider transport network and encourages those accessing the site to do so by sustainable modes of transport, thereby reducing car dependency for residents, staff and visitors of the site.

The key objectives of the GTP are to:

- Achieve a high modal share for public transport, cycling and walking journeys for residents, staff and visitors of the site;
- Reduce private vehicle dependency as a means of access to the site;
- Ensure adequate facilities are provided at the site to enable users to travel by sustainable transport modes; and

- Raise awareness of, and actively encourage the use of, sustainable transport amongst users.

4.4 Mode share targets

The aim of the GTP is to encourage a modal shift away from private vehicles by implementing measures that influence the travel patterns of residents living at the site. The implementation of the GTP would be regularly monitored to ensure that the GTP is having the desired effect. The success of the GTP is measured by setting modal share targets and identifying the measures and actions that have the greatest impact.

The mode share targets have been set based on the site's location near the Chatswood transport interchange – therefore having strong access to public transport, employment and general services. Bicycle parking will be provided for building staff, with complementary end of trip facilities, and therefore this mode of transport is expected to increase compared to current conditions. All residents will also be provided with secure bicycle parking facilities. The overall mode share targets for the site are summarised in Table 5 below.

Table 5 Mode share targets

Mode of travel	Existing Mode Share		Target Mode Share	
	Residents	*Employees*	*Residents*	*Employees*
Car driver	12%	36%	7%	31%
Car passenger	2%	1%	2%	1%
Bus	4%	9%	5%	10%
Train / Metro	49%	41%	53%	45%
Walk	32%	11%	32%	11%
Other	1%	2%	1%	2%
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**

4.5 Design initiatives

A number of initiatives have been incorporated within the design of the building to promote travel by sustainable modes and reduce car dependency – in line with the objectives of the GTP. These design measures include:

- Provision of publicly accessible car share spaces within the basement of the building.
- Bicycle parking for residents, staff and visitors in line with the minimum requirements outlined in the Willoughby DCP.
- End of trip facilities (showers, lockers, change areas) for staff of the building.
- Pedestrian through site links to open up the ground plane and support improved permeability and accessibility within the site.
- Motorcycle parking within the basement of the car park to support travel via this mode of transport.
- Strong access to nearby public transport including bus stops and Chatswood Transport interchange.

4.6 Potential strategies

A suite of potential measures is described below to be implemented as part of the GTP, which can be developed further as the development progresses.

Table 6 List of potential GTP measures

Action	Responsibility
Cycling	
Provide sufficient cycle parking to meet needs, which is easily accessible and secure	Developer
Provide adequate cycle parking facilities for visitors	Developer
Ensure cycle parking is clearly visible or provide signage to direct people to cycle bays	Building manager
Produce a map showing cycle routes and bike stands in the area	Building manager
Supply a communal toolkit for staff consisting of puncture repair equipment, a bike pump, a spare lock and lights.	Building manager
Promote the participation in annual events such as 'Ride to Work Day'	Tenants
Walking	
Identify tenants living near work that may be interested in walking to work	Building manager
Identify through the travel survey what incentives might need to be put in place for non-walkers to consider a mode shift	Building manager
Public Transport	
Develop a map showing public transport routes in the area	Building manager
Put up a noticeboard with leaflets and maps showing the main public transport routes to and from the site	Building manager

Action	Responsibility
Carshare / Carpooling	
Establish a car pooling program to help people find someone to share in their daily commute. Engagement with car share operators (e.g. Go Get) will take place closer to the initial occupancy of the development to confirm there is market demand for these spaces.	Building manager and tenants
Develop a map showing car-share spots in the area to encourage staff and visitors to use a shared car (e.g. GoGet) if they are required to drive	Building manager and tenants
General actions	
Promotion including: (iii) Allow staff the flexibility to commute outside peak periods to reduce overall congestion and travel time. (iv) Identify a tenant/champion to complete travel coordinator duties (v) Provide a welcome pack upon initial occupation of each tenant which includes details around sustainable travel options	Tenants

The information provided within the GTP will be provided to residents staff and visitors in the form of a package of easy to understand travel information known as a Transport Access Guide (TAG).

TAGs provide customised travel information for people travelling to and from a particular site using sustainable forms of transport – walking, cycling and public transport. It provides a simple quick visual look at a location making it easy to see the relationship of site to train stations, light rail stations, bus stops and walking and cycling routes. Such TAGs encourage the use of non-vehicle mode transport and can reduce associated greenhouse gas emissions and traffic congestion while improving health through active transport choices.

They can take many forms from a map printed on the back of business cards or brochures. Best practice suggests that the information should be as concise, simple and site centred as possible and where possible provided on a single side/sheet. If instructions are too complex, people are likely to ignore them.

4.7 Management and monitoring

There is no standard methodology for the implementation and management of a GTP. However, the GTP will be monitored to ensure that it is achieving the desired benefits. The mode share targets set out in this document are used in this regard to ensure there is an overall goal in the management of the GTP.

The Plan is a 'living' document, so measures excluded at this time could be reconsidered or reintroduced at any time in the future. It is recognised that travel needs, and patterns will change, and new measures will become available. The Plan will be periodically reviewed to ensure that the objectives are being met.

The monitoring of the GTP would require travel surveys to be undertaken with a focus to establish travel patterns including mode share of trips to and from the site. It is anticipated that the first set of surveys would be undertaken within six months of first occupation to obtain the baseline mode shares for the site. Sample travel surveys for staff and residents of the building have been developed and are provided in Appendix B and C respectively.

Utilisation of bicycle parking and end of trip facilities will also provide a measure for monitoring the effectiveness of the plan – and enhance these facilities should monitoring determine that demand is exceeding supply. Additionally staff and visitor feedback on the bicycle parking and end of trip facilities should be gathered on an ongoing basis (e.g. through staff meetings) to understand any concern with the provision of bicycle facilities, with enhancements made based on the outcomes of this feedback and subsequent investigations.

5 Preliminary Construction Pedestrian Traffic Management Plan

5.1 Overview

For the purposes of the SSDA a preliminary Construction Pedestrian Traffic Management Plan (CTPMP) has been prepared. This preliminary CPTMP outlines the key principles for how construction may be carried out on the site, subject to further planning to be undertaken during subsequent stages of the project. As the project is in very early concept phase details around construction timeframes, methodology and processes are not yet clear.

Prior to the commencement of construction for the site, a detailed CPTMP will be prepared. This will be reinforced through an appropriately worded condition of consent, with the purpose of the CTPMP to assess the proposed access and operation of construction traffic associated with the proposed development with respect to safety and capacity. The Contractor will be responsible for preparing the CTPMP, ensuring the following are addressed:

- Proposed construction vehicle routes;
- Indicative construction programme;
- Expected construction vehicle types and volumes;
- Car parking arrangements and site access during construction;
- Safety measures to minimise impacts to pedestrians and cyclists; and

The Contractor will also be responsible for monitoring and coordinating all vehicles entering and exiting the site.

5.2 Working hours

Working hours will be confirmed at the time of the development of the detailed CPTMP however are envisaged to take place during the following hours:

- Monday to Saturday: 7am – 5pm
- Sunday / public holiday: No work

The appointed contractor will be responsible for instructing and controlling all subcontractors regarding the hours of work. Any work outside the approved construction hours would be subject to specific prior approval.

5.3 Construction traffic routes

The construction vehicles routes to be utilised for the construction of the site would be selected in order to:

- Maximise vehicle use to the State and Regional road network, and limit the extent of travel on residential streets;
- Avoid impacting concurrent construction projects in the vicinity of the site; and
- Minimise impacts to the public transport network and impacts through the heart of the Chatswood CBD.

The potential construction vehicle routes are illustrated in Figure 18 and include the following key roads:

- Fullers Road
- Pacific Highway
- Boundary Street
- Anderson Street

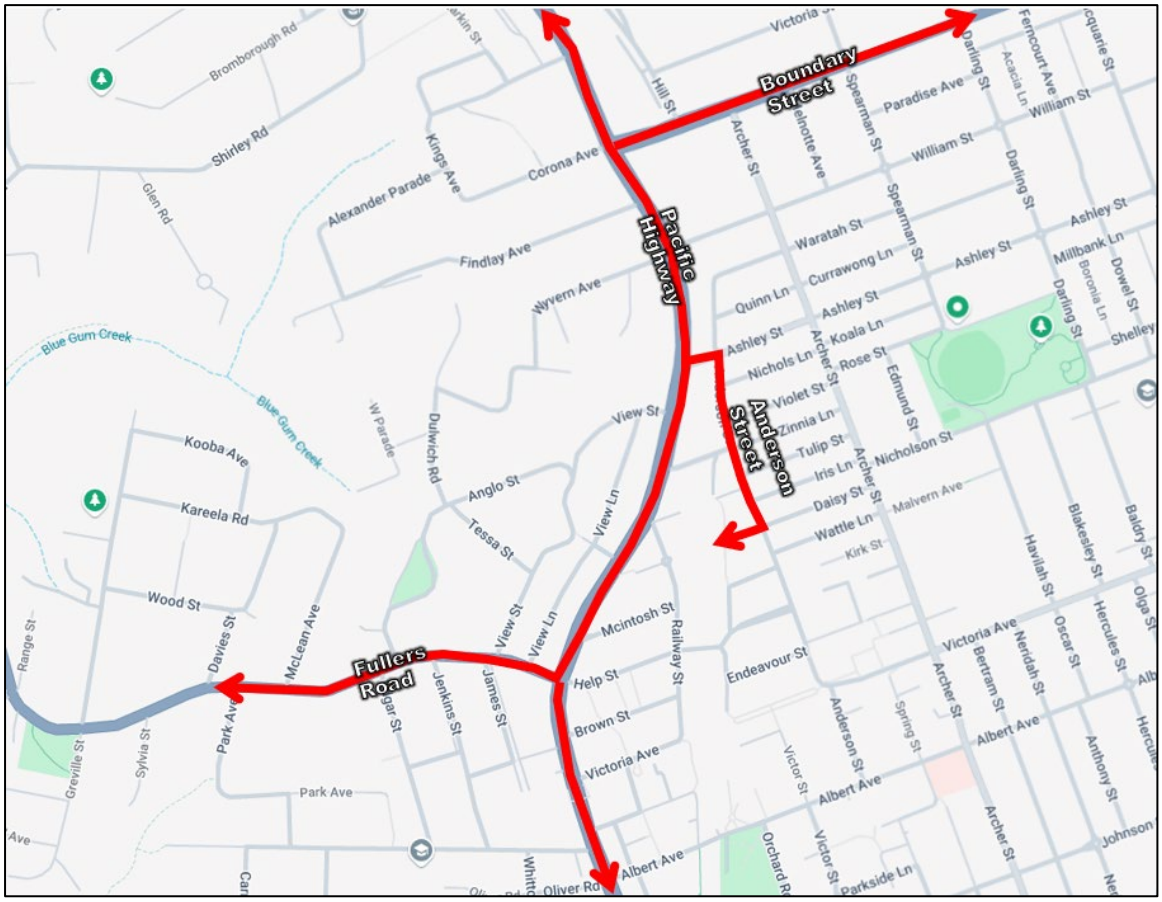


Figure 18 Construction vehicle routes

5.4 Construction vehicle volumes

The number of construction vehicles accessing the site on a typical day may be in the order of 30-40 vehicles or 4 to 5 vehicles per hour. This figure will be confirmed following the appointment of a contractor and will form part of the detailed CPTMP to be prepared prior to the commencement of construction. It should be noted however that the level of construction vehicle traffic will be less than that generated during the operational phase of the project.

As previously detailed in Section 3.9 of this document, the surrounding road network has the ability to accommodate this volume of traffic subject to appropriate management.

Trips generated by construction staff will typically be outside of the main road network peaks. The impact of construction traffic volumes on the external network is therefore expected to be low. The good availability of public transport in the area, particularly the Chatswood transport interchange, will encourage workers to minimise private vehicle use which will further reduce the impacts on the local road network.

5.5 Size and type of vehicles

The site will have various types of construction vehicles accessing the site, including:

- 19m Single Articulated Vehicles (AVs) and 19m Truck and Dog Trailers;
- 12.5m Heavy Rigid Vehicles (HRVs)
- 8.8m Medium Rigid Vehicles (MRVs)
- 6.5m Small Rigid Vehicles (SRVs);
- Utes/vans

The largest construction vehicles accessing the site on a typical day will include 19m Articulated Vehicles and Truck and Dog Trailers. Use of these longer vehicles are considered acceptable given that they will be primarily using arterial roads to access the site.

5.6 Impacts to pedestrians

Temporary fencing and hoardings will be installed along frontage of the works site to maintain pedestrian movements and ensure the safety of pedestrians walking adjacent to the construction site. Footpaths will remain open at all times to pedestrians and therefore minimal impacts are anticipated.

Traffic controllers will be positioned at vehicle site access points to manage interactions between vehicles and pedestrians on the adjoining footpaths. Traffic control plans detailing further measures to manage pedestrian safety will be provided as part of the detailed CPTMP to be prepared prior to the commencement of construction on the site.

5.7 Mitigation measures

Mitigation measures would be adopted during construction to ensure traffic movements have minimal impact on surrounding land uses and the community in general, and may include the following:

- Trucks to minimise the use local streets for access to the construction site;
- Trucks to enter and exit the site in a forward direction;
- Pedestrians near the ingress/egress points will not be held unnecessarily.
- At construction vehicle access/egress points, priority is to be given to trucks accessing the site over trucks egressing the site so as to have no impact to traffic flow on surrounding roads (unless exceptional circumstances do not permit)
- Trucks to not circulate on the road network to wait to enter the site (unless exceptional circumstances do not permit)
- Restrict construction vehicle activity to designated routes which do not utilise any local roads;
- Truck drivers will be advised of the designated truck routes to/ from the site;
- Construction access from the external road network to mainly occur at signalised intersection;
- Pedestrian movements adjacent the construction site will be managed and controlled by site personnel where required;
- Pedestrian warning signs and construction safety signs/devices to be utilised in the vicinity of the site and to be provided in accordance with WorkCover requirements;
- Construction activity to be carried out in accordance with approved hours of work;
- Truck loads would be covered during transportation off-site;
- Activities related to the construction works would not impede traffic flow along adjacent roads;
- Construction vehicles not to queue on adjacent streets
- During site induction, workers will be informed of the existing bus, train and light rail network servicing the site; and
- Development and enforcement of driver charter.

These mitigation measures will be further developed as the project progresses and outlined in detail in the CPTMP to be prepared prior to the commencement of construction.

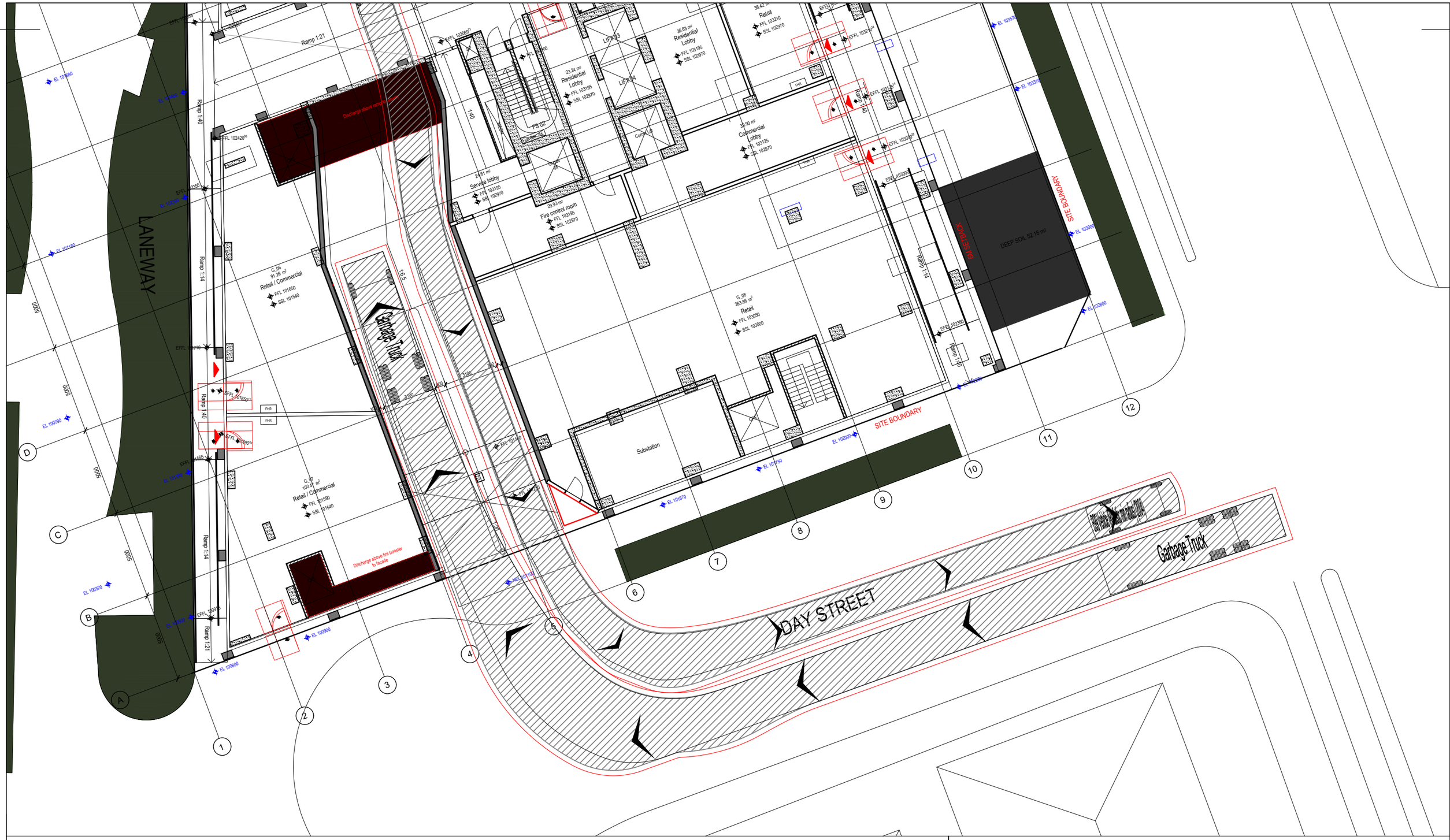
6 Summary

This transport impact assessment report has been prepared by JMT Consulting on behalf of Bridgestone Projects to support a State Significant Development Application for the site at 44-52 Anderson Street, Chatswood. Key findings of the assessment are as follows:

- Under the proposal a single point of access for vehicles would be provided off Day Street to minimise conflicts with pedestrians and general traffic along Anderson Street, as well as to not impact a proposed future enhancement by Council of the Anderson Street cycleway. This access arrangements complies with the requirement of the site specific DCP.
- The proposal includes a loading dock located within the basement of the building, with the design not reliant on a mechanical solution (e.g. turntable) for loading and unloading and still facilitating vehicle entry and exit in a forwards direction.
- The proposal provides for car parking consistent with the minimum requirements of the Housing SEPP 2021 (for residential uses) and the Willoughby DCP (for residential visitor and commercial/retail uses).
- The site is located in close proximity to various public transport facilities, including Chatswood transport interchange and nearby bus stops, thus any future development is not expected to not generate significant traffic impacts.
- Analysis indicates that the net increase in traffic as a result of the proposal is limited to approximately 20 vehicles per hour in the busiest times of the day. This increase in traffic has been considered as part of the broader Chatswood CBD strategic transport study which considered all potential new developments in the CBD. Traffic modelling undertaken for this SSDA confirms that the adjacent intersection of Anderson Street and Day Street will continue to perform at a strong 'Level of Service A;.
- Secure bicycle parking is provided in line with rates specified in the site specific DCP.
- Travel demand management measures have also been suggested to improve the mode share of public transport and active transport. These items should be considered further prior to the initial occupancy of the building.

In the above context, the traffic and transport impacts arising from the proposal are considered acceptable.

Appendix A: Swept Path Analysis



Job Title

44-52 Anderson Street, Chatswood
Development Application

Client

Bridgestone Projects

JMT Consulting
ABN: 32 6358 30054
www.jmtconsulting.com.au
PO Box 99, Kingsford NSW 2032

Drawing Title

Turning Paths
Ground Floor

Drawing No

2070_01

Date

23.10.24

Legend

- Body Envelope
- 300mm Envelope
- Wheel Envelope

Job No

2070

Scale at A3

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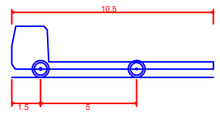
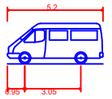
Vehicle type(s)



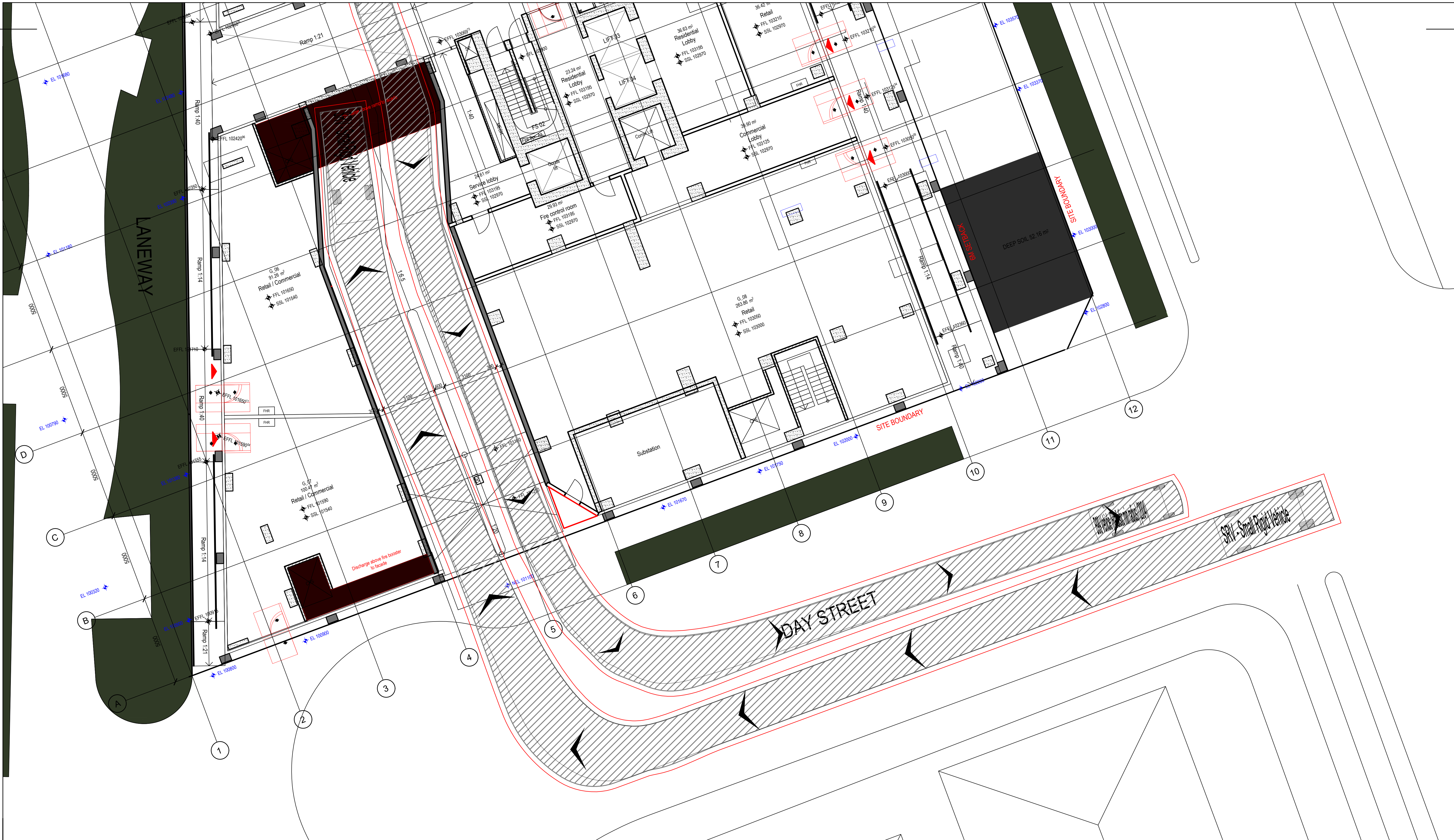
10.5m MRV - Medium Rigid Vehicle

Overall Length	10.500m
Overall Width	2.500m
Overall Body Height	2.662m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m



B99 Vehicle (8m min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	8.000m



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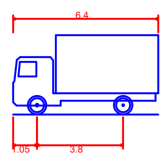
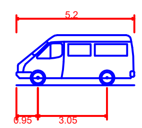


SRV - Small Rigid Vehicle	
Overall Length	6.400m
Overall Width	2.330m
Overall Body Height	3.500m
Min Body Ground Clearance	0.398m
Track Width	2.330m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	7.100m



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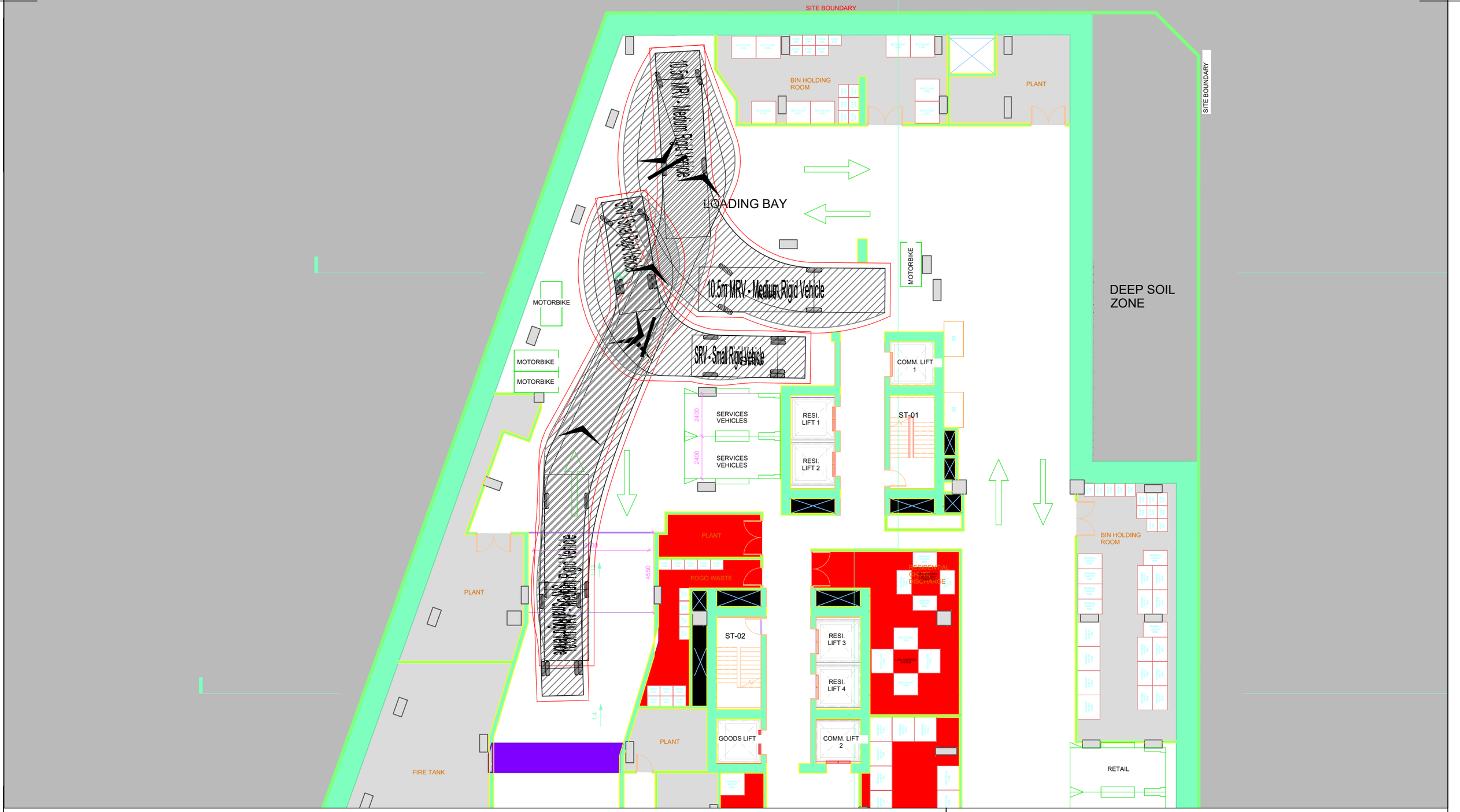

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Date

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Legend

Body Envelope
300mm Envelope
Wheel Envelope

Job No

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Scale at A3

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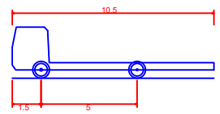
Vehicle type(s)



10.5m MRV - Medium Rigid Vehicle

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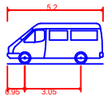
Overall Body Height	2.662m
Min Body Ground Clearance	0.428m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10.000m



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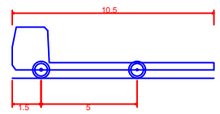

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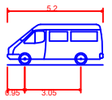

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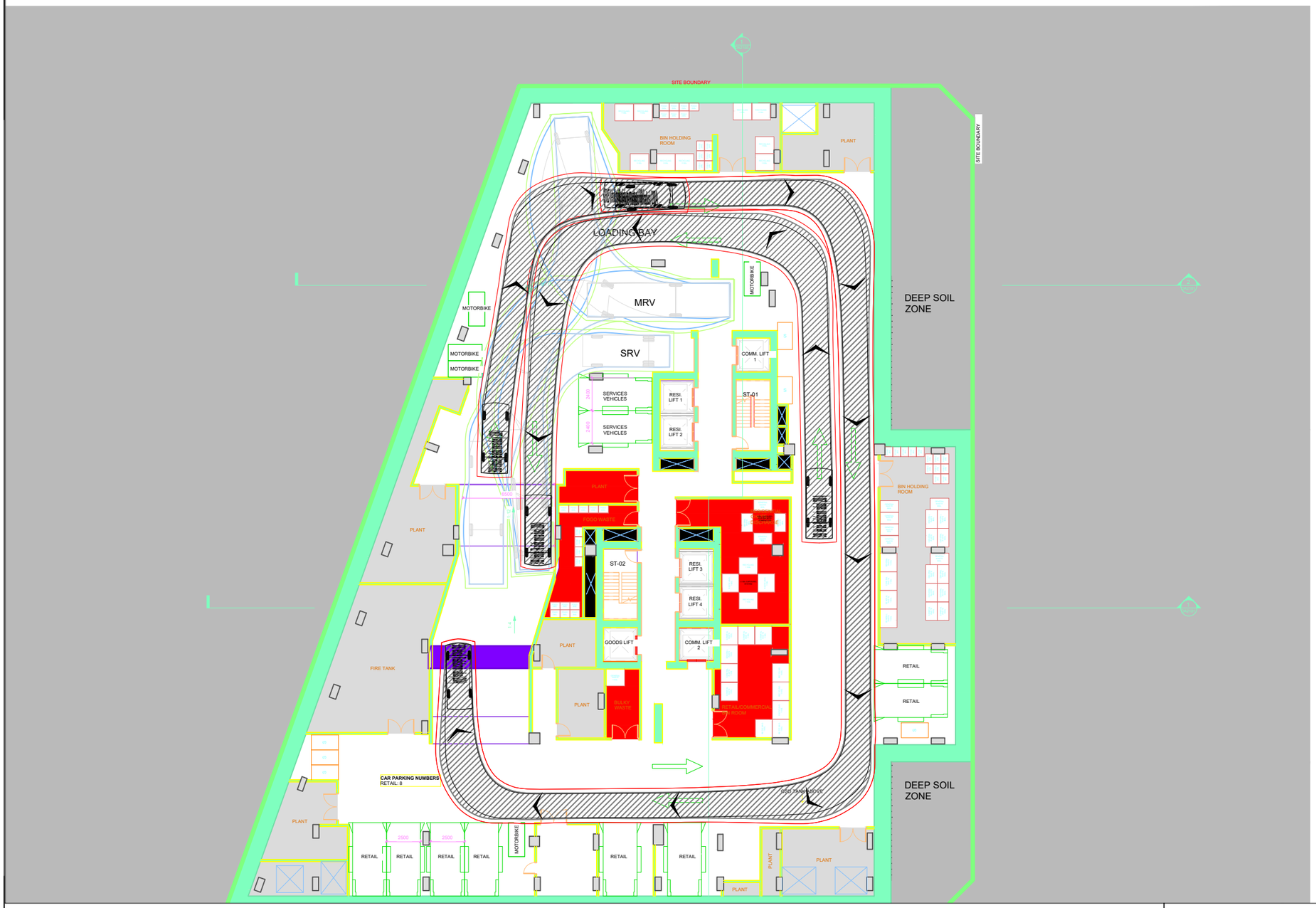

KEY PLAN

- RESIDENTIAL LOBBY / AMENITY
- 1 BEDROOM APARTMENT
- 2 BEDROOM APARTMENT
- 3 BEDROOM APARTMENT
- 4 BEDROOM APARTMENT
- RETAIL
- COMMERCIAL
- PRIVATE AMENITY
- END OF TRIP
- PLANT
- POOL
- AMENITY
- S STORAGE
- SITE BOUNDARY

Job Title

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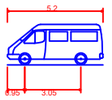

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Appendix B: Traffic Modelling Outputs

MOVEMENT SUMMARY

Site: 101 [AM Existing (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	13	0.0	13	0.0	0.184	5.5	LOS A	0.8	5.8	0.30	0.37	0.30	54.4
2	T1	All MCs	167	14.5	167	14.5	0.184	0.0	LOS A	0.8	5.8	0.30	0.37	0.30	56.7
3	R2	All MCs	93	0.0	93	0.0	0.184	8.3	LOS A	0.8	5.8	0.30	0.37	0.30	54.2
Approach			273	8.9	273	8.9	0.184	3.1	NA	0.8	5.8	0.30	0.37	0.30	55.7
East: Daisy Street (E)															
4	L2	All MCs	77	0.0	77	0.0	0.074	6.4	LOS A	0.3	2.0	0.36	0.60	0.36	51.9
5	T1	All MCs	3	0.0	3	0.0	0.074	6.9	LOS A	0.3	2.0	0.36	0.60	0.36	52.3
6	R2	All MCs	6	0.0	6	0.0	0.074	8.9	LOS A	0.3	2.0	0.36	0.60	0.36	51.6
Approach			86	0.0	86	0.0	0.074	6.6	LOS A	0.3	2.0	0.36	0.60	0.36	51.9
North: Anderson Street (N)															
7	L2	All MCs	13	0.0	13	0.0	0.144	5.5	LOS A	0.0	0.3	0.01	0.04	0.01	57.1
8	T1	All MCs	249	7.6	249	7.6	0.144	0.0	LOS A	0.0	0.3	0.01	0.04	0.01	59.6
9	R2	All MCs	3	0.0	3	0.0	0.144	6.4	LOS A	0.0	0.3	0.01	0.04	0.01	56.8
Approach			265	7.1	265	7.1	0.144	0.3	NA	0.0	0.3	0.01	0.04	0.01	59.4
West: Day Street (W)															
10	L2	All MCs	8	0.0	8	0.0	0.022	6.1	LOS A	0.1	0.5	0.40	0.59	0.40	51.3
11	T1	All MCs	1	0.0	1	0.0	0.022	6.7	LOS A	0.1	0.5	0.40	0.59	0.40	51.7
12	R2	All MCs	8	0.0	8	0.0	0.022	9.3	LOS A	0.1	0.5	0.40	0.59	0.40	51.1
Approach			18	0.0	18	0.0	0.022	7.6	LOS A	0.1	0.5	0.40	0.59	0.40	51.2
All Vehicles			642	6.7	642	6.7	0.184	2.5	NA	0.8	5.8	0.19	0.27	0.19	56.5

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [AM Existing + Growth (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	15	0.0	15	0.0	0.227	5.5	LOS A	1.0	7.6	0.35	0.41	0.35	54.3
2	T1	All MCs	201	14.5	201	14.5	0.227	0.0	LOS A	1.0	7.6	0.35	0.41	0.35	56.5
3	R2	All MCs	111	0.0	111	0.0	0.227	9.2	LOS A	1.0	7.6	0.35	0.41	0.35	54.0
Approach			327	8.9	327	8.9	0.227	3.4	NA	1.0	7.6	0.35	0.41	0.35	55.5
East: Daisy Street (E)															
4	L2	All MCs	92	0.0	92	0.0	0.095	6.6	LOS A	0.4	2.6	0.40	0.63	0.40	51.7
5	T1	All MCs	4	0.0	4	0.0	0.095	7.9	LOS A	0.4	2.6	0.40	0.63	0.40	52.1
6	R2	All MCs	8	0.0	8	0.0	0.095	10.1	LOS A	0.4	2.6	0.40	0.63	0.40	51.5
Approach			104	0.0	104	0.0	0.095	6.9	LOS A	0.4	2.6	0.40	0.63	0.40	51.7
North: Anderson Street (N)															
7	L2	All MCs	15	0.0	15	0.0	0.173	5.5	LOS A	0.0	0.4	0.02	0.04	0.02	57.1
8	T1	All MCs	299	7.6	299	7.6	0.173	0.0	LOS A	0.0	0.4	0.02	0.04	0.02	59.6
9	R2	All MCs	4	0.0	4	0.0	0.173	6.9	LOS A	0.0	0.4	0.02	0.04	0.02	56.8
Approach			318	7.1	318	7.1	0.173	0.3	NA	0.0	0.4	0.02	0.04	0.02	59.4
West: Day Street (W)															
10	L2	All MCs	10	0.0	10	0.0	0.030	6.2	LOS A	0.1	0.7	0.45	0.62	0.45	50.8
11	T1	All MCs	1	0.0	1	0.0	0.030	7.6	LOS A	0.1	0.7	0.45	0.62	0.45	51.2
12	R2	All MCs	10	0.0	10	0.0	0.030	10.6	LOS A	0.1	0.7	0.45	0.62	0.45	50.6
Approach			21	0.0	21	0.0	0.030	8.3	LOS A	0.1	0.7	0.45	0.62	0.45	50.7
All Vehicles			771	6.7	771	6.7	0.227	2.7	NA	1.0	7.6	0.22	0.29	0.22	56.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [AM Existing + Growth + Proposal (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	20	0.0	20	0.0	0.230	5.5	LOS A	1.0	7.7	0.35	0.41	0.35	54.2
2	T1	All MCs	201	14.5	201	14.5	0.230	0.0	LOS A	1.0	7.7	0.35	0.41	0.35	56.5
3	R2	All MCs	111	0.0	111	0.0	0.230	9.2	LOS A	1.0	7.7	0.35	0.41	0.35	53.9
Approach			332	8.7	332	8.7	0.230	3.4	NA	1.0	7.7	0.35	0.41	0.35	55.5
East: Daisy Street (E)															
4	L2	All MCs	92	0.0	92	0.0	0.095	6.6	LOS A	0.4	2.6	0.40	0.63	0.40	51.7
5	T1	All MCs	4	0.0	4	0.0	0.095	7.9	LOS A	0.4	2.6	0.40	0.63	0.40	52.1
6	R2	All MCs	8	0.0	8	0.0	0.095	10.3	LOS A	0.4	2.6	0.40	0.63	0.40	51.5
Approach			104	0.0	104	0.0	0.095	6.9	LOS A	0.4	2.6	0.40	0.63	0.40	51.7
North: Anderson Street (N)															
7	L2	All MCs	15	0.0	15	0.0	0.174	5.5	LOS A	0.1	0.5	0.02	0.04	0.02	57.1
8	T1	All MCs	299	7.6	299	7.6	0.174	0.0	LOS A	0.1	0.5	0.02	0.04	0.02	59.5
9	R2	All MCs	5	0.0	5	0.0	0.174	7.5	LOS A	0.1	0.5	0.02	0.04	0.02	56.8
Approach			320	7.1	320	7.1	0.174	0.4	NA	0.1	0.5	0.02	0.04	0.02	59.4
West: Day Street (W)															
10	L2	All MCs	25	0.0	25	0.0	0.055	6.2	LOS A	0.2	1.3	0.43	0.62	0.43	51.1
11	T1	All MCs	1	0.0	1	0.0	0.055	7.7	LOS A	0.2	1.3	0.43	0.62	0.43	51.5
12	R2	All MCs	16	0.0	16	0.0	0.055	10.8	LOS A	0.2	1.3	0.43	0.62	0.43	50.8
Approach			43	0.0	43	0.0	0.055	8.0	LOS A	0.2	1.3	0.43	0.62	0.43	51.0
All Vehicles			798	6.5	798	6.5	0.230	2.9	NA	1.0	7.7	0.23	0.30	0.23	56.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM Existing (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	11	0.0	11	0.0	0.176	5.5	LOS A	0.8	5.7	0.32	0.39	0.32	54.4
2	T1	All MCs	155	10.9	155	10.9	0.176	0.0	LOS A	0.8	5.7	0.32	0.39	0.32	56.6
3	R2	All MCs	92	1.1	92	1.1	0.176	8.5	LOS A	0.8	5.7	0.32	0.39	0.32	54.0
Approach			257	7.0	257	7.0	0.176	3.2	NA	0.8	5.7	0.32	0.39	0.32	55.6
East: Daisy Street (E)															
4	L2	All MCs	102	0.0	102	0.0	0.108	6.5	LOS A	0.4	3.0	0.39	0.62	0.39	51.8
5	T1	All MCs	4	0.0	4	0.0	0.108	7.1	LOS A	0.4	3.0	0.39	0.62	0.39	52.2
6	R2	All MCs	14	0.0	14	0.0	0.108	9.1	LOS A	0.4	3.0	0.39	0.62	0.39	51.5
Approach			120	0.0	120	0.0	0.108	6.8	LOS A	0.4	3.0	0.39	0.62	0.39	51.8
North: Anderson Street (N)															
7	L2	All MCs	7	0.0	7	0.0	0.155	5.5	LOS A	0.1	0.5	0.02	0.04	0.02	57.1
8	T1	All MCs	267	9.4	267	9.4	0.155	0.0	LOS A	0.1	0.5	0.02	0.04	0.02	59.6
9	R2	All MCs	6	0.0	6	0.0	0.155	6.7	LOS A	0.1	0.5	0.02	0.04	0.02	56.8
Approach			281	9.0	281	9.0	0.155	0.3	NA	0.1	0.5	0.02	0.04	0.02	59.5
West: Day Street (W)															
10	L2	All MCs	6	0.0	6	0.0	0.022	6.0	LOS A	0.1	0.5	0.42	0.59	0.42	51.3
11	T1	All MCs	3	0.0	3	0.0	0.022	6.7	LOS A	0.1	0.5	0.42	0.59	0.42	51.7
12	R2	All MCs	7	0.0	7	0.0	0.022	9.5	LOS A	0.1	0.5	0.42	0.59	0.42	51.0
Approach			17	0.0	17	0.0	0.022	7.7	LOS A	0.1	0.5	0.42	0.59	0.42	51.2
All Vehicles			675	6.4	675	6.4	0.176	2.8	NA	0.8	5.7	0.21	0.29	0.21	56.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM Existing + Growth (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	13	0.0	13	0.0	0.219	5.5	LOS A	1.0	7.4	0.37	0.43	0.37	54.2
2	T1	All MCs	186	10.9	186	10.9	0.219	0.0	LOS A	1.0	7.4	0.37	0.43	0.37	56.4
3	R2	All MCs	110	1.1	110	1.1	0.219	9.4	LOS A	1.0	7.4	0.37	0.43	0.37	53.8
Approach			308	7.0	308	7.0	0.219	3.6	NA	1.0	7.4	0.37	0.43	0.37	55.4
East: Daisy Street (E)															
4	L2	All MCs	123	0.0	123	0.0	0.141	6.8	LOS A	0.6	3.9	0.44	0.66	0.44	51.6
5	T1	All MCs	5	0.0	5	0.0	0.141	8.1	LOS A	0.6	3.9	0.44	0.66	0.44	52.0
6	R2	All MCs	16	0.0	16	0.0	0.141	10.4	LOS A	0.6	3.9	0.44	0.66	0.44	51.3
Approach			144	0.0	144	0.0	0.141	7.2	LOS A	0.6	3.9	0.44	0.66	0.44	51.6
North: Anderson Street (N)															
7	L2	All MCs	9	0.0	9	0.0	0.186	5.5	LOS A	0.1	0.6	0.03	0.04	0.03	57.1
8	T1	All MCs	321	9.4	321	9.4	0.186	0.0	LOS A	0.1	0.6	0.03	0.04	0.03	59.6
9	R2	All MCs	8	0.0	8	0.0	0.186	7.4	LOS A	0.1	0.6	0.03	0.04	0.03	56.8
Approach			337	9.0	337	9.0	0.186	0.3	NA	0.1	0.6	0.03	0.04	0.03	59.5
West: Day Street (W)															
10	L2	All MCs	8	0.0	8	0.0	0.030	6.1	LOS A	0.1	0.7	0.48	0.63	0.48	50.7
11	T1	All MCs	4	0.0	4	0.0	0.030	7.6	LOS A	0.1	0.7	0.48	0.63	0.48	51.1
12	R2	All MCs	9	0.0	9	0.0	0.030	11.0	LOS A	0.1	0.7	0.48	0.63	0.48	50.4
Approach			20	0.0	20	0.0	0.030	8.5	LOS A	0.1	0.7	0.48	0.63	0.48	50.7
All Vehicles			810	6.4	810	6.4	0.219	3.0	NA	1.0	7.4	0.24	0.31	0.24	56.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 101 [PM Existing + Growth + Proposal (Site Folder: Day Street / Anderson Street)]

Output produced by SIDRA INTERSECTION Version: 9.1.1.200

New Site
Site Category: (None)
Give-Way (Two-Way)
Design Life Analysis (Final Year): Results for 10 years

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Anderson Street (S)															
1	L2	All MCs	28	0.0	28	0.0	0.227	5.5	LOS A	1.1	7.8	0.37	0.44	0.37	54.1
2	T1	All MCs	186	10.9	186	10.9	0.227	0.0	LOS A	1.1	7.8	0.37	0.44	0.37	56.3
3	R2	All MCs	110	1.1	110	1.1	0.227	9.7	LOS A	1.1	7.8	0.37	0.44	0.37	53.7
Approach			323	6.6	323	6.6	0.227	3.8	NA	1.1	7.8	0.37	0.44	0.37	55.2
East: Daisy Street (E)															
4	L2	All MCs	123	0.0	123	0.0	0.142	6.8	LOS A	0.6	3.9	0.44	0.66	0.44	51.6
5	T1	All MCs	5	0.0	5	0.0	0.142	8.3	LOS A	0.6	3.9	0.44	0.66	0.44	52.0
6	R2	All MCs	16	0.0	16	0.0	0.142	10.6	LOS A	0.6	3.9	0.44	0.66	0.44	51.3
Approach			144	0.0	144	0.0	0.142	7.3	LOS A	0.6	3.9	0.44	0.66	0.44	51.6
North: Anderson Street (N)															
7	L2	All MCs	9	0.0	9	0.0	0.195	5.5	LOS A	0.2	1.4	0.06	0.08	0.06	56.9
8	T1	All MCs	321	9.4	321	9.4	0.195	0.0	LOS A	0.2	1.4	0.06	0.08	0.06	59.3
9	R2	All MCs	18	0.0	18	0.0	0.195	8.5	LOS A	0.2	1.4	0.06	0.08	0.06	56.5
Approach			347	8.7	347	8.7	0.195	0.6	NA	0.2	1.4	0.06	0.08	0.06	59.1
West: Day Street (W)															
10	L2	All MCs	14	0.0	14	0.0	0.047	6.1	LOS A	0.2	1.1	0.47	0.63	0.47	50.6
11	T1	All MCs	4	0.0	4	0.0	0.047	7.8	LOS A	0.2	1.1	0.47	0.63	0.47	51.0
12	R2	All MCs	14	0.0	14	0.0	0.047	11.3	LOS A	0.2	1.1	0.47	0.63	0.47	50.4
Approach			32	0.0	32	0.0	0.047	8.6	LOS A	0.2	1.1	0.47	0.63	0.47	50.6
All Vehicles			846	6.1	846	6.1	0.227	3.2	NA	1.1	7.8	0.26	0.34	0.26	55.8

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.