Transport Planning

26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd, St Leonards Proposed Residential Development

Traffic and Parking Assessment

26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd, St Leonards Proposed Residential Development

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1 Introduction

MLA Transport Planning (MLA) has been commissioned by Berry Road Development Pty Ltd to prepare this traffic and parking assessment report for a proposed residential development at Nos. 27-47 Berry Road, Nos. 26-50 Park Street and Nos. 48-54 River Road, St Leonards. It accompanies a development application to be submitted to Lane Cove Municipal Council.

The proposed development involves the demolition of all existing structures on the site and the construction in their place four residential buildings up to 12 storeys accommodating 306 apartments and a 4-level basement car park with 545 car parking spaces.

The subject site is located within an urban renewal area known as St Leonards South. Lane Cove Council prepared a planning proposal in 2018 to permit higher density residential development in the area. The planning proposal has been gazetted in November 2020 and Council has prepared and adopted development control plan for the overall St Leonards South precinct. The gazetted planning proposal is expected to deliver 2,000 additional dwellings. Land within the St Leonards South is proposed to be amalgamated into 23 areas to provide larger parcel of land to facilitate "*economic and aesthetic redevelopment while preventing land fragmentation or isolation that detracts from the desired future character of the precinct*". The subject site is the amalgamation of Nos. 27 to 47 Berry Road, Nos. 26 to 50 Park Street and Nos. 48 to 54 River Road to form Area Nos. 22 and 23 permitting buildings of up to 10 storeys with an open green space at the end of Berry Street, next to River Road.

The proposed development is consistent with the development anticipated for Area Nos. 22 and 23 (the subject site) as envisaged in the St Leonards South planning proposal.

This report assesses the transport, traffic and parking effects of the proposed development. The remainder of the report is set out as follows:

- Chapter 2 describes the existing conditions including a description of the subject site
- Chapter 3 outlines the planning proposal for the St Leonards South precinct
- Chapter 4 presents a brief description of the proposed development
- Chapter 5 assesses the proposed on-site parking provision and the design of the car parking spaces
- Chapter 6 examines the traffic generation and its effects, and
- Chapter 7 presents the summary and conclusion of the assessment.

This is a revised traffic and parking report assessing traffic and parking effects of the revised proposed development. The revised scheme predominantly involves modifications to the apartment layout and apartment mix to address Council's comments arising from the original DA submission. The number of apartments has been reduced from 314 to 306. The basement car park layout remains consistent with that proposed in the original DA scheme with the exception of the car park ramp beneath Building D providing access from B2 to B1 where it has been relocated to a different location.

2 Existing Conditions

2.1 Site Description

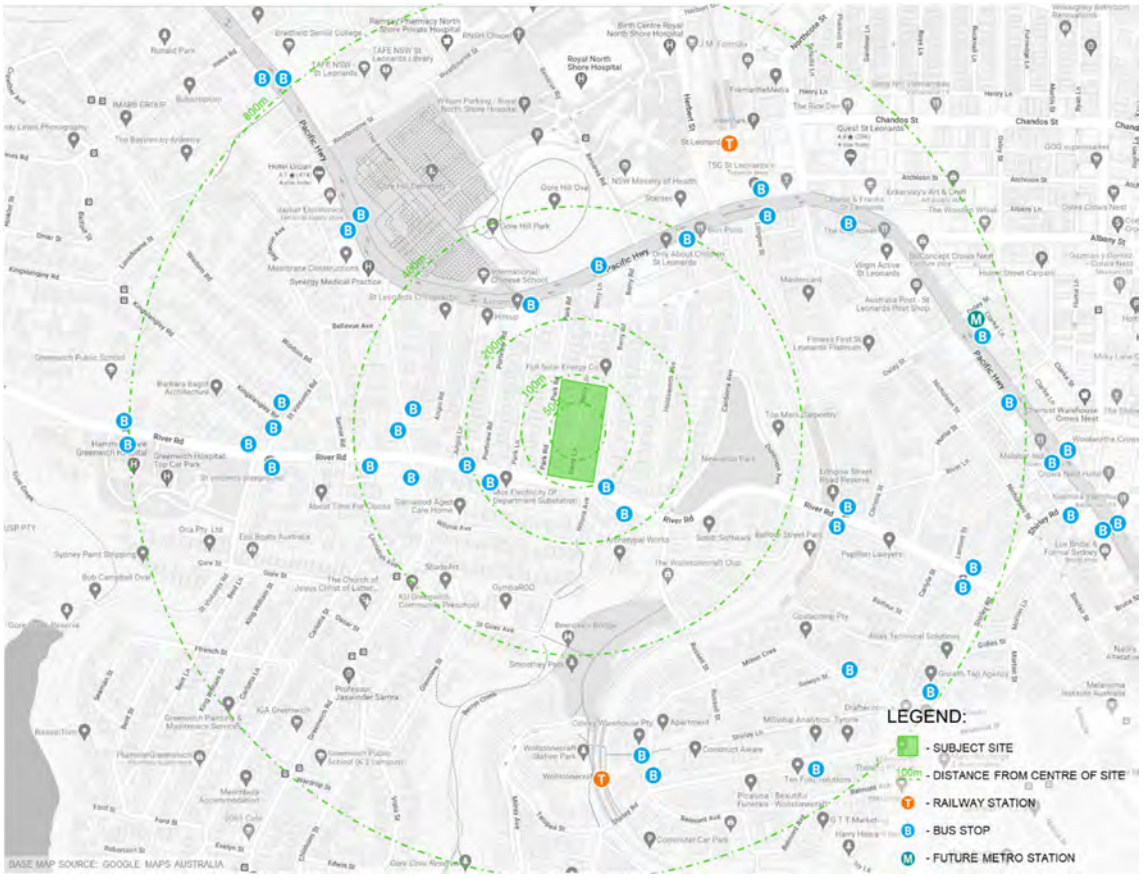
The subject site is located at Nos. 27-47 Berry Road, Nos. 26-50 Park Road, and Nos. 48-54 River Road, St Leonards. The legal descriptions of these properties are as follows:

- 27 Berry Rd, St Leonards – Lot 19 DP82696
- 29 Berry Rd, St Leonards – Lot 1 DP533847
- 31 Berry Rd, St Leonards – Lot 2 DP533847
- 33 Berry Rd, St Leonards – Lot 21 DP3044
- 35 Berry Rd, St Leonards – Lot 22 DP111237
- 37 Berry Rd, St Leonards – Lot 23 DP79978
- 39 Berry Rd, St Leonards – Lot 24 DP3044
- 41 Berry Rd, St Leonards – Lot 25 DP3044
- 43A Berry Rd, St Leonards – Lot 1 DP734702
- 43B Berry Rd, St Leonards – Lot 2 DP734702
- 45 Berry Rd, St Leonards – Lot 27 DP3044
- 47 Berry Rd, St Leonards – Lot 28 DP3044
- 26 Park Rd, St Leonards – Lot 44 DP3044
- 28 Park Rd, St Leonards – Lot 43 DP3044
- 30 Park Rd, St Leonards – Lot 5 DP305449
- 32 Park Rd, St Leonards – Lot 4 DP305449
- 34 Park Rd, St Leonards – Lot 3 DP305449
- 36 Park Rd, St Leonards – Lot 2 DP305449
- 38 Park Rd, St Leonards – Lot 1 DP305449
- 40A Park Rd, St Leonards – Lot 2 DP225445
- 40B Park Rd, St Leonards – Lot 3 DP225445
- 42A Park Rd, St Leonards – Lot 4 DP225445
- 42 Park Rd, St Leonards – Lot 37 DP666528
- 44 Park Rd, St Leonards – Lot 36 DP3044
- 46 Park Rd, St Leonards – Lot 351 DP848236
- 48 Park Rd, St Leonards – Lot 352 DP848236
- 50 Park Rd, St Leonards – Lot 1 DP225445
- 48 River Rd, St Leonards – Lot 29 DP72918

- 50 River Rd, St Leonards – Lot 1 DP1223070
- 52 River Rd, St Leonards – Lot 31 DP3044
- 54 River Rd, St Leonards – Null SP16063

The location of the subject site and its surrounding environs are shown in Figure 2.1.

Figure 2.1: Site Locality Plan



The subject site is located within the local government area of Lane Cove Municipal Council. The site is currently occupied by 31 low density dwelling houses.

The subject site is also located within the St Leonards South precinct for which a planning proposal to provide additional high density housing has been given approval with the local environmental plan and development control plan finalised.

The subject site is surrounded by low density detached dwellings on all sides. The entire area including the subject site is undergoing through an urban renewal process consistent with the St Leonards South planning proposal as noted previously. This development application is part of the renewal process relating to the subject site.

2.2 Road Network

The road network in the vicinity of the subject site includes Pacific Highway, River Road, Berry Road, Park Road, Holdsworth Avenue and Canberra Avenue. Below is a description of the local road network.

2.2.1 Pacific Highway

Pacific Highway is a declared State Road under the jurisdiction of Transport for New South Wales (TfNSW). It forms part of the arterial major road network linking the North Shore area and beyond to Sydney CBD via Sydney Harbour Bridge and Sydney Harbour Tunnel.

In the vicinity of the site, Pacific Highway is aligned in an east-west direction and is generally configured as a six-lane, divided two-way road except at Albany Road and Westbourne Road where a westbound lane has been dropped to provide an auxiliary right turn lane.

One hour parking is permitted within the kerbside lane on both sides of Pacific Highway outside of the peak periods (except at bus zones and "NO STOPPING" zones). In addition, T3 lane is implemented on the eastbound carriageway during the morning peak period (6:00am to 10:00am) and on the westbound carriageway during the evening peak period (3:00pm to 7:00pm).

Pacific Highway has a sign posted speed limit of 60km/hr.

2.2.2 River Road

River Road is a regional road maintained by Lane Cove Council with funding from TfNSW. It is generally aligned in an east-west direction. It connects to Pacific Highway to the east (via Shirley Road) and to Burns Bay Road to the west (via Northwood Road and River Road West). It is generally configured with one traffic lane and one parking lane in each direction, however at its intersection with Canberra Avenue the carriageway is reduced to one traffic lane in each direction separated by a raised median strip. Traffic movements to and from Canberra Avenue is restricted to left in and left out traffic movements. River Road has a sign posted speed limit of 50km/hr.

2.2.3 Canberra Avenue

Canberra Avenue is a local street under the jurisdiction of Lane Cove Council. It provides access to properties fronting on to it. It is configured as a 2-lane undivided road with a generally north-south alignment. It terminates at the northern end to form a cul-de-sac near Pacific Highway. Time restricted kerbside parking (2P) is available on both sides of the road north of Duntroon Avenue, while south of Duntroon Avenue unrestricted kerbside parking is available on the western side of Canberra Avenue and

"NO PARKING" parking restriction is enforced on the eastern side. Canberra Avenue is located within a 50km/hr speed limit area.

2.2.4 Berry Road

Berry Road is a local road under the administration of Lane Cove Council providing access to abutting properties. It is aligned in a north-south direction. It connects to Pacific Highway to the north via a signalised intersection. Berry Road terminates at its southern end to provide a cul-de-sac with pedestrian access permitted to River Road.

It is generally configured as a 2-lane undivided road with kerbside parking on both sides of the road. Kerbside parking is restricted to 1P and 2P parking in the vicinity of its intersection with Holdsworth Avenue. It is located within a 50km/hr speed limit area.

2.2.5 Park Road

Park Road is a local road providing access to abutting properties and is administrated by Lane Cove Council. The road is generally aligned in a north-south direction. It is configured as a 2-lane undivided road with kerbside restricted parking (2P) permitted. It is located within a 50km/hr speed limit area.

2.2.6 Other Local Roads

In addition to the above roads, the site is located in vicinity of a number of local roads include Park Lane and Berry Lane. Park Lane and Berry Lane are configured as single lane, two-way accessway providing vehicular access to the abutting properties. "NO PARKING" restriction is enforced on both sides of Park Lane and Berry Lane.

2.3 Public Transport

The subject site is located within 650m to St Leonards Railway Station and 600m to Wollstonecraft Railway Station. In addition, the subject site can be accessed by bus services on Pacific Highway and River Road with the nearest bus stop located within 130m of the site.

The site can be accessed using train services operated by Sydney Trains and NSW TrainLink as well as regular scheduled bus services operated by Transit Systems, Hillsbus Keolis Downer Northern Beaches and Busways North West. As such, the subject site is well located in terms of accessibility to public transport services.

The available public transport services in the vicinity of the site are summarised in Table 2.1 for train services and Table 2.2 for bus services.

Table 2.1: Available Train Services at St Leonards Railway Station

Line	Line Description	Weekday Peak Period Frequency
T1 Western Line	Emu Plains/Richmond to City	3-10 minutes
T1 North Shore Line	Berowra to City via Gordon	3-5 minutes
T9 Northern Line	Hornsby to North Shore via City	15 minutes
Central Coast & Newcastle Line	Newcastle to Central via Strathfield or Gordon	15 minutes

Table 2.2: Available Bus Services

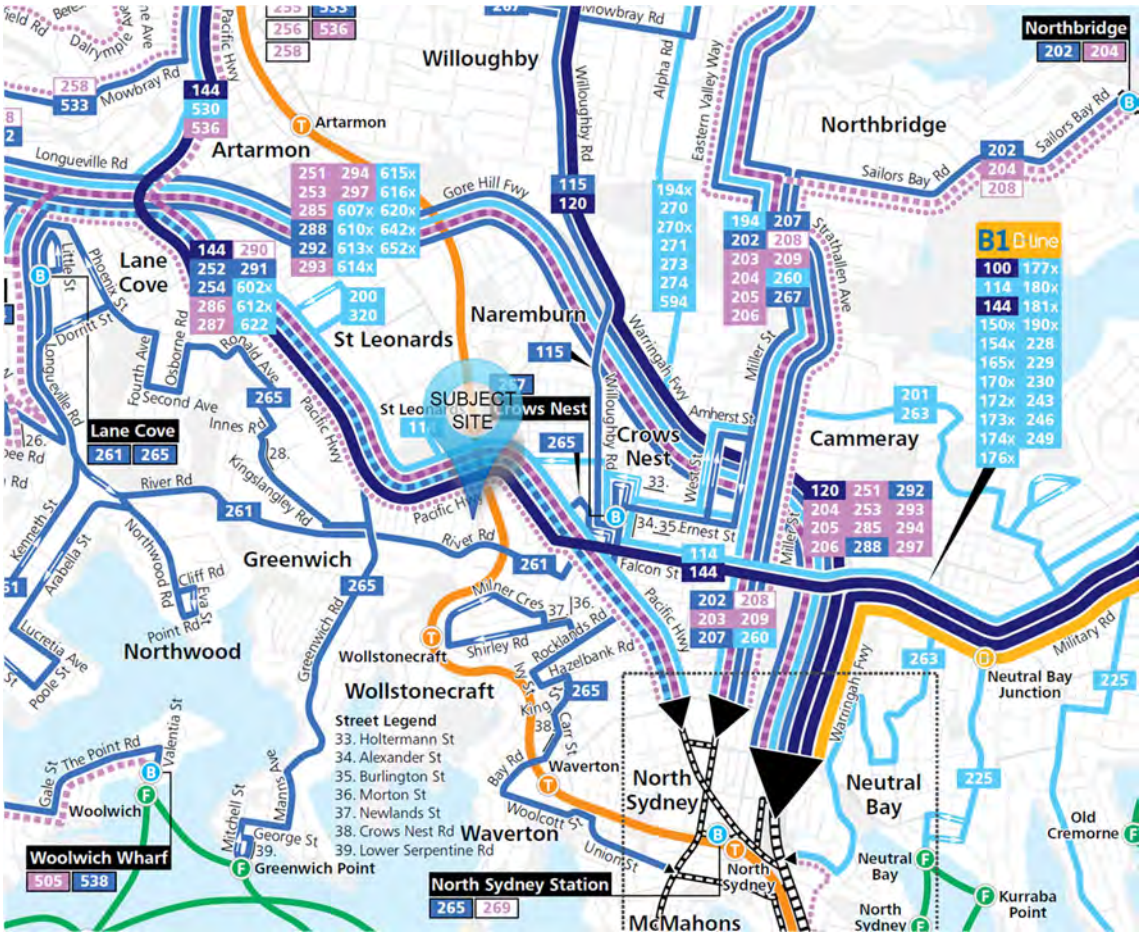
Route No.	Route Description	Weekday Peak Period Frequency
114	Balmoral to Royal North Shore Hospital	20-25 minutes
144	Manly to Chatswood via St Leonards	10 minutes
200	Bondi Junction to Gore Hill	15-20 minutes
252	Gladesville to City King Street Wharf via North Sydney	20-45 minutes
254	McMahons Point to Riverview	15-20 minutes
261	Lane Cove to City King Street Wharf via Longueville	30 minutes
265	North Sydney to Lane Cove via Greenwich	30 minutes
286	Denistone East to Milsons Point via St Leonards & North Sydney	30 minutes
287	Milsons Point to Ryde via North Sydney & St Leonards	30 minutes
291	McMahons Pt to Epping	20 minutes
320	Mascot to Gore Hill	10-15 minutes
602X	Bella Vista Station to North Sydney (Express Service)	10-15 minutes
612X	Castle Hill to North Sydney (Express Service)	10 minutes
622	Dural to Milsons Point via Cherrybrook	30 minutes

Figure 2.2 shows a network map of the rail and metro services, while Figure 2.3 shows a map of the existing available bus services in the vicinity of the subject site.

Figure 2.2: Rail/Metro Network

Source: TfNSW

Figure 2.3: Bus Network



Source: TfNSW

In addition to the existing public transport services that can be used to access the subject site, it is noted the site is located within walking distance to the future Crows Nest Metro Station. The new metro station at Crows Nest is currently under construction and is expected to be operational in 2024.

The metro station is expected to provide train services to the City and beyond with a 5-minute frequency during the peak periods and 15-minute during the off-peak periods.

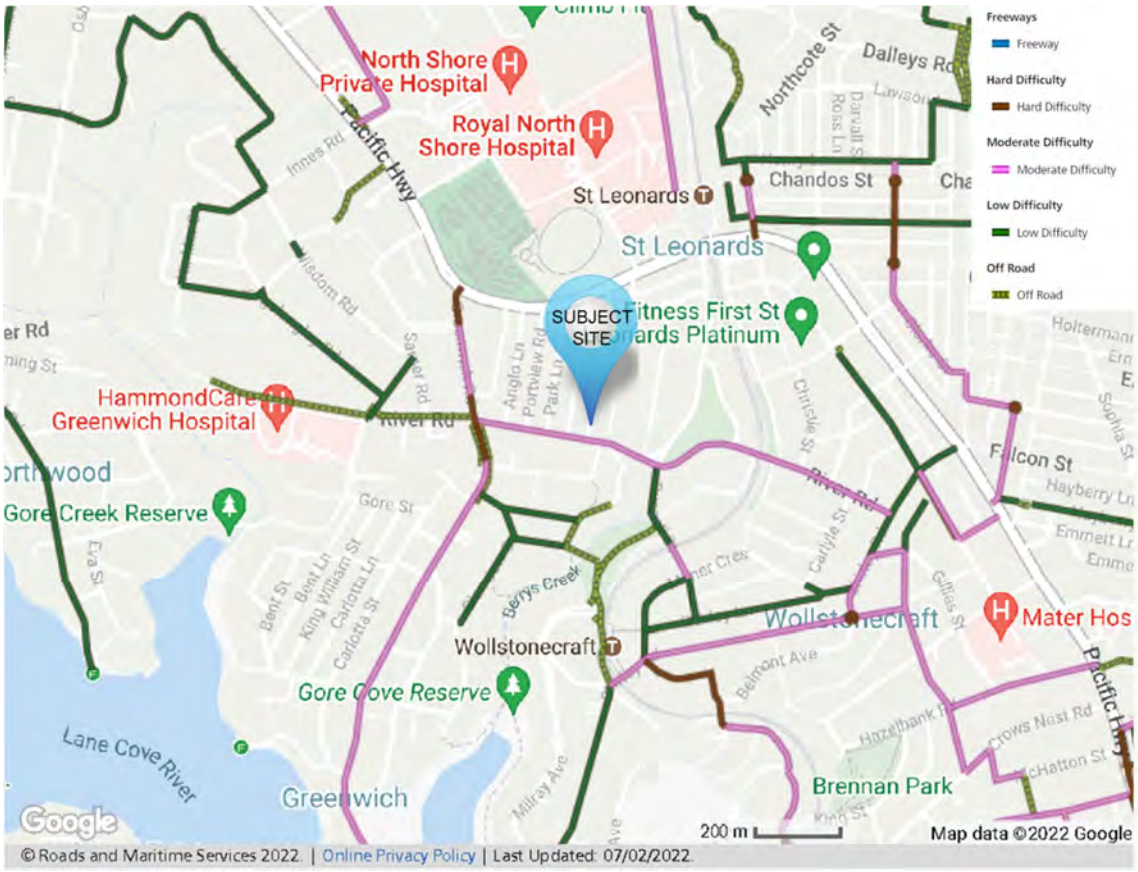
2.4 Pedestrian and Cycle Network

Within the immediate vicinity of the site, well established pedestrian and cycle infrastructures are available.

Fully formed pedestrian paths are provided on all existing roads in the vicinity of the site.

In relation to bicycle pathways in the vicinity of the site, the map in Figure 2.4 shows the existing bicycle paths in the area.

Figure 2.4: Cycle Network Map



Source: https://www.rms.nsw.gov.au/maps/cycleway_finder

It is noted that in the future the St Leonards South precinct will include a number of pedestrian links and bicycle paths. These are depicted in Figure 2.5 which has been extracted from Lane Cove Development Control Plan 2010.

Figure 2.5: Future Access Network in St Leonards South Precinct

3 Planning Proposal

3.1 Background

The subject site is part of the St Leonards South precinct. The subject site and the surrounding area were the subject matter of a planning proposal prepared by Lane Cove Council. The planning proposal process commenced in July 2015 when Lane Cove Council resolved to undertake a master planning exercise for the precinct.

Lane Cove Council exhibited the planning proposal in 2018. The planning proposal was reviewed by the Independent Planning Commission of NSW. A design charrette was organised and attended by representatives from Lane Cove Council, Government Architect NSW (GANSW), Greater Sydney Commission (GSC) and three independent State Design Review Panel (SDRP) members. The planning proposal was finalised by the Department of Planning, Industry and Environment in September 2020 and gazetted in November 2020. The development control plan was adopted by Council in its October 2020 meeting and come into effect on the same date.

The gazetted planning proposal permitted an additional 2,000 new dwellings delivered through the following changes to the relevant controls and provisions in Lane Cove Council Local Environmental Plan (LEP):

- land use zone control – from R2 Low Density Residential to R4 High Density Residential
- maximum building height control – from 9.5m to up to 65m (or equivalent to 19 storeys), and
- maximum floor space ratio control – from 0.5-0.6:1 up to 3.85:1.

The subject site, which has been designated as Areas 22 and 23 in the planning proposal, with the following planning controls in the gazetted planning proposal:

- a R4 High Density Residential zoning
- a maximum building height of 2.5m and 37m (up to 10 storeys), and
- a maximum floor space ratio of 2.75:1.

3.2 Traffic Assessment

The planning proposal was supported by a cumulative traffic assessment report[1] prepared on behalf of Lane Cove Council. The cumulative traffic assessment included the development of a Aimsun traffic model which takes into account the cumulative traffic impacts arising from all known developments at the time in the St Leonards area within the local government area of Lane Cove Council. It includes development traffic generated by the St Leonards South precinct which was anticipated to provide an additional 2,400 dwellings (this was reduced to 2,000 dwellings in the gazetted planning proposal).

The Aimsun traffic model has been developed by building upon the previous microsimulation traffic models developed on the Paramics platform.

The Aimsun traffic model adopted the following traffic generation rates:

- morning peak period – 0.14 trips per peak hour per dwelling, and
- evening peak period – 0.07 trips per peak hour per dwelling.

The above traffic generation rates have been extracted from Technical Direction TDT 2013/04a, TfNSW's updated traffic generation guidelines and are based on the St Leonards high density residential site. These rates have also been agreed with the then Roads and Maritime Services (now Transport for NSW, TfNSW).

The Aimsun traffic model includes assessment of the following traffic scenarios:

- Base Model 2013 – existing traffic conditions at the time
- Base Model 2021 – future case with additional development traffic including those from LEP 2009 growth, St Leonards South and the Loftex sites on Marshall Avenue (Site L)
- Model 2021 + A – Base Model 2021 plus development traffic from Site A (Winten sites) which is currently under construction and is generally referred to as 88 Christie Street
- Model 2021 + AB – Model 2021 + A plus development traffic from Site B (Mirvac site) which has been completed and occupied, and
- Model 2021 + ABC –Model 2021 + AB plus development traffic from Site C (New Hope/VIMG site) which is currently under construction.

The cumulative traffic assessment recommended a number of traffic measures in order to achieve satisfactory performance in the Base Model 2021 scenario. These are

[1] St Leonards South, A Report on Traffic Impacts of Large-Scale Developments on Pacific Highway prepared by TEF Consulting for Lane Cove Council (Ref: 17020 Rep 02a 170424)

required "*as a result of the general growth of network traffic, LEP 2009 developments and the proposed St Leonards South Master Plan development*". These measures include:

- parking bans on streets approaching certain intersections
- adjustment to traffic signal timing and phasing at select intersections
- right turn bans at select intersections, and
- new road connection (between Park Road and Berry Road).

The cumulative traffic assessment found that:

> *"The results of modelling for all development options, with consideration of subsequent cumulative impacts of each large development analysed in this study, are generally consistent with findings of the traffic impact assessment reports submitted for the respective development applications.*
>
> *Primarily due to the fact that the proposed developments replace existing substantial buildings, traffic increases as a result were very moderate for each of the developments L, A, B and C and in some cases a reduction of trip generation resulted from the land use change.*
>
> *Accordingly, although total traffic delays for the whole network generally increased with each additional development, some intersections even experienced slight improvements (due to traffic redistribution), whilst increased delays at other intersections were minor to moderate. Levels of Service remained essentially the same for all models."*

4 Development Description

4.1 Development Description

The proposed development involves the demolition of all existing buildings on the site and the construction in their place four residential buildings up to 12-storeys.

The proposed buildings will accommodate 306 residential apartments with the following apartment mix:

- 2 x studio unit
- 74 x 1-bedroom units
- 133 x 2-bedroom units, and
- 97 x 3/4/5-bedroom units.

The proposed development includes a combined basement car park with four basement levels containing a total of 545 car parking spaces including 65 accessible car parking spaces and 76 visitor car parking spaces.

The architectural car park plans are contained in Appendix A.

4.2 Proposed Access Arrangement

Vehicular access to the basement car park and loading area is proposed to be provided off Park Road, near the southern boundary of the overall site. The proposed access is proposed to be configured as a combined entry and exit driveway to be shared between general traffic and service vehicles.

All redundant vehicle crossovers will be removed with kerb and gutter re-instated to Council's requirements and in accordance with relevant design guidelines.

4.3 Loading Facility

The proposed development includes an on-site loading dock inside the basement on Level B1. It has dimensions of 7.3m by 14.1m long. It is proposed to design the loading bay to accommodate service vehicles up to an Australian Standard 8.8m long medium rigid vehicle (MRV). Up to two MRVs can use the loading dock simultaneously.

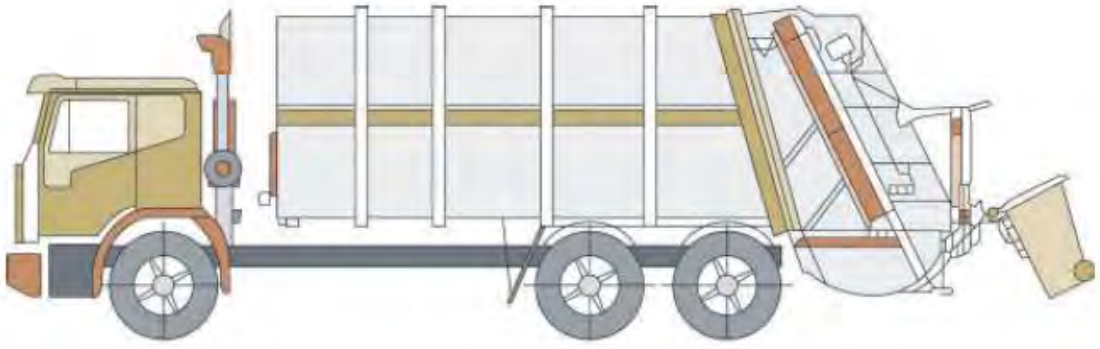
The loading dock is proposed to be shared between waste collection vehicles, removalist trucks and other bulky item delivery vehicles.

It is noted that the design of the loading dock to accommodate waste collection vehicles up to the size of an 8.8m MRV is in compliance with Part Q of the Lane Cove Development Control Plan 2010 (DCP 2010). DCP 2010 states that residential developments are to be designed to accommodate waste collection vehicles in Appendix E of DCP 2010. The largest waste collection vehicle in Appendix E of DCP 2010 is a 9.64m long vehicle which is a side loading vehicle. The largest rear loading waste vehicle is an 8.0m long waste vehicle – see Figure 4.1 below.

Figure 4.1: Council's Waste Collection Vehicle

- **Typical Council Garbage Truck used for Domestic Waste Collection – Rear Load**

Length overall	8.0 metres
Width overall	2.5 metres
Operational height	4.3 metres
Travel height	4.3 metres
Weight (vehicle and load)	22.5 tonnes
Weight (vehicle only)	13 tonnes
Turning Circle	25.0 metres



rearloader garbage truck

Side loading waste collection vehicles are typically used for kerbside collection, while rear loading waste collection vehicles are typically used for onsite waste collection. It is also noted that Council's Waste Contract Coordinator has agreed to the use of an 8.0m long waste vehicle for development sites in the St Leonards South precinct.

As noted above, the proposed development has been designed to accommodate an 8.8m long MRV which exceeds the dimensions of an 8.0m long rear loading waste collection vehicle in DCP 2010.

In addition, it is noted that an 8.8m long service vehicle bay can also accommodate typical removalist trucks.

Following the above, the proposed loading dock is proposed to operate as a shared loading facility for the proposed development i.e. it will accommodate service vehicles for waste collection, removalist trucks and large bulky items deliveries (refrigerators, televisions, washing machines) etc.

It is also proposed for service vehicles to share the same access as the general traffic accessing the car park.

5 Parking Assessment

5.1 Car Parking Requirements

Parking requirements for the proposed development have been assessed against Lane Cove Council's Lane Cove Development Control Plan 2010, specifically Table 1 in Part R Traffic, Transport and Parking (DCP 2010).

The parking assessment based on DCP 2010 requirements for the proposed development is presented in Table 5.1.

Table 5.1: Car Parking Assessment

Proposed Land Use	No. of Dwellings	DCP Parking Rates	Car Parking Requirement
Studio Dwellings	2 Apt	0.5 spaces per dwelling	1
1-Bedroom Dwellings	74 Apts	1.0 space per dwelling	74
2-Bedroom Dwellings	133 Apts	1.5 spaces per dwelling	200
3/4/5-Bedroom Dwellings	97 Apts	2.0 spaces per dwelling	194
Visitors	-	1.0 space per 4 dwellings	76
Total	**-**	**-**	**545**

Based on the DCP parking requirements presented in Table 5.1, the proposed development is required to provide a total of 545 car parking spaces comprising the followings:

- 469 resident car parking spaces, and
- 76 visitor car parking spaces.

5.2 Adequacy of Car Parking Spaces

The proposed development includes a 4-level basement car park. The basement car park with consideration to the required set back and deep soil area has been maximised to provide a total of 545 car parking spaces to serve the proposed development.

The makeup of the car parking spaces is as follows:

- 469 car parking spaces for residents and
- 76 visitor car parking spaces is proposed.

The above proposed car parking provisions comply with car parking requirements stipulated in the DCP 2010. As such, the proposed car parking provisions are satisfactory.

5.3 Accessible/Adaptable Car Parking

DCP 2010 requires accessible parking for residents to be provided at a rate of one accessible car space per one adaptable housing unit. In relation to parking for visitors, DCP 2010 also requires one accessible car space per 50 visitor car parking spaces to be provided (with a minimum of one accessible space).

It is proposed that accessible/adaptable car parking be provided in full compliance with the requirements stipulated in DCP 2010.

The proposed development includes 62 adaptable apartments. As such, based on DCP 2010 requirement, the proposed development is required to provide 62 accessible parking for residents. Similarly, the proposed development proposes to provide 76 visitor car parking spaces. As such, the proposed development is required to provide two visitor accessible car parking spaces.

The architectural car park plans indicate a total of 63 accessible car parking spaces for residents and two accessible visitor car parking spaces. Therefore, the proposed accessible parking provision for the proposed development is satisfactory.

Separately, the accessible car parking spaces are proposed to be distributed to all parking levels.

5.4 Electric Vehicle Charging Bays

It is proposed to provide electric vehicle charging equipment at three visitor car parking spaces. These charging bays will be available to the residents to charge their electric vehicles. The use of the charging bays will be subject to a booking through the building manager.

5.5 Bicycle Parking

DCP 2010 requires bicycle parking for residential developments to be provided at a rate of one bicycle parking space per four dwellings for residents and one bicycle space plus one bicycle space per 10 dwellings.

Therefore, the proposed development is required to provide 77 bicycle parking spaces residents and 31 bicycle parking spaces for visitors.

The proposed development includes 77 bicycle parking spaces for residents and 33 bicycle parking spaces for visitors. As such, the proposed bicycle parking provision complies with DCP 2010 requirement and is therefore satisfactory.

5.6 Motorcycle Parking

DCP 2010 requires motorcycle parking to be provided at a rate of one motorcycle parking space per 15 car parking spaces for all types of development.

The proposed development includes 545 car parking spaces. Therefore, it is required to provide 36 motorcycle parking spaces.

The proposed development includes 36 motorcycle parking spaces. Therefore, the proposed motorcycle parking provision is also satisfactory.

5.7 Service and Delivery Vehicle Parking

In relation to service vehicle requirements, DCP 2010 requires any proposed residential developments to provide service vehicle bays at a rate of one removalist truck space per 100 residential units.

As such, the proposed development with 306 dwellings, in accordance with DCP 2010, is required to provide three truck bays.

It is noted that the basement is not able to accommodate this many truck bays due to setback and deep soil area requirements. In addition, it is considered the requirement to provide three truck bays for a residential development to be excessive.

Instead, it is proposed that a loading docks with two truck bays accommodating service vehicles up to an Australian Standard 8.8m long medium rigid vehicle. The loading dock is proposed as a shared use facility accessed by waste collection vehicles, removalist trucks and other bulky item delivery vehicles.

The use of the loading bay will be subject to the implementation of a loading dock management plan. The loading dock management plan will include a number of conditions that all users of the loading dock will abide by. Conditions of the loading dock management plan will require the user of the loading dock to make a prior booking with the building manager in order to use the loading dock, the building manager to accept/reject the request based on the dock availability and the building restrict the general use of the loading dock outside of the waste collection period.

5.8 Car Park Layout Design

The car park is proposed as a 4-level basement car park from Levels B1 to B4. It can be accessed via a combined entry and exit driveway located off Park Road providing direct access to Level B3.

Basement Levels B3 and B4 occupy the entire site except for the area beneath the communal open space to the north of the site. Basement Levels B1 and B2 occupy the northern half of the site also except beneath the communal open space. In addition, the car park on Basement Level B1 is provided as two separate car parking areas.

A straight two-lane, two-way ramp is proposed at the approximate centre of the site on Basement Levels B2 to B4 provides access between these basement levels. Access to Basement Level B1 is via two separate single lane, two-way straight ramps located on the western and eastern boundaries of the site (near the northern boundary).

Car parking spaces inside the basement are predominantly configured as 90 degree car parking spaces.

In relation to the design of the parking spaces, it is noted that the car parking spaces have minimum dimensions of 2.4m wide by 5.4m long with aisle width of 5.8m. The proposed dimensions of the car parking spaces comply with the Australian Standard AS2890.1:2004 as Class 1A car parking facility. The Australian Standard notes that a Class 1Acar park facility is suitable for a residential car park.

The proposed accessible car spaces and associated shared areas have dimensions 2.4m wide by 5.4m long with 5.8m wide aisles. The proposed dimensions comply with AS2890.6:2009. Some accessible car parking spaces have dimensions of 3.8m wide by 5.4m long which comply with AS4299, the Australian Standard for Adaptable Housing.

In addition, MLA's car parking spaces design review also assessed the following (but not limited to) design elements relating to car parking spaces:

- the first 6m of the access driveway behind the property boundary has a maximum grade of 1:20 has been provided
- an additional width of 0.3m has been provided for car spaces adjacent to a wall
- all columns have been located outside of the parking space design envelope
- blind aisles have been provided with an extension of 1.0m beyond the last car parking space
- single sided aisles (where one side is confined by a vertical obstruction higher than 0.15m) have been provided with an additional 0.3m in width
- minimum clear head heights of 2.2m for general car parking spaces and 2.5m for accessible parking spaces have been provided within the basement car park as required by AS2890.1 and AS2890.6

- maximum vertical grade of 1:4 with appropriate length transitions at 1:8 have been provided along ramps used by passenger vehicles in accordance with AS2890.1
- bicycle parking spaces have dimensions of 0.5m by 1.8m with an aisle width of 1.5m
- motorcycle parking spaces have dimensions of 3.0m by 1.2m as required by DCP 2010, and
- the proposed loading area has been designed to accommodate service vehicles up to an Australian Standard 8.8m long medium rigid vehicle, it can enter and exit the site in a forward direction, and
- loading area including along access paths to and from the loading area have a minimum headroom of 4.5m.

Our review indicates that the design of the car parking spaces and aisles generally complies with the design requirements set out in the Australian Standard for car parking facilities in AS2890.1, AS2890.3 and AS2890.6. Therefore, the design of the proposed car parking spaces is satisfactory. The design of the loading dock also complies with AS2890.2.

Finally, it is noted swept path analysis has been conducted at the driveway and along the internal ramps using an Australian Standard 5.2m long B99 vehicle as the design vehicle. The analysis indicates that a B99 vehicle can access and circulate within the car park satisfactorily and have sufficient clearance to pass one another where required.

Swept path analysis has also been conducted for an MRV accessing the loading dock. These were also found to be satisfactory.

The swept path diagrams are contained in Appendix C.

6 Traffic Assessment

6.1 Previous Traffic Assessment

As noted previously, the planning proposal was supported by a cumulative traffic assessment which included the development of a Aimsun traffic model – see Section 3.2 of this report.

The Aimsun traffic model assessed the traffic effects of additional development traffic arising from all known developments within Lane Cove Council's St Leonards area which included the expected 2,400 additional dwellings within the St Leonards South precinct.

With agreement from the then RMS, the traffic assessment adopted traffic generation rates of 0.14 and 0.07 vehicle trips per peak hour per dwelling during the morning and evening peak periods respectively.

The Aimsun model assessed several traffic scenarios including Model 2021 + ABC. This scenario includes all known developments at the time including the St Leonards South precinct.

The modelling results extracted from the cumulative traffic assessment for the traffic scenario Model 2021 + ABC are presented in Figure 6.1 and Figure 6.2 for the morning and evening peak periods respectively.

Figure 6.1: Intersection Operation Results – Morning Peak

Base Model 2021 +ABC	SB			EB			NB			WB			AVD	LOS
	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)		
Pacific Hwy / Alexander St	1588	18.8	11.0				1248	21.6	9.0	392	30.1	10.2	21.2	B
Pacific Hwy / Shirley Rd/Falcon St	1710	51.7	25.6	601	39.7	6.4	958	24.3	7.4	945	29.1	11.0	38.7	C
Pacific Hwy / Hume St	1698	21.4	13.4	243	66.1	9.6	1372	21.5	12.4	187	119.4	6.6	29.8	C
Pacific Hwy / Oxley St	1654	7.6	7.2	377	56.3	6.4	1512	5.4	5.8	101	54.0	3.2	13.0	A
Pacific Hwy / Albany St	2047	15.1	10.6				1515	16.2	6.0	581	68.8	13.2	23.0	B
Pacific Hwy / Christie St	654	56.8	10.2	2737	19.9	15.6	152	0.6	0.2	1875	17.3	13.4	22.9	B
Pacific Hwy / Herbert St	702	69.6	21.2	2476	25.7	12.6				2282	16.2	5.6	27.4	B
Pacific Hwy / Reserve Rd/Berry Rd	166	48.1	6.8	2176	34.2	16.8	474	63.6	9.0	2004	13.8	8.8	29.1	C
Pacific Hwy / Greenwich Rd				1805	10.7	7.6	675	55.9	10.0	1939	19.1	11.0	21.3	B
Shirley Rd / River Rd	569	36.2	12.0	1244	17.6	8.6	199	31.3	4.2				24.2	B
River Rd / Greenwich Rd	452	56.0	7.4	1587	48.2	31.8	307	78.9	9.0	648	49.1	8.2	52.8	D

Source: Cumulative Traffic Assessment prepared by TEF on behlaf of Lane Cove Council

Figure 6.2: Intersection Operation Results – Evening Peak

Base Model 2021 + ABC	SB			EB			NB			WB			AVD	LOS
	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)	Flow (veh)	Delay time Sec	Queue max (veh)		
Pacific Hwy / Alexander St	1091	12.4	6.6				1430	20.5	11.0	290	22.3	7.4	17.6	B
Pacific Hwy / Shirley Rd/Falcon St	1254	41.8	21.0	690	38.2	6.8	1114	28.9	9.0	1017	23.3	11.2	33.0	C
Pacific Hwy / Hume St	1208	13.0	7.6	226	77.4	9.6	1261	20.3	11.6	152	81.4	5.0	25.0	B
Pacific Hwy / Oxley St	1233	6.0	3.4	203	61.1	4.2	1340	6.0	5.2	172	60.9	5.6	13.0	A
Pacific Hwy / Albany St	1500	9.0	8.0				1315	12.0	4.6	536	61.6	12.6	18.6	B
Pacific Hwy / Christie St	453	47.1	9.4	2029	10.4	9.6	187	0.7	0.0	1711	12.6	10.4	14.7	B
Pacific Hwy / Herbert St	859	65.1	21.4	1617	18.0	7.4				1933	17.1	5.2	26.8	B
Pacific Hwy / Reserve Rd/Berry Rd	246	40.8	7.6	1554	22.6	10.8	121	52.5	3.4	1849	7.9	5.4	17.6	B
Pacific Hwy / Greenwich Rd				1476	7.6	5.6	359	61.2	9.2	1711	17.9	10.4	18.0	B
Shirley Rd / River Rd	869	28.5	15.4	809	17.9	7.6	387	40.3	8.0				26.5	B
River Rd / Greenwich Rd	420	65.9	7.2	971	21.0	14.8	240	73.6	7.6	1095	26.9	8.0	34.9	C

Source: Cumulative Traffic Assessment prepared by TEF on behlaf of Lane Cove Council

The traffic assessment concluded that level of service for the assessed intersections "*remained essentially the same for all models*".

6.2 Traffic Assessment

The revised proposed development includes 306 residential apartments which has been reduced from 314 apartments as originally proposed. The traffic assessment has been conducted based on 314 residential apartments. As such, the revised proposed development would generate less development traffic than the previous scheme and therefore traffic impact arising from the revised scheme would be less than that assessed.

Using traffic generation rates adopted in the Aimsun traffic model (commissioned by Lane Cove Council) which have been agreed by the then RMS (now Transport for NSW, TfNSW), the proposed development (with 314 apartments as originally proposed) is expected to 44 vehicles per hour (vph) during the morning peak and 22 vph during the evening peak period.

An addition of 44 vph generated by the proposed development is equivalent to, on average, less than one vehicle every minute. This level of additional development traffic is considered to be low and is not expected to create any adverse traffic impacts to the local road network for reasons explained below.

The minute change in the net additional traffic when input into a traffic modelling tool such as Aimsun and SIDRA, especially after the development traffic has been distributed to the local road, is unlikely to register any changes to the modelling output. This is demonstrated in the traffic assessment undertaken for the nearby 88 Christie Street, St Leonards proposed mixed use development which was recently completed. The DA traffic assessment for that proposed development included traffic modelling of a number of nearby intersections.

The 88 Christie Street project was estimated to generate some 525 vph during the busiest peak period. This represents an additional development traffic of 180 vph above the previous approved scheme which has been assessed in the Aimsun traffic

model. Intersection analysis conducted in SIDRA for the pre and post development traffic conditions indicated no material change in the intersection performance of the assessed intersections even though the local network is expected to receive an additional 180 vph.

As such, an addition of 44 vph arising from the revised proposed development is not expected to result in any changes to the intersection performance, especially when the nearby intersections have been assessed to operate with LoS A/B intersection performance.

Furthermore, as noted previously the gazetted planning proposal for the St Leonards South precinct permits an additional 2,000 dwellings. The proposed 314 residential dwellings in this proposed development contribute towards the permitted 2,000 additional dwellings envisaged in the planning proposal. It is further noted that the purpose of the Aimsun traffic model prepared on behalf Lane Cove Council was to assess the cumulative traffic effects of the St Leonards South planning proposal as well as those arising from other known developments at the time. In addition, the Aimsun traffic model assumed 2,400 additional dwellings instead of the 2,000 dwellings gazetted in the planning proposal thereby over-estimating traffic effects of the additional dwellings by some 20 per cent. Even with an additional 20 per cent over estimate of traffic generation, the Aimsun traffic model concluded the nearby intersections "*...experienced slight improvements (due to traffic redistribution), whilst increased delays at other intersections were minor to moderate. Levels of Service remained essentially the same for all models*".

In the light of the above, it is thus submitted that the traffic effects arising from the proposed development would be minimal and is not expected to create any adverse traffic impacts to the local road network. Therefore, the traffic effects of the proposed development is satisfactory.

Notwithstanding the above, intersection capacity analysis has been conducted for the intersection of River Road with Parking Road. The results are presented below.

6.3 Intersection Analysis

The operation of the River Road intersection with Park Road under existing and future traffic conditions has been assessed using SIDRA Intersection 9.0, a computer-based traffic modelling package which calculates intersection performance parameters such as vehicle delays and level of service.

Level of Service (LoS) is a key performance parameter used by TfNSW to describe the operation of an intersection. It ranges from LoS A (good operation) to LoS F (over-saturated conditions), as presented in Table 6.1. At signalised intersections, the LoS criteria relate to the overall average intersection delay, whilst at sign-controlled intersections and roundabouts, LoS is determined by the worst movement delay.

Table 6.1: Level of Service Criteria for Intersections

Level of Service	Average Delay (Seconds per Vehicle)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity. At signals, incidents will cause excessive delays Roundabouts require other control mode	At capacity, requires other control mode
F	Greater 70	Unsatisfactory with excessive queueing	Unsatisfactory with excessive queueing; requires other control mode

Source: TfNSW Guide to Traffic Generating Developments, 2002

Intersection turning movement counts were conducted at the intersection on Tuesday 13 September 2022 for the morning (from 7:00am to 9:00am) and the evening (from 4:00pm to 6:00pm) peak periods.

Intersection capacity analysis has been carried out for existing traffic conditions with and without development traffic. Traffic model for the existing case i.e. without development traffic has been calibrated to replicate traffic operating conditions observed on site. This is then used to assess the traffic effects of the proposed development by superimposing the expected development traffic (as discussed above) on the existing case traffic models.

It is noted that all development traffic arising from the proposed development have assigned to access the River Road intersection with Park Road. However, in reality it is likely that the development traffic would distribute evenly between the Park Road intersections with River Road and the Pacific Highway. That is, the traffic assessment has over-estimated the future traffic using the River Road intersection with Park Road and as such provides a conservative assessment.

The results from the above analysis are summarised in Table 6.2. Detailed analysis results are provided in Appendix C.

Table 6.2: Intersection Capacity Analysis Results

Intersection	Scenario	Morning Peak		Evening Peak	
		Delay (sec)	LoS	Delay (sec)	LoS
River Rd-Park Rd	Existing – Without Development	26	B	26	B
River Rd-Park Rd	Future – With Development	26	B	27	B

From Table 6.2, it can be seen that the River Road intersection with Park Road operates satisfactorily with minimal delays. With the additional development traffic expected from the proposed development the intersection would continue to operate satisfactorily with similar performance as existing traffic conditions. That is, the additional development traffic arising from the proposed development is not expected to create any noticeable traffic impacts to the intersection as noted above in Section 6.2 of this report.

7 Summary and Conclusion

This traffic and parking assessment accompanies a development application to Lane Cove Municipal Council for a proposed residential development at Nos. 27-47 Berry Road, Nos. 26-50 Park Street and Nos. 48-54 River Road, St Leonards.

The proposed development relates to the construction of four residential flat buildings accommodating 306 dwellings with a combined basement car park. The proposed development contributes to the 2,000 additional dwellings envisaged in the St Leonards South Precinct Planning Proposal which has been recently gazetted in November 2020.

The salient findings of this assessment are presented below.

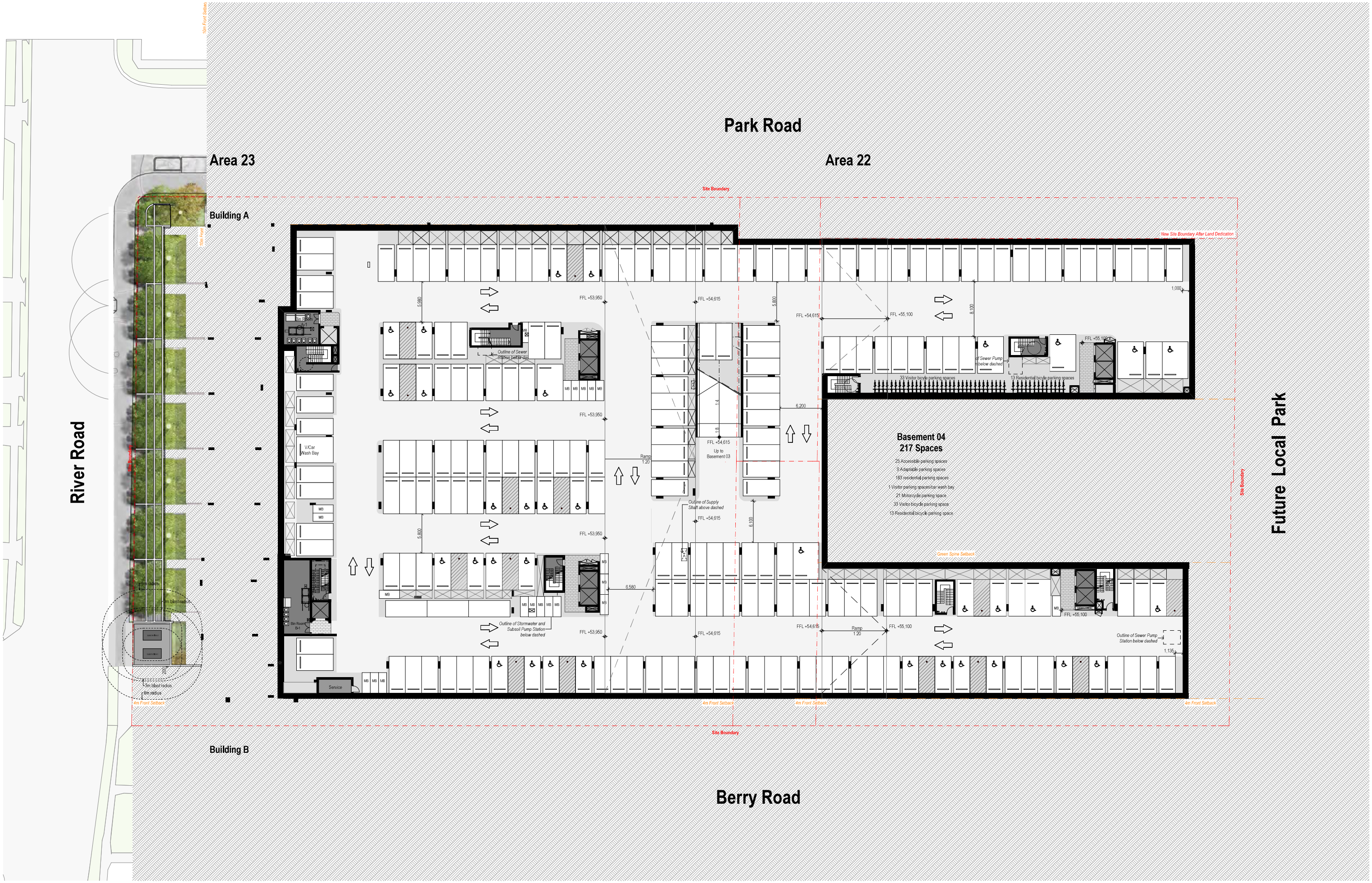
- Vehicular access to the proposed development is proposed to be provided off Park Road to be shared between general traffic and service vehicles.
- Based on requirements stipulated in Council's development control plan, the proposed development is required to provide a 545 car parking spaces including 76 visitor car parking spaces.
- The proposed development proposes to provide a total of 545 car parking spaces including 76 visitor car parking spaces. The proposed car parking provision complies with parking requirements stipulated in Council's development control plan.
- The proposed car parking spaces have been designed to comply with the Australian Standard as Class 1A car parking spaces and are considered to be satisfactory.
- Bicycle and motorcycle parking spaces are proposed to be provided in full compliance with the requirements stipulated in the development control plan.
- The proposed development includes a loading dock with two service vehicle bays which has been designed to accommodate service vehicles up to an Australian Standard 8.8m medium rigid vehicle. The proposed loading facility is proposed to be shared between waste collection vehicles, removalist trucks and other delivery vehicles.
- The car park and loading area have been designed to comply with the design requirements set out in the Australian Standard, namely AS2890.1:2004, AS2890.2:2018. AS2890.3:2015 and AS2890.6:2009.
- The proposed development has been estimated to generate a total of 44 vph during the busiest peak period. This is based on the previous scheme with 314 residential apartments.

- Intersection analysis of the Park Road intersection with River Road indicates the proposed development is not expected to create any material change to the operation of the intersection.

Overall, from a traffic and parking perspective the proposed development is considered to be satisfactory.

Appendix A

Architectural Car Park Layout Plans



Builder/Contractor shall verify job dimensions before any job commences. Figured dimensions take precedence over drawings and job dimensions. All shop drawings shall be submitted to the Architect/Consultant, and manufacture shall not commence prior to return of inspected shop drawings by the Architect/Consultant

Notes
ALL WORKS TO BE IN ACCORDANCE WITH AUTHORITY & STATUTORY APPROVALS.

REFER TO SITE SURVEY FOR ALL INFORMATION RELATING TO EXISTING SITE CONDITIONS.
ALL BOUNDARY INFORMATION TO BE CONFIRMED BY REGISTERED SURVEYOR BEFORE COMMENCING WORKS ON SITE.

REFER TO LANDSCAPE ARCHITECT'S DOCUMENTATION & ARBORIST REPORTS FOR ALL INFORMATION RELATING TO TREES AND THEIR RETENTION/REMOVAL AND NEW LANDSCAPE WORKS.

ALL DRAWINGS TO BE READ IN CONJUCTION WITH:
- ALL SPECIFICATIONS & SCHEDULES
- ALL SPECIALIST CONSULTANTS DOCUMENTATION
- BASIX, NATHERS & SECTION J CERTIFICATES

MINOR CHANGES TO FORM & CONFIGURATION MAY BE REQUIRED AFTER DEVELOPMENT CONSENT WHEN DRAWINGS ARE PREPARED FOR CONSTRUCTION PURPOSES.

Rev	Date	By	Chk	Description
A	24/11/2022	AC, MJ, XD	XD, MR	Issued for DA
B	11/05/2023	AC	XD	DA Amendment
C	5/06/2023	AC, JR	XD	DA Amendment

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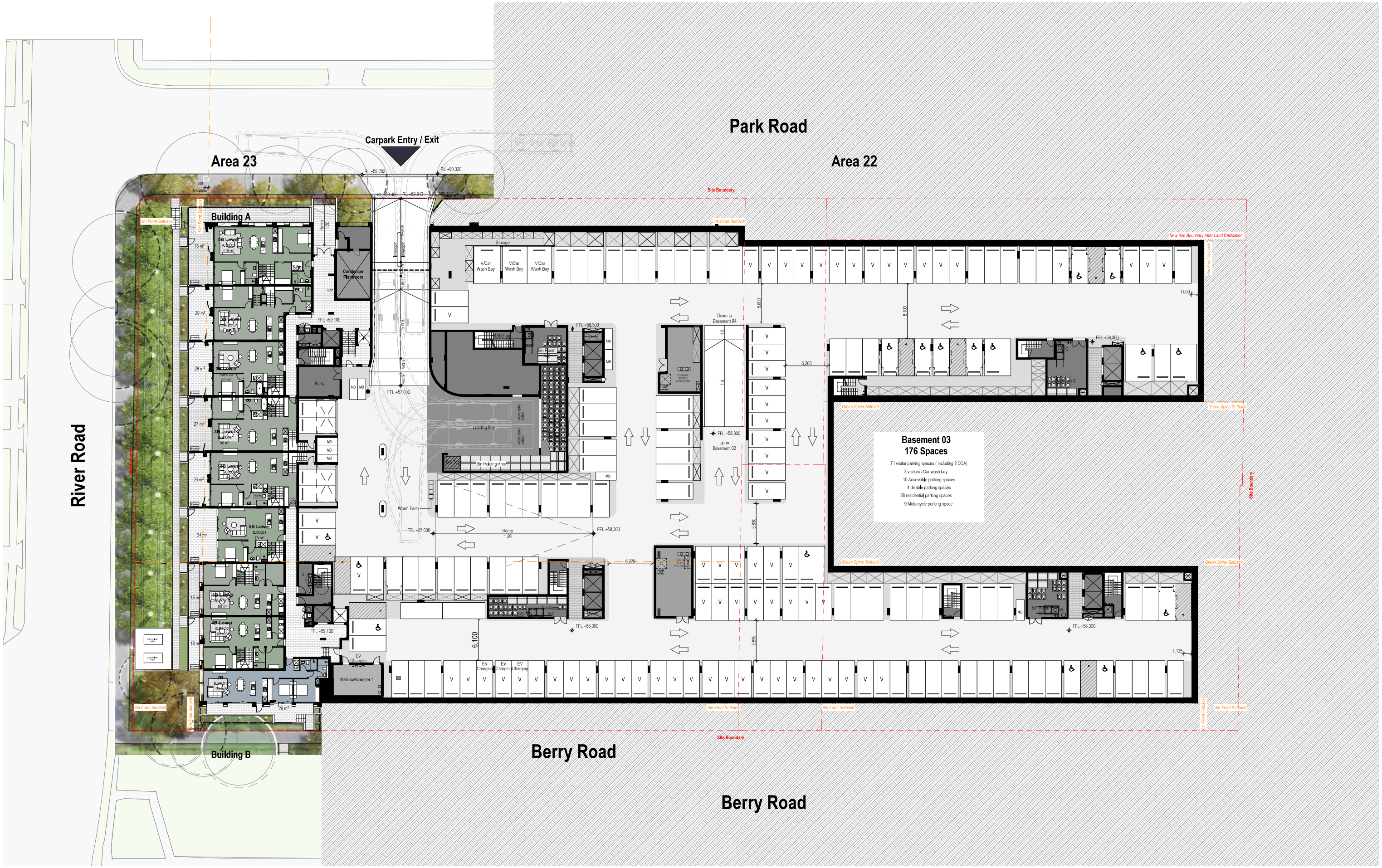
Koos de Keijzer 5767
David Randerson 8542

DKO

Project Name	Park Road
Project Address	26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd , (Area 22 & 23), NSW 2065
Client	Berry Road Development Pty Ltd.
Project Number	12883
Drawing Name	Basement 4
Scale	1:250@A1
Date	June 2023
Drawing Number	DA200
Revision	C



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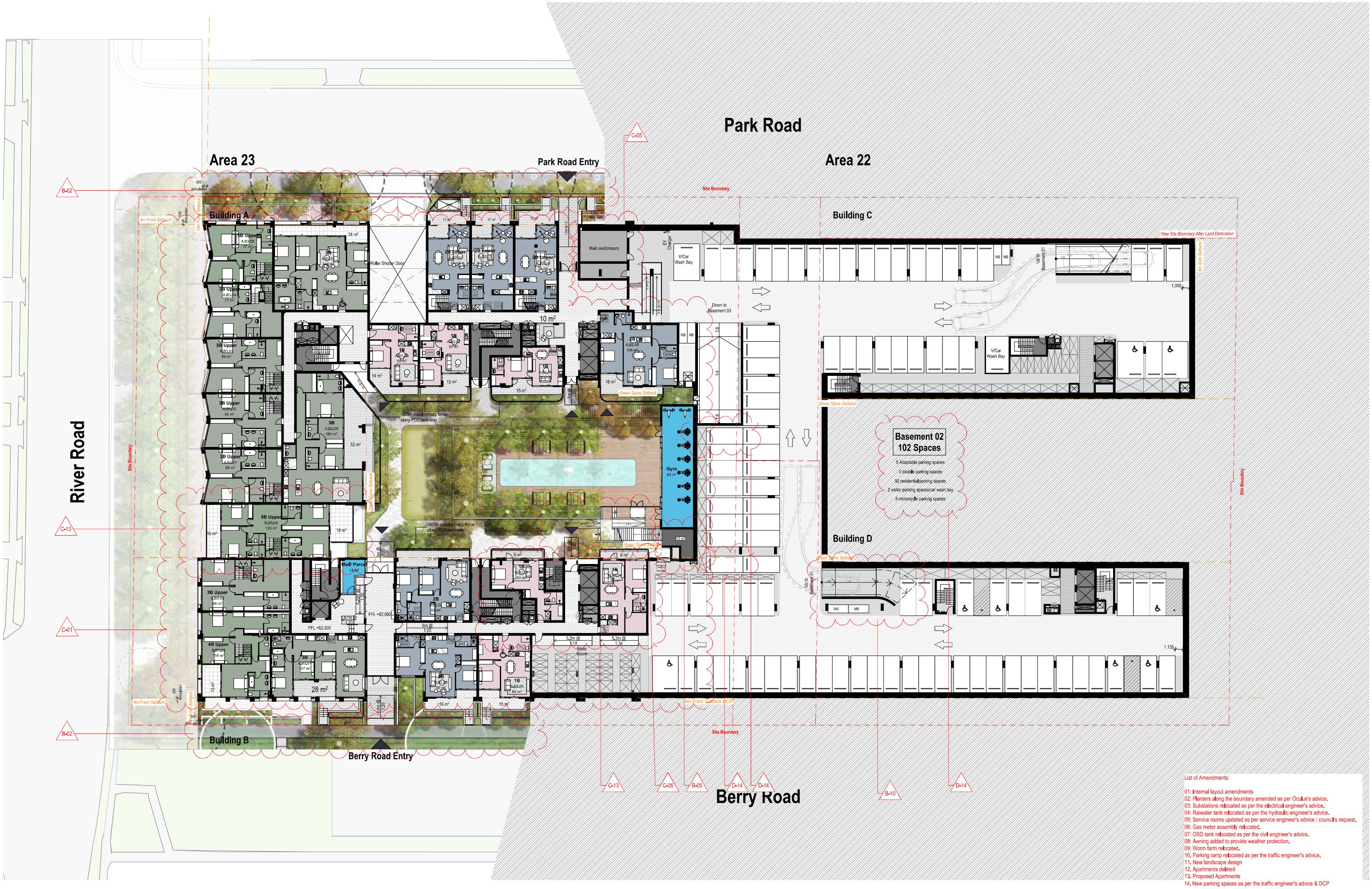
Project Name	Park Road
Project Address	26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd , (Area 22 & 23), NSW 2065
Client	Berry Road Development Pty Ltd.
Project Number	12883
Drawing Name	Basement 3
Scale	1:250@A1
Date	June 2023
Drawing Number	DA201
Revision	C



List of Amendments:

01: Internal layout amendments
02: Planters along the boundary amended as per Oculus's advice.
03: Substations relocated as per the electrical engineer's advice.
04: Raiwater tank relocated as per the hydraulic engineer's advice.
05: Service rooms updated as per service engineer's advice / council's request.
06: Gas meter assembly relocated.
07: OSD tank relocated as per the civil engineer's advice.
08: Awning added to provide weather protection.
09: Worm farm relocated.
10. Parking ramp relocated as per the traffic engineer's advice.
11. New landscape design
12. Apartments deleted
13. Proposed Apartments
14. New parking spaces as per the traffic engineer's advice & DCP

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B	11/05/2023	AC	XD	DA Amendment
C	9/06/2023	AC, IR	XD	DA Amendment
D	10/07/2023	AC, IR	XD	DA Amendment

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DKO

Project Name	Park Road	Project Number	12883
Project Address	26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd , (Area 22 & 23), NSW 2065	Drawing Name	Basement 2
		Scale	1:250@A1
		Date	July 2023
Client	Berry Road Development Pty Ltd.	Drawing Number	DA202
		Revision	D

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Rev	Date	By	Chk	Description
A	24/11/2022	AC, MJ, XD	XD, MR	Issued for DA
B	11/05/2023	AC	XD	DA Amendment
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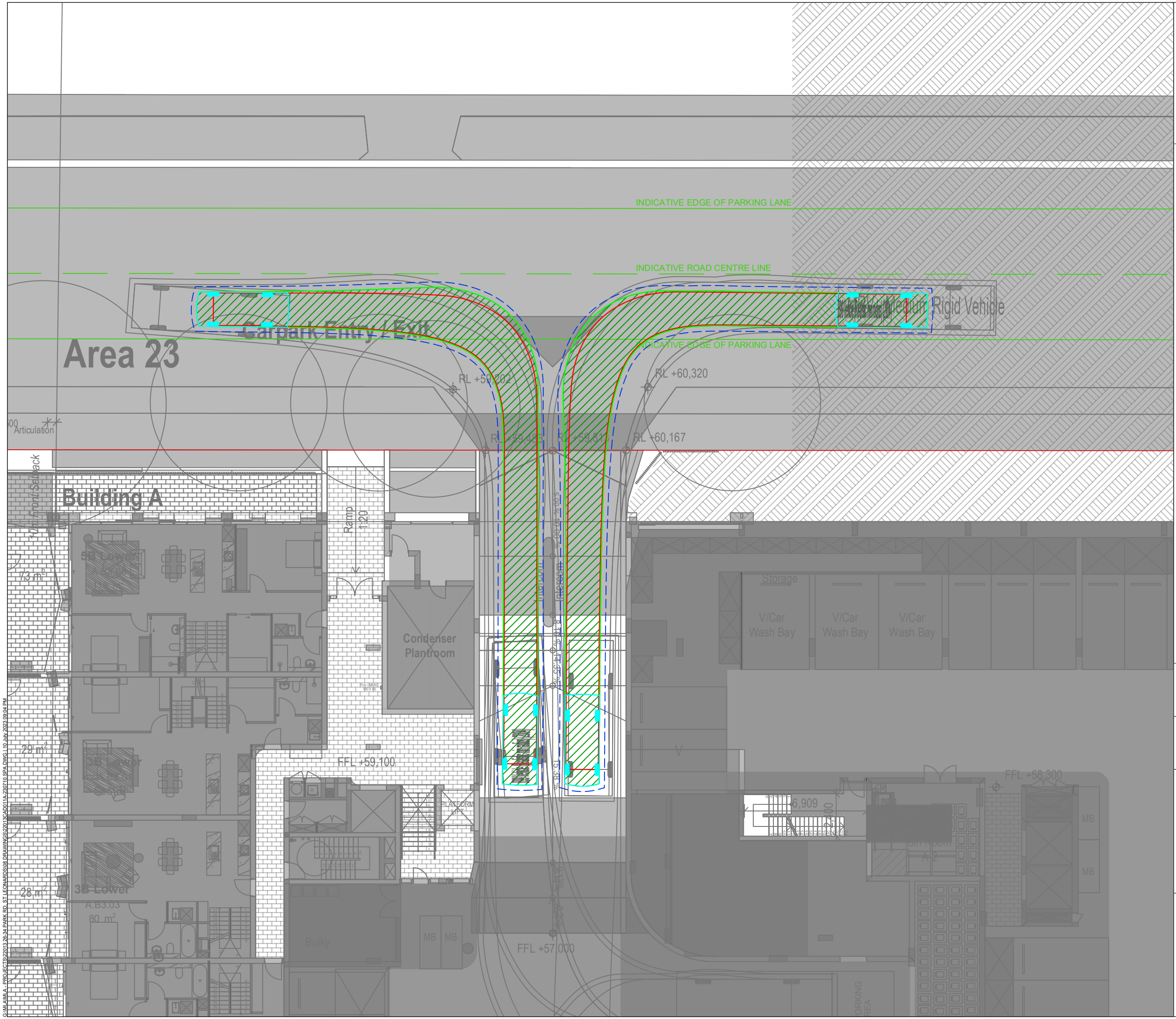
Project Name	Park Road
Project Address	26-50 Park Rd, 27-47 Berry Rd, 48-54 River Rd , (Area 22 & 23), NSW 2065
Client	Berry Road Development Pty Ltd.
Project Number	12883
Drawing Name	Basement 1
Scale	1:250@A1
Date	June 2023
Drawing Number	DA203
Revision	C

Appendix B

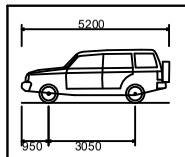
Swept Path Diagrams



MLA Transport Planning
Level 13 | 465 Victoria Ave
Chatswood | NSW | 2067

KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



B99 Vehicle (Realistic min radius) (2004)

Overall Length	5200mm
Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

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DRAWING NO.:	REV:
22013CAD011A-001	A

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SWEPT PATH ANALYSIS - AS2890.1 5.2M B99 ENTERING AND EXITING BASEMENT CAR PARK

PROJECT:
26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

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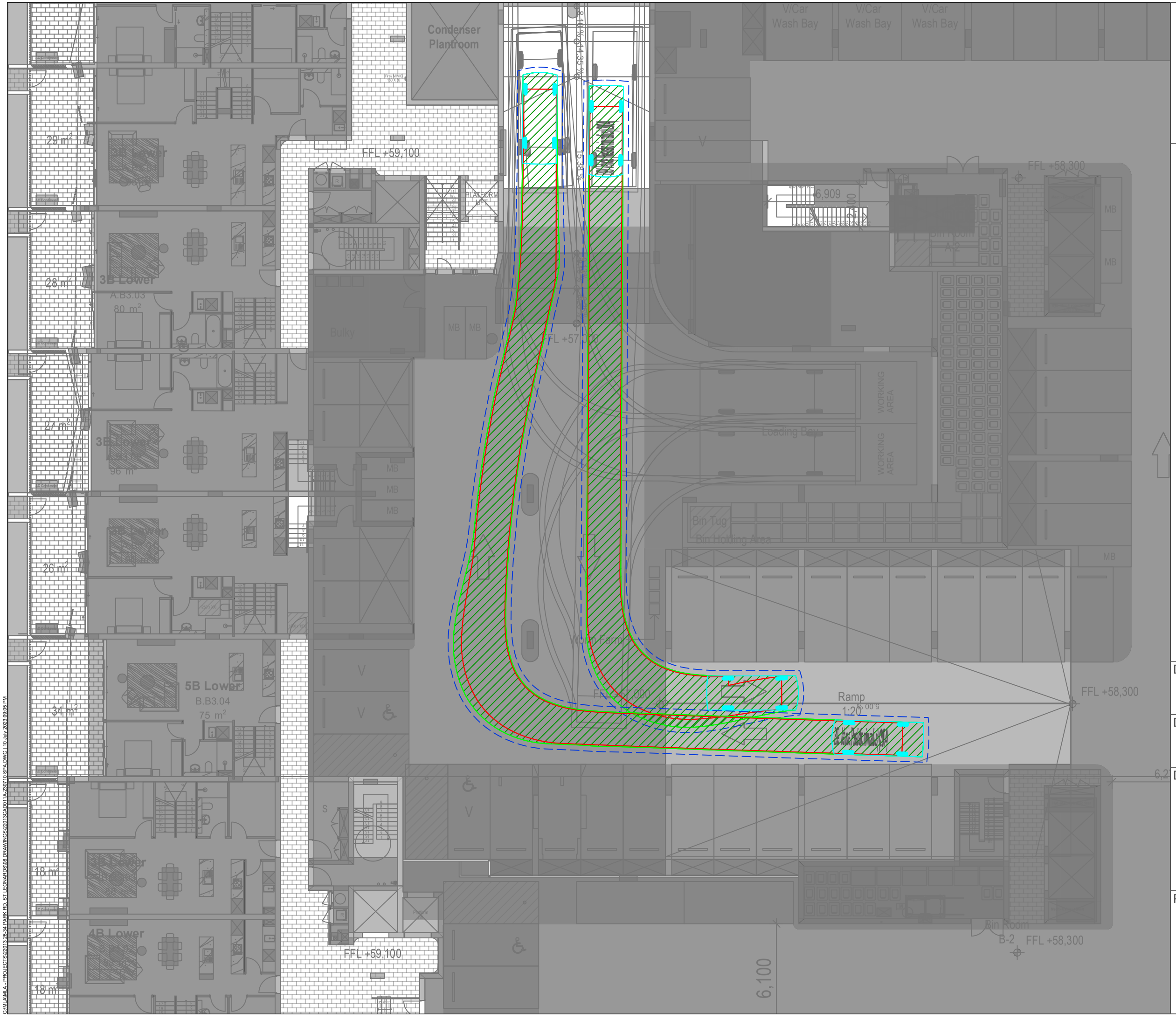

Transport Planning

Level 13 | 465 Victoria Ave
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KEY:

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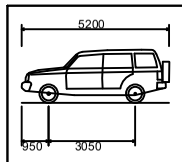

B99 Vehicle (Realistic min radius) (2004)

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Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

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SWEPT PATH ANALYSIS - AS2890.1 5.2M B99 ENTERING AND EXITING BASEMENT CAR PARK

PROJECT:

26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

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Transport Planning
Level 13 | 465 Victoria Ave
Chatswood | NSW | 2067

INDICATIVE EDGE OF PARKING LANE

INDICATIVE ROAD CENTRE LINE

INDICATIVE EDGE OF PARKING LANE

Carpark Entry / Exit

MRV - Medium Rigid Vehicle

Area 23

Building A

RL +59.202

RL +60,320

RL +59.416

RL +59.613

RL +60,167

Ramp 1:20

Condenser Plantroom

Storage

V/Car Wash Bay

V/Car Wash Bay

V/Car Wash Bay

Intercom

MRV - Medium Rigid Vehicle

FFL +59,100

FFL +58,300

FFL +57,000

Bulky

MB

MB

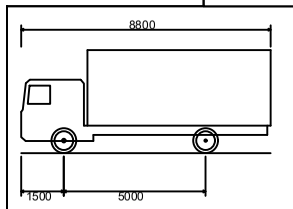
MB

MB

3B Lower
A.B3.03
80 m²

KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



MRV - Medium Rigid Vehicle

Overall Length	8800mm
Overall Width	2500mm
Overall Body Height	3633mm
Min Body Ground Clearance	428mm
Track Width	2500mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10000mm

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DRAWING TITLE:

SWEPT PATH ANALYSIS - AS2890.2 8.8M MRV ENTERING AND EXITING BASEMENT CAR PARK

PROJECT:

26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

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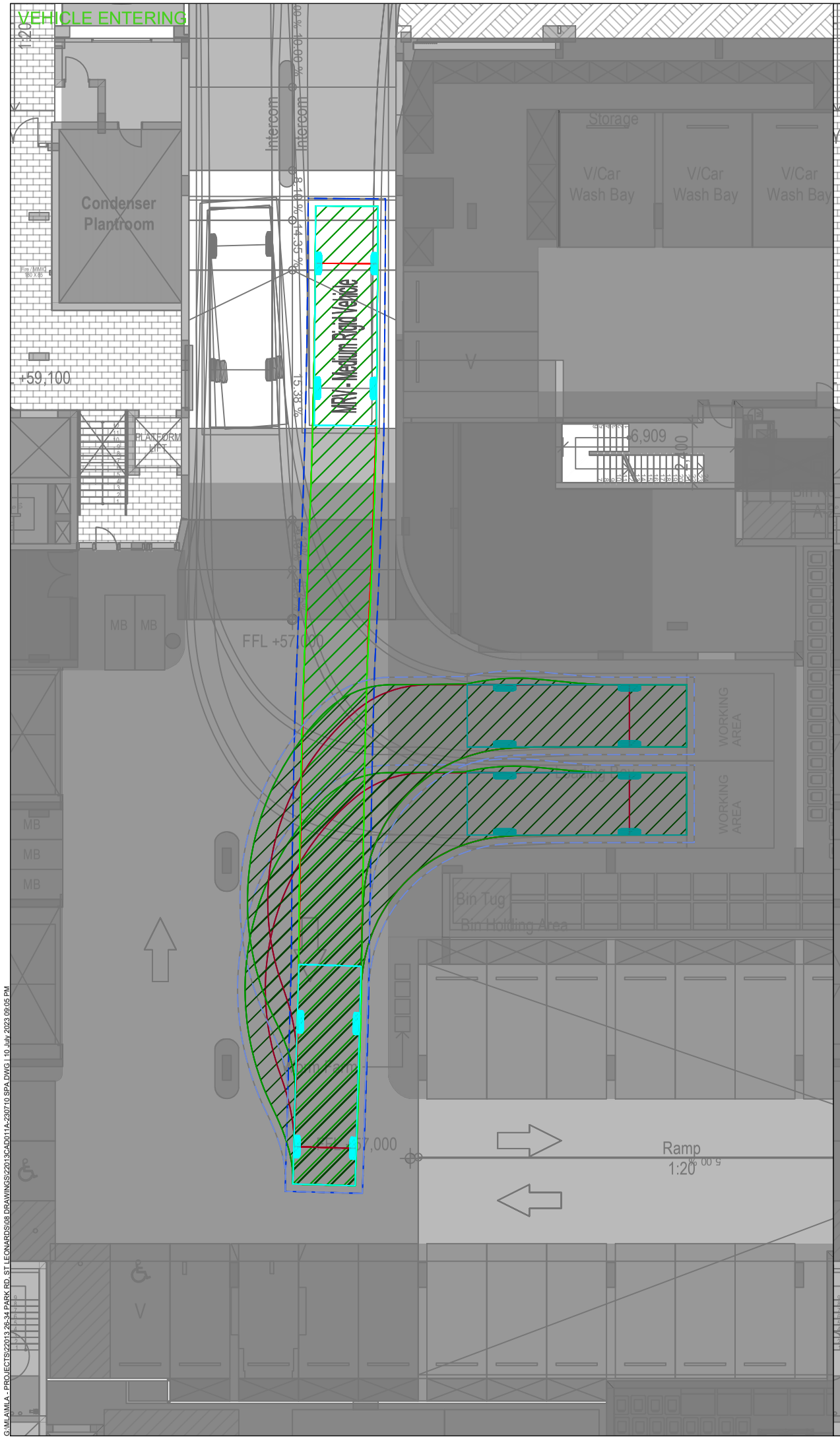

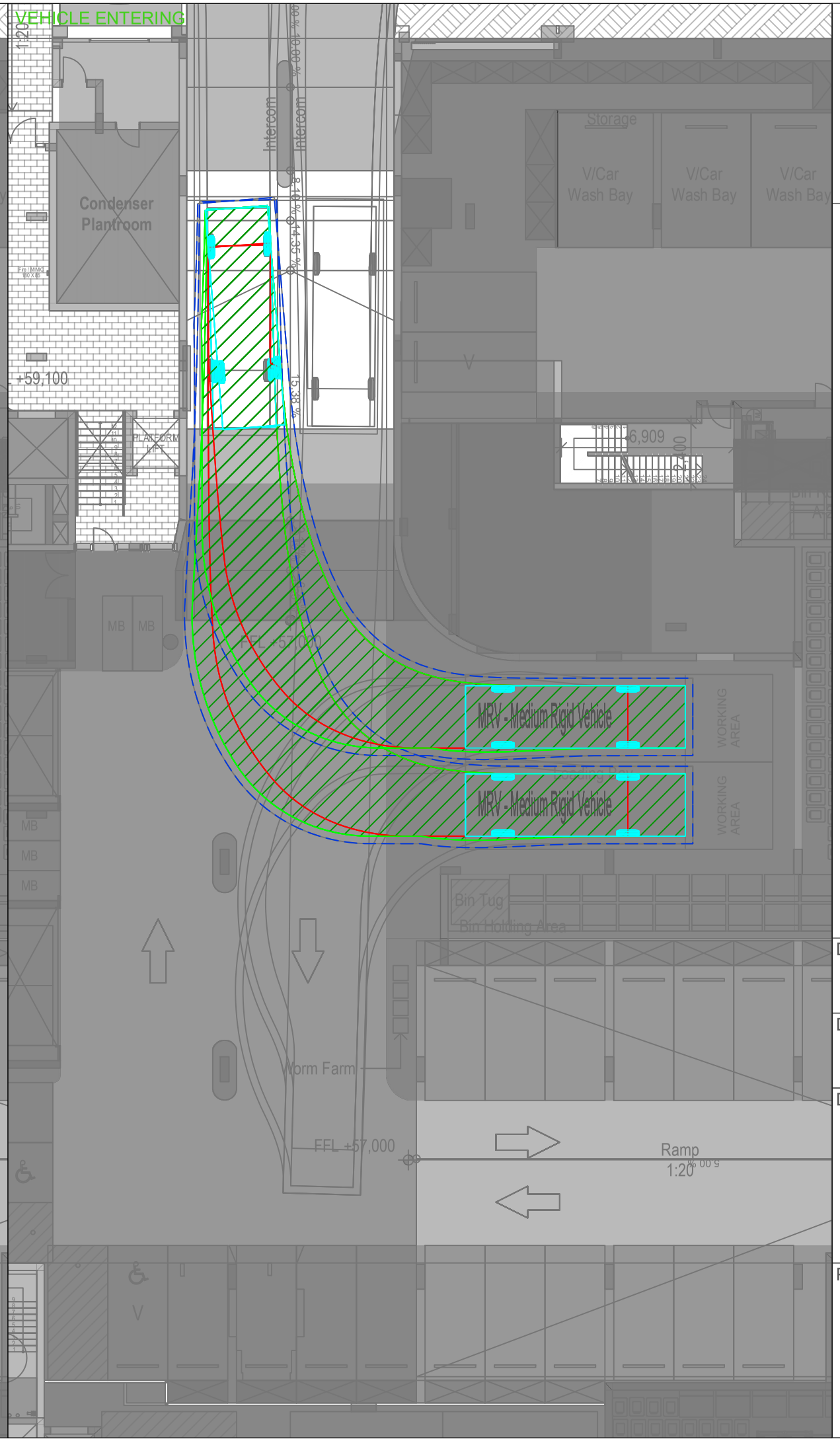

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Level 13 | 465 Victoria Ave
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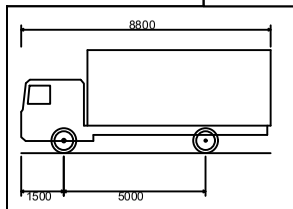
KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



MRV - Medium Rigid Vehicle	
Overall Length	8800mm
Overall Width	2500mm
Overall Body Height	3633mm
Min Body Ground Clearance	428mm
Track Width	2500mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	10000mm

DATE:	SCALE:
10 JULY 2023	1:200@A3
DRAWING NO.:	REV:
22013CAD011A-004	A

DRAWING TITLE:

SWEPT PATH ANALYSIS - AS2890.2 8.8M MRV ACCESSING LOADING BAYS

PROJECT:

26-34 PARK RD, ST LEONARDS
PROPOSED RESIDENTIAL DEVELOPMENT

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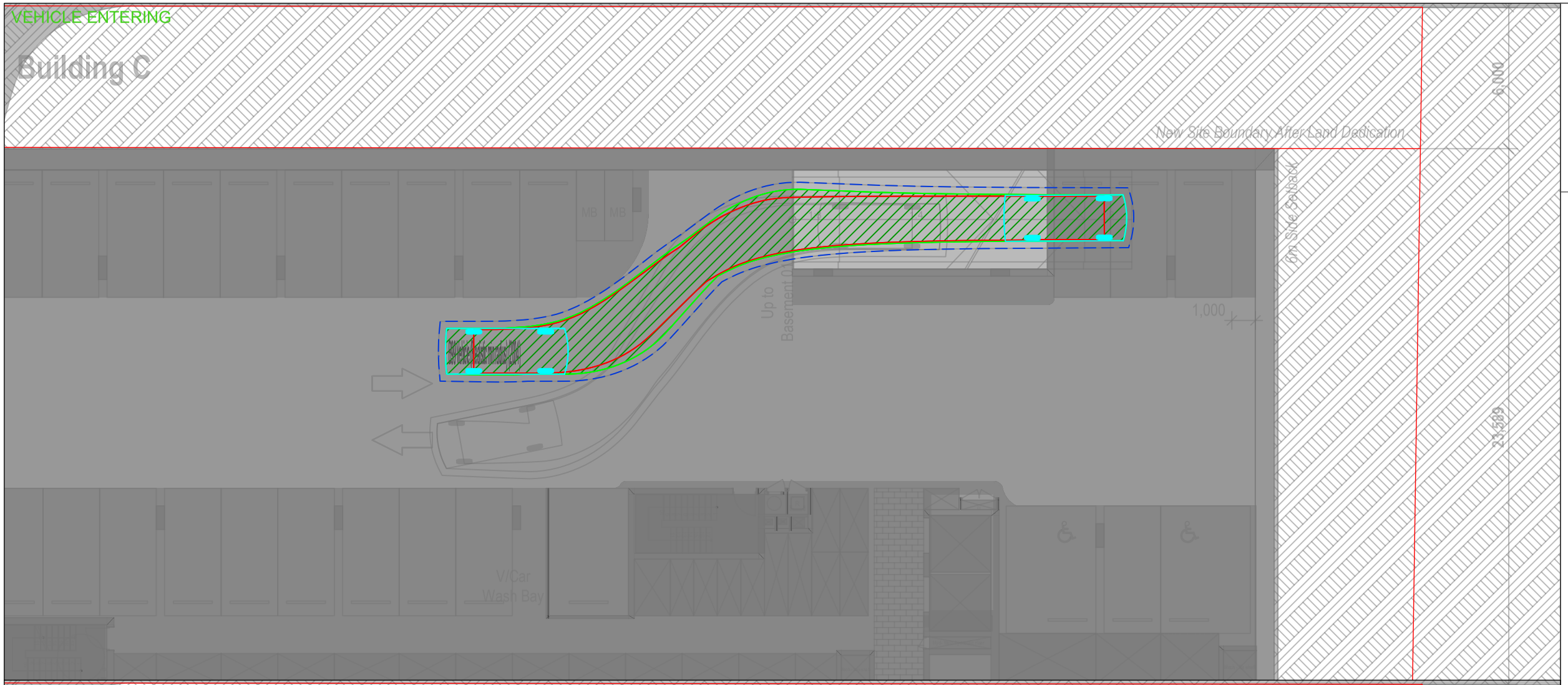
VEHICLE ENTERING



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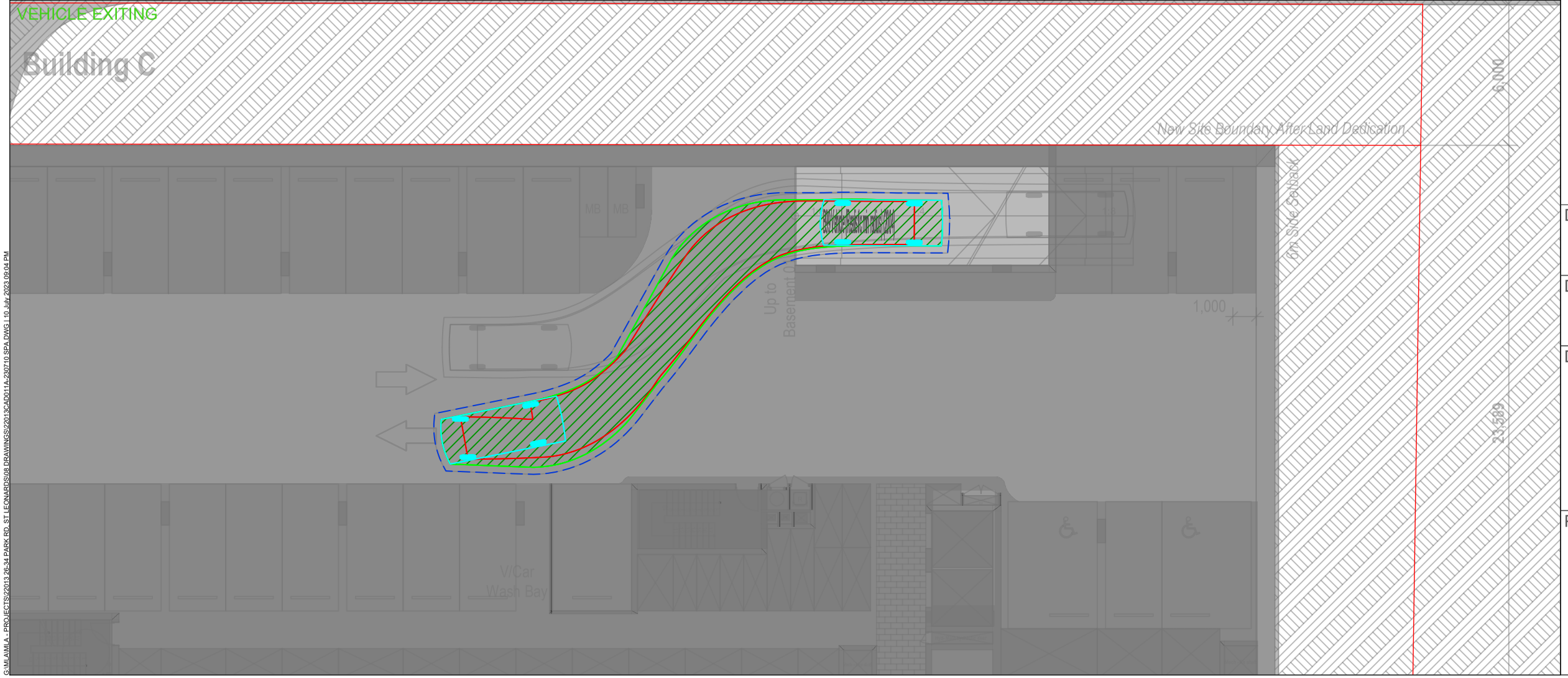

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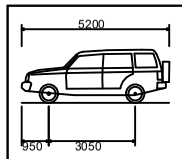
KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



B99 Vehicle (Realistic min radius) (2004)

Overall Length	5200mm
Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

DATE:	SCALE:
10 JULY 2023	1:200@A3
DRAWING NO.:	REV:
22013CAD011A-005	A

DRAWING TITLE:

SWEPT PATH ANALYSIS - AS2890.1 B99 VEHICLE ENTERING AND EXITING B2-B1 RAMP ON B2 (WEST)

PROJECT:

26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

VEHICLE ENTERING

Building C

New Site Boundary After Land Dedication

6m Side Setback

1:4

Basement 01
25 Spaces

5 disable parking spaces
20 residential parking spaces

VEHICLE EXITING

Building C

New Site Boundary After Land Dedication

6m Side Setback

Basement 01
25 Spaces

5 disable parking spaces
20 residential parking spaces

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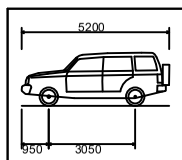
KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



B99 Vehicle (Realistic min radius) (2004)

Overall Length	5200mm
Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

DATE:	SCALE:
10 JULY 2023	1:200@A3
DRAWING NO.:	REV:
22013CAD011A-006	A

DRAWING TITLE:

SWEPT PATH ANALYSIS - AS2890.1 B99 VEHICLE ENTERING AND EXITING B2-B1 RAMP ON B1 (WEST)

PROJECT:

26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

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VEHICLE ENTERING

Gym
83 m²

15 m²

Green Spine Setback

Basement 02
102 Spaces

5 Adaptable parking spaces
3 disable parking spaces
92 residential parking spaces
2 visitor parking spaces/car wash bay
6 motorcycle parking spaces

Building D

Green Spine Setback

Up to Basement 01

MB MB

VEHICLE EXITING

Gym
83 m²

15 m²

Green Spine Setback

Basement 02
102 Spaces

5 Adaptable parking spaces
3 disable parking spaces
92 residential parking spaces
2 visitor parking spaces/car wash bay
6 motorcycle parking spaces

Building D

Green Spine Setback

Up to Basement 01

MB MB

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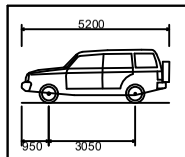
KEY:

	Forward	Reverse
Wheel Path		
Body Envelope		
Clearance (300mm)		



B99 Vehicle (Realistic min radius) (2004)

Overall Length	5200mm
Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

DATE:	SCALE:
10 JULY 2023	1:200@A3
DRAWING NO.:	REV:
22013CAD011A-007	A

DRAWING TITLE:
SWEPT PATH ANALYSIS - AS2890.1 B99 VEHICLE ENTERING AND EXITING B2-B1 RAMP ON B2 (EAST)

PROJECT:
26-34 PARK RD, ST LEONARDS
PROPOSED RESIDENTIAL DEVELOPMENT

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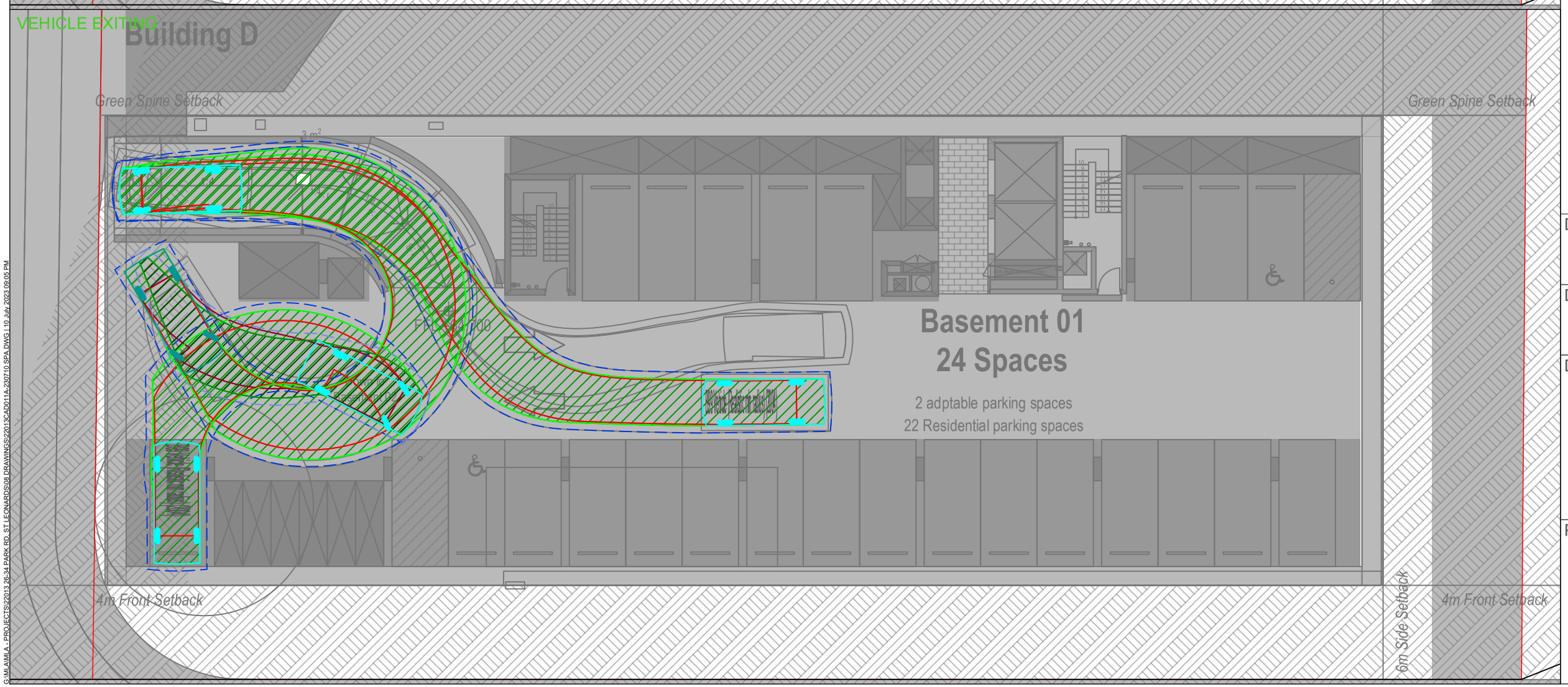
VEHICLE ENTERING

VEHICLE EXITING



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KEY:

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Wheel Path		
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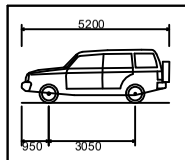
Clearance (300mm)		



B99 Vehicle (Realistic min radius) (2004)

Overall Length	5200mm
Overall Width	1940mm
Overall Body Height	1878mm
Min Body Ground Clearance	272mm
Track Width	1840mm
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6250mm

DATE:	SCALE:
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DRAWING NO.:	REV:
22013CAD011A-008	A

DRAWING TITLE:
SWEPT PATH ANALYSIS - AS2890.1 B99 VEHICLE ENTERING AND EXITING B2-B1 RAMP ON B1 (EAST)

PROJECT:
26-34 PARK RD, ST LEONARDS PROPOSED RESIDENTIAL DEVELOPMENT

Appendix C

SIDRA Results

MOVEMENT SUMMARY

Site: 101 [River Rd-Park Rd AMEX (Site Folder: General)]

2022 Existing AM Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: River Rd E														
5	T1	566	18	596	3.2	0.381	0.9	LOS A	1.0	7.3	0.23	0.07	0.30	48.8
6	R2	60	1	63	1.7	0.381	9.6	LOS A	1.0	7.3	0.23	0.07	0.30	48.1
Approach		626	19	659	3.0	0.381	1.7	NA	1.0	7.3	0.23	0.07	0.30	48.8
North: Park Rd														
7	L2	19	0	20	0.0	0.087	6.4	LOS A	0.3	2.0	0.71	0.79	0.71	41.8
9	R2	11	1	12	9.1	0.087	25.9	LOS B	0.3	2.0	0.71	0.79	0.71	41.6
Approach		30	1	32	3.3	0.087	13.6	LOS A	0.3	2.0	0.71	0.79	0.71	41.7
West: River Rd W														
10	L2	22	2	23	9.1	0.328	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.1
11	T1	1176	20	1238	1.7	0.328	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		1198	22	1261	1.8	0.328	0.2	NA	0.0	0.0	0.00	0.01	0.00	49.8
All Vehicles		1854	42	1952	2.3	0.381	0.9	NA	1.0	7.3	0.09	0.04	0.11	49.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [River Rd-Park Rd PMEX (Site Folder: General)]

2022 Existing PM Peak
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: River Rd E														
5	T1	986	8	1038	0.8	0.285	0.3	LOS A	0.6	3.9	0.05	0.01	0.06	49.6
6	R2	22	0	23	0.0	0.285	10.3	LOS A	0.6	3.9	0.11	0.03	0.13	48.6
Approach		1008	8	1061	0.8	0.285	0.6	NA	0.6	3.9	0.05	0.01	0.06	49.6
North: Park Rd														
7	L2	25	0	26	0.0	0.146	8.6	LOS A	0.5	3.2	0.76	0.89	0.76	40.9
9	R2	17	0	18	0.0	0.146	25.8	LOS B	0.5	3.2	0.76	0.89	0.76	40.7
Approach		42	0	44	0.0	0.146	15.6	LOS B	0.5	3.2	0.76	0.89	0.76	40.8
West: River Rd W														
10	L2	6	0	6	0.0	0.003	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
11	T1	624	8	657	1.3	0.340	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		630	8	663	1.3	0.340	0.2	NA	0.0	0.0	0.00	0.01	0.00	49.8
All Vehicles		1680	16	1768	1.0	0.340	0.8	NA	0.6	3.9	0.05	0.03	0.06	49.4

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [River Rd-Park Rd AMFU (Site Folder: General)]

2022 AM Peak with Development
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: River Rd E														
5	T1	566	18	596	3.2	0.389	1.0	LOS A	1.1	8.2	0.25	0.07	0.34	48.7
6	R2	67	1	71	1.5	0.389	9.6	LOS A	1.1	8.2	0.25	0.07	0.34	48.0
Approach		633	19	666	3.0	0.389	1.9	NA	1.1	8.2	0.25	0.07	0.34	48.6
North: Park Rd														
7	L2	42	0	44	0.0	0.180	6.5	LOS A	0.6	4.2	0.72	0.82	0.72	41.9
9	R2	24	1	25	4.2	0.180	25.4	LOS B	0.6	4.2	0.72	0.82	0.72	41.7
Approach		66	1	69	1.5	0.180	13.4	LOS A	0.6	4.2	0.72	0.82	0.72	41.9
West: River Rd W														
10	L2	24	2	25	8.3	0.328	4.7	LOS A	0.0	0.0	0.00	0.02	0.00	49.1
11	T1	1176	20	1238	1.7	0.328	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	49.8
Approach		1200	22	1263	1.8	0.328	0.2	NA	0.0	0.0	0.00	0.01	0.00	49.8
All Vehicles		1899	42	1999	2.2	0.389	1.2	NA	1.1	8.2	0.11	0.06	0.14	49.1

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [River Rd-Park Rd PMFU (Site Folder: General)]

2022 PM Peak with Development
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] veh/h	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: River Rd E														
5	T1	986	8	1038	0.8	0.297	0.5	LOS A	0.9	6.4	0.08	0.02	0.09	49.4
6	R2	36	0	38	0.0	0.297	10.4	LOS A	0.9	6.4	0.17	0.05	0.21	48.1
Approach		1022	8	1076	0.8	0.297	0.9	NA	0.9	6.4	0.08	0.02	0.10	49.4
North: Park Rd														
7	L2	28	0	29	0.0	0.167	8.6	LOS A	0.5	3.7	0.77	0.89	0.77	40.7
9	R2	19	0	20	0.0	0.167	26.6	LOS B	0.5	3.7	0.77	0.89	0.77	40.6
Approach		47	0	49	0.0	0.167	15.9	LOS B	0.5	3.7	0.77	0.89	0.77	40.7
West: River Rd W														
10	L2	10	0	11	0.0	0.006	4.6	LOS A	0.0	0.0	0.00	0.53	0.00	46.6
11	T1	624	8	657	1.3	0.340	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach		634	8	667	1.3	0.340	0.2	NA	0.0	0.0	0.00	0.01	0.00	49.8
All Vehicles		1703	16	1793	0.9	0.340	1.0	NA	0.9	6.4	0.07	0.04	0.08	49.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site 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: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MLA Transport Planning

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