Appendix 13

Traffic, Parking and Access Study

SCT Consulting

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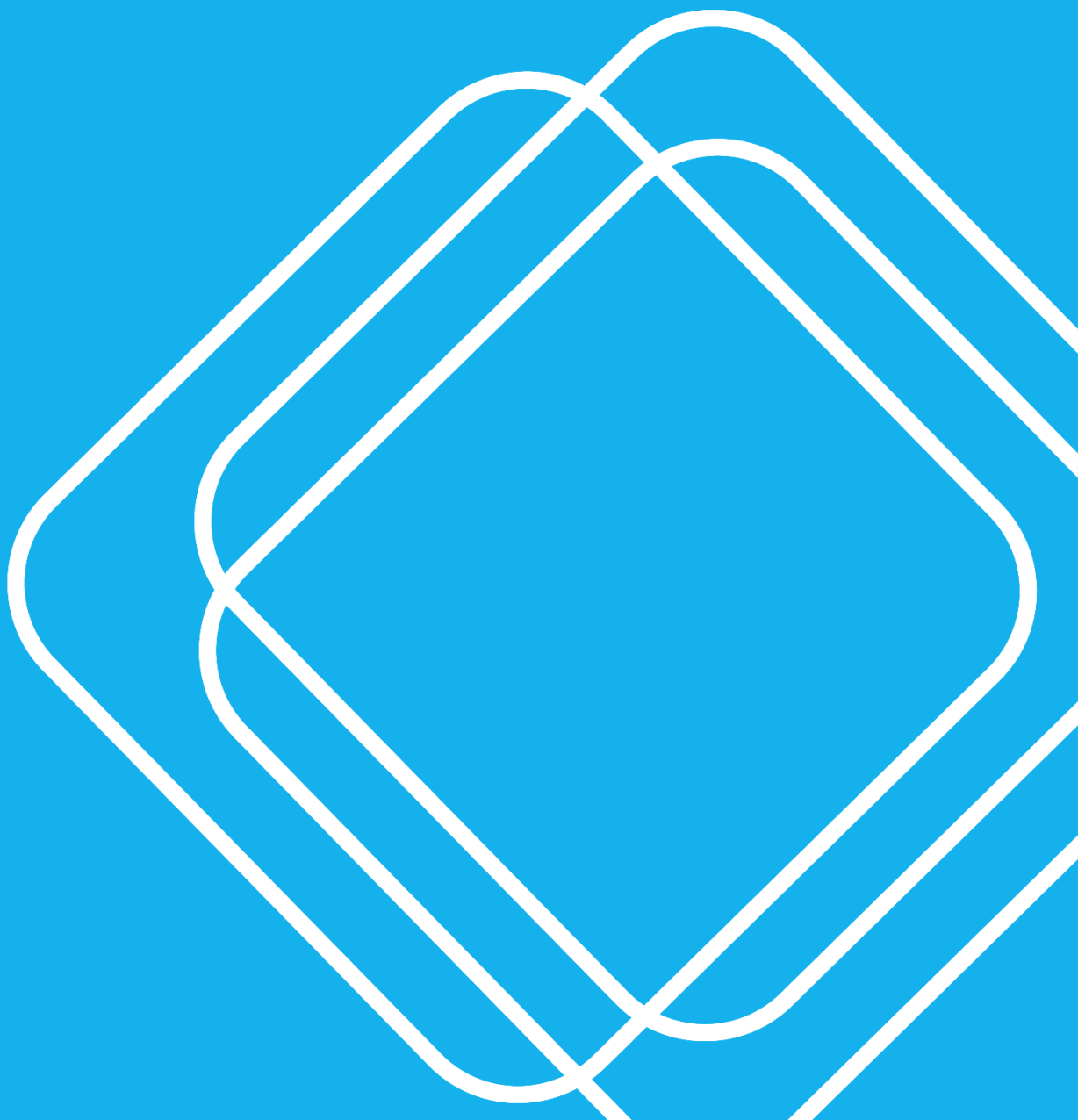
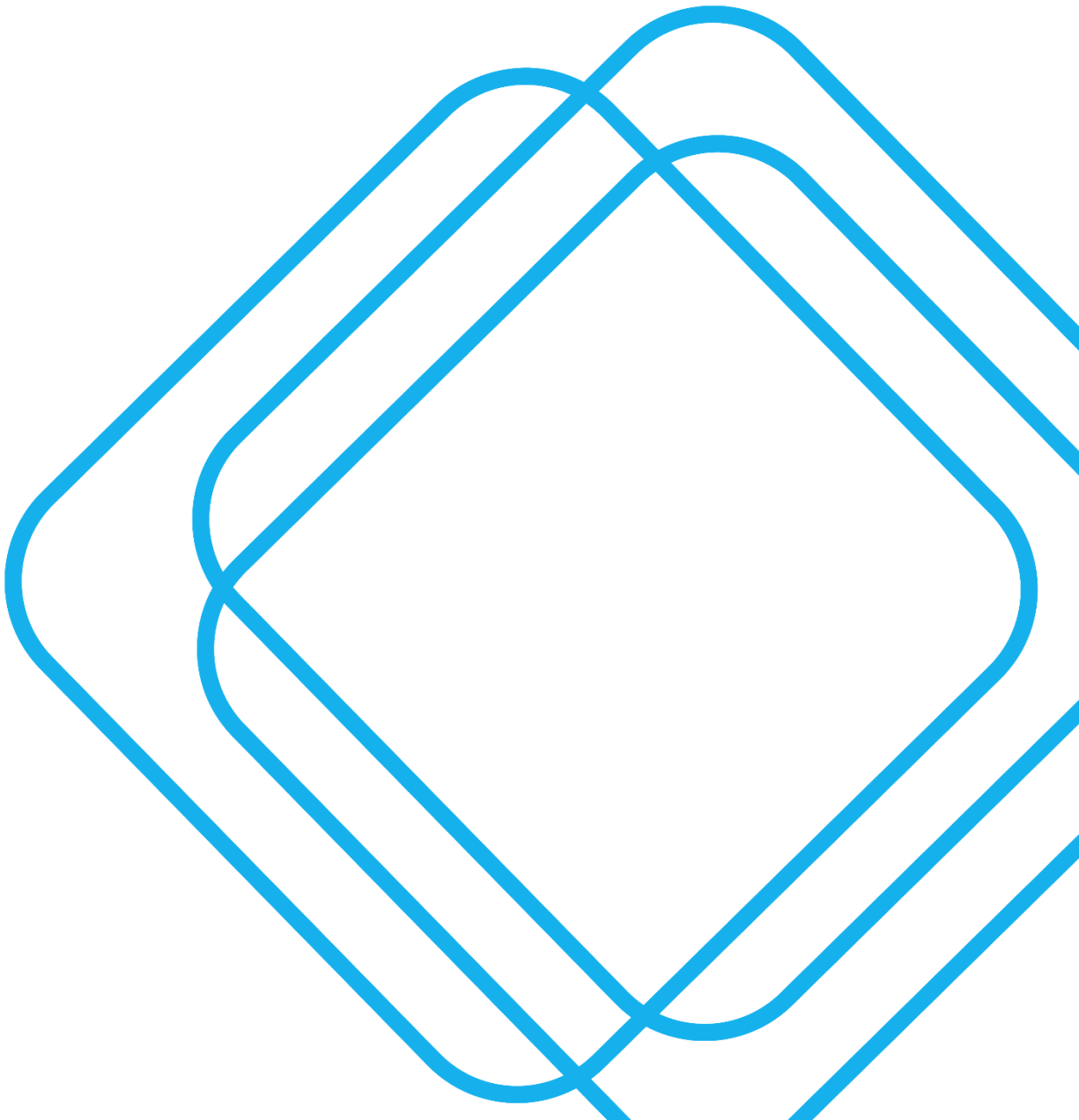
ST LEONARDS SOUTH, EAST QUARTER LOT 18, 19 & 20

Traffic, Parking and Access Study

9 MAY 2022





Quality Assurance

Project:	St Leonards South, East Quarter Lot 18, 19 & 20		
Project Number:	SCT_00209		
Client:	Greaton	**ABN:**	34 620 994 103
Prepared by:	SCT Consulting PTY. LTD. (SCT Consulting)	**ABN:**	53 612 624 058

Quality Information	
Document name:	St Leonards South, East Quarter Lot 18, 19 & 20
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Revision	Revision Date	Details
1.0	8 April 2022	Draft report
2.0	29 April 2022	Updated draft report
3.0	9 May 2022	Updated draft report

Contents

Appendices

Executive Summary

The subject site for this development application is the Greaton owned land within St Leonards South, East Quarter. The site is part of the St Leonards South Residential Precinct, which has been approved to deliver a high-density residential use with significant additional local infrastructure and green spaces.

This development application aims to seek approval for a residential development with 245 apartments on the existing lots adjoining River Road, Berry Road and Holdsworth Avenue.

This report contains a traffic, parking and access study of the potential development on the surrounding transport systems, which builds on the finalised St Leonards South Development Control Plan by Lane Cove Council (Council) and St Leonards Crows Nest 2036 Plan by the Department of Planning, Industry & Environment (the Department). From a transport perspective, the proposed development is consistent with the previous work.

Based on traffic generation rates previously endorsed by Roads and Maritime Services of 0.14 vehicle trips per dwelling in the AM peak hour and 0.07 vehicle trips per dwelling in the PM peak hour, the net traffic increase of the proposed scheme is less than 20 car trips in both peak hours considering the replacement of the existing 16 houses.

Previous traffic modelling undertaken by Council identified that with a suite of proposed upgrades, the network could address an uplift of 2,400 (reduced to 2,000 in the final St Leonards South rezoning) additional dwellings that comprise St Leonards South. The development is compliant with the Local Environmental Plan and Council's DCP in terms of land use type and floor space ratio, resulting in a permissible development yield and relatively small net traffic increase when the development is completed. Hence, it is expected that the trip generation of the development would be accommodated by the existing and planned infrastructure.

Previous work by Council and the Department identifies several walking and cycling opportunities to increase accessibility to the stations at St Leonards and Crows Nest, including the provision of east-west through-site connections. The proposal includes the delivery of a walking connection on the site. The site will also contribute to local and state infrastructure through relevant mechanisms.

The site also has excellent access to transport, being less than 800m walk from St Leonards Station and less than 1km from the new Crows Nest Metro station. These two stations provide access to destinations across Sydney and make this development transit-oriented. The site is also located within 100m of bus services on River Road.

According to *Lane Cove Council DCP*, It is proposed that the parking rates would follow one space for one-bed apartment, 1.5 spaces for 2-bed apartment and two spaces per three-bed apartment plus 0.25 additional spaces per apartment for visitor car parking. Hence, the total provision of 418 parking spaces is compliant.

A comparison of the contents of this report and the Lane Cove Council DA Checklist is provided in **Table ES1**.

Table ES1 Compliance with Council DA Checklist

		Present	Section in report
1.0 INTRODUCTION		✓	1.0
1.1 Background	Description of development proposal.	✓	1.1

		Present	Section in report
2.0 EXISTING TRANSPORT NETWORK & TRAFFIC SITUATION		✓	2.0
2.1 Site Location	Current land-use characteristics, site location & boundary, including map of site location. Description of local road network eg. hierarchy, speed limits, intersection controls, etc.	✓	2.5
2.2 Surveys & Existing Traffic Flow	Description of traffic surveys undertaken eg. type, location, date, time, weather.	✓	2.5
2.3 Assessment of Existing Traffic Conditions	Assessment of current traffic conditions, including local intersection performance analysed using appropriate modelling software.	✓	1.2 2.5

		Present	Section in report
2.4 Assessment of Existing Travel Options	Assessment of current public transport, walking and cycling infrastructure and services in the vicinity of the site.	✓	2.2 2.3 2.4

		Present	Section in report
3.0 PROPOSED DEVELOPMENT		✓	3.0
3.1 The Development	Description of nature and size of the development e.g. number of residential units, GFA, operating hours, etc.	✓	3.1
3.2 Access Location	Proposed access locations and turning movements.	✓	3.2
3.3 On-site Parking	Assessment of proposed parking provisions against Lane Cove DCP requirements and relevant Australian Standards, including justification for any proposed deviation.	✓	3.4

		Present	Section in report
4.0 IMPACT OF PROPOSED DEVELOPMENT		✓	4.0
4.1 Development Traffic Generation	Estimated peak hour traffic generation.	✓	3.6.1 4.3
4.2 Development Traffic Distribution & Assignment	Plan showing likely assignment of development traffic to the surrounding road network and peak hour access/egress routes.	✓	3.6.1
4.3 Future Traffic Conditions with the Proposed Development	Assessment of the future traffic conditions, including affected intersections and roads, based on background traffic growth and development traffic using appropriate traffic modelling software.	✓	4.3
4.4 Improvement Proposal	<IF REQUIRED> Investigation of practical improvement measures to mitigate the traffic impacts of the development e.g. intersection treatments, traffic calming etc.	Not required	-

		Present	Section in report
5.0 OTHER ASSESSMENT ISSUES		✓	4.0
5.1 Public Transport	Estimation of the proposed development's public transport demand, accessibility and adequacy of provision, optimised traffic layout to minimise traffic conflicts between modes of transport, etc.	✓	3.6.2 4.1
5.2 Pedestrians	Review of pedestrian facilities and proposal of necessary improvements.	✓	2.2 3.2.3 4.2
5.3 Cyclists	Review of cycling facilities and proposal of necessary improvements, including end of trip facilities on site.	✓	3.2.3 4.2
5.4 Loading & Unloading Facilities	<IF REQUIRED> Provision of appropriate loading & unloading facilities eg. Council waste-collection vehicles.	✓	3.2.4

		Present	Section in report
5.5 Pick-up / Drop-off Facilities	<IF REQUIRED> Suitable location of pick-up/drop-off activities and number of bays required.	Not required	
5.6 Access & Traffic Circulation	Traffic circulation pattern and internal manoeuvres including swept-path analysis. Type of traffic control and vehicle manoeuvres at access/egress points.	✓	3.7
5.7 Construction Traffic Management Plan	Assessment of traffic and parking impacts of demolition/construction phase of development including Traffic Control Plan.	✓	5.0

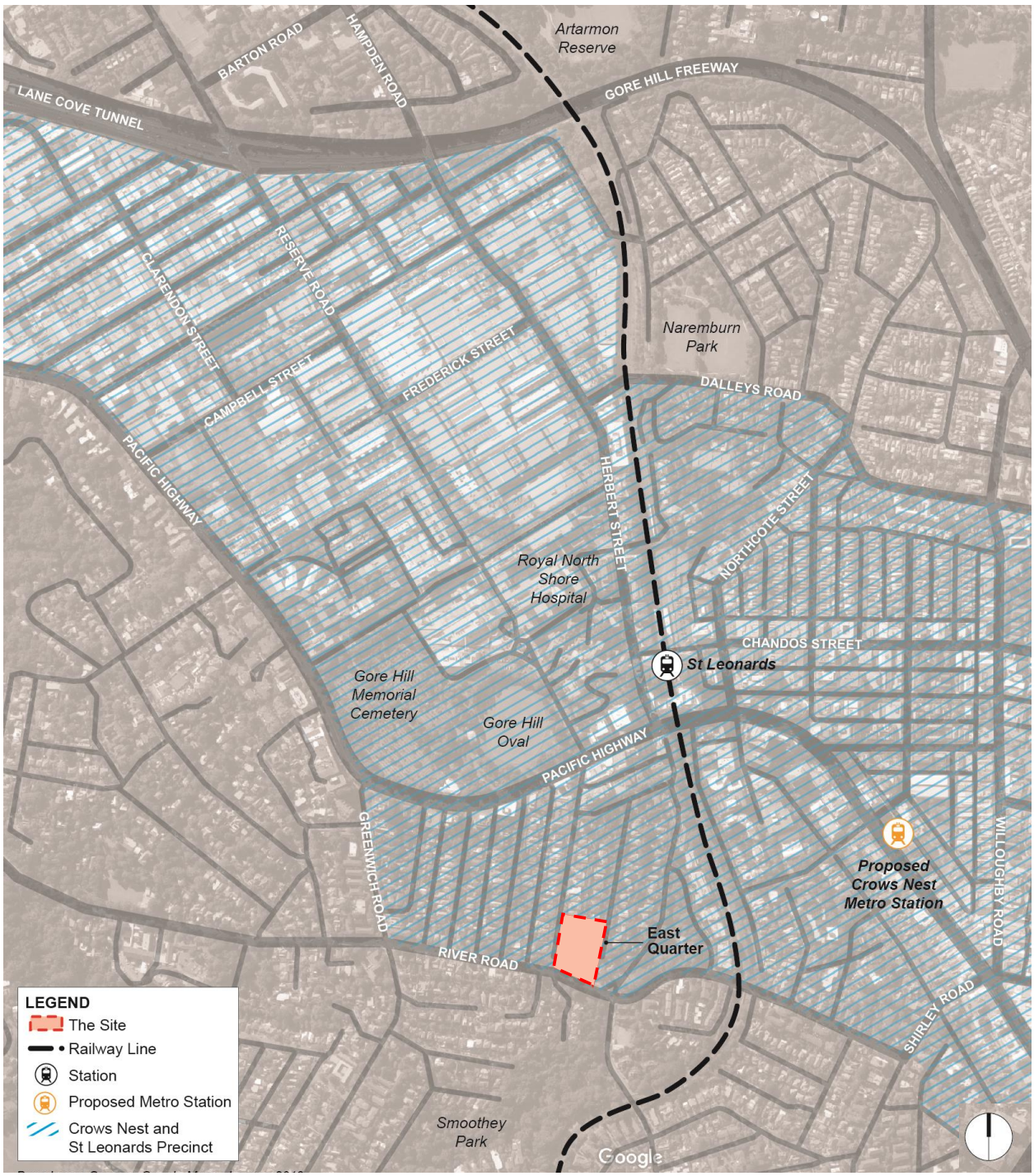
		Present	Section in report
6.0 RECOMMENDATIONS AND CONCLUSIONS		✓	
6.1 Findings	Summary of the key study issues & findings.	✓	6.0
6.2 Recommendations	Summary of traffic and transport improvement recommendations.	✓	6.0
6.3 Compliance Table	TIA Checklist compliance table with justification for any non-compliance.	✓	Executive Summary

1.0 Introduction

1.1 Background

SCT Consulting has been engaged by Greaton to prepare a Traffic, Parking and Access Study to support a Development Application (DA) for the East Quarter of the St Leonards South Lot 18, 19, 20 (as shown in **Figure 1-1**).

Figure 1-1 Proposed site



The subject site is located within the local government area of Lane Cove Council on the Lower North Shore. It is located within the St Leonards South area, identified in the St Leonards and Crows Nest Planned Precinct. It is currently characterised by low-density detached residential dwellings.

Key transport infrastructure that already exists near the sites includes:

– Pacific Highway: a major route for general traffic and the majority of bus routes

– T1 Railway line: this provides a high-capacity public transport service with the approximate 30-minute catchment to stations including Waitara, Pennant Hills, Edgecliff, Sydenham and just short of Burwood.

The proposed Sydney Metro City and Southwest (proposed to be operational by 2024) will provide significant capacity to the transport network in the Precinct with a station proposed at Crows Nest. Crows Nest Metro Station will increase the proportion of the Precinct within a convenient catchment of a high-quality and high-capacity rail transport infrastructure. This will improve the accessibility of the sites to other areas of Sydney and is expected to reduce the need for private vehicle ownership and car parking.

1.2 Traffic assessment approach

In 2017, TEF Consulting conducted a review and independent assessment of the cumulative traffic impacts of current proposals, and other approved proposals, within the St Leonards South (where the subject site is located) and St Leonards East areas.

Commencing in October 2016, Cardno conducted a Strategic Transport Study for the Department of Planning, Industry and Environment for St Leonards and Crows Nest Station Precinct, including the St Leonards South area. Five scenarios were tested through the modelling process.

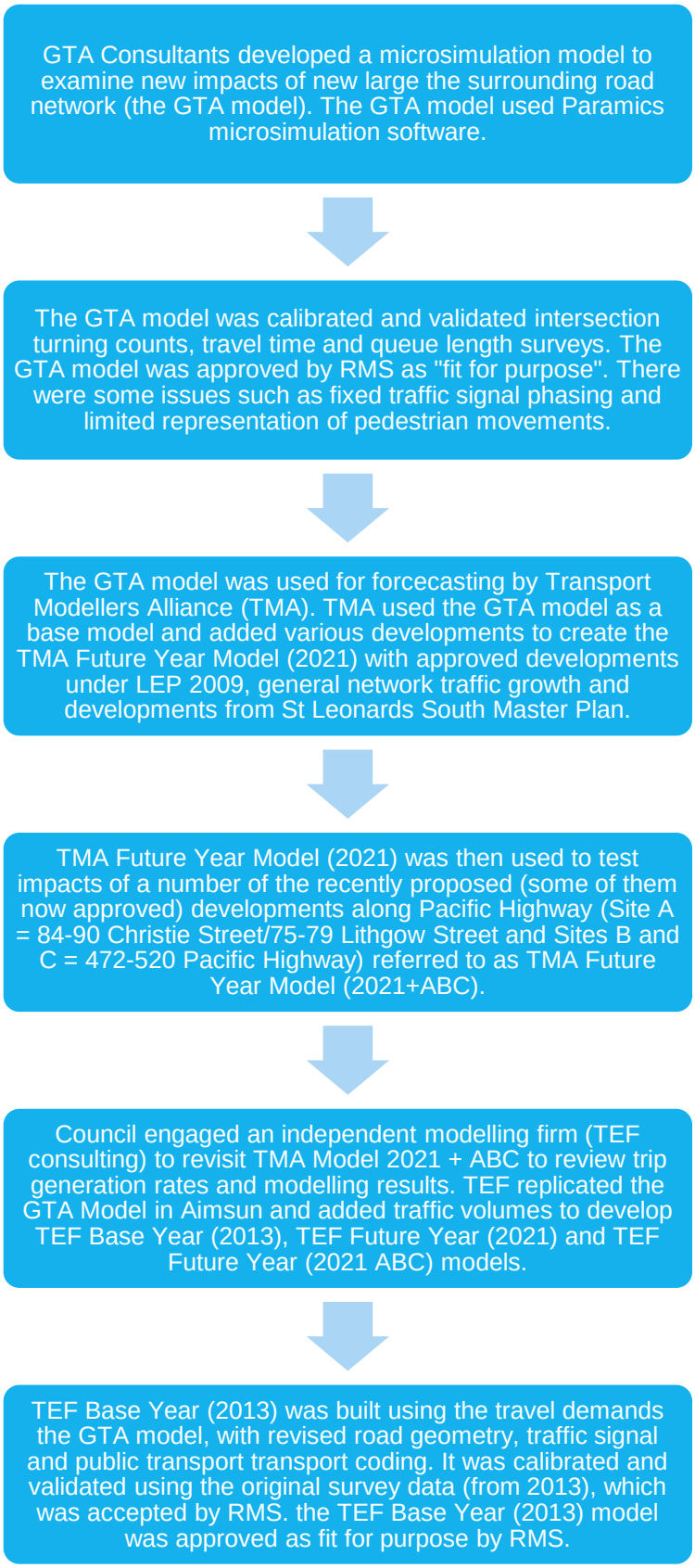
See **Figure 1-2** for a flowchart of the assessment and modelling history.

The detailed Aimsun traffic modelling undertaken by Lane Cove Council for St Leonards South precinct considered the cumulative traffic impacts arising from the proposed development as well as proposals across the precinct, totalling 2,400 dwellings (reduced to 2,000 in the final St Leonards South rezoning). Based on the site area and permissible Floor Space Ratio, Lot 18, 19 and 20 could accommodate about 325 dwellings under the original assumption. This is about 33 per cent more than the proposed 245 dwellings under this DA. Therefore, it is expected that the traffic impact of this DA would be far less than that originally assessed as part of the Aimsun modelling.

By the time of drafting this report, the Lane Cove Council's St Leonards South Planning Proposal has been approved and the resultant DCP and St Leonards and Crows Nest 2036 Plan have been finalised.

SCT Consulting is consistent with the methodologies and findings of the traffic studies conducted for the St Leonards South Planning Proposal and the St Leonards Crows Nest 2036 Plan. As such, due to the recent extensive traffic assessments already conducted in the area, there is no need to update the Aimsun model which has been approved by Council and endorsed by TfNSW. A qualitative review of the traffic implications has been undertaken for the Greaton Development and is summarised in this report.

Figure 1-2 Historical assessment and modelling approach



Source: TEF Consulting and SCT Consulting, 2022

1.3 Purpose of report

The purpose of this report is to provide an assessment of the transport and parking effects of the DA. The purpose of this document is to:

– Undertake background research to inform the strategic context of the proposal

– Collate existing traffic and travel pattern data

– Review existing traffic and transport conditions

– Understand the status of any planned and committed infrastructure upgrades as well as land use changes

– Estimate trip generation and trip distribution to understand the likely implications of the proposed development

– Determine likely infrastructure upgrades required to cater for the proposed development

– Identify public and active transport measures and sustainable travel initiatives for the development, as well as the likely required parking provision.

1.4 Report structure

This report has been structured into the following sections:

– **Section 2** describes the existing transport conditions for all modes of transport.

– **Section 3** describes the proposed development, its access strategy and a review of Council parking and access requirements.

– **Section 4** outlines the traffic and transport appraisal which describes the likely trip generation and indicative impact of the proposed development as part of the DA.

– **Section 5** discussed the construction traffic management plan.

– **Section 6** summarises presents the conclusions of the study.

2.0 Existing conditions

2.1 Travel behaviour

2.1.1 Journey to Work Data

2016 Method of travel to work data from the Statistical Area 2 (SA2) Lane Cove – Greenwich that the site sits was analysed to determine the travel behaviour of the existing residents in the vicinity of the site.

At the time of the journey to work data being collected in 2016, there were approximately 13,706 employed persons in the study area. The study area showed a similar proportion of drivers, 50 per cent to the 53 per cent of Greater Sydney. Public transport use was 30 per cent, higher than the Greater Sydney average. The percentage of people who walked/cycled to work was at five per cent, which is also close to the Sydney average level. Overall, the study area indicated lower car dependence and higher usage of public transport given the site locality, the proximity to jobs and Sydney CBD and good public transport accessibility.

Due to the lack of data in 2016, **Table 2-1** shows the journey to work 2011 destinations for departures from travel zones (TZ) in St Leonards by Local Government Area (LGA). The Sydney city area attracts the highest percentage of commutes from the travel zone at 38.6 per cent, followed by North Sydney (15.4%), Willoughby (8.6%) and Ryde (6%). The remainder of departures from the travel zones is fragmented across Sydney.

Table 2-1 LGA destinations from travel zones

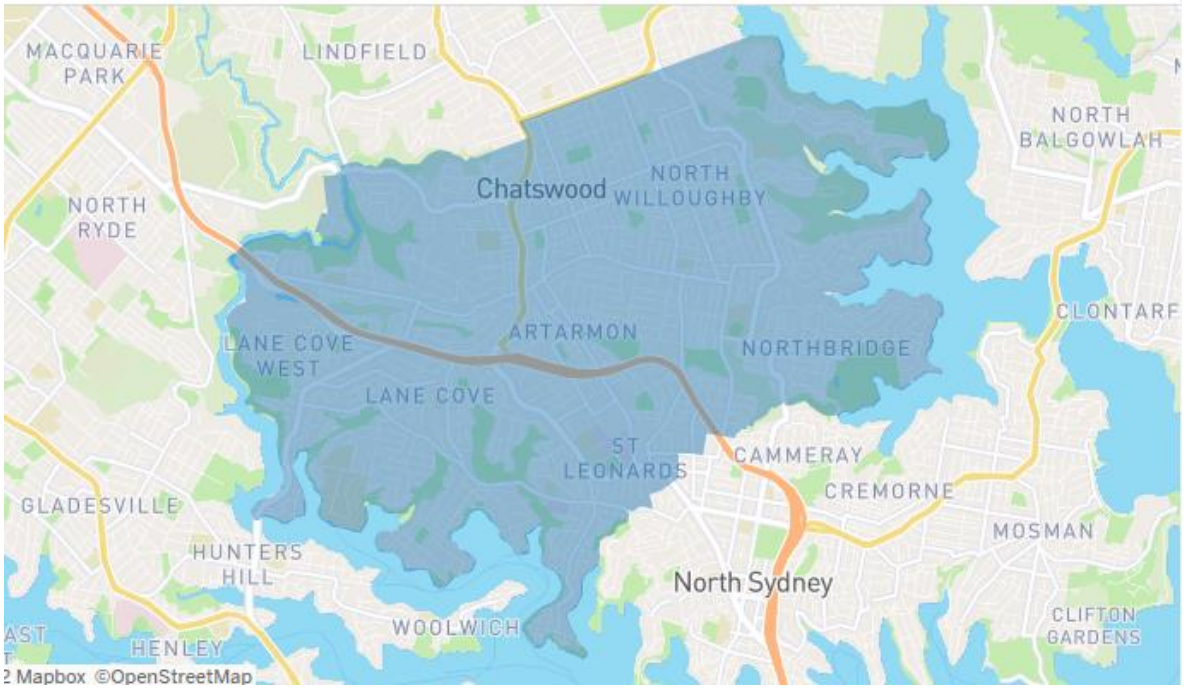
Destination LGA	TZ1832	TZ1844	TZ1911	Total	Proportion
Sydney	64	420	89	573	39%
North Sydney	22	159	47	228	15%
Willoughby	12	96	20	128	9%
Ryde	11	69	12	92	6%
Lane Cove	13	45	9	67	5%
Parramatta	8	21	2	31	2%
Ku-ring-gai	2	27	2	31	2%
Botany Bay	1	27	1	29	2%
Warringah	2	21	3	26	2%

Source: https://opendata.transport.nsw.gov.au/dataset/journey-work-jtw-2011, TABLE 19: Origin TZ x Destination TZ x Mode9 V1.1, 2018

2.1.2 Household Travel Survey

The subject site sits within the statistical area Chatswood - Lane Cove as defined by the Australian Bureau of Statistics, 2019/2020 Household Travel Survey (HTS). **Figure 2-1** shows the boundaries of this area.

Figure 2-1 Chatswood - Lane Cove area map



Source: https://www.transport.nsw.gov.au/performance-and-analytics/passenger-travel/surveys/household-travel-survey-hts/household-travel, accessed 2022

Analysis of the 2019/2020 Household Travel Survey (HTS), which is reflective of the travel characteristics of residents throughout an average weekday, demonstrates travel trends throughout the larger area. **Table 2-2** provides a summary of the overall mode choice made by residents of Lane Cove and Greater Sydney statistical areas.

Table 2-2 Household Travel Survey – residents within Lane Cove and Greater Sydney - trip mode

Travel Mode	% of total trips (Lane Cove)	% of total trips (Greater Sydney)
Vehicle Driver	39%	47%
Vehicle Passenger	15%	21%
Train	8%	7%
Bus	10%	6%
Walk Only	27%	17%
Other	2%	2%

Source: Transport for New South Wales, 2022

The survey indicated that the travel behaviours in Lane Cove are less car-dependent than average for Greater Sydney, with a higher proportion of households preferring to walk or use buses. This is consistent with the proximity and range of public transport in the area. The localities within the Lane Cove statistical area include more low-density residential areas, which impacts on ease of access to public transport services and therefore car usage statistics. As St Leonards South transitions to a higher residential density area and Crows Nest station is completed, some differences to this data would be expected.

The travel purpose data (**Table 2-3**) indicates a different typology of travel in some areas when compared with Greater Sydney averages. There is a decrease in travel for work-related business. Conversely, there is an increase in travel for education, shopping and social recreation.

Table 2-3 Household Travel Survey – residents within Lane Cove and Greater Sydney – trip purpose

Travel Purpose	% of total trips (Lane Cove)	% of total trips (Greater Sydney)
Commute	15%	17%
Work Related Business	3%	6%
Education / childcare	13%	10%
Shopping	17%	15%
Personal Business	6%	6%
Social / Recreation	27%	25%
Serve Passenger	17%	18%
Other	2%	2%

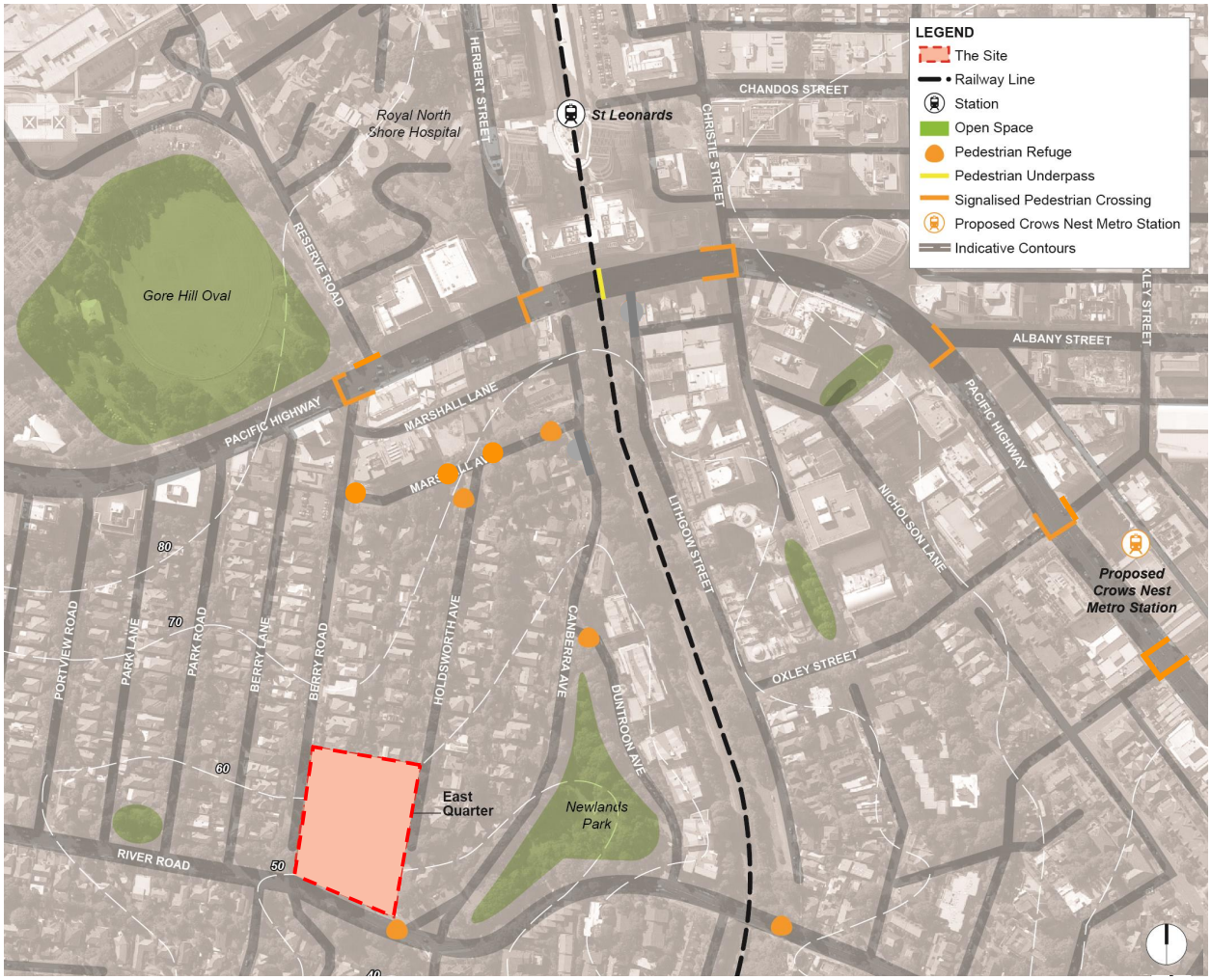
Source: Transport for New South Wales, 2022

2.2 Pedestrian network

The current conditions for pedestrians in St Leonards South have constraints. The lack of crossing facilities and traffic congestion on Pacific Highway leads to pedestrian safety issues. Pedestrian desire lines make this a popular place to cross. To the south, River Road carries a high volume of regional traffic and lacks a formalised crossing facility within the study area. A new refuge island has been provided near Canberra Avenue, however, there is no other designated crossing facility within 400m to the west (at Greenwich Road) or 330m to the east (at Lithgow Street).

The existing pedestrian connections between Berry Road and Holdsworth Avenue with River Road are via ramps and stairs, which are substandard and have night time security issues due to poor lighting. Refer to **Figure 2-2** for the existing pedestrian infrastructure.

Figure 2-2 Existing pedestrian infrastructure for St Leonards South



Additionally, the steepness of the St Leonards South precinct leads to issues for access for certain groups or people, such as people with disabilities and people with prams. This, along with a lack of wayfinding signage, leads to some difficulties navigating the area. Park Road has a change in height of approximately 25m from Pacific Highway to River Road. The significant grade differences north-south make walking along the north-south axis challenging. East-west links have an important role in the future master plan to mitigate the grade challenges in the walk to the station. This is also important in providing connectivity to the future Sydney Metro Crows Nest Station, which is within 800m as the crow flies, but is over 1km from the heart of St Leonards South due to the lack of east-west connectivity and railway crossing facility.

2.3 Bicycle network

St Leonards South has a limited provision of separate cycleways and shared paths, as well as the challenging topography, highly motorised roads and the prevalence of kerbside parking, have reduced the safety and attractiveness of cycling in the area. Some of the main constraints for cyclists in the area include inconsistent wayfinding signage, an incomplete cycling network and no bicycle lantern for crossing Pacific Highway.

Figure 2-3 Existing cycling facilities for St Leonards South

2.4 Public transport

The St Leonards South precinct is within easy walking distance of the St Leonards Station. St Leonards Station is located on the northern side of Pacific Highway. Additionally, Wollstonecraft Station is located within 800m of the area. Both stations provide rail connections along the T1 line. The T1 (the North Shore and Northern and the Western line) operates at a frequency of approximately three minutes during peak periods and between five to ten minutes during the off-peak period.

In addition to frequent train services, a large number of bus services operate along Pacific Highway that provides connections to key centres including Chatswood, North Sydney, Manly, the Sydney CBD, Bondi as well as The Hills District. There is only one bus route that operates from River Road, operating between Lane Cove and the City. The bus services in the vicinity of this site are:

– 144 – operated by State Transit, Manly to/from Chatswood via Royal North Shore Hospital
– 200 – operated by State Transit, Bondi Junction to/from Gore Hill
– 252 – operated by State Transit, Gladesville to/from City via North Sydney
– 254 – operated by State Transit, McMahons Point to/from Riverview
– 261 – operated by State Transit, Lane Cove to/from the City
– 265 – operated by State Transit, Lane Cove to/from North Sydney via Greenwich
– 286 – operated by State Transit, Denistone East to/from Milsons Point via St Leonards and North Sydney
– 287 – operated by State Transit, Ryde to/from Milsons Point via St Leonards and North Sydney

- 290 – operated by State Transit – Epping to/from City via Macquarie University and North Sydney
- 291 – operated by State Transit – Epping to/from McMahons Point
- 602X – operated by Hills Bus, Bella Vista to/from Milsons Point
- 612X – operated by Hills Bus, Castle Hill to/from Milsons Point
- 622 – operated by Hills Bus, Dural to/from Milsons Point via Cherrybrook
- 320 – operated by State Transit, Green Square to/from Gore Hill
- N90 – operated by State Transit, Hornsby to/from City via Chatswood
- N91 – operated by State Transit, Bondi Junction to Macquarie Park via City

The Artarmon Loop is a free shuttle bus service that connects St Leonards Station with the Artarmon industrial area, providing a dedicated public transport connection for employees transferring from train services.

The Artarmon Loop runs every 10 minutes during peak times (Route A) and every 30 minutes during off-peak periods from 6.00 am to 7.00 pm, Monday to Friday. The service incorporates Artarmon Station, Artarmon shops and the Royal North Shore Hospital (Route B) between 10.00 am and 2.30 pm, stopping at these locations every 30 minutes. Bicycles can be carried on bike racks at the rear of the bus.

Interchange is provided at Pacific Highway bus stops near St Leonards Station. The southbound stop provides a relatively simple interchange experience. Northbound stops near the station are across the Pacific Highway in several locations. The interchange between the northbound stops and St Leonards Station is longer and circuitous. The bus stops in the vicinity of the site are summarised in **Table 2-4**.

Table 2-4 Bus stop and services summary

Location	Bus services	Distance to site	Peak period frequency
Pacific Highway	144, 200, 252, 254, 265, 286, 287, 290, 291, 602X, 612X, 622, 653, 320, N90, N91	>300m	Peak direction: 35 trips Off-peak direction: 15 trips
River Road	261	25m	Peak direction: 2 trips Off-peak direction: 2 trips

Source: Transportnsw.info

The existing bus frequency map is shown in **Figure 2-4**.

Figure 2-4 Existing bus frequency

2.5 Road network

The site is situated in what is currently a low-density residential area. The East Quarter is bounded by Berry Road, River Road and Holdsworth Avenue.

Pacific Highway is a state road located just outside the St Leonards South precinct with a high movement function. It is generally configured with three through lanes in each direction, but occasionally with two lanes where turning lanes are provided at some intersections. Where there are three lanes, parking is generally allowed in the kerbside lane during off-peak periods. Through the St Leonards and Crows Nest Precinct, there are 14 signalised intersections. It is obvious from the frequent change in the number of through lanes that the corridor is space constrained by surrounding development.

The high movement function along the Pacific Highway is prioritised with restrictions to pedestrian crossing movements and vehicle turning movements at several locations within the corridor. This configuration leads to the circuitous movement of vehicles through the Precinct. In some locations, there are limited opportunities to turn right from Pacific Highway. Vehicles may be required to first turn left, and traverse local streets to then go back to the Pacific Highway to cross to the opposite side.

River Road is located at the southern end of the St Leonards South precinct. It provides a key link to suburbs to the west of the area, including Greenwich, Longueville and Lane Cove. Shirley Road is at the eastern end of River Road, which also connects across the Pacific Highway to Falcon Street.

A number of local roads in the St Leonards South precinct are cul-de-sacs that direct general traffic onto the roads throughout the area that connect to the wider network. Lane Cove Council planned and designed the street network to discourage through traffic but still allow servicing. The roads in or immediately bordering the area are Park Road, Berry Lane, Berry Road, Holdsworth Avenue and Canberra Avenue running North-South, and River Road and Marshall Avenue running East-West.

Pacific Highway has a speed limit of 60km/h and a school zone near Gore Hill Oval, while all other roads in the area have a speed limit of 50km/h.

Figure 2-5 Road network hierarchy

Daily vehicle volumes from the traffic surveys completed on 17th November 2016 at 18 locations throughout the Precinct confirm that the Pacific Highway is the main thoroughfare for drivers with over 20,000 vehicles using certain stretches of this road in both directions. There is also a high level of vehicles on Falcon Street, with approximately 10,000 vehicles in both directions. The Pacific Highway experiences the highest volume of private vehicles through the Precinct, and road network congestion is evident during peak periods.

Key distributor roads, such as Shirley Road, River Road, Herbert Street and Greenwich Road providing access to the Pacific Highway currently have a demand of between 4,000 – 8,000 vehicles per day.

2.6 Car share

Car share decreases the need for some people to own a car or a second car and can therefore reduce parking demand and traffic generation. It differs from traditional car hire companies in that cars can be hired by half hour increments and cars are located near to where people live or work. Car share is available from either company that owns a vehicle fleet or peer-to-peer services for individual owners to share their vehicles.

Within the Precinct, GoGet is currently one of the operators. A map of the GoGet parking locations is shown in **Figure 2-6**. There are approximately 10 Go Get cars in the Precinct. There are three car share parking locations on Canberra Avenue, Marshall Avenue and Duntronoon Avenue within/close to the St Leonards South precinct, as well as a significant number in the St Leonards and Crows Nest town centre within walking distance, generally close to higher density residential and business land uses.

Peer to peer car share services generally offers both cheaper and more expensive hire rates than GoGet depending on the value of the vehicle. Peer to peer car share services available in the Precinct include:

– Car next door

– Drive my car.

Figure 2-6 GoGet Car Share parking locations

3.0 The development proposal

3.1 Proposed development

The proposed East Quarter (Lot 18, 19 and 20) covers a land area of about 8,758m^2 and comprises the following key elements:

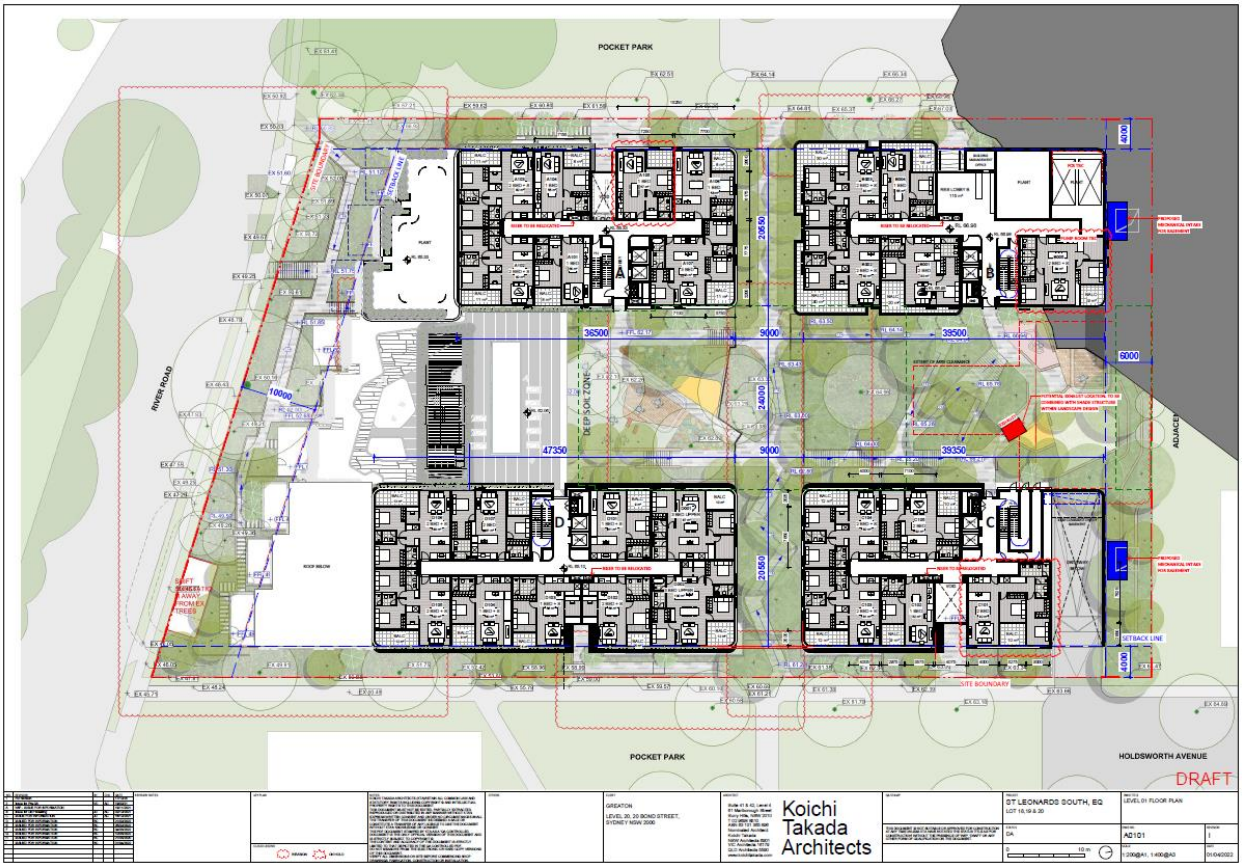
– Five building envelopes, providing a total gross floor area (GFA) of approximately 22,875m^2 (floor space ratio 2.6:1) and yield of 245 dwellings

– Five (5) levels of basement car parking including two partial levels at the mezzanine and B4 levels

– Open space through the middle of the site (“green spine”)

– An east-west through-site pedestrian link.

Figure 3-1 Proposed site plan



Source: Koichi Takada Architects, 2022

3.1.1 Site yield

The proposed development seeks to provide 245 residential dwellings (in replace of the existing 16 houses) in various housing types and 418 basement parking spaces. A breakdown of the residential types is shown in **Table 3-1**.

Table 3-1 Development yield

Residential type	Yield
One bed	82 units
Two bed	114 units
Three bed	49 units
Total	**245 units**

Source: Koichi Takada Architects, 2022

3.1.2 Basement car parking

The proposal provides a basement car parking comprising approximately 418 car spaces and 28 motorcycle parking spaces with access to be provided via a single car entry/exit from Holdsworth Avenue. The basement will also accommodate 66 bicycle parking spaces for residents. A breakdown of the parking spaces by levels is shown in **Table 3-2**.

Table 3-2 Car parking provision

Levels	Resident parking	Visitor parking	Car wash space	Electric vehicle
Mezzanine	-	18 + (1)	-	-
B1	49 + (15)	44 + (1)	-	-
B2	105 + (18)	-	-	-
B3	112 + (17)	-	-	-
B4	28	-	5	5
Total	**294 + (50)**	**62 + (2)**	**5**	**5**
	418			

NB: The number in brackets denotes the number of accessible parking

Source: SCT Consulting based on Koichi Takada Architects, 2022

There is a circulation roadway at each parking level to provide access to each parking space. The five levels are connected by a ramp in the centre of the basement footprint.

3.1.3 Pedestrian link

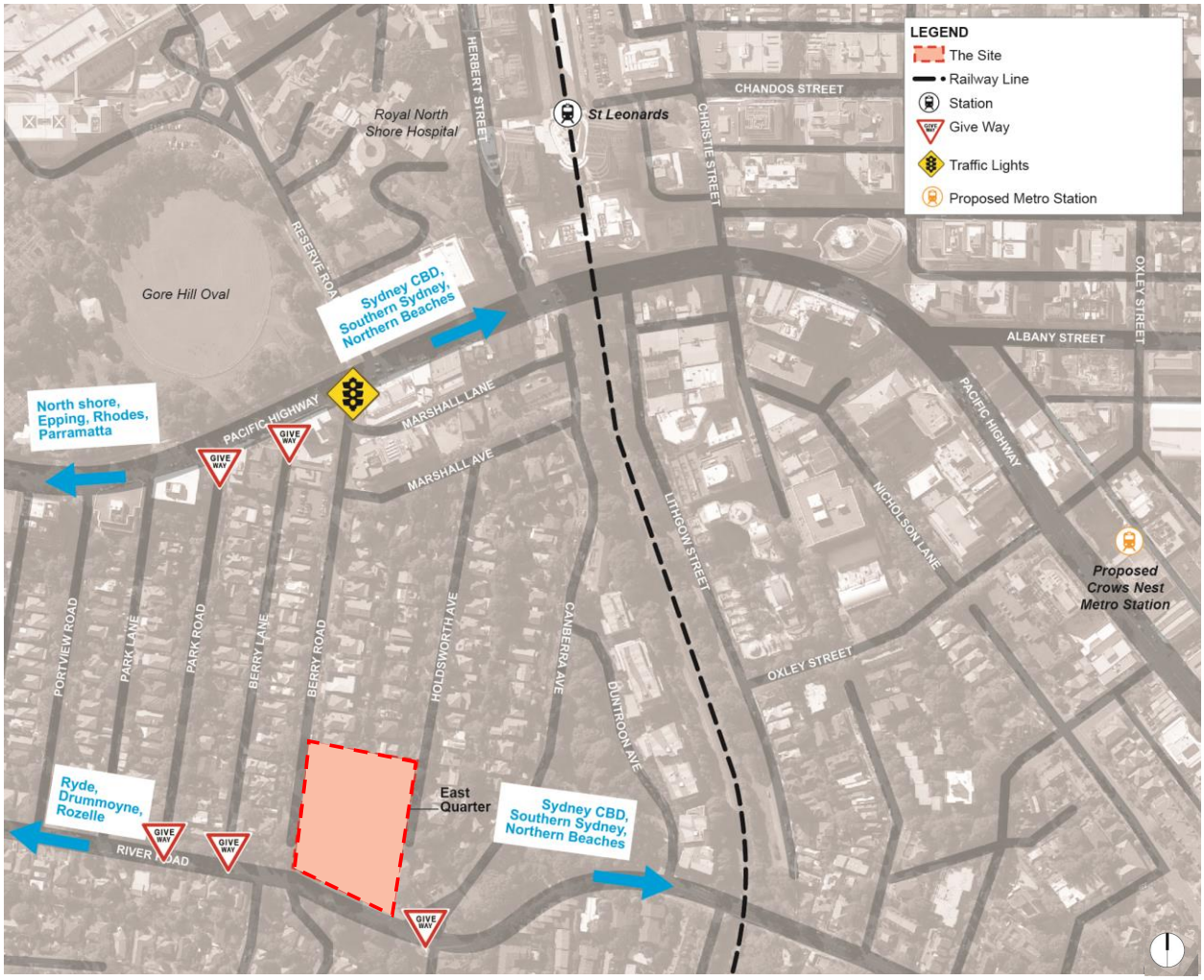
As shown in **Figure 3-1**, a wide east-west pedestrian link is provided at the centre of the site. It will provide a pedestrian connection from Berry Road to Holdsworth Avenue and will connect to the pocket park planned for the southern end of Holdsworth Avenue and the planned pedestrian connection further to the east. The pedestrian link is to be delivered as planned in Council's DCP.

3.2 Proposed access strategy

3.2.1 Vehicular access

The proposed site is connected to Pacific Highway and River Road as shown in **Figure 3-2**. Pacific Highway can be accessed from Park Road, Berry Lane and Berry Road. River Road can be accessed from Canberra Avenue, Park Road and Berry Lane. Residents can use the Pacific Highway access points to travel towards the North Shore, Epping, Rhodes and Parramatta, or the Sydney CBD, Southern Sydney and the Northern Beaches. Residents can use the River Road access points to travel towards Ryde, Drummoyne and Rozelle, or the Sydney CBD, Southern Sydney or the Northern Beaches. Considering the projected vehicle impact from this development, there would be less than 10 additional vehicles per hour at major access points.

Figure 3-2 Proposed vehicle access locations



The DCP proposes that car park accesses should be off Park Road, Berry Road and Holdsworth Avenue. Given the site is bounded by River Road in the south and two proposed parks in the east and west extended from Holdsworth Avenue and Berry Road, access in the northeast corner would:

– Minimise impact from the car park entrance on existing street parking, resulting in fewer on-street parking spaces reduction

– Cul-de-sac of Holdsworth Avenue generates little through traffic, ensuring good access efficiency for development traffic

– Nil vehicular traffic impact on the proposed pocket parks to ensure a good pedestrian-friendly environment

– Reduced impact on existing trees where proposed car park and truck entrances

3.2.2 Public transport access and connections

There are no proposed changes to public transport access from the site. Being within 400 to 800m of St Leonards Station and 1km from Crows Nest Metro Station, the level of public transport access from the site is very high quality and consistent with that of a high-density residential area. The wide network coverage, train frequency, journey-time reliability and improved customer offering of Sydney Metro, will increase journey to work trips by non-car modes.

The coverage of bus routes provide alternative transport options to private vehicle for trips outside of the train line, and connect to key destinations in the Artarmon industrial area. The extensive bus network on the Pacific Highway continues to play a key role to attract commuters to public transport.

The delivery of this site would support development with sustainable travel behaviour, by providing increased density in proximity to high frequency and capacity public transport services.

3.2.3 Active transport access and connections

Substantial work has already been completed to ensure adequate active transport access and connections throughout the planned St Leonards South precinct. Upgrades will continue to be made as per Council's work in the area. This includes the provision of east-west links to provide more direct routes with reduced gradients for pedestrians and cyclists.

Pedestrian accesses from each building are connected to the internal footpath network, which maximises site permeability for pedestrians. It further provides links to a wider footpath system in St Leonards South.

Given the bicycle parking provision at the basement level, the cyclists are expected to use the ramp to access the bicycle storage room. Alternatively, the lifts provide a connection between the basement and pedestrian accesses at grade which would facilitate the access by cyclists.

3.2.4 Service vehicles

According to *Lane Cove Council DCP*, on-site parking for a removalist vehicle should be provided for residential development. There are two loading spaces at the basement mezzanine level. The service traffic would share the access and ramp with passenger cars between street level and mezzanine level.

The site is constrained and the width of the ramp is not wide enough to accommodate two opposing vehicles at the beginning/end of the ramp. A truck needs to cross the centre line on the ramp for entering/exiting the loading dock. A loading dock management plan is expected to ensure that there is no conflict between the two opposing vehicles using the ramp. This can be mitigated by traffic lights and mirrors to avoid conflict. Servicing activity is expected to take place during commuting off-peak (see **Section 3.7** and **Appendix A**).

3.3 Travel Demand Management measures

Sustainable transport and Travel Demand Management (TDM) strategies involve the application of policies, objectives, measures and targets to influence travel behaviour and to encourage uptake of sustainable forms of transport, i.e. non-car modes, wherever possible. TDM measures have proven to reduce congestion created by growth within urban areas and unlock urban renewal opportunities. They result in travel behaviour that uses less road space than a single-occupant vehicle commute and takes advantage of spare transport capacity outside the morning and afternoon peaks.

TDM strategies generally guide all relevant customers (residents, employees and visitors) in changing the travel behaviour in the following ways:

– Reduce travel

– Re-mode (consideration of travel via alternative modes)

– Re-time (consideration of travel at alternative times)

– Re-route.

Greaton is expected to set up a framework for a more sustainable journey, which has been used as a key principle of planning for the development. A Travel Plan should be developed by future developers and monitored by strata management for the St Leonards Crows Nest Precinct community to deliver best practice travel programs and initiatives to manage travel demand for transit-oriented development. Key initiatives and measures of Travel Demand Management Strategies should be further developed into a Travel Plan to:

– Reduce the need to travel

  - Planning of the wider St Leonards Crows Nest Precinct as a mixed use community to maximise trip containment within the precinct and encourage the use of active transport (walking and cycling) for short trips.

– Re-think the mode of travel

  - Walking and cycling:
    - A highly permeable and safe pedestrian network throughout the development.
    - Dedicated cycle routes that connect to the regional routes and major transport hubs.
    - Key design principles to integrate walking and cycling network and facilities into the planning and delivery of the development.

    - High-quality, safe and accessible end-of-trip facilities (centralised cycle hubs that are integrated within development at convenient locations, on-street secure bicycle storage located conveniently at end of cycle destinations, parking hubs for shared bikes, lockers and showers).
    - Promotion of bicycle initiatives – NSW bicycle week, cycle to work day, free bike check-up events.
    - Establishment of a Bicycle User/Consultation Group.
  - Public transport:
    - Provision of frequent public transport services to establish a non-car travel behaviour.
    - Good quality public transport stops in the vicinity of the development.
    - Tailored information with clear mapping and walking catchments at public transport stop.
    - Provision of public transport information from home via television channel or community app.
  - Parking measures to encourage alternative modes of travel:
    - Reduced parking rates with flexibility in parking arrangements such as shared parking between non-conflicting uses, shared vehicle parking and/or carpooling to accommodate the parking needs of all employees.
    - Parking spaces dedicated to electric vehicles, with charging stations.
    - Parking spaces dedicated to car share scheme and community car-share vehicles, both on-street and incorporated in easily-accessed public car parks.
  - Development and use of carpooling app for the wider precinct and community.
- Re-time and Re-route journeys:
  - Development of specific community app/community engagement program to enable changing travel behaviour which includes:
    - Active and public transport maps
    - Personalised journey planner
    - Notifications of the latest travel information
    - Shared vehicles information
    - Car-pooling opportunities
    - Other precinct-related information
  - Real-time information is embedded into development and public transport stops.

While it is important to develop a Travel Plan that is aimed at managing travel demand and reducing reliance on car travel, it is more important to monitor and evaluate the effectiveness of individual measures and the need to adjust the measures. The planning and implementation of a targeted Travel Plan with the above green travel initiatives/principles could support the delivery of transit-oriented development at St Leonards South that provides significant opportunities for alternative travel options and reduces the need for car travel.

3.4 Car parking requirements

According to *Lane Cove Council DCP*, the car parking rates for residential flat buildings are listed below:

- 1 bed – 1 space
- 2 beds – 1.5 spaces
- 3 beds or more – 2 spaces
- One disabled space needs to be provided for each adaptable dwelling.
- For visitor parking, one space needs to be provided every four dwellings and one accessible space per 50 visitor parking spaces.
- One car wash bay per 50 units.

Therefore, based on the split of unit size as discussed in **Section 3.1.1**, the required and provided parking spaces for the proposal are calculated in **Table 3-3**.

Table 3-3 Car parking requirement

User group	Unit type	No. of units	Parking rates	Required spaces	Provided spaces
Residents	One bed	82 units	1 space per dwelling	82 spaces	-
	Two bed	114 units	1.5 spaces per dwelling	171 spaces	
	Three bed	49 units	2 spaces per dwelling	98 spaces	
Visitors	-	245 units	1 space per 4 dwellings	62 spaces	
Car wash	-	245 units	1 space per 50 dwellings	5 spaces	
Total	**-**	**245 units**	**-**	**418 spaces**	**418 spaces**

Source: SCT Consulting based on Koichi Takada Architects, 2022

The current provision of 418 spaces on-site is complaint according to the DCP.

3.5 Other parking requirements

3.5.1 Motorcycle provisions

The rate of provision of motorcycle spaces under the *Lane Cove Council DCP* is 1 space per 15 car spaces for all types of development. The provision of 28 motorcycle parking is sufficient.

3.5.2 Loading dock provisions

One on-site removalist truck space per 100 residential units is required. Hence, the provision of two loading spaces is sufficient for the site.

3.5.3 Disabled space provision

One disabled space for each adaptable housing unit and one disabled space per 50 visitor spaces are required. Hence, the provision of 52 disabled parking spaces is compliant.

3.5.4 Bicycle provisions

Bicycle parking provisions for this type of development under the *Lane Cove Council DCP* are:

– 1 space per 4 dwellings for residents

– 1 rack + 1 rack per 10 dwellings for visitors.

The bicycle parking provision for this development is therefore:

– 66 bicycle parking spaces for residents

– 26 bicycle racks for visitors.

Hence, the provision of 66 on-site bicycle parking and 26 bicycle racks is acceptable.

3.6 Trip generation

3.6.1 Vehicle trip generation

Previous consultation was undertaken between Lane Cove Council and Roads and Maritime Services resulted in a request from Roads and Maritime Services (4 January 2016) to use the rate of 0.14 vehicle trips per dwelling in the AM peak and 0.07 vehicle trips per dwelling in the PM peak. Given the recent nature of this advice, these rates will be adopted for the testing of traffic impacts.

Table 3-4 Vehicle trip generation

Item	Existing residence	East Quarter	Net increase
Total dwellings	16 dwellings	245 dwellings	-
AM peak traffic generation rate	0.95 cars per dwelling*	0.14 cars per dwelling	-
AM peak total traffic	15 car trips	34 car trips	**+19 car trips**
PM peak traffic generation rate	0.99 cars per dwelling*	0.07 cars per dwelling	**-**
PM peak total traffic	16 car trips	17 car trips	**+1 car trips**

*Based on The Guide to Traffic Generating Developments Updated traffic surveys – Technical Direction TDT2013/04a

The total scale of traffic impacts for the proposed development is less than 20 vehicles per hour in both peak periods. Given the scale of other growth in the area, this DA represents about 12 per cent of the anticipated St Leonards South potential uplift and an even smaller proportion of the total uplift anticipated by the Land Use and Infrastructure Implementation Plan.

The distribution of this demand is expected to be:

– 10 additional peak hour trips on Pacific Highway

– 9 additional peak hour trips on River Road.

3.6.2 Person trip generation

Using the mode share estimated by the ptc. report, the number of using each mode of transport is estimated in **Table 3-5**. For the conservative purpose, the person trip generation of the existing 16 residential dwellings will not be considered, hence, there will be no reduction of the additional person trips by existing trips.

Table 3-5 Person trip generation of the proposal

Mode of travel	Mode share	East Quarter trips	
		AM peak	PM peak
Car	12.5%	34	17
Car as passenger	2.5%	7	3
Train	56%	154	77
Walk only	19%	52	26
Bus	6%	16	8
Other	4%	11	5
Total	**100%**	**274**	**137**

3.7 Swept path

A car park review and related swept path assessment were conducted based on the latest drawings. The detailed swept path analysis for cars and trucks at multiple pinch points is shown in **Appendix A**.

4.0 Traffic and transport impact appraisal

With the significant volume of quantitative work already undertaken by previously approved transport planning work and assessments, the impact assessment will rely on that work as it has been endorsed by Council for public exhibition.

4.1 Public transport impacts

Public transport mode share is high in the St Leonards South area, with 30 per cent of peak hour trips occurring on trains and buses. The Greaton East Quarter development would create an additional 180 trips predicted during the AM peak, and 85 trips predicted during the PM peak, using public transport (see **Table 3-5**). While the public transport network in the area is currently very close to capacity, the completion of the Crows Nest Metro planned service by 2024, in combination with current services, will be more than sufficient to accommodate for the increased capacity.

4.2 Active transport impacts

The proposed upgrades to the pedestrian and cycle networks include undertaking footpath and cycle path improvements, improving pedestrian crossings and creating East-West links to enhance connectivity within the precinct. The number of walking trips generated during peak periods is 222 during the AM peak period and 111 during the PM peak period, which are relatively small figures. Therefore, the number of trips generated by the Greaton East Quarter development during the peak periods is at a level able to be accommodated by the existing and planned services.

4.3 Road network impacts

The scale of additional vehicle trips in the network is less than 20 vehicles per hour in each peak period, which is small in comparison to the other proposed developments in the area. Previous traffic modelling by Lane Cove Council indicated that with improvements to the network, the cumulative impact of the growth (before the St Leonards Crow Nest Plan 2036) was manageable.

The development is compliant with the Local Environmental Plan and Council's DCP in terms of land use type and floor space ratio, resulting in a permissible development yield and relatively small net traffic increase when the development is completed. Hence, it is expected that the trip generation of the development would be accommodated by the existing and planned infrastructure.

4.4 Infrastructure summary

The proponent will deliver the following transport infrastructure on their land:

– East-west pedestrian connections – land and infrastructure

– North-south "green spine" – land and infrastructure

– Amenity improvements adjoining Park Road, Berry Road, and Holdsworth Avenue.

4.5 Satisfaction of St Leonards Crows Nest 2036 Plan requirements

The requirements of the St Leonards Crows Nest 2036 Plan for St Leonards South are satisfied as follows:

– **Consider accessibility to St Leonards and Crows Nest Stations:** the site is located with a direct north-south link to St Leonards Station, which is the most direct route possible for the site. Internal footpaths also promote these connections.

– **Improve active transport connections:** the delivery of footpath connections east-west through the site provides the best possible connections to the stations by reducing the need to walk up steep grades for transport users across St Leonards South

– **Consider cumulative traffic impacts:** cumulative traffic impact modelling was undertaken in the previous stage of planning, which considered relevant uplift in the area.

5.0 Construction Traffic Management Plan

5.1 Construction traffic impacts

It is estimated that full construction contains the demolishing stage and construction stage. Following the Draft Construction Noise Guideline (EP&A) recommended standard hours for construction work, construction activities are proposed to occur between the hours of 7 am to 6 pm on weekdays and 8 am to 1 pm Saturdays, with no work on Sundays or Public Holidays. The work does not involve blasting.

Construction workers would typically arrive in light vehicles. For heavy vehicle trip estimation, a Medium Rigid Vehicle (MRV) is expected to operate during the construction, which has an average unit capacity of 36 m^3. It is assumed that the demolition stage lasts one month (20 working days) and the construction stage lasts two years (400 working days).

As estimated by *St Leonards EQ Site Waste Minimisation Plan* (Wasteaudit, 2022), the waste quantity would be about 2,980 m^3 and 82,827 m^3 during the two stages, respectively. Hence, the predicted number of trucks would be four trucks per day during the demolition stage and about 10-11 trucks per day during the construction phase (considering an additional 100 per cent of the trips for unloading construction materials. Final construction vehicle numbers are subject to the actual construction plan and are still being confirmed.

5.2 Access routes

Access routes to the construction compound will depend on the construction approach, which has not been confirmed at this stage. There is no specific restriction on truck weight on the surrounding road network. The proposed haulage route would be via Pacific Highway and Berry Road.

5.3 Mitigation of impacts

Road network impacts by worker traffic to the site will be mitigated by the construction workers generally starting earlier and finishing earlier than the commuter peak periods and would likely not coincide with the school or road network peak periods. Construction workers will be encouraged to carpool or travel to work by public transport, further reducing the impact on the road network and local on-street parking during the construction period.

To manage driver conduct the following measures are to be implemented:

– All truck movements will be scheduled.

– Vehicles are to enter and exit the site in a forward direction along the travel path shown on delivery maps.

– Drivers are to always give way to pedestrians and plants.

Traffic controllers will be used to stop traffic on the public streets to allow trucks to enter or leave the site if required. Where possible, vehicles must enter and exit the site in a forward direction. They must wait until a suitable gap in traffic allows them to assist trucks to enter or exit the site. The Roads Act does not give any special treatment to trucks leaving a construction site, the vehicles already on the road have the right-of-way. Vehicles entering, exiting, and driving around the site will be required to always give way to pedestrians.

It is not expected that there will be other major concurrent construction activities. A further review of potential concurrent construction should occur as part of the construction traffic management plan to ensure that this remains the case or that mitigations are proposed.

Road Occupancy Licenses will be applied for following approval for locations where traffic control is required.

5.4 Next stage

Given the typical level of construction activities associated with similar upgrade works, the level of construction traffic will be limited. Hence, the impacts of the construction activities and additional delays to the network should be insignificant.

A detailed Construction Traffic Management Plan (CTMP), which will include a construction traffic control plan will be prepared, separate from this report at a later stage. This will be done prior to commencement of construction and following the *Traffic Control at Work Sites Technical Manual* (2010).

The CTMP will address the overall traffic management of the site during the construction phase, including provision for vehicular and pedestrian access, parking for construction vehicles and appropriate wayfinding. The vehicular movements and expected routes to and from the site will also be further quantified and defined.

6.0 Conclusions

The Traffic, Parking and Access Study indicates that the impacts of the Development Application can be appropriately mitigated by the proposed infrastructure schedule.

From a transport perspective, the proposal is consistent with the St Leonards South DCP and Department of Planning, Industry & Environment's St Leonards Crows Nest 2036 Plan.

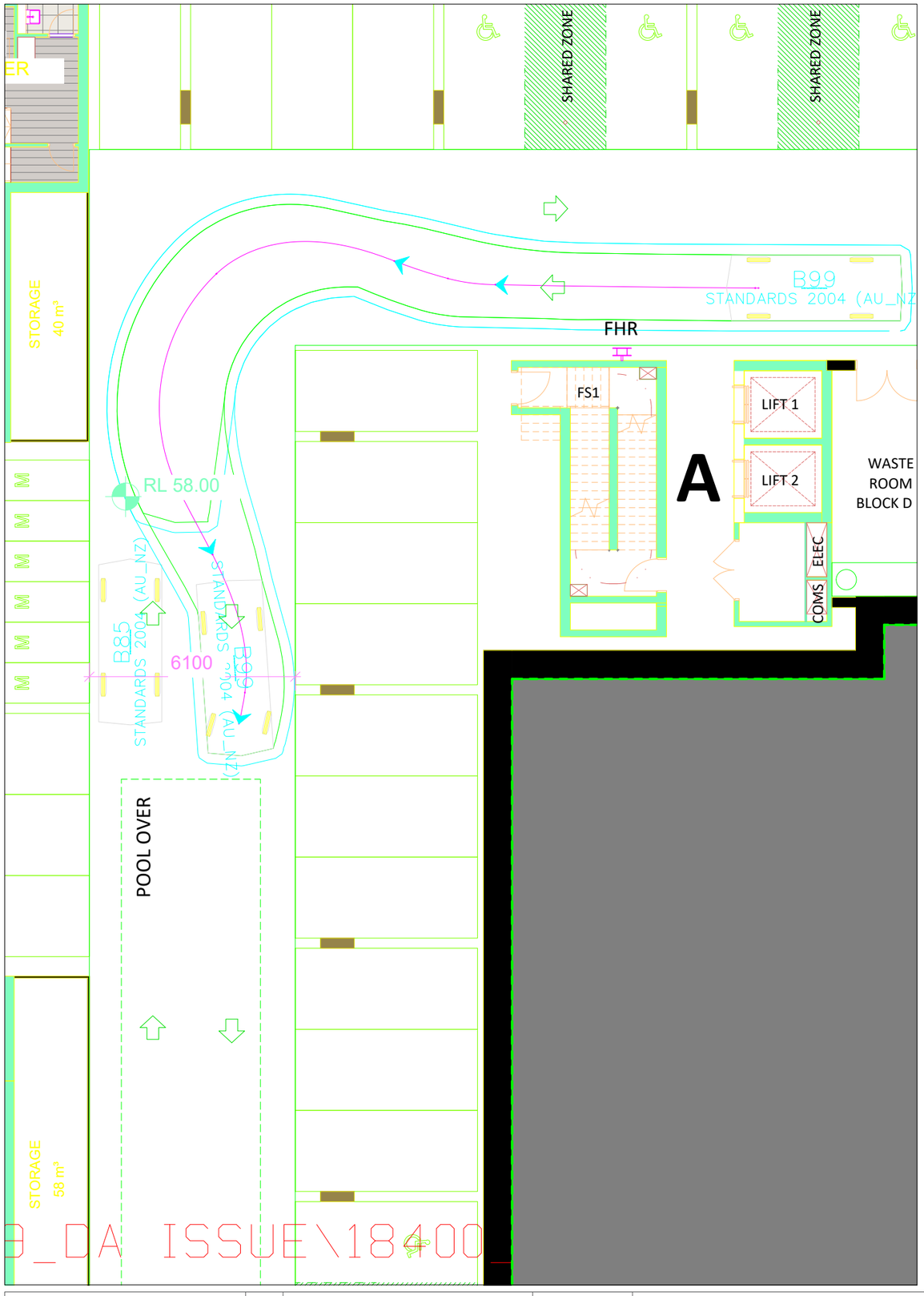
The scale of traffic impacts for the proposed development is minor and not significant relative to the other proposals in the area – comprising about 12 per cent of the total St Leonards South yield. The total traffic generation is less than 20 vehicles per hour during peak periods.

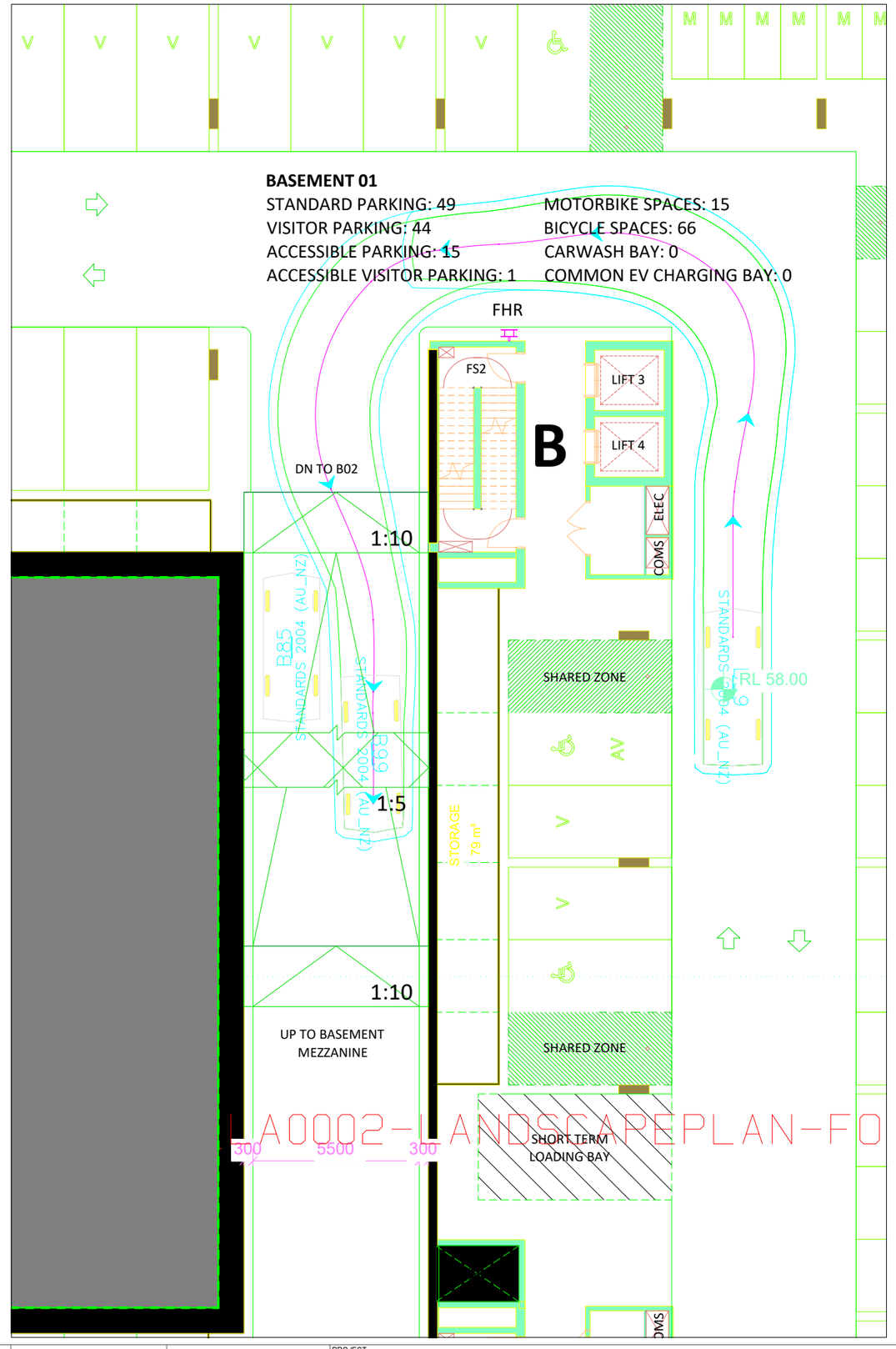
The site is topographically challenged, but the proposed east-west walking and cycling mitigate this so far as is practicable. The topography is significantly less steep along the east-west axis, so these links make the station easier to access.

The Department's St Leonards Crows Nest 2036 Plan requirements are fully met by the proposal.

APPENDIX A

Swept path assessment





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SCT Consulting

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PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	05/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

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PROJECT

Greaton EQ DA
Swept path analysis

TITLE

Circulation at B1

DRAWING NUMBER

SCT_00209-01-003

SHEET 01 OF 02

A3

BASEMENT 01

STANDARD PARKING: 49
VISITOR PARKING: 44
ACCESSIBLE PARKING: 15
ACCESSIBLE VISITOR PARKING: 1

MOTORBIKE SPACES: 15
BICYCLE SPACES: 66
CARWASH BAY: 0
COMMON EV CHARGING BAY: 0

SHARED ZONE
SHARED ZONE
STORAGE 40 m³
RL 58.00
B99 STANDARDS 2004 (AU_NZ)
B85 STANDARDS 2004 (AU_NZ)
6100
POOL OVER
STORAGE 58 m³
FHR
FS1
A
LIFT 1
LIFT 2
ELEC
COMS
WASTE ROOM BLOCK D
DN TO B02
1:10
1:5
1:10
UP TO BASEMENT MEZZANINE
FS2
B
LIFT 3
LIFT 4
ELEC
COMS
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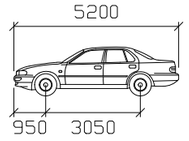
300
SHORT TERM LOADING BAY
DMS

B99



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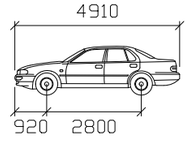

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PROJECT
Greaton EQ DA
Swept path analysis

TITLE
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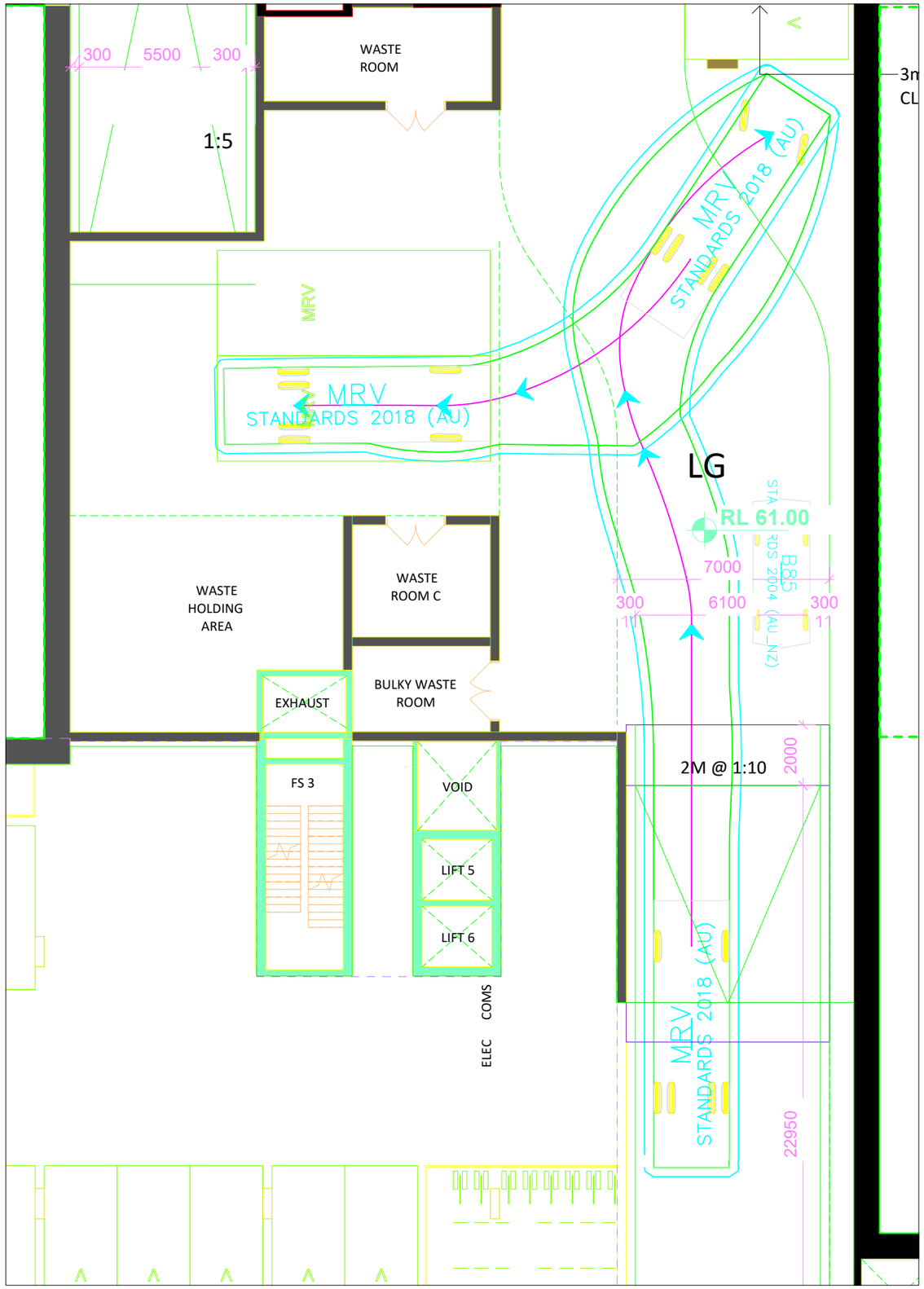

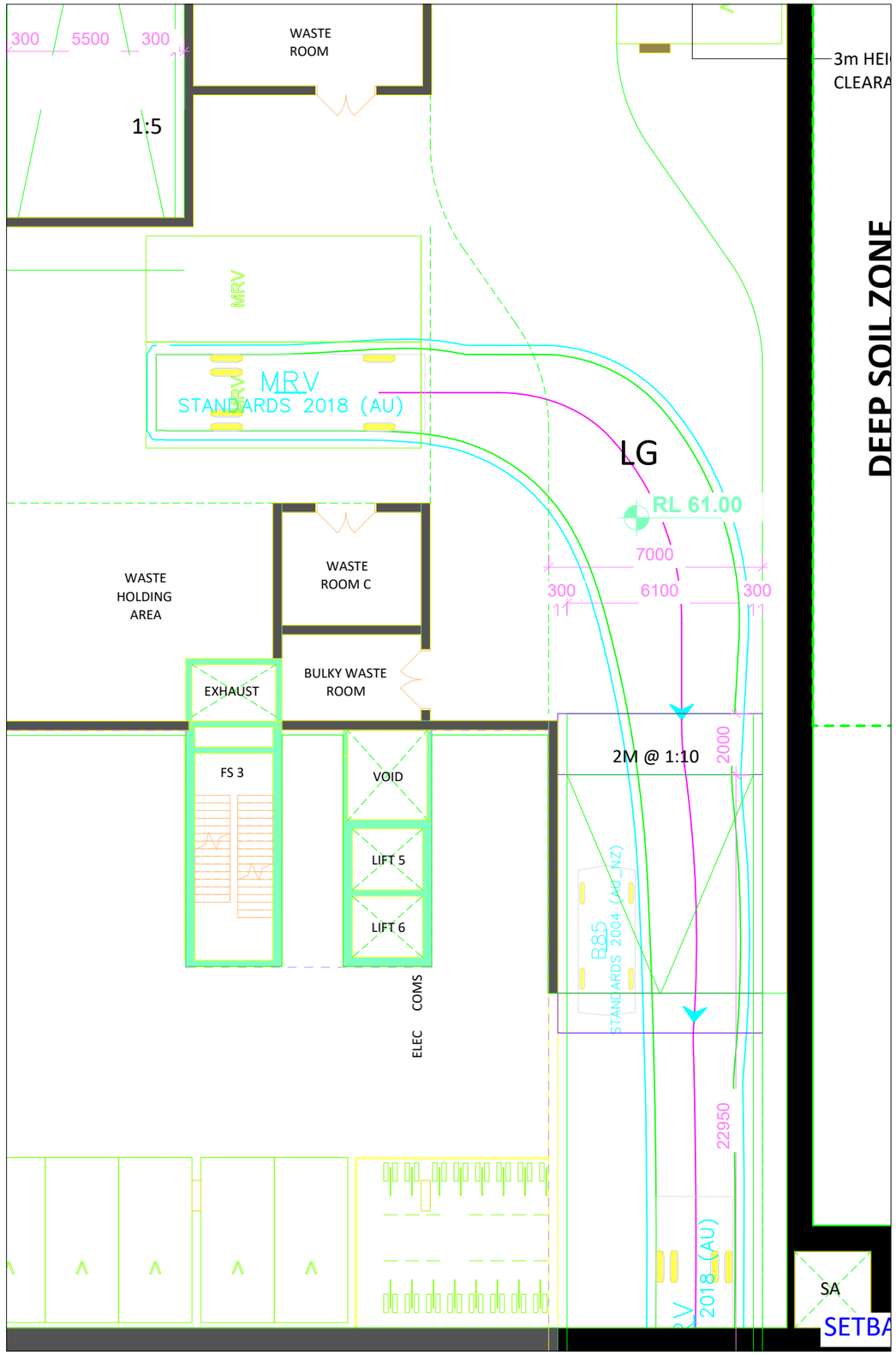

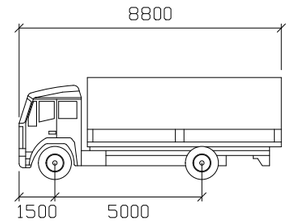

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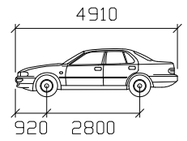

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B	PRELIMINARY DRAFT	28/04/2022

PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	04/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

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PROJECT

Greaton EQ DA

Swept path analysis

TITLE

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DRAWING NUMBER

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SHEET 01 OF 04

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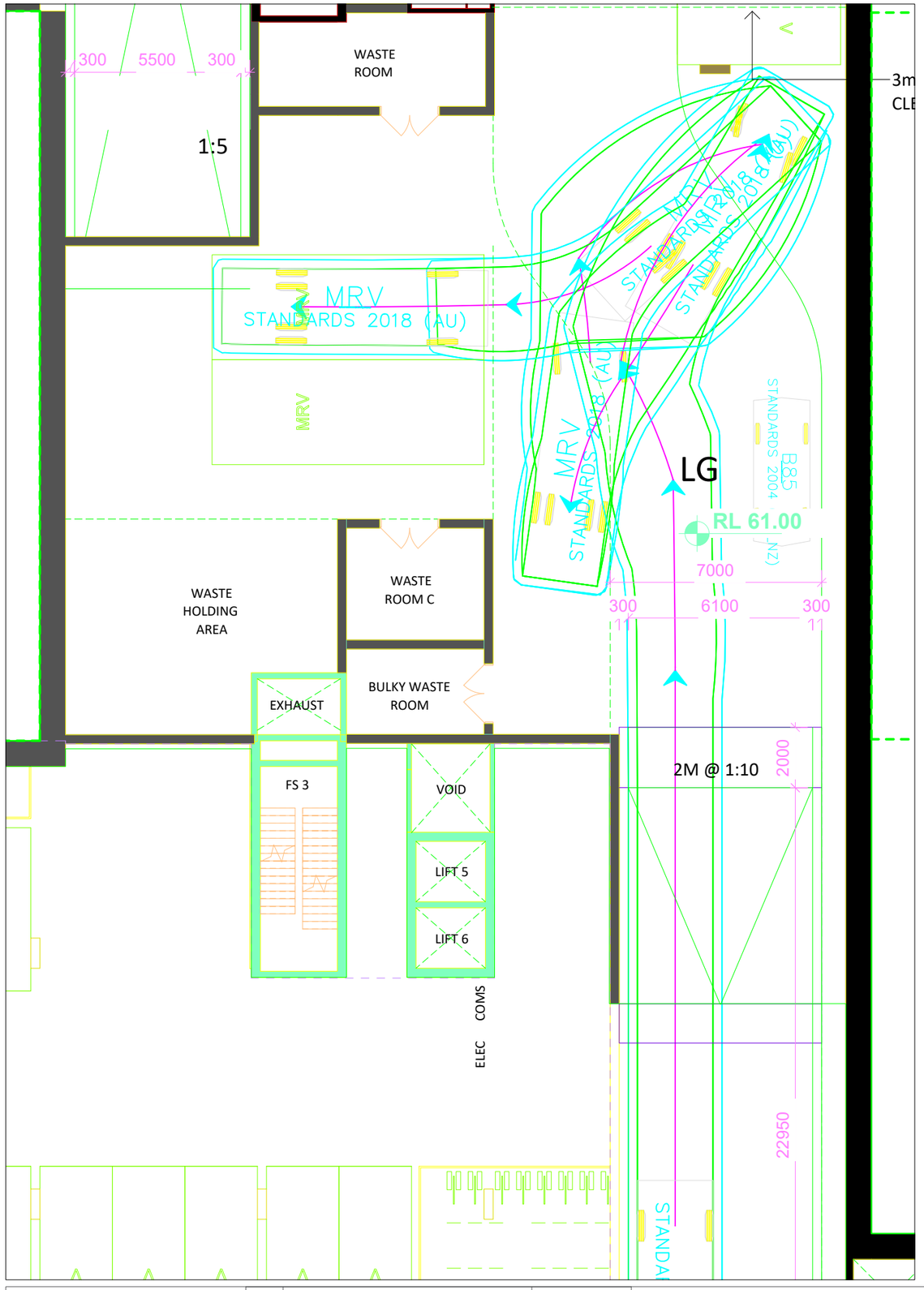

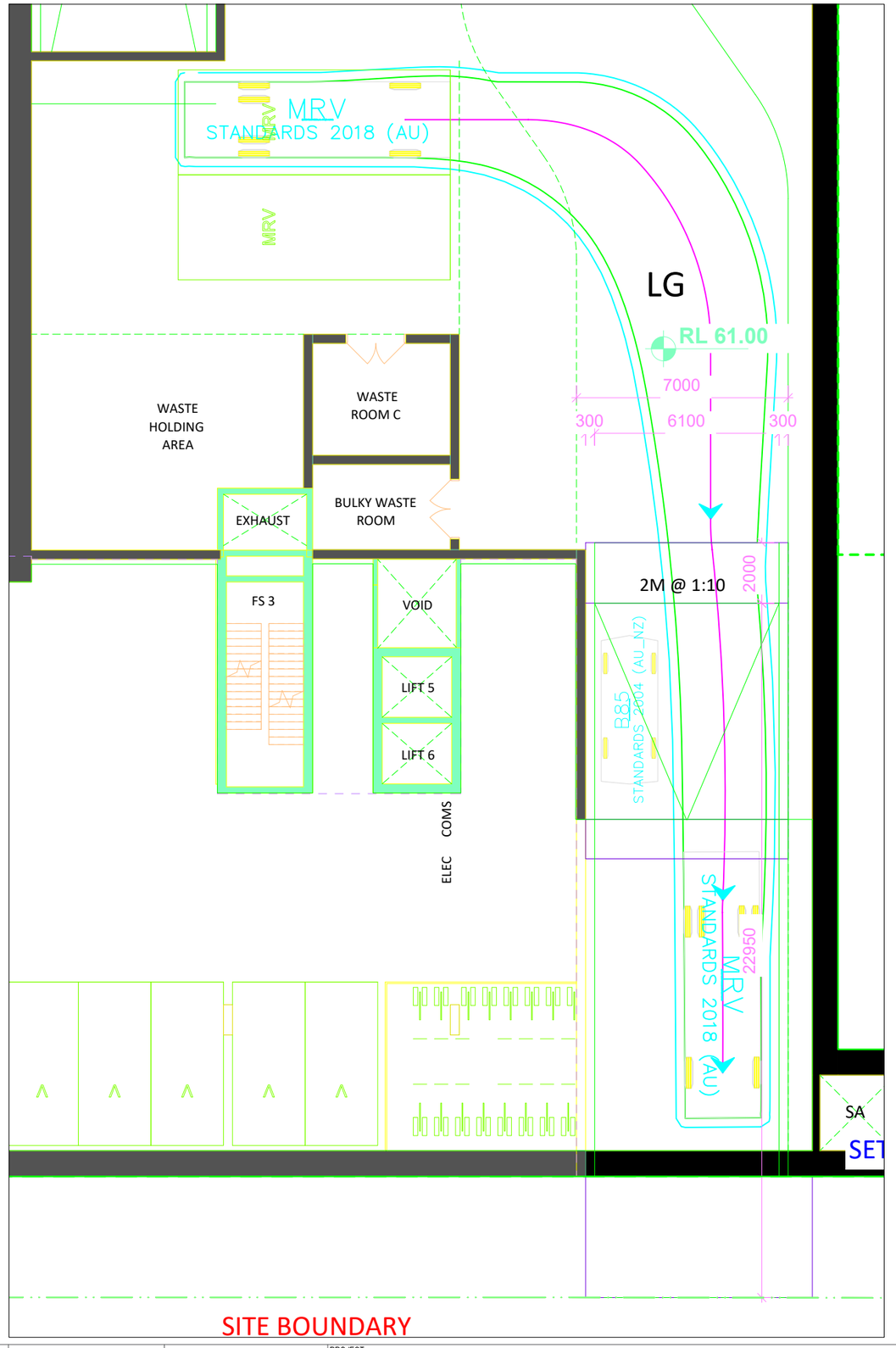

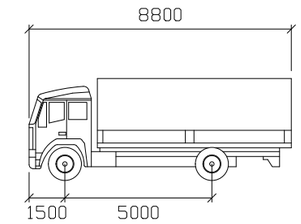

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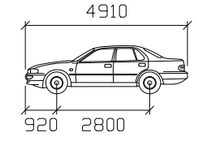

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B	PRELIMINARY DRAFT	28/04/2022

PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	04/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

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PROJECT

Greaton EQ DA

Swept path analysis

TITLE

Loading dock 2_MRV

DRAWING NUMBER

SCT_00209-01-002

SHEET 02 OF 04

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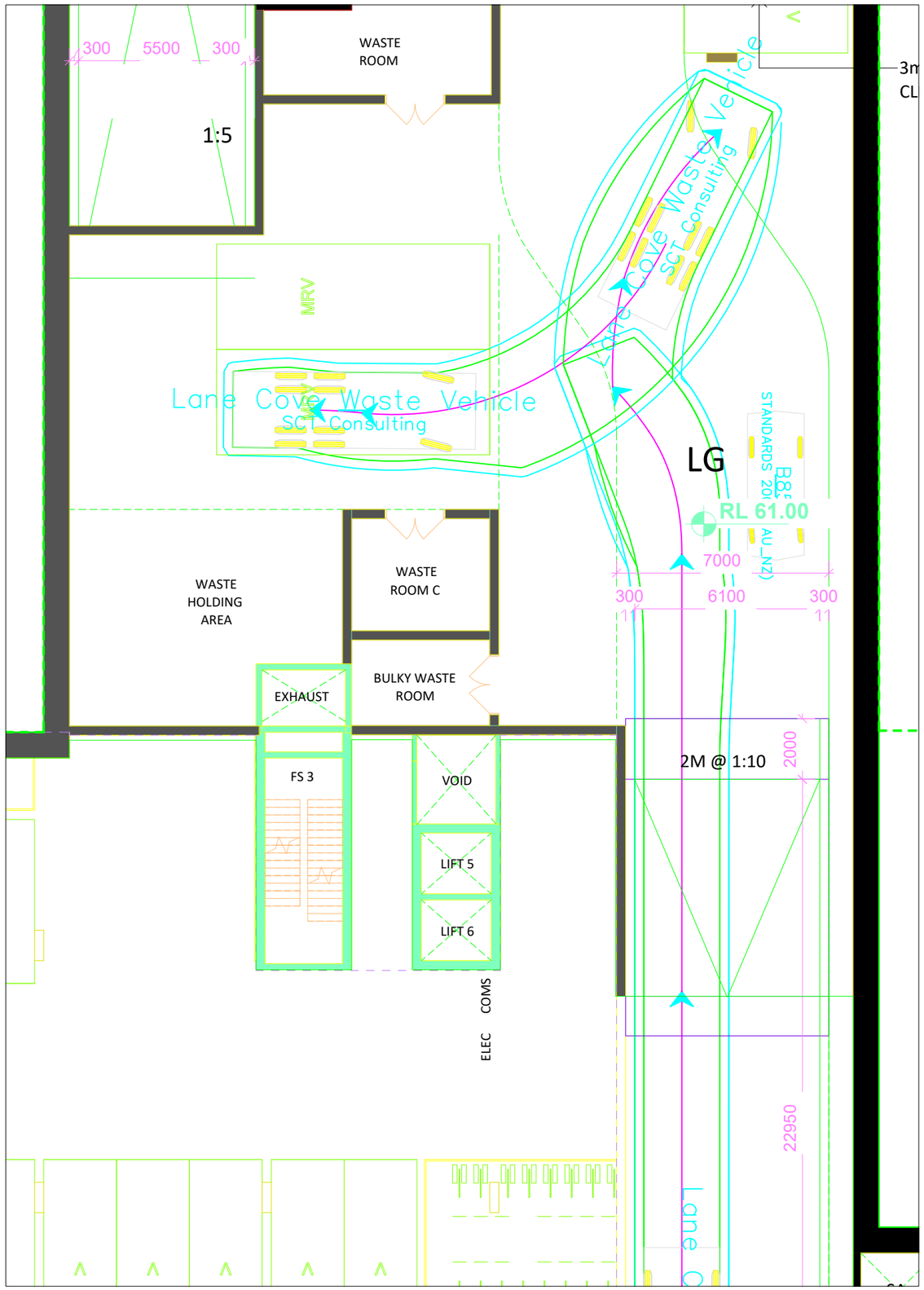

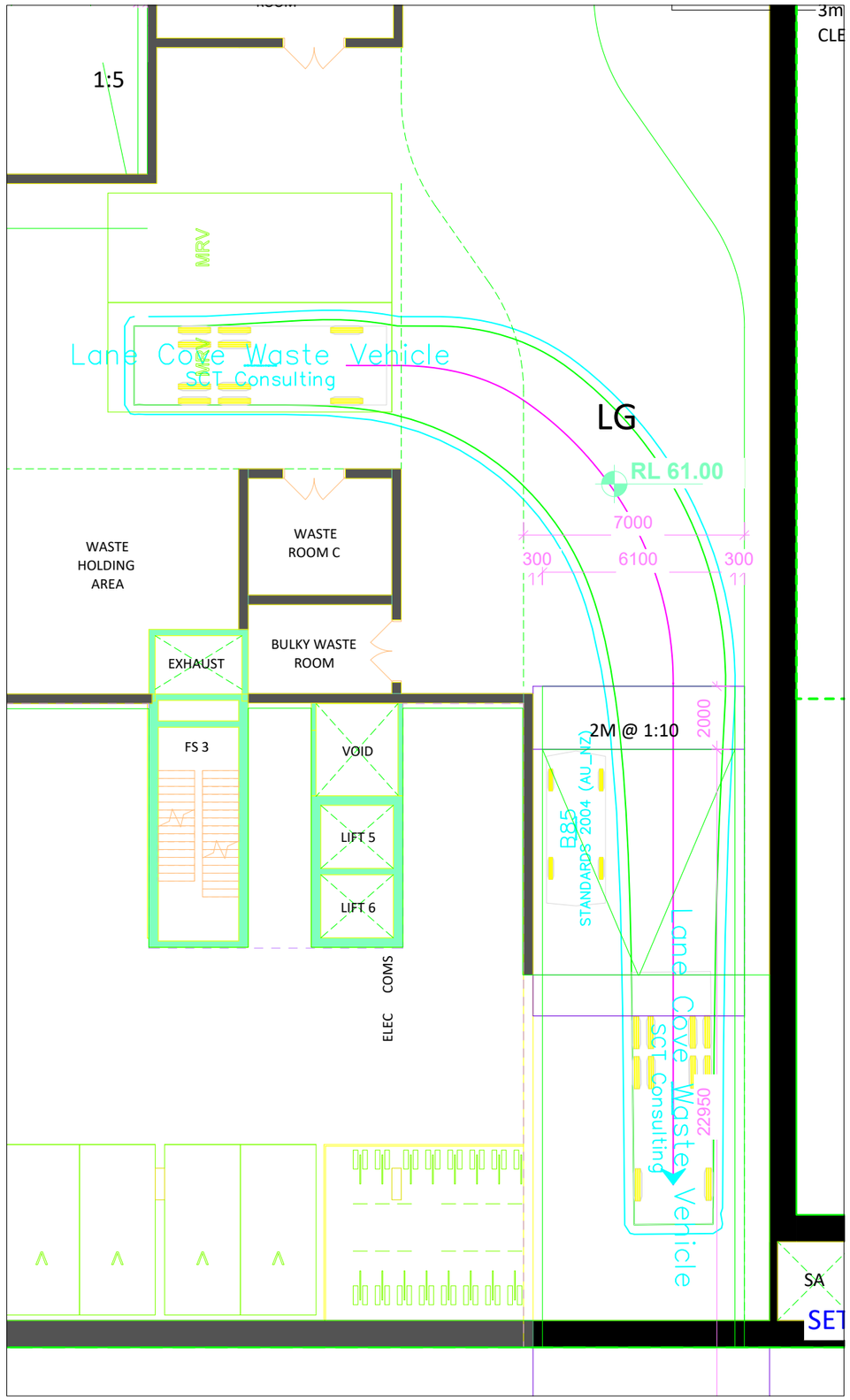

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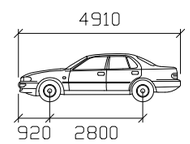

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Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

SCT Consulting

REV	DESCRIPTION	DATE
A	PRELIMINARY DRAFT	05/04/2022
B	PRELIMINARY DRAFT	28/04/2022

PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	04/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

SCALE @ A3

0 10 20

SCALE - X:XX

PROJECT

Greaton EQ DA

Swept path analysis

TITLE

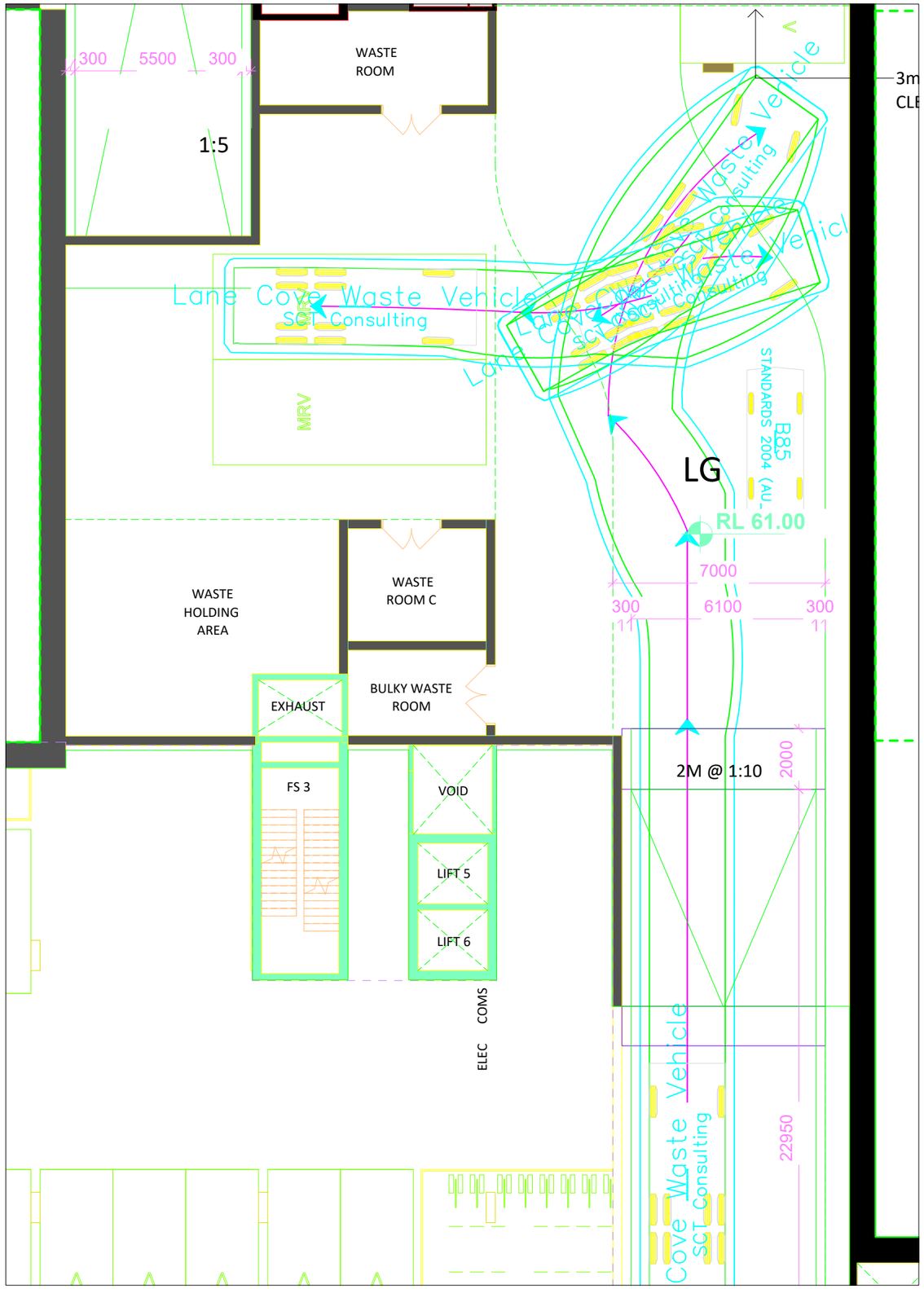
Loading dock 1_Waste Vehicle

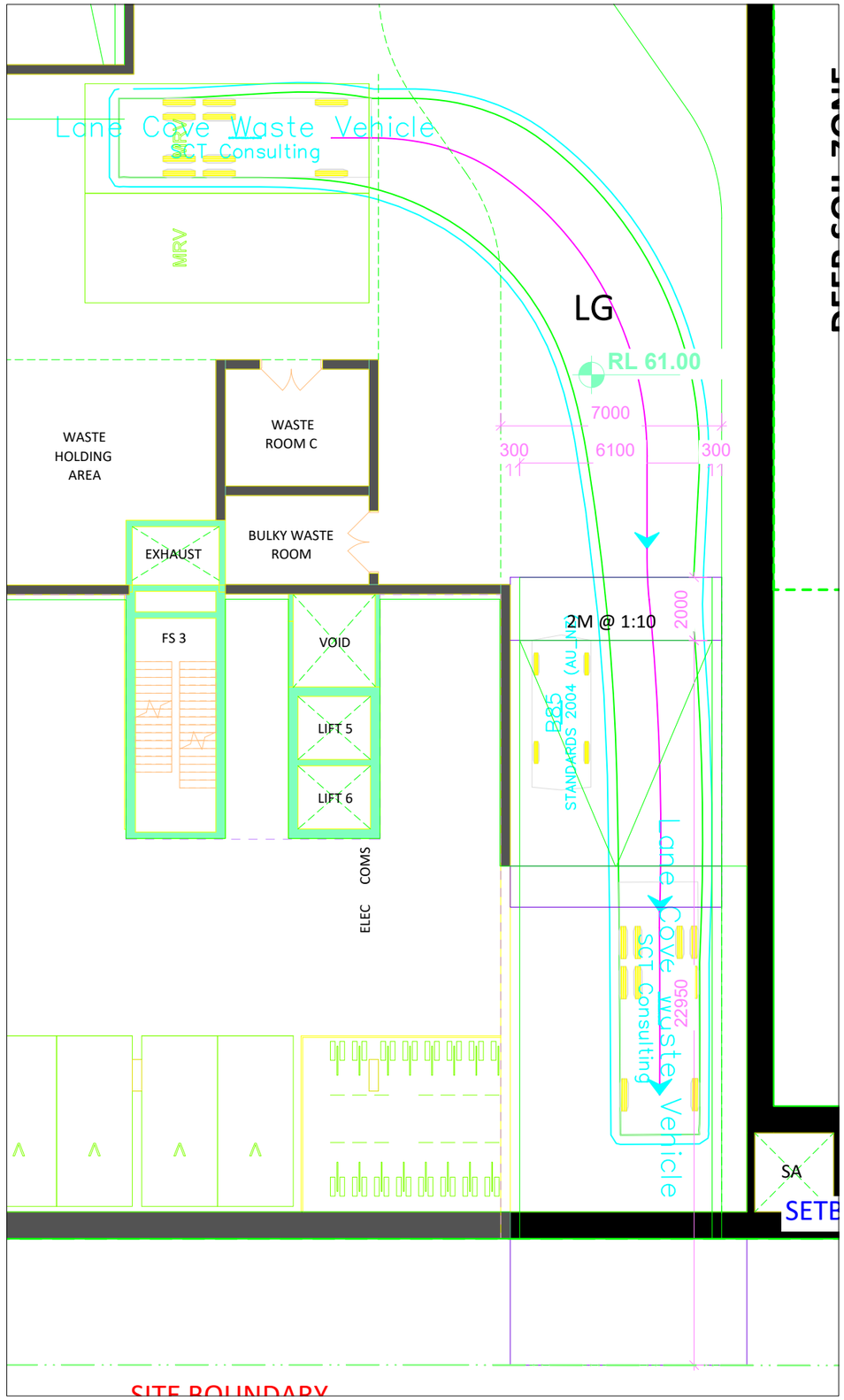
DRAWING NUMBER

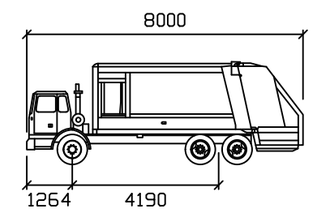
SCT_00209-01-002

SHEET 03 OF 04

A3



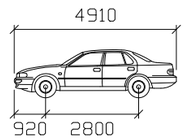




Lane Cove Waste Vehicle

mm

Width	: 2500
Track	: 2500
Lock to Lock Time	6.0
Steering Angle	: 22.7



B85

mm

Width	: 1870
Track	: 1770
Lock to Lock Time	6.0
Steering Angle	: 34.1

SCT Consulting

REV	DESCRIPTION	DATE
A	PRELIMINARY DRAFT	05/04/2022
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PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	04/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

SCALE @ A3

0 10 20

SCALE - X:XX

PROJECT

Greaton EQ DA

Swept path analysis

TITLE

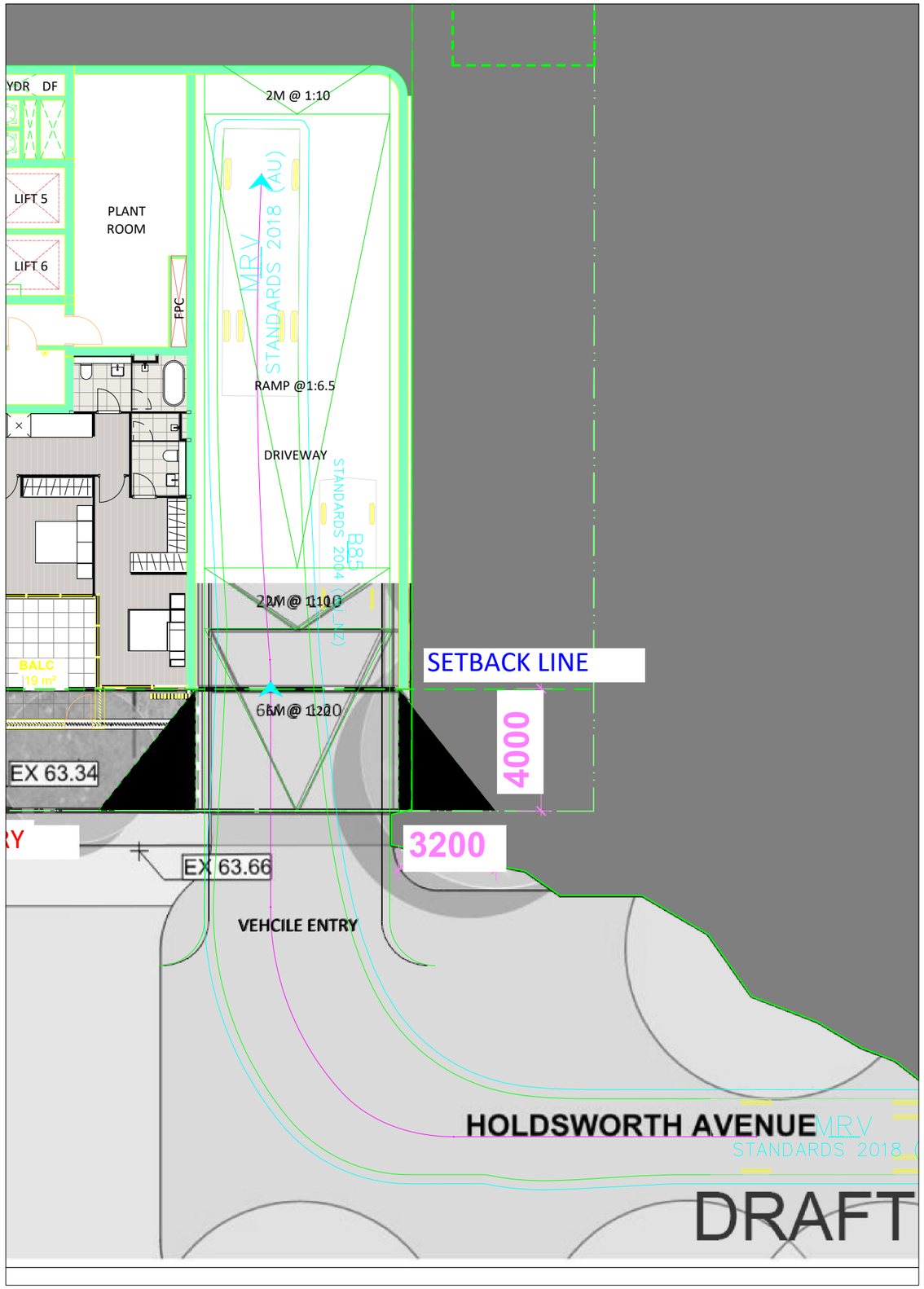
Loading dock 2_Waste Vehicle

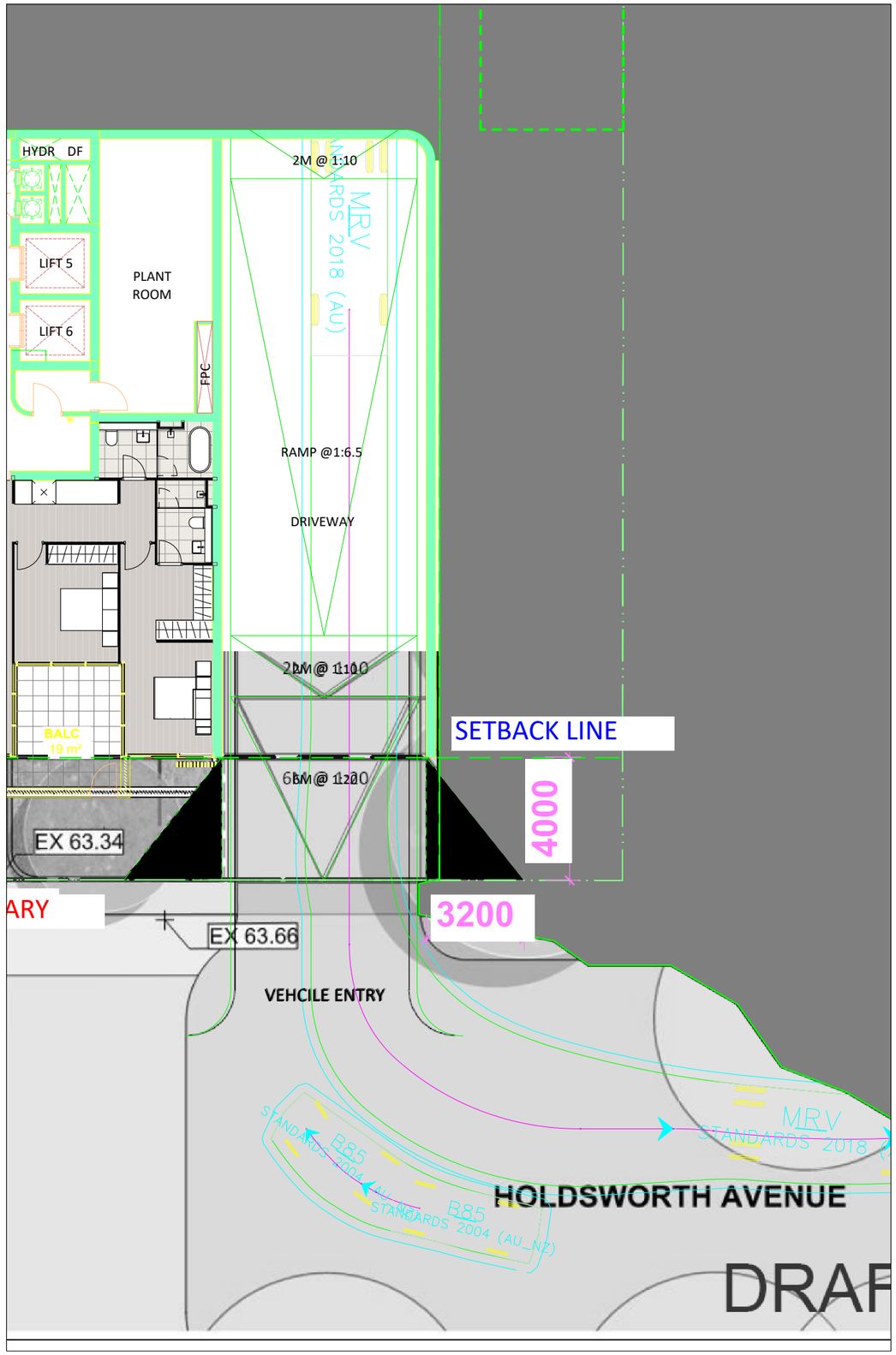
DRAWING NUMBER

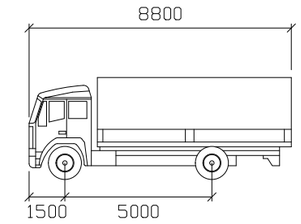
SCT_00209-01-002

SHEET 04 OF 04

A3

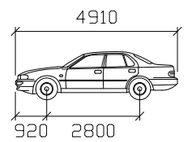






MRV

	mm
Width	: 2500
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 34.0



B85

	mm
Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

SCT Consulting

REV	DESCRIPTION	DATE
A	PRELIMINARY DRAFT	05/04/2022
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PREPARED FOR

GREATON

QUALITY INFORMATION	
DATE	04/22
PREPARED	S.C
REVIEWED	J.B
AUTHORISED	X.X

SCALE @ A3

0 10 20

SCALE - X:XX

PROJECT

Greaton EQ DA
Swept path analysis

TITLE

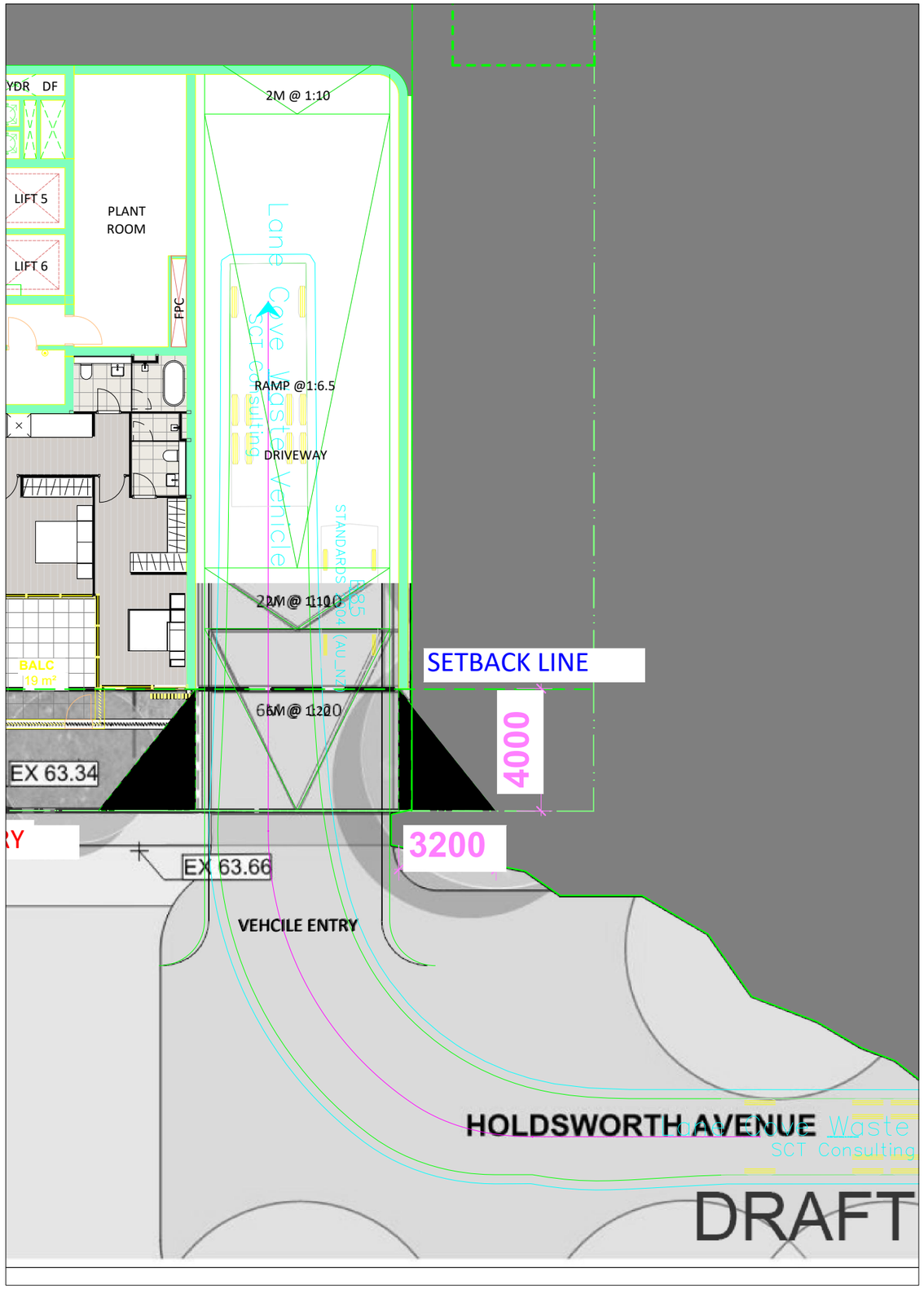
Access_MRV

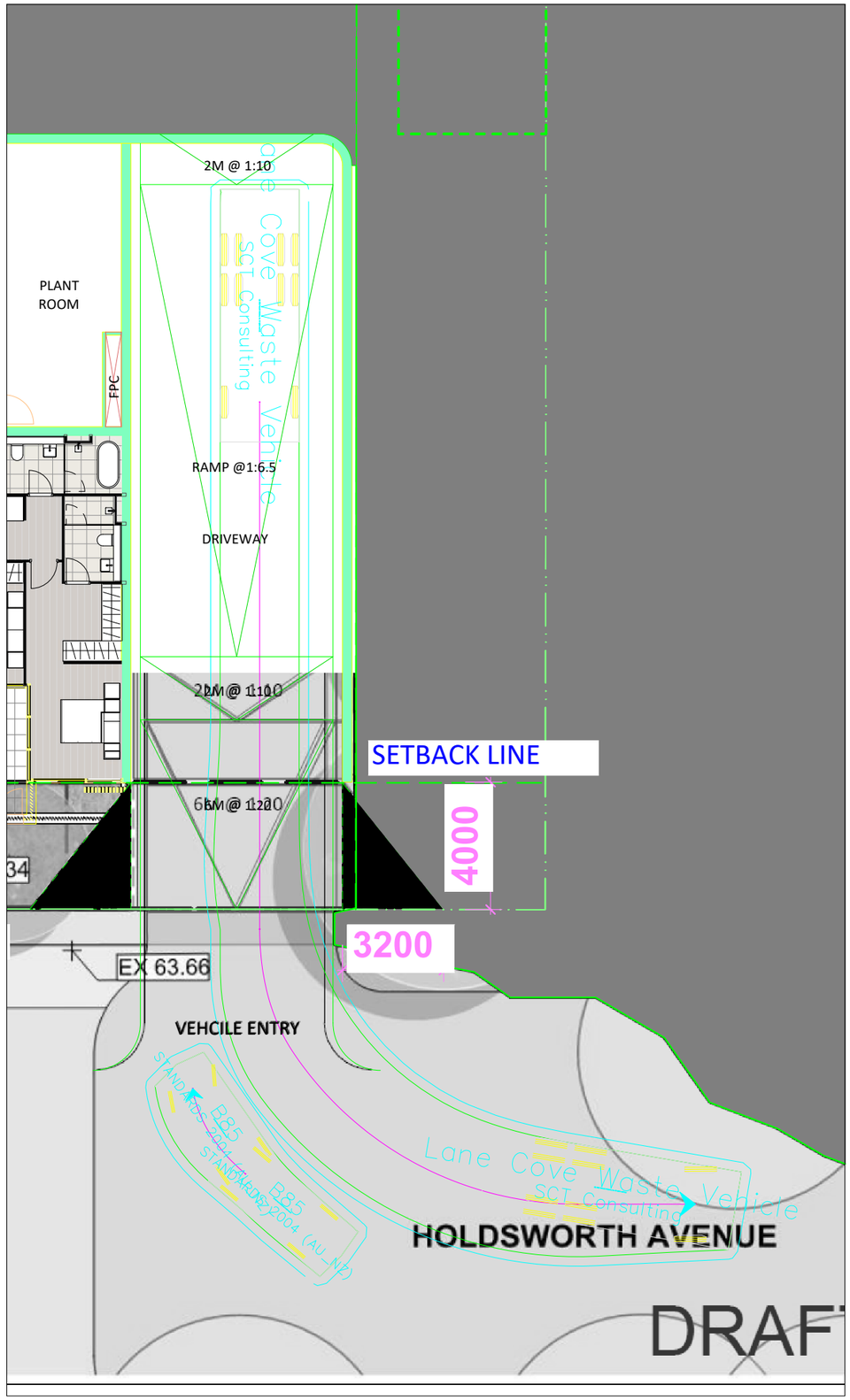
DRAWING NUMBER

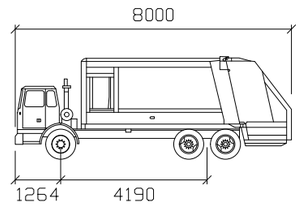
SCT_00209-01-001

SHEET 01 OF 02

A3



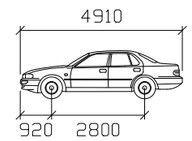




Lane Cove Waste Vehicle

mm

Width	: 2500
Track	: 2500
Lock to Lock Time	: 6.0
Steering Angle	: 22.7



B85

mm

Width	: 1870
Track	: 1770
Lock to Lock Time	: 6.0
Steering Angle	: 34.1

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SCALE - X:XX

PROJECT

Greaton EQ DA
Swept path analysis

TITLE

Access_Waste Vehicle

DRAWING NUMBER

SCT_00209-01-001

SHEET 02 OF 02

A3


SCT
Consulting