



Transport Assessment

State Significant Development Application

372-374 Mann Street & 35-37 Dwyer Street, North Gosford

30/05/2025

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Document Control

Project No	2437
Project	372-374 Mann Street and 35-37 Dwyer Street, North Gosford
Client	Stockbridge Properties
File Reference	P2437r01v2 TA_372-374 Mann Street and 35-37 Dwyer Street, North Gosford

Revision History

Revision No.	Date	Details	Author	Approved by
1	14/03/2025	Final	A. Tan, R. Hazell	R. Hazell
2	30/05/2025	Updated to include minor design modifications	A. Tan, R. Hazell	R. Hazell

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1 Introduction

1.1 Overview

This Transport Assessment accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), in respect of a State Significant Development Application (SSDA) for a proposed mixed-use development at 35-37 Dwyer Street and 372-374 Mann Street, North Gosford.

The project site is known as 35-37 Dwyer Street and 372-374 Mann Street, North Gosford and is legally known as Lot 4-5 in DP 15954, Lot 2A in DP 407164 and Lot 31 in DP 553523.

The site is irregularly shaped and has an area of 7,038.5m². The site has a frontage of 86m to Dwyer Street to the north and 34.2m to Mann Street to the east. It is mostly zoned B4 Mixed Use with a floor space ratio of between 2.75:1 and 4:1 and 18m to 36m height limits.

The project is a mixed-use development which includes site preparation works, the construction of three buildings ranging in height from seven storeys to 22 storeys containing residential apartments, commercial/retail floor area and basement car parking, and the construction of a private road, landscaping and public domain improvements.

This report details the extent of the proposal and assesses the existing transport environment together with describing the impact of the proposed development on the surrounding transport network. The assessment was completed under the requirements of the Department of Planning, Housing and Infrastructure, with City of Sydney and relevant State agency consultation key.

This report should be read in conjunction with the Addendum Transport Assessment, which was prepared in response to stakeholder consultation whereby the Design Review Panel requested that the entire precinct be incorporated into the modelling. The Addendum Transport Assessment is provided in **Appendix A**.

1.2 Secretary's Environmental Assessment Requirements

This transport assessment responds to all traffic and transport matters outlined within the Secretary's Environmental Assessment Requirements (SEARs) issued on 17 April 2024 as it relates to SSD-69773460. The traffic and transport related SEARs are outlined in **Table 1**.

TABLE 1: SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

Requirement	Reference
10. Traffic, Transport and Accessibility	
Provide a transport and accessibility impact assessment, which includes:	
An analysis of the existing transport network, including the road hierarchy and any pedestrian, bicycle or public transport infrastructure, current daily and peak hour vehicle movements, and existing performance levels of nearby intersections.	Section 2
Details of the proposed development, including pedestrian and vehicular access arrangements (including swept path analysis of the largest vehicle and height clearances), parking arrangements and rates (including bicycle and end-of-trip facilities), drop-off/pick-up-zone(s) and bus bays (if applicable), and provisions for servicing and loading/ unloading.	Section 3, Appendix C
Analysis of the impacts of the proposed development during construction and operation (including justification for the methodology used), including predicted modal split, a forecast of additional daily and peak hour multimodal network flows as a result of the development (using industry standard modelling), identification of potential traffic impacts on road capacity, intersection performance and road safety (including pedestrian and cyclist conflict) and any cumulative impact from surrounding approved developments.	Section 5, Section 7 (Section 7.5 to 7.7), Appendix A
Measures to mitigate any traffic impacts, including details of any new or upgraded infrastructure to achieve acceptable performance and safety, and the timing, viability and mechanisms of delivery (including proposed arrangements with local councils or government agencies) of any infrastructure improvements in accordance with relevant standards.	Section 5.3, Appendix A
Proposals to promote sustainable travel choices for employees, residents, guests and visitors, such as connections into existing walking and cycling networks, minimising car parking provision, encouraging car share and public transport, providing adequate bicycle parking and high-quality end-of-trip facilities, and implementing a Green Travel Plan.	Section 4.2, Section 6
Provide a Construction Traffic Management Plan detailing predicted construction vehicle routes, access and parking arrangements, coordination with other construction occurring in the area, and how impacts on existing traffic, pedestrian and bicycle networks would be managed and mitigated.	Section 7

1.3 Purpose of this Report

This report sets out an assessment of the anticipated transport implications of the proposed development, including consideration of the following:

- existing pedestrian and transport conditions surrounding the site
- suitability of the proposed parking in terms of supply (quantum) and layout
- service vehicle requirements
- pedestrian and bicycle requirements
- the traffic generating characteristics of the proposed development
- suitability of the proposed access arrangements and pedestrian through site links
- the transport impact of the development proposal on the surrounding road network.

1.4 Key References

In preparing this transport assessment, Ason Group has referenced key planning documents and transport standards and guidelines, including but not limited to:

- Central Coast Local Environmental Plan 2022 (LEP 2022).
- Central Coast Development Control Plan 2022 (DCP 2022).
- Gosford City Centre Development Control Plan 2018 (DCP 2018).
- Local Strategic Planning Statement, August 2020.
- Gosford City Centre Masterplan.
- Transport for New South Wales, Guide to Transport Impact Assessment 2024 (GTIA).
- Australian Standard 2890.1:2004: Parking Facilities – Off-Street Car Parking.
- Australian Standard 2890.2:2018: Parking Facilities – Off-Street Commercial Vehicle Facilities.
- Australian Standard 2890.3:2015: Parking Facilities – Bicycle Parking.
- Australian Standard 2890.6:2022: Parking Facilities – Off-Street Parking for People with Disabilities.
- Architectural plans for the proposed development prepared by Curzon + Partners, May 2024.
- Other documents as referenced in this report.

2 Existing Conditions

2.1 Site Location

The proposed development is located on the northern edge of the Gosford City Centre boundary and legally known as Lots 4&5 in DP15954, Lot 2A in DP407164 and Lot 31 in DP553523. It is bound by Mann Street to the east, Dwyer Street to the north and a range of commercial and light industrial buildings to the south and west. The site is currently occupied by a mix of low-density residential dwellings and small commercial building fronting Mann Street.

Vehicle access to the site is via separate driveways on Mann Street and Dwyer Street with low density residential dwellings opposite the site on the northern side of Dwyer Street. A range of residential land uses surround the site to the north and east, with several high-density residential apartment buildings to the east and south. Commercial buildings generally front Mann Street to the south with the site generally forming a key gateway site at the northern end of North Gosford. The main Central Coast and Newcastle Railway Line dissects the area to the west. The location of the site is shown in **Figure 1** and aerial view included in **Figure 2**.



Source: Nearmap aerial imagery

Figure 1: Site location



Source: Curzon + Partners

Figure 2: Aerial view (looking south)

2.2 Road Network

The road hierarchy surrounding the site is detailed in **Table 2**. Mann Street is a regional road under the management and control of Council and Henry Parry Drive a State Road under the management and control of TfNSW. In combination they form the key north-south roads through Gosford and North Gosford on the eastern side of the rail line.

Racecourse Road intersects with Mann Street (and Etna Street) at a signalised intersection and forms the key regional road route bypassing Gosford City Centre and connects with Central Coast Highway further to the south-west. Dwyer Street is a local road and provides access to the site and surrounding residential and commercial land uses.

All local roads in the vicinity of the site, including Dwyer Street generally provide one traffic lane and one parking lane in each direction with Dwyer Street including unformed kerbs west of Mann Street. Parking demand is generally low to moderate in the vicinity of the site with 2P parking restrictions in place on Mann Street south of Dwyer Street. The key streets in the vicinity of the site are shown in **Figure 3** to **Figure 5**.

TABLE 2: ROAD HIERARCHY

Road	Classification	Description
Dwyer Street	Local Road	- Aligned in an east-west direction north of the site. Connects with the Henry Parry Drive to the east and ends at the rail line to the west. - Two-way road with unformed kerbs and informal parking on both sides west of Mann Street. Formal kerbs west of Mann Street. - Provides a variable carriageway west of Mann Street and 9m wide carriageway east of Mann Street within a 19.5m wide road reserve. - Kerbside parking permitted.
Mann Street	Regional Road (7757)	- Aligned in a north-south direction along the eastern boundary of the site. Connects with Racecourse Road and Central Coast Highway to the south and forms part of the (old) Pacific Highway link through the area. - Two-way road providing one traffic lane in each direction with time restricted kerbside parking generally permitted on both sides south of Dwyer Street. More lane capacity is provided at key intersections. - Provides a 12m wide carriageway within a 19.5m wide road reserve. - Posted 60km/h speed limit in the vicinity of the site. - Includes a bus stop on the western kerb south of Dwyer Street.
Racecourse Road	Regional Road (7757)	- Aligned in an east-west direction south of the site. Connects with Mann Street in the east and Central Coast Highway in the west. - Two-way road providing one traffic lane in each direction with kerbside parking generally permitted on both sides. More lane capacity provided at key intersections. - Provides a 13m wide carriageway within a 20m wide road reserve.
Henry Parry Drive	State Road (MR 673)	- Aligned in a north-south direction east of the site. Connects with Pacific Highway (and Mann Street) to the north and Central Coast Highway/ York Street to the south-east. - Two-way road providing one to two traffic lanes in each direction with kerbside parking mostly not permitted on both sides. - Provides a 13m wide carriageway within a 20m wide road reserve.



Figure 3: Dwyer Street (looking west)



Figure 4: Mann Street (looking north)



Figure 5: Mann Street (looking south)

2.3 Active Transport

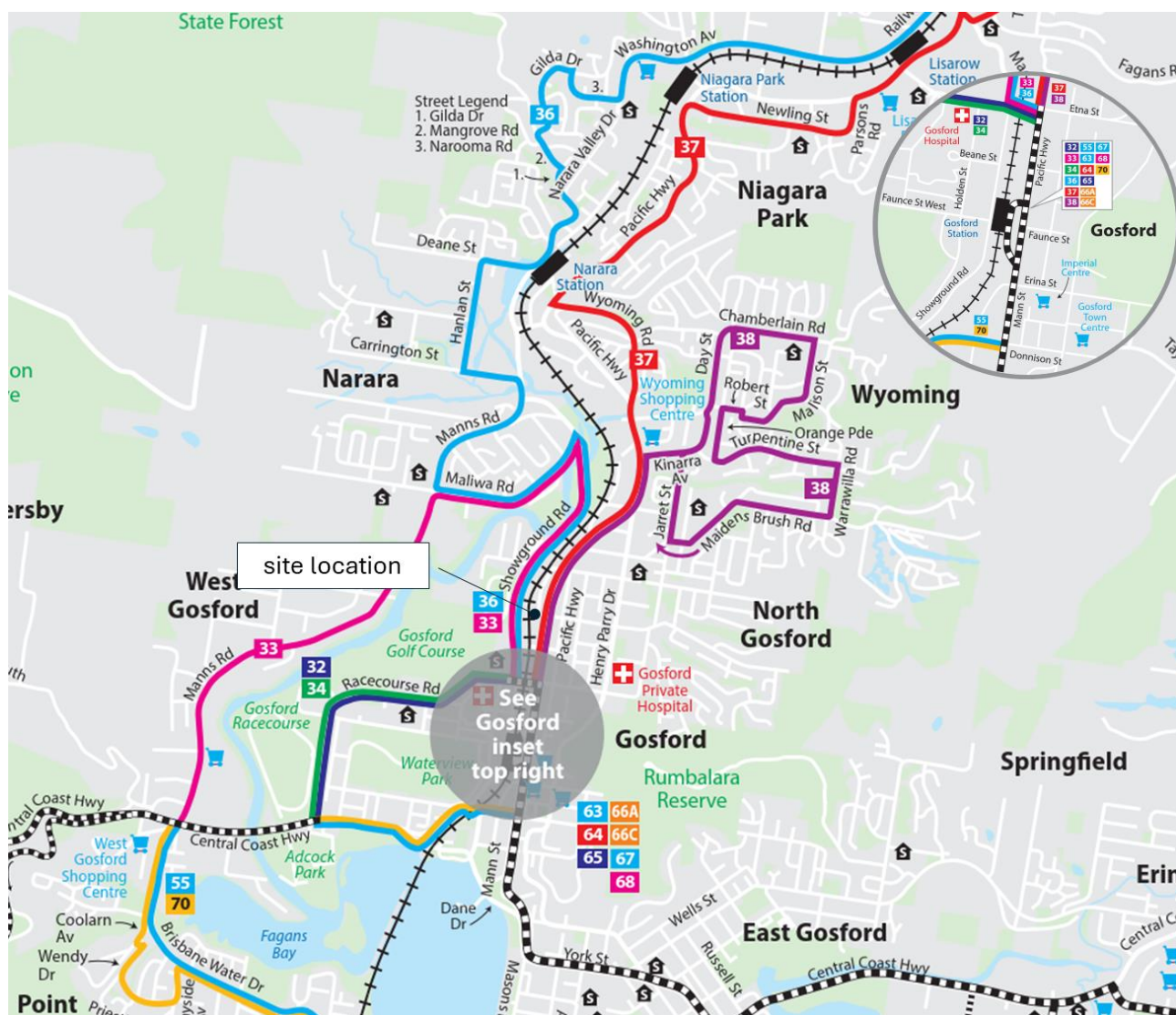
The local area is afforded established pedestrian infrastructure along most key road corridors through the local area. Mann Street provides pedestrian footpaths on both sides of the road south of Dwyer Street and on the eastern side only north of Dwyer Street. All roads south of the site similarly include standard footpaths on both sides. These facilities improve further to the south and within Gosford City Centre, with **Figure 7** showing the extent of footpaths in the surrounding area. There is a general absence of cycling routes in the immediate vicinity, with most shared paths limited to the southern edge of Gosford City Centre and along the Brisbane Waters foreshore.

This pedestrian infrastructure ensures secure and consistent connections to a bus and train services and ensure linear paths of travel for the purposes of connectivity to Gosford interchange and broader city centre.

2.4 Public Transport

2.4.1 Bus Services

TfNSW Guidelines state that bus services influence the travel mode choice associated with sites within 400 metres, or a 5-minute walk of a bus stop. In this regard, there are bus stops located on both sides of Mann Street adjacent to the site frontage with the key bus routes in the local area detailed in **Figure 6** and **Table 3**.

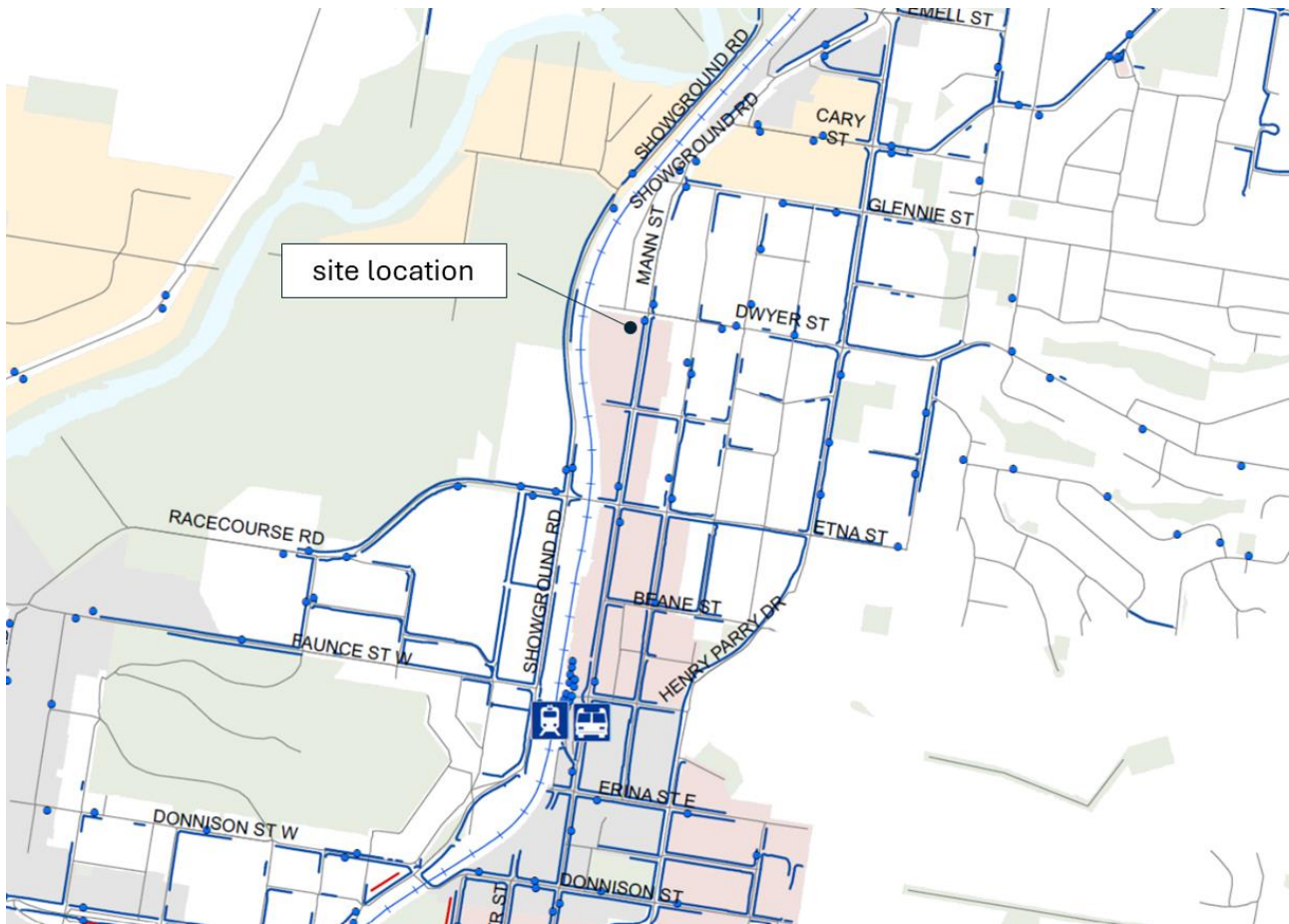


Source: [Busways Central Coast Network](#)

Figure 6: Existing bus services

TABLE 3: EXISTING BUS SERVICES

Route No.	Route	Route Description	Average Service Frequency
37	Tuggerah to Gosford via Lisarow	Tuggerah, Kangy Angy, Ourimbah, Niagara Park, Wyoming, North Gosford, Gosford	21 services per day (2 in each AM and PM peaks)
38	Gosford to Wyoming (loop service)	Gosford, North Gosford, Wyoming	38 services per day (4 in AM peak, 2 in PM peak)



Source: Central Coast Council centralcoast.nsw.gov.au/sites/

Figure 7: Local area footpaths and bus stops

2.4.2 Train Services

TfNSW Guidelines state that train services influence the travel mode choice of areas within 800 metres (10-minute walk) of a train station. While the site is marginally outside of this practical catchment it remains within a convenient 900m walk via Mann Street.

Gosford Station is a major station with three platforms servicing two train lines and with more than 20 bus services also connecting with the station the area forms a notable transport interchange south of the site. This combination of high frequency bus and rail services, with the interchange connecting with the broader Central Coast region (and Sydney) ensures convenient and quality transport services close to the site.

2.5 Existing Traffic Volumes

Traffic volume surveys were completed in mid-May 2024 to determine the existing traffic flows on the surrounding road network. This is important to understand the local area traffic volumes and through traffic volumes, particularly on Mann Street past the site.

The following intersections have been surveyed noting that the proposal is expected to generate moderate traffic and unlikely to materially impact key intersection operation, as discussed throughout this report.

- Mann Street/ Dwyer Street
- Henry Parry Drive/ Dwyer Street
- Mann Street/ Racecourse Road/ Etna Street.

The survey data indicates an overall peak between 8:15am and 9:15am and between 4:30pm and 5:30pm during the weekday peak periods. The existing AM and PM peak hour traffic volumes are shown in **Figure 8**.



Figure 8: Existing peak hour traffic volumes

2.6 Existing Intersection Operation

SIDRA INTERSECTION modelling has been completed to establish the baseline operation of the key study intersections. In this regard, the SIDRA modelling outputs include a range of performance measures relevant to this assessment, including:

- **Degree of Saturation (DOS)** – The DOS is used to measure the performance of intersections where a value of 1.0 represents an intersection at theoretical capacity. As the performance of an intersection approaches DOS of 1.0, queue lengths and delays increase rapidly. It is recommended that DOS to be less than 0.9, with satisfactory intersection operation generally achieved with a DOS below 0.8.
- **Average Vehicle Delay (AVD)** – The AVD (or average delay per vehicle in seconds) for intersections also provides a measure of the operational performance and is used to determine an intersection Level of Service. For signalised intersections, the AVD reported relates to the average of all vehicle movements through the intersection. For priority (Give Way, Stop & Roundabout controlled) intersections, the AVD

reported is that for the movement with the highest AVD. It should be noted that in some circumstances, examining the highest movement average delay can be misleading. The volume of the movement with the highest average delay should also be considered. For example, an intersection where all movements are operating at a LOS A, except one which is at LOS E may not strictly define the overall intersection LOS as E if that movement is minor. In short, longer delays to a small number of vehicles is unlikely justified to upgrading an intersection unless a safety issue was also involved.

- *Level of Service (LOS)* – This is a comparative measure that provides an indication of the operating performance, based on AVD.

Table 4 shows the criteria that SIDRA adopts in assessing level of service.

TABLE 4: LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	Average Delay per Vehicle (sec/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	Less than 14	Good operation	Good operation
B	15 to 28	Good with acceptable delays & spare capacity	Acceptable delays & spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity & 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	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

The results of the SIDRA analysis for the key intersections are shown **Table 5** with detailed intersection operation outputs included in **Appendix B**.

TABLE 5: BASELINE INTERSECTION OPERATION

Intersection	Period	DOS	AVD	LOS
Mann Street/ Dwyer Street	AM	0.353	60.0	F
	PM	0.477	106.6	F
Henry Parry Drive/ Dwyer Street	AM	0.939	56.5	E
	PM	0.862	24.2	C
Mann Street/ Racecourse Road/ Etna Street	AM	0.817	36.2	D
	PM	0.863	37.0	D

The results show that the key study intersections are generally operating at satisfactory levels during the respective peak hours. While the ‘worst’ right turn movements at the Mann Street/ Dwyer Street intersection are at LOS E/F, there is only minor queuing and generally acceptable delays for vehicles exiting the minor side road (Dwyer Street) to access the regional through road (Mann Street).

The Mann Street/ Henry Parry Drive roundabout also experiences some delay and queuing during peak periods. This is attributable to the relatively high volumes on Henry Parry Drive and vehicles associated with Gosford Private Hospital. Queuing and delay are generally manageable with some queues forming on Henry Parry Drive and Dwyer Street east (associated with Gosford Private Hospital traffic) during both peak periods.

The Racecourse Road/ Mann Street/ Etna Street traffic signals generally operates at an overall LOS D during both peak periods with some spare capacity on each approach. Such a level of service is generally acceptable in such locations with any delay typically short-term and the peak period limited.

2.7 Planning Context

2.7.1 Gosford City Centre Masterplan

Gosford is recognised as a regional city for the Central Coast and with the planned growth in population targets and new job opportunities, a targeted Masterplan has been developed to support delivery of the necessary infrastructure and services. The Masterplan seeks to create a vibrant, accessible, and well-connected urban environment that caters to both residents and visitors. Its objectives focus on public transport, pedestrian-friendly spaces, and overall revitalization.

Transport Management and Accessibility Plan (TMAP) aims to boost the share of work trips taken by public transport and encourage use for a variety of purposes. Pedestrian and cycling infrastructure is also a focus, with the aim of developing an improved, connected and safe network across the city.

With the site located on the northern edge of the city centre boundary, it forms part of a key precinct and potential gateway site with the ability to significantly improve the northern edge and encourage greater activity through better pedestrian connections and activated public domain in an area that has long been underutilised.

2.7.2 Gosford Local Strategic Planning Statement

The Gosford Local Strategic Planning Statement (LSPS) is a 20-year planning vision developed by Central Coast Council with the key objective to outline the land use, infrastructure and sustainability objectives and guide growth.

Again, establishing an integrated transport network, with Gosford interchange at its core is a key target together with promoting active travel through improved pedestrian and cycling infrastructure. Traffic management strategies also play a key role in establishing a safer environment for all users, reducing congestion and improving traffic flow through targeted upgrades, signal optimization and innovation.

3 Proposed Development

3.1 Overview

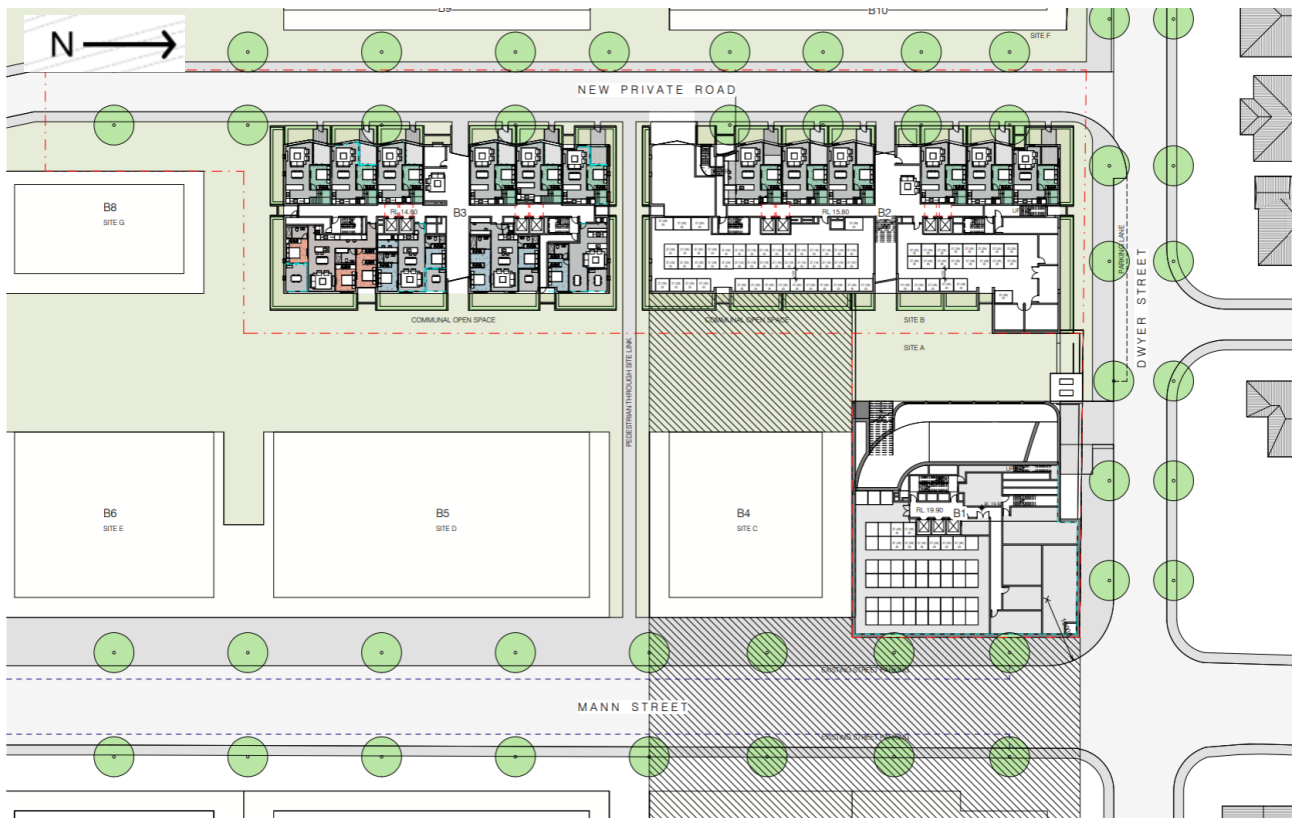
The proposal aims to deliver three separate buildings comprising 249 residential apartments and 375m² of commercial/retail Gross Floor Area on the ground floor of Site A in the north-east corner of the site. Site A includes a single tower over 22 levels with frontages to Mann Street and Dwyer Street. Site B includes two separate buildings, each over four levels with a frontage to a new private road along the western site boundary.

The new private road is proposed to provide vehicular access to Site B via a single driveway, with Site A afforded access via Dwyer Street via a single driveway east of Campbell Street along the northern boundary. All vehicles accessing the basement loading docks and car parks would use Dwyer Street on approach and departure.

The proposed yield is shown in **Table 6** with the site layout plan, including additional block planning shown in **Figure 9**.

TABLE 6: PROPOSED LAND USES

Land Use	Yield
Site A (building 1)	
1 bedroom	38
2 bedrooms	62
3+ bedrooms	14
Sub-total	114 apartments
Commercial/retail	375m² GFA
Site B (building 2)	
1 bedroom	20
2 bedrooms	45
3+ bedrooms	8
Sub-total	73 apartments
Site B (building 3)	
1 bedroom	23
2 bedrooms	30
3+ bedrooms	9
Sub-total	62 apartments



Source: Curzon + Partners

Figure 9: Proposed site layout plan and indicative block planning

3.2 Site Layout Review

The proposal includes three separate buildings with a single driveway on each of Dwyer Street and the new private road accessing basement car parking and loading dock. Each driveway is integrated into the building façade and considers the headroom clearances per Council waste truck requirements, with minimum 3.5m clearances to structure and services (and 4m within the loading dock). The driveways are minimum 6m wide and setback from adjacent intersections, in accordance with AS2890.1:2004. The site access ramps, and internal car park ramps are designed in accordance with Australian Standards with maximum 1:6.5 gradients on the access ramps and 1:4 for the internal car only ramps. Maximum 1:20 gradients over 6m are provided measured from the property boundary. Each car park is designed as a User Class 1A car park with minimum 2.4m wide and 5.4m long spaces with adjacent 5.8m wide circulation aisles.

The new private road along the western boundary is dimensioned in accordance with Council engineering requirements with a minimum 6m wide carriageway allowing for two-way traffic movements and no on-street parking. This is appropriate having regard to the intended function as a local road, primarily facilitating property access. A further 1.5m setback adjacent to the Site B frontage allows for a pedestrian footpath. Site A facilitates ground level commercial/retail space with public domain fronting Mann Street and Dwyer Street with the widening of Dwyer Street allowing for formal kerb and gutter and kerbside parking. The setbacks improve pedestrian amenity and create quality space on the northern periphery of Gosford City Centre. 10m kerb radii also ensure all vehicles, including all rigid trucks can independently access Dwyer Street and the new private road. The site layout and building separation also allows for through pedestrian site links, improving pedestrian amenity and permeability.

The proposal includes 353 parking spaces, separated between each basement to allow for staged delivery, if required. With one loading dock provided within the upper basement level of each car park, such provision exceeds Council DCP and relevant guidelines.

Masterplanning for the precinct between Dwyer Street and Lindsey Street west of Mann Street has been completed to demonstrate appropriate planning principles. This ensures that the new private road can be extended further south in the future, allowing other land to be similarly developed. With a southern connection, the new private road would facilitate property access and allow flexibility on approach and departure and alleviate any constraints at the Mann Street/ Dwyer Street intersection in the future (assuming background traffic growth continues along Mann Street). Further improvements to pedestrian facilities and public transport facilities and connections would further encourage active and public transport use.

A range of vehicle swept paths have been completed to confirm appropriate design, including confirmation of adequate dimensions to accommodate Council's waste collection vehicle, as per Council's Resource and Waste Management Planning requirements. Where required, all vehicle movements maintain independence, with all circulation areas and internal ramps designed in accordance with relevant Australian Standards. Traffic management measures will be necessary at infrequent times when waste vehicles (and other heavy vehicles) enter and exit the basement loading areas. This would include a standard stop/go signal system, with laser detectors set at appropriate height. The vehicle swept paths are included in **Appendix C**.

Overall, the site is well considered and meets all relevant Council design requirements while establishing a gateway site at the northern extent of Gosford City Centre.

4 Parking Requirements

4.1 Car Parking

The proposed development aims to provide parking within each building and ensure an approach that can support any such staged delivery, if required. **Table 7** details the parking requirements as outlined in DCP 2018.

TABLE 7: CAR PARKING REQUIREMENTS

Land Use	Type	Parking Rate	Yield	Parking Requirement
Site A (building 1)				
Commercial/retail		1 space per 40m ²	375m ²	10
Residential	1-bed	1 space per dwelling	38	38
	2-bed	1.2 spaces per dwelling	62	74
	3-bed	1.5 spaces per dwelling	14	21
	Visitor	1 space per 5 dwellings	Σ 114	23
Sub-total				166
Accessible parking		No less than 10%		17
Site B (building 2)				
Residential	1-bed	1 space per dwelling	20	20
	2-bed	1.2 spaces per dwelling	45	54
	3-bed	1.5 spaces per dwelling	8	12
	Visitor	1 space per 5 dwellings	Σ 73	15
Sub-total				101
Accessible parking		No less than 10%		10
Site B (building 3)				
Residential	1-bed	1 space per dwelling	23	23
	2-bed	1.2 spaces per dwelling	30	36
	3-bed	1.5 spaces per dwelling	9	14
	Visitor	1 space per 5 dwellings	Σ 62	12
Sub-total				85
Accessible parking		No less than 10%		9
Total				352 spaces

Based on the above, the proposed development is required to provide 352 on-site parking spaces split as necessary across the three separate buildings. With a total of 353 car spaces apportioned as necessary across each site and land use, the proposed parking supply is appropriate and consistent with DCP 2018 requirements.

A total of 17 motorcycle spaces are also required, with 18 motorcycle spaces spread across the three basements to ensure compliance with DCP 2018. at least 10 per cent of residential and residential visitor spaces are required to be accessible, resulting in the need for 36 accessible spaces. With 38 accessible spaces proposed, this requirement is similarly met. All accessible spaces are designed in accordance with

AS2890.6:2022 with adjacent shared areas (with centrally located bollard) being a minimum 2.4m wide. Headroom clearances of minimum 2.5m (to structure and services) are provided above all accessible spaces and shared areas.

The proposed development includes provision of the above parking requirements, with each building basement (and number of basement levels) able to deliver the required quantum of parking for the proposed land uses. Visitor and accessible parking spaces will be linemarked to ensure appropriate use.

4.2 Bicycle Parking

Reference has been made to DCP 2018, as it relates to bicycle parking provision. In this regard, the bicycle parking requirements are summarised in **Table 8**.

TABLE 8: BICYCLE PARKING REQUIREMENTS

Type	Yield	Applicable Rate	Requirement
Residential			
resident	249 apartments	1 space per 3 apartments	83
residential visitor		1 space per 12 apartments	21
Sub-total			104
Commercial/retail			
commercial/retail staff	375m ²	1 space per 200m ²	2
commercial/retail visitors		1 space per 750m ²	1
Sub-total			3
Total			107 spaces

Secure bicycle parking is provided in the basement car parks for use by residents and commercial/retail staff through a combination of storage cages and secure bicycle storage rooms fitted with bicycle lockers and bicycle racks. These facilities ensure capacity for 104 resident bicycle spaces, two commercial/retail staff spaces and one commercial/retail visitor meet the requirements of DCP 2018. This specifically includes 48 spaces for building 1, 30 spaces for building 2, 26 spaces for building 3 and three spaces for the commercial/retail space.

Visitor bicycle parking is provided in the form of double-sided bicycle racks close to the building entrances and across the ground level public domain along the street frontages.

4.3 Service Vehicle Requirements

The proposed development ensures all loading and waste collection activity can occur on-site within the upper level of each basement. Each of the three buildings has capacity to accommodate a minimum of one service vehicle with dimensions and manoeuvring area adequate to accommodate all Council rear lift type truck waste trucks up to 10.24m long. This includes an operational and travel height of 3.5m (desirable 4m internal to the dock). All other service vehicles will be limited to 8.8m medium rigid vehicles and smaller with small delivery vehicles and vans/ utes also able to make use of kerbside parking, if required.

Given that DCP 2018 does not include specifics on the provision of loading facilities, reference is made to the TfNSW Urban Freight Forecasting Model (UFFM) to provide an accurate assessment of service vehicle

demand for the proposed development. The UFFM is a useful tool developed by TfNSW which has two main functions:

1. Provides daily profiles of the volume and types of freight and servicing activity that a building is likely to generate across a typical weekday, based on building information entered by the user.
2. Assesses the performance of loading dock parking spaces provided by a development to manage the freight demand generated by the building.

The objective of the model is to assist planners and developers in understanding the facilities that will be appropriate for a development to be self-sufficient in managing its own freight and servicing activity. The following key outputs can be produced by the model:

- Projected vehicle arrival profiles by loading spaces (HRV, MRV, SRV and cars, vans, utes etc.).
- Estimated distribution of demand throughout the day.
- Efficiency of the loading dock (dock performance).

The inputs for the UFFM model are listed in **Table 9** with the model outputs summarised in **Table 10**.

TABLE 9: UFFM CALCULATION INPUTS

Land Use	Size (GFA) / No.
number of floors	4-22
commercial area	-
number of apartments	249
retail area	375m ²
availability of a dedicated goods lift	no

TABLE 10: PARKING SPACES FOR COMMERCIAL VEHICLES

Vehicle Type	Demand
Small (B99, vans, utes)	2
Medium (SRV, small truck)	1
Large (MRV, HRV, large trucks)	1

The UFFM suggests that the proposed development may need to provide up to four loading bays, including two for vans/ utes, one for small rigid vehicles and one for large trucks. With the proposal including separate basements able to accommodate a minimum of one large rigid truck (Council's 10.2m waste truck), the proposed development meets the loading requirements of the UFFM. It is noted that small service vehicles such as vans/ utes regularly prefer to use on-street parking for deliveries etc. (if available) for ease of access and convenience. This is both common and accepted.

5 Traffic Assessment

5.1 Traffic Generation

Traffic generation estimates for the proposed development have been sourced from the GTIA, which considers traffic generation rates based on survey data for high-density residential flat dwellings, including those close to public transport services and exceeding six storeys. In this regard, the average morning and evening peak hour trip generation is 0.19 and 0.15 trips per apartment. Based on the proposed 249 apartments, the proposed development would generate between 37 and 47 vehicle trips in any peak hour.

It is however recognised that while the site is afforded a reasonable level of access to public transport services and active travel facilities, it is a 900m walk north of Gosford interchange. In this regard, the site may generate slightly higher vehicle trips, with a conservatively high 0.3 vehicle trips per apartment adopted for the purposes of this assessment. The minor commercial/retail space would also mostly attract surrounding residents and commercial staff who are likely to walk and/or travel outside the road network peak periods. On this basis, a conservative traffic generation rate of 0.5 trips per car space has been adopted for the purposes of this assessment.

Overall, the proposed development is anticipated to generate up to 80 vehicle trips in any peak hour, as summarised in as detailed in **Table 11**.

TABLE 11: TRIP GENERATION

Land Use	Trip rate	Yield	Trip generation
Residential	0.3 trips per apartment	249 apartments	75
Commercial/retail	0.5 trips per car space	10 spaces	5
Total			80 vehicle trips

5.2 Traffic Distribution and Assignment

The directional distribution and assignment of traffic generated by the site will be influenced by several factors, including the:

- Configuration of the surrounding road network.
- Existing operation of the intersections providing access between the local and arterial road network.
- Configuration of access points to the site.
- Travel patterns evident from the surveyed traffic volumes through the nearby key intersections.

Post development SIDRA modelling has been completed to understand the traffic impacts on the surrounding road network associated with the proposed development. The directional split of traffic both spatially (which roads do they use on approach and departure) and proportionately (differential split on arrival and departures) has been completed.

For residential land uses, it is broadly accepted that there is an 80:20 split in arrivals and departures during the respective peak periods. This is reflected by vehicles exiting in the AM and returning in the PM. As such an 80:20 outbound: inbound split has been applied during the weekday AM peak, reversed in the PM peak. The same directional splits have been applied to the nominal commercial/retail traffic generation (peak flow reversed from residential).

5.3 Traffic Impacts

With the proposed development expected to generate up to 80 vehicle trips in any peak hour, such moderate volumes are not expected to materially affect the overall operation of the study intersections. However, as part of a robust and conservative traffic-based assessment, post development traffic modelling has been completed to understand the impacts associated with the proposed development.

In this regard, the following scenarios have been completed to inform the traffic impacts on the surrounding road network.

- Year of opening (2026) base case.
- Year of opening (2026) with development.
- 10-year horizon (2036) base case.
- 10-year horizon (2036) with development.

Based on the site access driveways and known traffic patterns through the area, it is estimated that most traffic would use Mann Street on approach and departure. Overall, 30 per cent of traffic is estimated to use Mann Street to/ from the north with 60 per cent to/ from the south and 10 per cent via Dwyer Street to/ from the east. On this basis, the post-development intersection operation has been modelled through the study intersections to confirm if there are any such traffic related impacts. The post development traffic volumes are shown in **Figure 10** and **Figure 11**.



Figure 10: Existing AM peak hour plus development traffic volumes



Figure 11: Existing PM peak hour plus development traffic volumes

The SIDRA results are summarised in **Table 12** for the post development and future 10-year horizon (2036) with development scenarios, with SIDRA summary outputs included in **Appendix B**.

TABLE 12: POST DEVELOPMENT INTERSECTION OPERATION

Intersection	Period	DOS	AVD	LOS
Mann Street/ Dwyer Street	AM	0.659	80.8	F
	PM	0.507	139.4	F
Henry Parry Drive/ Dwyer Street	AM	0.946	58.9	E
	PM	0.864	24.5	C
Mann Street/ Racecourse Road/ Etna Street	AM	0.836	36.2	D
	PM	0.904	38.9	D

The post development SIDRA results indicate that the proposed development would have a moderate impact at the Mann Street/ Dwyer Street intersection and nominal impacts at the other study intersections. This is expected and acceptable noting that the constraints at the Mann Street/ Dwyer Street intersection relate to Dwyer Street traffic, and particularly those turning right from the east and west approaches. Again, this is expected and accepted when exiting a minor road onto a main road. The Degree of Saturation remains between 0.6 to 0.7 with minor queues for all approaches. This demonstrates an acceptable overall level of intersection operation and is supported on traffic grounds.

It is noted that even with the proposed development generating moderate traffic, future year traffic modelling (in 2036) has been completed by applying a 1.5 per cent annual growth rate to Mann Street traffic to understand any such constraints in the future. With additional northbound and southbound traffic on Mann Street, the right turns in and out of Dwyer Street worsen. This includes a Degree of Saturation above one and notable average delays. This would apply to similar intersections along this section of Mann Street and unrelated to the proposed development. In this regard, Gosford City Centre planning has earmarked intersection upgrades, including Mann Street at Henry Parry Drive and Dwyer Street. Any such developer contributions could be directed to such upgrades if and as required to accommodate background growth rates on the state and regional road network.

Overall, the traffic generated by the proposed development is moderate and not expected to materially impact the operation of local key intersections. While some delay is evident for right turns from Dwyer Street at Mann Street, the post development delays are nominal and queue lengths minor. Such delays are common and accepted when exiting minor roads onto major roads with any such future delays associated with background growth on the regional and state road network.

6 Overview Green Travel Plan

6.1 Travel Plan Framework

Transport is an essential aspect of daily life, impacting the economy, public health, and the environment. The transportation sector stands out as one of the rapidly growing sources of emissions in Australia, presenting a significant opportunity for reducing greenhouse gases. Beyond environmental considerations, offering diverse travel options, prioritizing walking, cycling, and public transport, holds substantial public health advantages and contributes to the development of a strong and prosperous community.

While the physical infrastructure integrated into the development is a crucial component, it represents only a portion of the overall solution. A Green Travel Plan (GTP) will ensure that the transportation infrastructure, services, and policies both within and beyond the site are tailored to user needs and strategically coordinated to achieve the highest level of sustainability.

6.1.1 What is a GTP?

A GTP encompasses a set of strategies aimed at fostering eco-friendly travel choices and decreasing reliance on individual automobiles. Its purpose is not to be 'anti-car,' but rather to inspire and assist individuals in pursuing their daily activities in a more sustainable manner. Such plans can include:

- Measures limiting car usage (disincentives or 'sticks').
- Measures encouraging or supporting sustainable travel, decreasing the necessity for travel, or enhancing travel efficiency (incentives or 'carrots').

The GTP seeks to advocate for transportation alternatives other than private cars, offering users the flexibility to opt for more sustainable and environmentally conscious commuting options. The report outlines various non-car transport alternatives available at the site. Given the project's objective to minimize private travel to the location, the adoption of a GTP would prove advantageous.

6.2 Key Objectives

Underpinning this GTP comprises a package of measures which could be adopted and designed to address the specific travel needs of the site. In this regard, the overall intention is to encourage and facilitate the use of alternative and sustainable modes of transport and to reduce single-occupancy car travel for journeys to and from the site.

The primary objectives of the GTP will be to:

- Promote the use of 'active transport' modes such as walking and cycling, particularly for short-medium distance journeys.
- Reduce reliance on the use of private vehicles for all journeys.
- Promote use of private vehicles in an efficient manner.

The intention is that the travel plan will deliver the following benefits:

- Reduce the environmental footprint of the site.
- Improve access, amenity, convenience, and safety of sustainable transport modes to/ from the site.
- Encourage a healthier, happier, and a more active and public transport inclined culture.

6.3 Site Specific Measures

Numerous possibilities exist to incentivize users to consider alternative travel modes to and from the site. The following potential measures and initiatives could be implemented to encourage more sustainable travel modes:

Active Travel

- Establish quality, prominent bicycle parking.
- Foster cultural change through initiatives such as:
 - Creating a bike user group, targeting residents working within five kilometres of the site.
 - Providing information outlining opportunities and facilities available to users, including maps of available cycling routes to the site.

Promote Carpooling

- Encourage carpooling through the establishment of a carpooling club or registry/ forum.
- Conduct community programs to encourage carpooling for residents.

Public Transport

- Develop a Travel Access Guide (TAG) for residents and commercial staff, incorporating details on site facilities and surrounding public transport services and active transport initiatives. Update the TAG as the surrounding transport environment evolves.
- Install public transport information boards/ apps to inform residents and visitors about alternative transport options, utilizing the TAG as a reference.

Additional Travel Demand Initiatives

- Establish quality pedestrian connections between the site and existing bus routes, engaging with service providers to assess the feasibility of increasing frequency and timing.
- Explore opportunities for new and/ or revised frequency local bus services to ensure convenient bus services and frequencies near the site.

Maintain ongoing engagement with TfNSW and Council to capture any additional demand generated by the site as part of ongoing train and bus planning for the area.

6.3.2 Travel Access Guide

A TAG provides users with details on utilizing sustainable transport modes, including walking and public transit, to reach the site. This information is conveyed visually through a map or app, showcasing the site's location and nearby transportation options, emphasizing accessible pedestrian and cycling routes.

6.3.3 Communication Strategy

Opportunities exist to provide residents, visitors and commercial staff with details regarding nearby transport choices. Disseminating information can aid in journey planning and enhance their awareness of convenient and cost-effective travel alternatives that encourage ongoing shifts in travel behaviour. These opportunities encompass:

- TfNSW, offering public transport timetables and journey planning through their Transport Info website: www.transportnsw.info.

Furthermore, engaging with users through social media channels might serve as a platform for informally testing new initiatives, establishing travel-buddy networks, and fostering communication.

6.3.4 Monitoring

So as to record the overall success, as well as the effectiveness of the individual measures, monitoring and review of the GTP is to be conducted at regular intervals. The appointed Travel Plan Co-ordinator (TPC) will act as the primary point of contact for all enquiries relating to the GTP's progress.

The GTP should be monitored on a regular basis, e.g. yearly, by carrying out travel surveys. Travel mode surveys would determine the proportion of persons travelling to/ from the site by each transport mode. This will be in the form of annual travel mode questionnaire surveys to be completed by all persons attending the site, as far as practicable.

If targets are not met at the end of the initial period of monitoring, the GTP will be reviewed, new measures introduced and would be reassessed at the next monitoring stage.

6.4 Summary

The proposal has the potential to formulate and implement a travel plan aimed at actively encouraging greater reliance on sustainable modes of transport. While it's challenging to anticipate the specific measures that could be identified, the outlined initiatives offer a foundation for the site and the eventual implementation of a comprehensive GTP.

A detailed GTP will be developed in future stages and prior to opening.

7 Overview Construction Pedestrian and Traffic Management

7.1 Overview

This section seeks to provide an overview of the Construction Pedestrian and Traffic Management Plan (CPTMP) initiatives to be implemented as part of the construction works associated with the proposed development. Specifically, this overview CPTMP considers the following:

- truck routes to/ from the site
- anticipated truck volumes during construction stages
- construction site access arrangements
- works zone details
- pedestrian and cyclist access
- worker parking (if any)
- traffic control measures
- overview of CPTMP requirements.

The designated contractor(s) will formulate a detailed CPTMP outlining the measures for traffic and pedestrian management throughout all construction works.

The general principles of traffic management during construction activities includes:

- minimizing disruptions to pedestrian movements
- maintaining appropriate public transport access
- mitigating impacts on existing traffic along adjacent roads and intersections
- ensuring continued access to and from adjacent properties
- maintaining construction vehicle movements along designated routes to and from the site
- exercising control over construction vehicle activity in proximity to the site
- adhering to Council-approved hours of work for construction activities

7.2 Description of Works

Specific construction works have not yet been considered and may be delivered as part of a staged approach. Even so, a practical construction programme has been estimated and indicatively covers a period of up to two years. With early works and excavation reasonably able to commence in September 2025, completion could be achieved by around mid to late 2027. The indicative staging is shown in **Table 13**.

TABLE 13: INDICATIVE CONSTRUCTION STAGING

Stage	Timeline	Duration
Excavation	September 2025 to March 2026	6 months
Piling	April 2026 to May 2026	2 months
Structure	May 2026 to December 2026	9 months
Façade	October 2026 to March 2027	6 months
Finishing	August 2026 to September 2027	13 months

7.3 Work Hours

The works will be carried out during the approved work hours. Indicative work hours are as follows:

- Weekdays: 7:00am to 6:00pm
- Saturdays: 8:00am to 1:00pm
- Sundays and public holidays: no work.

Workers would be advised of the approved work hours during induction. Any works outside of the approved work hours would be subject to specific prior approval from the appropriate authorities. Such works may include delivery of cranes, large plant or equipment required on the site that require oversize vehicle access.

7.4 Worker Induction

All workers and subcontractors engaged on-site will be required to complete site induction. The induction will include permitted arrival and departure routes for all vehicle types, as well as standard environmental, work health and safety (WHS), driver protocols and emergency procedures.

Any workers required to undertake works or traffic control within the public domain will be suitably qualified and covered by all necessary insurances.

7.5 Site Access and Loading

Construction vehicle access will be provided via Dwyer Street with all loading expected to take place within the bounds of the site or within approved on-street work zones. Any works zone will require application to the relevant authorities prior to commencement of works.

As part of the detailed CPTMP, Traffic Guidance Schemes will be prepared in accordance with the principles of the Traffic Control at Work Sites manual (TfNSW, 2020). Traffic Guidance Schemes primarily show where construction signs will be located at specific locations along the approved truck routes and at the construction site accesses to warn other road users of the increase in construction vehicle activity. Traffic controllers may be required to oversee the movement of construction vehicles when entering and exiting the construction site, with details to be confirmed in the CPTMP.

7.6 Construction Worker Parking

It is anticipated that there will be on average 80 workers on-site at one time, with up to 150 workers on-site during peak activities. These are initial estimates and subject to change based on the final site establishment, demolition and construction staging to be confirmed by the appointed contractor. Final worker numbers broken down by the construction stages will form part of a detailed CPTMP.

Only minor construction worker parking is theoretically possible on-site and only during the early stages of construction, assuming staged delivery. During site induction, workers will also be informed of the range of high frequency public transport services within a practical walk of the site, with all workers encouraged to use public transport (and to carpool) to access the site daily. Appropriate arrangements will be made for any equipment/ tool storage and drop-off requirements.

7.7 Heavy Vehicle Generation and Access Routes

Construction traffic will generally incorporate 12.5m heavy rigid vehicles, 18.1m truck and dog combinations and 19m articulated vehicles throughout all construction stages. This includes for the removal of spoil and transportation of material, delivery of structural beams and on concrete pour days.

Specific approval would be sought from relevant authorities for use of the above vehicles, if required. Any oversize vehicles using local roads to access the site would require additional Council and/ or TfNSW approval.

It is anticipated that construction works would generate 20 to 25 trucks per day equating to an average of about three to four trucks per hour. Peak construction works is anticipated to generate a maximum of 40 trucks per day during peak activities (such as concrete pours). Construction vehicle movements will be minimised during peak hours, where possible.

7.8 Heavy Vehicle Access Routes

Heavy vehicle movements would be restricted to designated routes and confined to the arterial road network wherever feasible. Heavy vehicle routes to/ from the site have been identified with the aim of providing the most direct routes to/ from the site as well as minimising the impact of heavy vehicles on local roads.

The direction, distribution, and allocation of traffic arising from construction activities will be shaped by factors such as the origin and destination of materials, site access points and the surrounding arterial road network. It is expected that heavy vehicles will use the approach and departure routes as shown **Figure 12**. The key routes rely on the key state and regional roads such as Mann Street, Racecourse Road, Central Coast Highway and Pacific Highway. These roads would combine to ensure appropriate travel paths, subject to authority approval.



Figure 12: Anticipated construction vehicle routes

7.9 Pedestrian and Cyclist Management

A combination of A-Class fencing, and B-Class hoardings will be installed around the perimeter of the site to maintain safe pedestrian and cyclist movement adjacent to the site. The CPTMP will detail how the construction impacts to pedestrian and cyclist movements will be minimised or any mitigation necessary to offset any such impacts.

Construction vehicle movements will be minimised during peak hours where practical to minimise the impact on pedestrians and cyclists.

8 Conclusion

Based on the analysis and discussions presented within this report, the following conclusions are made:

- This traffic, transport and accessibility report has been prepared to support a State Significant Development for the proposed residential development at 372-374 Mann Street and 35-37 Dwyer Street, North Gosford.
- The proposal aims to deliver three separate buildings comprising 249 residential apartments and 375m² of commercial/retail Gross Floor Area with public domain and generous setbacks fronting Mann Street and Dwyer Street on the northern periphery of Gosford City Centre.
- Each driveway is integrated into the building façade and considers the headroom clearances per Council waste truck requirements. The site access ramps, and internal car park ramps are designed in accordance with Australian Standards with each basement designed as a User Class 1A car park.
- The new private road along the western boundary is dimensioned in general accordance with Council engineering requirements and appropriate having regard to the intended function as a local road, primarily facilitating property access. Improvements to Dwyer Street include widening and kerbside parking with pedestrian footpaths along the site perimeter further improving public amenity in and around the site.
- Masterplanning for the precinct between Dwyer Street and Lindsey Street west of Mann Street has been completed to ensure adjacent sites can be developed in the future. The new private road could be extended further south to facilitate more property access along the western boundaries.
- The proposed development generates the need to provide 352 parking spaces based on DCP 2018, with the basement car parks allowing for such provision and spread across the two basements as necessary. The proposal seeks to provide a total of 353 spaces, including 293 resident spaces, 50 visitor spaces and 10 commercial/retail spaces split as necessary across the three separate buildings.
- Secure bicycle parking for 107 bicycles is provided across the three basements for use by residents and commercial/retail staff, in accordance with DCP 2018. Visitor bicycle racks are provided along the site frontages and public domain, close to the main building entrances.
- The proposed development is required to provide up to four loading bays based on the TfNSW Urban Freight Forecasting Model, including two vans/ utes and one each for small and medium rigid vehicles. The loading bays on the upper level of the two basements are each capable of accommodating Council's 10.2m waste truck and one smaller rigid truck or van/ ute. It is also recognised that small deliveries would likely make use of on-street parking.
- Existing traffic volumes and study area intersection operation has been assessed as part of a robust approach to ensure that the estimated traffic generation can be accommodated. Overall, the study intersections are operating satisfactorily noting some constraint on select approaches given consistent traffic movement through Mann Street, Racecourse Road and Henry Parry Drive during the weekday peak hours. Some spare capacity remains for most approaches.
- With consideration to the applicable Transport for NSW traffic generation rates and adopting a conservatively high approach, the proposed development is anticipated to generate up to 80 vehicle trips in any peak hour. Such moderate volumes are not expected to materially affect the overall operation of the study intersections.
- The key intersections have been modelled to understand the post development and future year operation. While select approaches continue to show some constraint, overall intersection operation remains at satisfactory levels post development.
- The post development SIDRA results indicate that the proposed development would have a moderate impact on right turn movements in and out of Dwyer Street west at the Mann Street intersection, with nominal impacts at the other study intersections. This is expected and accepted when exiting a minor road to access a major road.

- Future year traffic modelling indicates that with additional northbound and southbound traffic on Mann Street, the right turns in and out of Dwyer Street worsen. This includes a Degree of Saturation above one and notable average delays. This would apply to similar intersections along this section of Mann Street and unrelated to the proposed development.
- Gosford City Centre planning has earmarked intersection upgrades, including Mann Street at Henry Parry Drive and Dwyer Street. Any such developer contributions could be directed to such upgrades if and as required to accommodate background growth rates on the state and regional road network.
- The proposed development would be able to further develop and utilise a detailed green travel plan to actively promote increased use of active and public transport modes. Improved pedestrian connections south towards Gosford interchange would similarly encourage such use into the future.
- The anticipated construction traffic impact of the proposal is expected to be appropriately managed to minimise the impacts on pedestrians, cyclists and traffic across the day and week.
- Overall, the proposed development is well considered and supported from a transport and parking perspective.

Appendix A. Addendum Transport Assessment

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RE: 372-374 Mann Street and 35-37 Dwyer Street, North Gosford – Addendum Transport Assessment

Introduction and Background

Ason Group has been working with the project team on a State Significant Development Application (SSD-69773460) at 372-374 Mann Street and 35-37 Dwyer Street, North Gosford. The SSD includes a residential mixed-use development containing three buildings of varying heights with some minor ground floor commercial space near Mann Street.

The site is within a Council identified mixed-use precinct dissected by Mann Street and generally bound by the rail corridor to the west, Dwyer Street to the north, Lindsey Street to the south and Hill Street to the east. The precinct is shown in Figure 1 with the overall precinct yield (including the site) summarised below:

- Western Precinct (west of Mann Street):
 - 722 apartments (including 245 apartments on the SSD site)
 - 4,447m² GFA (including 300m² GFA on the SSD site)
- Eastern Precinct (east of Mann Street):
 - 300 apartments
 - 4,050m² GFA.

As part of the SSD assessment, detailed traffic modelling was completed on the surrounding road network to understand any such traffic impacts related to the proposal. Following stakeholder consultation, the Design Review Panel requested that the entire precinct be incorporated into the modelling. In this regard, traffic survey data has been collected in 2024 at the following key intersections:

- Mann Street/ Racecourse Road/ Etna Street
- Mann Street/ Lyndsey Street
- Mann Street/ Dwyer Street
- Henry Parry Drive/ Dwyer Street.

This letter has been prepared to assess the traffic impacts associated with full development of the Council identified precinct.

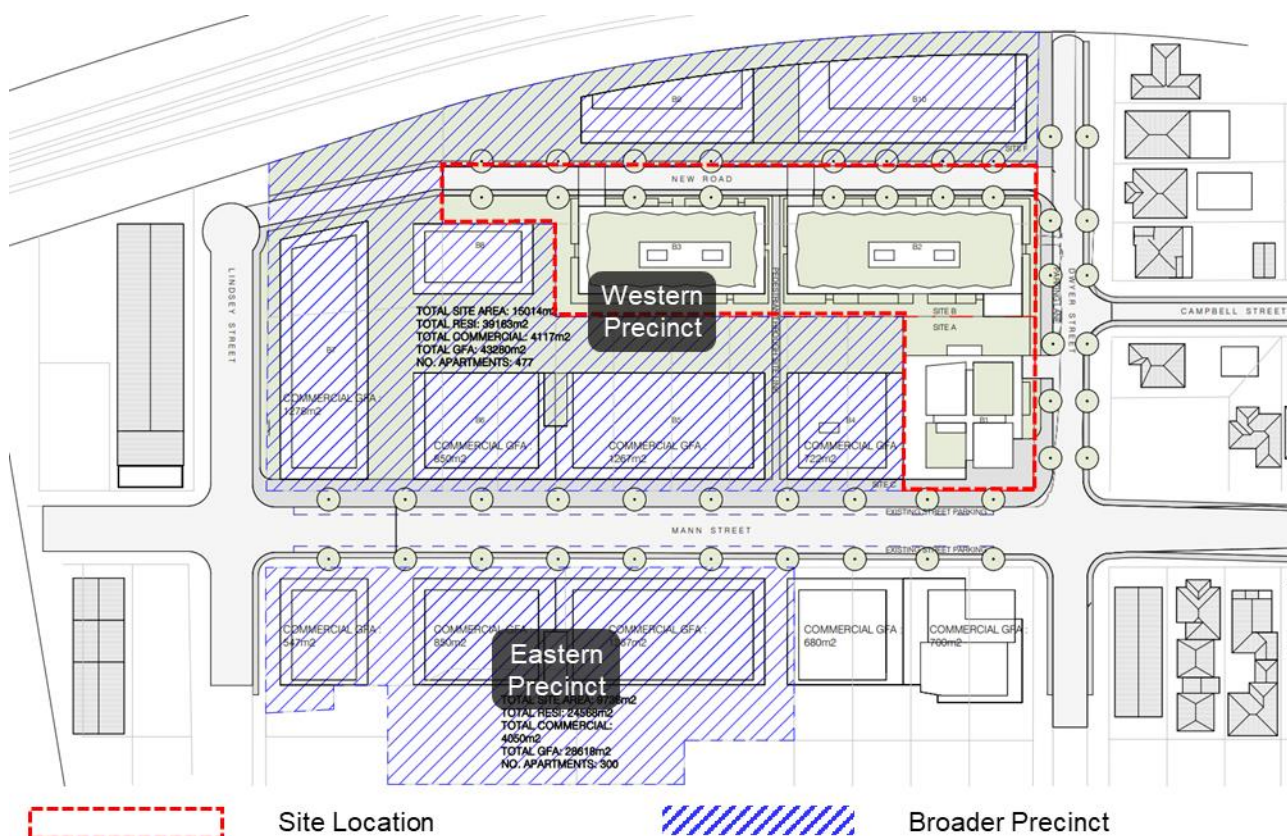


Figure 1: Broader Precinct Master Plan Layout

Base image source: Curzon + Partners, BLOCK GFA & NO. APT, job no. 23001, drawing no. SK7, dated 22 July 2024

Existing Conditions Modelling

Traffic surveys were initially completed in mid-May 2024 and August 2024 to understand existing traffic flows on the surrounding road network.

Consistent with the SSD traffic modelling, the overall peak hours remain between 8:15am and 9:15am and 4:30pm and 5:30pm on weekdays with these adopted for the purposes of this assessment. The existing AM and PM peak hour traffic volumes are shown in Figure 2.

SIDRA modelling has been completed to establish the baseline operation of the key study intersections with the results included in Table 1.

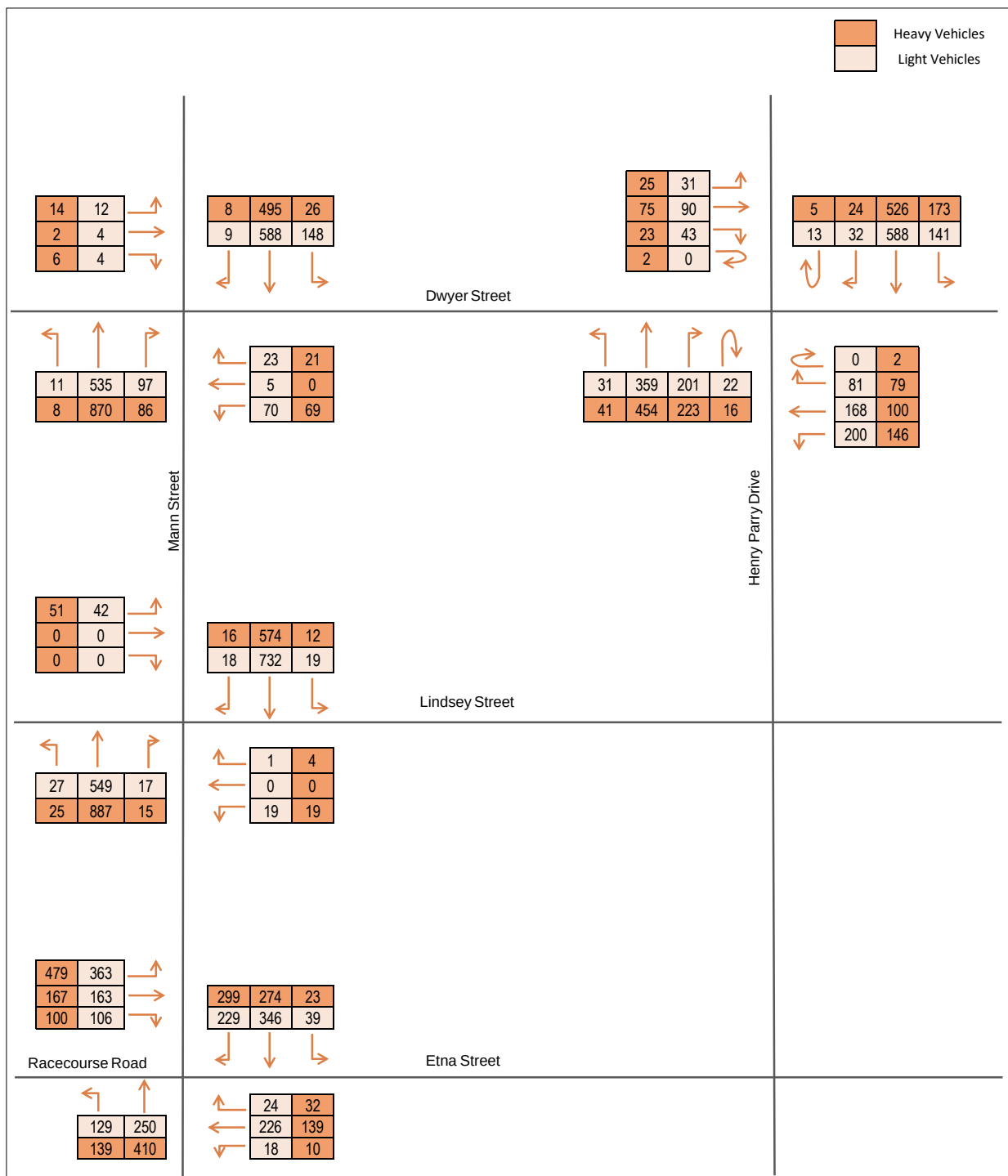


Figure 2: Existing Peak Hour Traffic Volumes

TABLE 1: EXISTING INTERSECTION OPERATION

Intersection	Period	DOS	AVD	LOS
Mann Street/ Dwyer Street	AM	0.353	60.0	E
	PM	0.477	106.6	F
Mann Street/ Lindsey Street	AM	0.067	58.6	E
	PM	0.147	90.8	F
Henry Parry Drive/ Dwyer Street	AM	0.939	56.5	D
	PM	0.862	24.2	B
Mann Street/ Racecourse Road/ Etna Street	AM	0.817	36.2	C
	PM	0.863	37.0	C

The results show that the study intersections are generally operating at satisfactory levels during the respective peak hours. While the 'worst' right turn movements at the Mann Street/ Dwyer Street and Mann Street/ Lindsey Street intersections are at LOS E/F, there is nominal queuing and generally acceptable delays for vehicles exiting the minor side roads to access the regional through road (Mann Street).

The Mann Street/ Henry Parry Drive roundabout also experiences some delay and queuing during peak periods, operating at high degrees of saturation. This is attributable to the relatively high volumes on Henry Parry Drive and vehicles associated with Gosford Private Hospital. Queuing and delay is generally manageable with some queues forming on Henry Parry Drive and Dwyer Street east (associated with Gosford Private Hospital traffic) during both peak periods.

The Racecourse Road/ Mann Street/ Etna Street signalised intersection generally operates at an overall LOS C during both peak periods with some spare capacity on each approach. Such a level of service is generally acceptable in such locations with any delay typically short-term and limited to the peak period.

Precinct Planning Traffic Impacts

Traffic Generation

Traffic generation estimates adopted for the precinct modelling are consistent with those used for the SSD assessment, being:

- Residential: 0.3 vehicle trips per apartment during the AM and PM peak hour.
- Commercial: 1.6 vehicle trips per 100m² GFA during the AM peak hour and 1.2 vehicle trips per 100m² GFA during the PM peak hour.

Overall, the estimated traffic generated by the proposed SSD and broader precinct are summarised in Table 2 noting that a range of access locations will need to be used, including a proportion requiring direct access to site access driveways on Mann Street.

TABLE 2: ESTIMATED TRAFFIC GENERATION

Description	Land Use	Trip rate		Yield	Trip Generation (veh trips/ hour)	
		AM	PM		AM	PM
SSD	Residential	0.3 trips/ unit	0.3 trips/ unit	245 apartments	74	74
	Commercial	1.6 trips/ 100m ²	1.2 trips/ 100m ²	330m ²	5	3
	SSD sub-total				79	77

West Precinct	Residential	0.3 trips/unit	0.3 trips/unit	477 apartments	143	143
	Commercial	1.6 trips/100m ²	1.2 trips/100m ²	4,117m ²	66	49
	Precinct (west) sub-total				209	193
East Precinct	Residential	0.3 trips/unit	0.3 trips/unit	300 apartments	90	90
	Commercial	1.6 trips/100m ²	1.2 trips/100m ²	4,050m ²	65	49
	Precinct (east) sub-total				155	139

Traffic Distribution and Assignment

The directional distribution and assignment of the estimated precinct traffic generation are based on 30% to and from the north, 60% south and 10% east.

For the residential land uses, an 80:20 split between arrivals and departures during the respective peak periods has been applied. This is reflected by vehicles exiting in the AM and returning in the PM. The same directional splits have been applied to the commercial traffic generation, reversed from the 80:20 split applied to the residential land uses in the respective peaks.

On this basis, SIDRA modelling has been completed for the following scenarios:

- 10-year horizon base case
- 10-year horizon with full development of the precinct yields.

The assumptions adopted as part of this updated assessment are generally consistent with those adopted as part of the SSD, including the broader traffic distribution (as discussed above) and application of a 1.5 per cent annual growth rate to Mann Street traffic volumes. However, the following additional assumptions have been made:

- Mann Street/ Lindsey Street intersection modified to permit full turning movements (varies from the current left turn only restrictions).
- Some sites within the broader precinct master plan will require direct access via Mann Street, due to access limitations and lot boundaries. The modelling assumes the access driveways will facilitate full turning movements.

The results of the 10-year horizon base (without development) modelling are included in Table 3.

TABLE 3: 10-YEAR HORIZON BASE INTERSECTION OPERATION

Intersection	Period	DOS	AVD	LOS
Mann Street/ Dwyer Street	AM	0.580	116.9	F
	PM	0.984	362.8	F
Mann Street/ Lindsey Street	AM	0.101	102.9	F
	PM	0.290	191.6	F
Henry Parry Drive/ Dwyer Street	AM	0.939	56.5	D
	PM	0.862	24.2	B
Mann Street/ Racecourse Road/ Etna Street	AM	0.948	39.1	C
	PM	1.002	45.4	D

The 10-Year Horizon Base (without development) SIDRA results indicate the following:

- Vehicles on the minor approach to the Mann Street/ Dwyer Street and Mann Street/ Lindsey Street intersections will experience long delays up to about six minutes during peak periods. Clearly, this represents delays above what is considered acceptable. The Mann Street/ Dwyer Street intersection would also exceed the practical degree of saturation (being 0.80 for priority-controlled intersections) per the TfNSW *Traffic Modelling Guidelines* would warrant appropriate intersection treatments to maintain an acceptable level of degree of saturation.
- The Mann Street/ Racecourse Road/ Etna Street intersection will exceed capacity operating at a degree of saturation greater than one with the addition of background traffic growth due to increased volumes on Mann Street.
- The Henry Parry Drive/ Dwyer Street intersection is also expected to exceed the practical degree of saturation (being 0.85 for roundabouts) which as per the TfNSW *Traffic Modelling Guidelines* would warrant appropriate intersection treatment to maintain an acceptable operation.

Based on the above, background traffic growth is expected to impact the operation of surrounding intersections resulting in high average delays and degree of saturation greater than one. This would likely trigger the need for intersection upgrades prior to development of the precinct.

Notwithstanding, additional traffic modelling has been completed for the 10-Year Horizon to consider the traffic impacts associated with development of the precinct yields. The SIDRA modelling results indicate that this would result in most study intersections exceeding a degree of saturation one with excessive average delays particularly at the Mann Street/ Dwyer Street and Mann Street/ Lindsey Street intersections.

Gosford City Centre planning has earmarked intersection upgrades, including the Mann Street/ Dwyer Street intersection. With this in mind, and considering the overall benefits for the precinct and other potential future developments along the Mann Street corridor, additional modelling has been undertaken at the Dwyer Street and Lindsey Street intersections to signalised intersections. On this basis, the Dwyer Street and Lindsey Street intersections would operate at acceptable levels of service during peak hours (LOS B or better).

Overall, it is important to recognise that the key study intersections along the Mann Street corridor would exceed a practical degree of saturation based on background traffic growth and prior to any development in the precinct. Naturally, any such future developer contributions could be directed to such upgrades if and as required to accommodate such growth on the state and regional road network.

I trust this provides the information you require and please don't hesitate to contact the undersigned if necessary.

Yours sincerely



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Appendix B. SIDRA Outputs

MOVEMENT SUMMARY

▼ Site: 1 [Mann St / Dwyer St (Site Folder: Existing AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
South: Mann St															
1	L2	All MCs	12	0.0	12	0.0	0.316	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	29.7
2	T1	All MCs	563	3.4	563	3.4	0.316	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	59.7
3	R2	All MCs	102	3.1	102	3.1	0.149	10.1	LOS B	0.5	3.8	0.65	0.86	0.65	42.3
Approach			677	3.3	677	3.3	0.316	1.7	NA	0.5	3.8	0.10	0.14	0.10	56.9
East: Dwyer St															
4	L2	All MCs	74	1.4	74	1.4	0.470	13.2	LOS B	1.9	13.5	0.86	1.05	1.22	31.0
5	T1	All MCs	5	0.0	5	0.0	0.470	46.6	LOS E	1.9	13.5	0.86	1.05	1.22	18.0
6	R2	All MCs	24	0.0	24	0.0	0.470	61.6	LOS F	1.9	13.5	0.86	1.05	1.22	32.9
Approach			103	1.0	103	1.0	0.470	26.3	LOS D	1.9	13.5	0.86	1.05	1.22	31.0
North: Mann St															
7	L2	All MCs	156	2.0	156	2.0	0.423	5.7	LOS A	0.0	0.0	0.00	0.12	0.00	33.2
8	T1	All MCs	619	2.4	619	2.4	0.423	0.2	LOS A	0.0	0.0	0.00	0.12	0.00	58.5
9	R2	All MCs	9	0.0	9	0.0	0.009	7.7	LOS A	0.0	0.3	0.53	0.63	0.53	46.1
Approach			784	2.3	784	2.3	0.423	1.4	NA	0.0	0.3	0.01	0.13	0.01	52.8
West: Dwyer St															
10	L2	All MCs	13	0.0	13	0.0	0.114	7.5	LOS A	0.4	2.5	0.80	0.90	0.80	34.6
11	T1	All MCs	4	0.0	4	0.0	0.114	45.1	LOS E	0.4	2.5	0.80	0.90	0.80	19.4
12	R2	All MCs	4	0.0	4	0.0	0.114	47.8	LOS E	0.4	2.5	0.80	0.90	0.80	32.5
Approach			21	0.0	21	0.0	0.114	23.1	LOS C	0.4	2.5	0.80	0.90	0.80	32.1
All Vehicles			1585	2.6	1585	2.6	0.470	3.4	NA	1.9	13.5	0.11	0.20	0.13	52.6

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

MOVEMENT SUMMARY

 Site: 2 [Henry Parry Dr / Dwyer St (Site Folder: Existing AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
South: Henry Parry Dr															
1	L2	All MCs	33	0.0	33	0.0	0.702	9.7	LOS A	9.2	64.9	0.92	0.77	1.08	41.5
2	T1	All MCs	378	1.7	378	1.7	0.702	9.8	LOS A	9.2	64.9	0.92	0.77	1.08	41.5
3	R2	All MCs	212	0.5	212	0.5	0.702	13.0	LOS B	9.2	64.9	0.92	0.77	1.08	42.6
3u	U	All MCs	23	0.0	23	0.0	0.702	15.7	LOS B	9.2	64.9	0.92	0.77	1.08	45.3
Approach			645	1.1	645	1.1	0.702	11.0	LOS B	9.2	64.9	0.92	0.77	1.08	42.0
East: Dwyer St															
4	L2	All MCs	211	2.0	211	2.0	0.939	50.7	LOS E	21.2	151.5	1.00	1.74	2.73	29.0
5	T1	All MCs	177	0.6	177	0.6	0.939	50.5	LOS E	21.2	151.5	1.00	1.74	2.73	26.7
6	R2	All MCs	85	6.2	85	6.2	0.939	54.4	LOS E	21.2	151.5	1.00	1.74	2.73	26.0
6u	U	All MCs	1	0.0	1	0.0	0.939	56.5	LOS E	21.2	151.5	1.00	1.74	2.73	30.2
Approach			474	2.2	474	2.2	0.939	51.3	LOS E	21.2	151.5	1.00	1.74	2.73	27.7
North: Henry Parry Dr															
7	L2	All MCs	148	5.0	148	5.0	0.942	30.5	LOS C	28.4	204.0	1.00	1.56	2.21	32.2
8	T1	All MCs	619	2.6	619	2.6	0.942	30.3	LOS C	28.4	204.0	1.00	1.56	2.21	32.4
9	R2	All MCs	34	0.0	34	0.0	0.942	33.4	LOS C	28.4	204.0	1.00	1.56	2.21	29.0
9u	U	All MCs	14	0.0	14	0.0	0.942	36.2	LOS D	28.4	204.0	1.00	1.56	2.21	29.5
Approach			815	2.8	815	2.8	0.942	30.6	LOS C	28.4	204.0	1.00	1.56	2.21	32.2
West: Dwyer St															
10	L2	All MCs	33	6.5	33	6.5	0.332	10.9	LOS B	2.4	17.4	0.90	0.77	0.90	38.6
11	T1	All MCs	95	3.3	95	3.3	0.332	10.7	LOS B	2.4	17.4	0.90	0.77	0.90	41.3
12	R2	All MCs	45	2.3	45	2.3	0.332	13.9	LOS B	2.4	17.4	0.90	0.77	0.90	40.7
12u	U	All MCs	1	0.0	1	0.0	0.332	16.4	LOS B	2.4	17.4	0.90	0.77	0.90	40.7
Approach			174	3.6	174	3.6	0.332	11.6	LOS B	2.4	17.4	0.90	0.77	0.90	40.7
All Vehicles			2107	2.2	2107	2.2	0.942	27.7	LOS C	28.4	204.0	0.97	1.29	1.87	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: SIDRA Roundabout LOS.

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 3 [Mann St / Racecourse Rd / Etna St (Site Folder: Existing AM)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 102 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Mann St															
1	L2	All MCs	136	11.6	136	11.6	0.241	33.2	LOS C	4.9	37.8	0.77	0.76	0.77	26.1
2	T1	All MCs	263	4.8	263	4.8	* 0.817	49.6	LOS D	13.9	101.5	1.00	0.96	1.18	30.5
Approach			399	7.1	399	7.1	0.817	44.0	LOS D	13.9	101.5	0.92	0.89	1.04	29.4
East: Etna St															
4	L2	All MCs	19	11.1	19	11.1	0.129	37.9	LOS D	2.3	16.7	0.81	0.66	0.81	25.0
5	T1	All MCs	238	1.8	238	1.8	0.521	36.0	LOS D	9.8	69.8	0.90	0.76	0.90	15.0
6	R2	All MCs	25	0.0	25	0.0	* 0.521	47.9	LOS D	9.8	69.8	0.92	0.78	0.92	28.4
Approach			282	2.2	282	2.2	0.521	37.2	LOS D	9.8	69.8	0.90	0.75	0.90	17.5
North: Mann St															
7	L2	All MCs	41	0.0	41	0.0	0.447	24.3	LOS C	13.2	94.7	0.71	0.64	0.71	27.8
8	T1	All MCs	364	2.9	364	2.9	0.447	18.7	LOS B	13.2	94.7	0.71	0.64	0.71	43.6
9	R2	All MCs	241	1.7	241	1.7	* 0.463	38.4	LOS D	9.4	66.6	0.86	0.91	0.86	28.4
Approach			646	2.3	646	2.3	0.463	26.4	LOS C	13.2	94.7	0.77	0.74	0.77	36.5
West: Racecourse Rd															
10	L2	All MCs	382	2.2	382	2.2	0.619	31.3	LOS C	15.0	106.5	0.75	0.79	0.75	35.5
11	T1	All MCs	172	0.6	172	0.6	0.619	49.4	LOS D	15.0	106.5	0.90	0.84	0.90	16.4
12	R2	All MCs	112	16.0	112	16.0	* 0.619	58.4	LOS E	10.2	76.2	0.96	0.86	0.96	24.1
Approach			665	4.1	665	4.1	0.619	40.5	LOS D	15.0	106.5	0.82	0.82	0.82	24.3
All Vehicles			1993	3.9	1993	3.9	0.817	36.2	LOS D	15.0	106.5	0.84	0.80	0.86	28.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Etna St												
P2	Full	10	11	45.2	LOS E	0.0	0.0	0.94	0.94	199.0	200.0	1.00
North: Mann St												
P3	Full	10	11	45.2	LOS E	0.0	0.0	0.94	0.94	199.0	200.0	1.00

West: Racecourse Rd												
P4	Full	10	11	45.2	LOS E	0.0	0.0	0.94	0.94	199.0	200.0	1.00
All		30	32	45.2	LOS E	0.0	0.0	0.94	0.94	199.0	200.0	1.00
Pedestrians												

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

▼ Site: 1 [Mann St / Dwyer St (Site Folder: Existing PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
South: Mann St															
1	L2	All MCs	8	0.0	8	0.0	0.500	5.7	LOS A	0.0	0.0	0.00	0.01	0.00	29.6
2	T1	All MCs	916	0.8	916	0.8	0.500	0.3	LOS A	0.0	0.0	0.00	0.01	0.00	59.5
3	R2	All MCs	91	2.3	91	2.3	0.092	7.9	LOS A	0.3	2.5	0.48	0.71	0.48	44.4
Approach			1015	0.9	1015	0.9	0.500	1.0	NA	0.3	2.5	0.04	0.07	0.04	58.2
East: Dwyer St															
4	L2	All MCs	73	1.4	73	1.4	0.576	16.1	LOS C	2.4	17.0	0.89	1.14	1.42	26.7
5	T1	All MCs	1	0.0	1	0.0	0.576	74.4	LOS F	2.4	17.0	0.89	1.14	1.42	14.6
6	R2	All MCs	22	0.0	22	0.0	0.576	100.8	LOS F	2.4	17.0	0.89	1.14	1.42	28.6
Approach			96	1.1	96	1.1	0.576	36.3	LOS E	2.4	17.0	0.89	1.14	1.42	27.1
North: Mann St															
7	L2	All MCs	27	0.0	27	0.0	0.296	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	33.8
8	T1	All MCs	521	1.6	521	1.6	0.296	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.5
9	R2	All MCs	8	0.0	8	0.0	0.014	10.8	LOS B	0.1	0.4	0.67	0.76	0.67	43.4
Approach			557	1.5	557	1.5	0.296	0.5	NA	0.1	0.4	0.01	0.04	0.01	57.9
West: Dwyer St															
10	L2	All MCs	15	0.0	15	0.0	0.221	14.3	LOS B	0.7	4.6	0.91	0.98	0.98	27.3
11	T1	All MCs	2	0.0	2	0.0	0.221	60.4	LOS F	0.7	4.6	0.91	0.98	0.98	13.5
12	R2	All MCs	6	0.0	6	0.0	0.221	94.3	LOS F	0.7	4.6	0.91	0.98	0.98	25.3
Approach			23	0.0	23	0.0	0.221	40.3	LOS E	0.7	4.6	0.91	0.98	0.98	25.8
All Vehicles			1691	1.1	1691	1.1	0.576	3.4	NA	2.4	17.0	0.09	0.13	0.12	55.2

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

MOVEMENT SUMMARY

 Site: 2 [Henry Parry Dr / Dwyer St (Site Folder: Existing PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist] m				
			veh/h		veh/h		v/c	sec							km/h
South: Henry Parry Dr															
1	L2	All MCs	43	2.4	43	2.4	0.732	8.0	LOS A	10.3	72.6	0.89	0.67	0.97	42.5
2	T1	All MCs	478	0.7	478	0.7	0.732	8.0	LOS A	10.3	72.6	0.89	0.67	0.97	42.6
3	R2	All MCs	235	0.4	235	0.4	0.732	11.2	LOS B	10.3	72.6	0.89	0.67	0.97	43.5
3u	U	All MCs	17	0.0	17	0.0	0.732	14.0	LOS B	10.3	72.6	0.89	0.67	0.97	46.3
Approach			773	0.7	773	0.7	0.732	9.1	LOS A	10.3	72.6	0.89	0.67	0.97	43.0
East: Dwyer St															
4	L2	All MCs	154	0.0	154	0.0	0.577	13.0	LOS B	5.7	39.9	0.97	0.89	1.19	41.3
5	T1	All MCs	105	1.0	105	1.0	0.577	13.1	LOS B	5.7	39.9	0.97	0.89	1.19	40.0
6	R2	All MCs	83	0.0	83	0.0	0.577	16.3	LOS B	5.7	39.9	0.97	0.89	1.19	39.3
6u	U	All MCs	2	0.0	2	0.0	0.577	19.1	LOS B	5.7	39.9	0.97	0.89	1.19	43.6
Approach			344	0.3	344	0.3	0.577	13.9	LOS B	5.7	39.9	0.97	0.89	1.19	40.5
North: Henry Parry Dr															
7	L2	All MCs	182	0.0	182	0.0	0.862	18.2	LOS B	18.1	127.7	1.00	1.13	1.60	37.2
8	T1	All MCs	554	1.3	554	1.3	0.862	18.3	LOS B	18.1	127.7	1.00	1.13	1.60	37.4
9	R2	All MCs	25	0.0	25	0.0	0.862	21.4	LOS C	18.1	127.7	1.00	1.13	1.60	34.4
9u	U	All MCs	5	0.0	5	0.0	0.862	24.2	LOS C	18.1	127.7	1.00	1.13	1.60	35.4
Approach			766	1.0	766	1.0	0.862	18.4	LOS B	18.1	127.7	1.00	1.13	1.60	37.3
West: Dwyer St															
10	L2	All MCs	26	4.0	26	4.0	0.290	12.0	LOS B	2.1	14.9	0.93	0.79	0.93	38.1
11	T1	All MCs	79	2.7	79	2.7	0.290	11.9	LOS B	2.1	14.9	0.93	0.79	0.93	40.7
12	R2	All MCs	24	0.0	24	0.0	0.290	14.9	LOS B	2.1	14.9	0.93	0.79	0.93	40.3
12u	U	All MCs	2	0.0	2	0.0	0.290	17.7	LOS B	2.1	14.9	0.93	0.79	0.93	40.1
Approach			132	2.4	132	2.4	0.290	12.6	LOS B	2.1	14.9	0.93	0.79	0.93	40.2
All Vehicles			2015	0.8	2015	0.8	0.862	13.7	LOS B	18.1	127.7	0.95	0.89	1.25	40.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 3 [Mann St / Racecourse Rd / Etna St (Site Folder: Existing PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 97 seconds (Site User-Given Phase Times)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Mann St															
1	L2	All MCs	146	3.6	146	3.6	0.185	24.0	LOS C	4.2	30.1	0.64	0.73	0.64	30.7
2	T1	All MCs	432	1.2	432	1.2	* 0.863	45.1	LOS D	22.3	157.9	1.00	1.02	1.20	31.9
Approach			578	1.8	578	1.8	0.863	39.7	LOS D	22.3	157.9	0.91	0.95	1.06	31.7
East: Etna St															
4	L2	All MCs	11	0.0	11	0.0	0.149	44.4	LOS D	1.9	13.0	0.90	0.69	0.90	22.9
5	T1	All MCs	146	0.0	146	0.0	0.604	41.9	LOS D	6.8	47.3	0.97	0.78	0.98	13.2
6	R2	All MCs	34	0.0	34	0.0	* 0.604	53.4	LOS D	6.8	47.3	0.99	0.80	1.00	25.9
Approach			191	0.0	191	0.0	0.604	44.1	LOS D	6.8	47.3	0.97	0.78	0.98	16.8
North: Mann St															
7	L2	All MCs	24	0.0	24	0.0	0.302	18.3	LOS B	7.9	56.7	0.58	0.52	0.58	30.2
8	T1	All MCs	288	2.6	288	2.6	0.302	12.7	LOS B	7.9	56.7	0.58	0.52	0.58	47.7
9	R2	All MCs	315	0.7	315	0.7	* 0.653	40.9	LOS D	12.1	85.1	0.94	0.97	0.94	27.5
Approach			627	1.5	627	1.5	0.653	27.1	LOS C	12.1	85.1	0.76	0.75	0.76	35.8
West: Racecourse Rd															
10	L2	All MCs	504	0.8	504	0.8	0.672	34.8	LOS C	16.5	116.2	0.74	0.81	0.74	36.9
11	T1	All MCs	176	0.0	176	0.0	0.672	48.6	LOS D	16.5	116.2	0.95	0.92	0.97	14.9
12	R2	All MCs	105	6.0	105	6.0	* 0.672	60.3	LOS E	11.4	81.5	0.96	0.93	0.98	23.9
Approach			785	1.3	785	1.3	0.672	41.3	LOS D	16.5	116.2	0.82	0.85	0.82	24.6
All Vehicles			2181	1.4	2181	1.4	0.863	37.0	LOS D	22.3	157.9	0.84	0.84	0.88	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Etna St												
P2	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
North: Mann St												
P3	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02

West: Racecourse Rd												
P4	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
All		30	32	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
Pedestrians												

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

▼ Site: 1 [Mann St / Dwyer St (Site Folder: Existing AM - Existing + Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh Dist] veh m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mann St															
1	L2	All MCs	22	0.0	22	0.0	0.322	5.6	LOS A	0.0	0.0	0.00	0.02	0.00	29.6
2	T1	All MCs	563	3.4	563	3.4	0.322	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	59.6
3	R2	All MCs	102	3.1	102	3.1	0.149	10.1	LOS B	0.5	3.8	0.65	0.86	0.65	42.3
Approach			687	3.2	687	3.2	0.322	1.8	NA	0.5	3.8	0.10	0.15	0.10	56.3
East: Dwyer St															
4	L2	All MCs	74	1.4	74	1.4	0.517	14.6	LOS B	2.1	15.1	0.88	1.08	1.30	29.6
5	T1	All MCs	7	0.0	7	0.0	0.517	49.4	LOS E	2.1	15.1	0.88	1.08	1.30	16.8
6	R2	All MCs	24	0.0	24	0.0	0.517	67.7	LOS F	2.1	15.1	0.88	1.08	1.30	31.5
Approach			105	1.0	105	1.0	0.517	29.2	LOS D	2.1	15.1	0.88	1.08	1.30	29.4
North: Mann St															
7	L2	All MCs	156	2.0	156	2.0	0.423	5.7	LOS A	0.0	0.0	0.00	0.12	0.00	33.2
8	T1	All MCs	619	2.4	619	2.4	0.423	0.2	LOS A	0.0	0.0	0.00	0.12	0.00	58.5
9	R2	All MCs	15	0.0	15	0.0	0.015	7.8	LOS A	0.1	0.4	0.54	0.65	0.54	46.0
Approach			789	2.3	789	2.3	0.423	1.4	NA	0.1	0.4	0.01	0.13	0.01	52.8
West: Dwyer St															
10	L2	All MCs	33	0.0	33	0.0	0.705	29.1	LOS D	3.2	22.2	0.95	1.21	1.68	22.3
11	T1	All MCs	11	0.0	11	0.0	0.705	72.8	LOS F	3.2	22.2	0.95	1.21	1.68	10.3
12	R2	All MCs	44	0.0	44	0.0	0.705	76.1	LOS F	3.2	22.2	0.95	1.21	1.68	20.5
Approach			87	0.0	87	0.0	0.705	58.1	LOS F	3.2	22.2	0.95	1.21	1.68	20.2
All Vehicles			1669	2.5	1669	2.5	0.705	6.3	NA	3.2	22.2	0.15	0.25	0.21	49.8

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

MOVEMENT SUMMARY

 **Site: 2 [Henry Parry Dr / Dwyer St (Site Folder: Existing AM - Existing + Development)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Henry Parry Dr															
1	L2	All MCs	35	0.0	35	0.0	0.704	9.7	LOS A	9.3	65.5	0.92	0.77	1.09	41.5
2	T1	All MCs	378	1.7	378	1.7	0.704	9.8	LOS A	9.3	65.5	0.92	0.77	1.09	41.5
3	R2	All MCs	212	0.5	212	0.5	0.704	13.0	LOS B	9.3	65.5	0.92	0.77	1.09	42.5
3u	U	All MCs	23	0.0	23	0.0	0.704	15.8	LOS B	9.3	65.5	0.92	0.77	1.09	45.3
Approach			647	1.1	647	1.1	0.704	11.1	LOS B	9.3	65.5	0.92	0.77	1.09	42.0
East: Dwyer St															
4	L2	All MCs	211	2.0	211	2.0	0.946	53.0	LOS E	22.0	156.7	1.00	1.78	2.81	28.5
5	T1	All MCs	177	0.6	177	0.6	0.946	52.9	LOS E	22.0	156.7	1.00	1.78	2.81	26.1
6	R2	All MCs	85	6.2	85	6.2	0.946	56.7	LOS E	22.0	156.7	1.00	1.78	2.81	25.5
6u	U	All MCs	1	0.0	1	0.0	0.946	58.9	LOS E	22.0	156.7	1.00	1.78	2.81	29.6
Approach			474	2.2	474	2.2	0.946	53.7	LOS E	22.0	156.7	1.00	1.78	2.81	27.2
North: Henry Parry Dr															
7	L2	All MCs	148	5.0	148	5.0	0.948	32.4	LOS C	29.6	212.4	1.00	1.62	2.31	31.6
8	T1	All MCs	619	2.6	619	2.6	0.948	32.2	LOS C	29.6	212.4	1.00	1.62	2.31	31.7
9	R2	All MCs	34	0.0	34	0.0	0.948	35.3	LOS D	29.6	212.4	1.00	1.62	2.31	28.3
9u	U	All MCs	14	0.0	14	0.0	0.948	38.0	LOS D	29.6	212.4	1.00	1.62	2.31	28.8
Approach			815	2.8	815	2.8	0.948	32.5	LOS C	29.6	212.4	1.00	1.62	2.31	31.5
West: Dwyer St															
10	L2	All MCs	33	6.5	33	6.5	0.344	11.0	LOS B	2.5	18.0	0.90	0.77	0.90	38.6
11	T1	All MCs	95	3.3	95	3.3	0.344	10.7	LOS B	2.5	18.0	0.90	0.77	0.90	41.2
12	R2	All MCs	52	2.0	52	2.0	0.344	13.9	LOS B	2.5	18.0	0.90	0.77	0.90	40.7
12u	U	All MCs	1	0.0	1	0.0	0.344	16.5	LOS B	2.5	18.0	0.90	0.77	0.90	40.7
Approach			180	3.5	180	3.5	0.344	11.7	LOS B	2.5	18.0	0.90	0.77	0.90	40.6
All Vehicles			2116	2.2	2116	2.2	0.948	28.9	LOS C	29.6	212.4	0.97	1.32	1.93	33.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 3 [Mann St / Racecourse Rd / Etna St (Site Folder: Existing AM - Existing + Development)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 101 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Mann St															
1	L2	All MCs	136	11.6	136	11.6	0.180	24.7	LOS C	4.0	30.8	0.64	0.73	0.64	30.2
2	T1	All MCs	269	4.7	269	4.7	* 0.710	42.0	LOS D	12.9	93.8	0.99	0.86	1.03	32.9
Approach			405	7.0	405	7.0	0.710	36.2	LOS D	12.9	93.8	0.87	0.82	0.90	32.3
East: Etna St															
4	L2	All MCs	19	11.1	19	11.1	0.176	44.0	LOS D	2.5	18.1	0.89	0.70	0.89	22.8
5	T1	All MCs	238	1.8	238	1.8	0.714	43.4	LOS D	11.0	78.1	0.98	0.84	1.04	13.0
6	R2	All MCs	26	0.0	26	0.0	* 0.714	54.0	LOS D	11.0	78.1	1.00	0.87	1.07	25.9
Approach			283	2.2	283	2.2	0.714	44.5	LOS D	11.0	78.1	0.97	0.83	1.03	15.5
North: Mann St															
7	L2	All MCs	45	0.0	45	0.0	0.494	25.6	LOS C	14.8	105.6	0.74	0.67	0.74	27.4
8	T1	All MCs	389	2.7	389	2.7	0.494	20.0	LOS C	14.8	105.6	0.74	0.67	0.74	42.7
9	R2	All MCs	252	1.7	252	1.7	* 0.539	39.6	LOS D	10.2	72.1	0.91	0.92	0.91	27.9
Approach			686	2.1	686	2.1	0.539	27.6	LOS C	14.8	105.6	0.80	0.76	0.80	35.9
West: Racecourse Rd															
10	L2	All MCs	385	2.2	385	2.2	0.521	30.8	LOS C	12.0	85.2	0.64	0.76	0.64	38.1
11	T1	All MCs	172	0.6	172	0.6	0.521	42.5	LOS D	12.0	85.2	0.86	0.85	0.86	16.7
12	R2	All MCs	112	16.0	112	16.0	* 0.521	57.0	LOS E	10.4	77.2	0.89	0.87	0.89	25.2
Approach			668	4.1	668	4.1	0.521	38.2	LOS D	12.0	85.2	0.74	0.80	0.74	25.2
All Vehicles			2043	3.8	2043	3.8	0.714	35.1	LOS D	14.8	105.6	0.82	0.80	0.83	29.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Etna St												
P2	Full	10	11	44.7	LOS E	0.0	0.0	0.94	0.94	198.5	200.0	1.01
North: Mann St												
P3	Full	10	11	44.7	LOS E	0.0	0.0	0.94	0.94	198.5	200.0	1.01

West: Racecourse Rd												
P4	Full	10	11	44.7	LOS E	0.0	0.0	0.94	0.94	198.5	200.0	1.01
All		30	32	44.7	LOS E	0.0	0.0	0.94	0.94	198.5	200.0	1.01
Pedestrians												

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

▼ Site: 1 [Mann St / Dwyer St (Site Folder: Existing PM - Existing + Development)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

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

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total HV] veh/h %		Arrival Flows [Total HV] veh/h %		Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh Dist] m		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Mann St															
1	L2	All MCs	48	0.0	48	0.0	0.523	5.7	LOS A	0.0	0.0	0.00	0.03	0.00	29.5
2	T1	All MCs	916	0.8	916	0.8	0.523	0.3	LOS A	0.0	0.0	0.00	0.03	0.00	59.2
3	R2	All MCs	91	2.3	91	2.3	0.092	7.9	LOS A	0.3	2.5	0.48	0.71	0.48	44.4
Approach			1055	0.9	1055	0.9	0.523	1.2	NA	0.3	2.5	0.04	0.09	0.04	56.7
East: Dwyer St															
4	L2	All MCs	73	1.4	73	1.4	0.691	22.9	LOS C	3.1	22.1	0.93	1.24	1.69	23.2
5	T1	All MCs	5	0.0	5	0.0	0.691	93.5	LOS F	3.1	22.1	0.93	1.24	1.69	12.1
6	R2	All MCs	22	0.0	22	0.0	0.691	115.8	LOS F	3.1	22.1	0.93	1.24	1.69	25.1
Approach			100	1.1	100	1.1	0.691	47.2	LOS E	3.1	22.1	0.93	1.24	1.69	23.2
North: Mann St															
7	L2	All MCs	27	0.0	27	0.0	0.296	5.6	LOS A	0.0	0.0	0.00	0.03	0.00	33.8
8	T1	All MCs	521	1.6	521	1.6	0.296	0.1	LOS A	0.0	0.0	0.00	0.03	0.00	59.5
9	R2	All MCs	28	0.0	28	0.0	0.052	11.5	LOS B	0.2	1.4	0.71	0.86	0.71	42.8
Approach			577	1.5	577	1.5	0.296	0.9	NA	0.2	1.4	0.03	0.07	0.03	57.4
West: Dwyer St															
10	L2	All MCs	20	0.0	20	0.0	0.592	37.5	LOS E	2.0	13.8	0.97	1.08	1.31	17.9
11	T1	All MCs	4	0.0	4	0.0	0.592	91.9	LOS F	2.0	13.8	0.97	1.08	1.31	7.8
12	R2	All MCs	17	0.0	17	0.0	0.592	133.7	LOS F	2.0	13.8	0.97	1.08	1.31	16.3
Approach			41	0.0	41	0.0	0.592	82.5	LOS F	2.0	13.8	0.97	1.08	1.31	16.4
All Vehicles			1773	1.1	1773	1.1	0.691	5.6	NA	3.1	22.1	0.11	0.17	0.16	52.4

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

MOVEMENT SUMMARY

 **Site: 2 [Henry Parry Dr / Dwyer St (Site Folder: Existing PM - Existing + Development)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist] m				km/h
South: Henry Parry Dr															
1	L2	All MCs	49	2.1	49	2.1	0.738	8.1	LOS A	10.6	74.4	0.90	0.67	0.99	42.5
2	T1	All MCs	478	0.7	478	0.7	0.738	8.1	LOS A	10.6	74.4	0.90	0.67	0.99	42.6
3	R2	All MCs	235	0.4	235	0.4	0.738	11.3	LOS B	10.6	74.4	0.90	0.67	0.99	43.4
3u	U	All MCs	17	0.0	17	0.0	0.738	14.1	LOS B	10.6	74.4	0.90	0.67	0.99	46.3
Approach			779	0.7	779	0.7	0.738	9.2	LOS A	10.6	74.4	0.90	0.67	0.99	42.9
East: Dwyer St															
4	L2	All MCs	154	0.0	154	0.0	0.579	13.1	LOS B	5.7	40.0	0.97	0.89	1.20	41.3
5	T1	All MCs	105	1.0	105	1.0	0.579	13.2	LOS B	5.7	40.0	0.97	0.89	1.20	39.9
6	R2	All MCs	83	0.0	83	0.0	0.579	16.4	LOS B	5.7	40.0	0.97	0.89	1.20	39.2
6u	U	All MCs	2	0.0	2	0.0	0.579	19.1	LOS B	5.7	40.0	0.97	0.89	1.20	43.6
Approach			344	0.3	344	0.3	0.579	14.0	LOS B	5.7	40.0	0.97	0.89	1.20	40.5
North: Henry Parry Dr															
7	L2	All MCs	182	0.0	182	0.0	0.864	18.4	LOS B	18.3	129.1	1.00	1.14	1.61	37.1
8	T1	All MCs	554	1.3	554	1.3	0.864	18.5	LOS B	18.3	129.1	1.00	1.14	1.61	37.3
9	R2	All MCs	25	0.0	25	0.0	0.864	21.7	LOS C	18.3	129.1	1.00	1.14	1.61	34.2
9u	U	All MCs	5	0.0	5	0.0	0.864	24.5	LOS C	18.3	129.1	1.00	1.14	1.61	35.3
Approach			766	1.0	766	1.0	0.864	18.7	LOS B	18.3	129.1	1.00	1.14	1.61	37.2
West: Dwyer St															
10	L2	All MCs	26	4.0	26	4.0	0.295	12.0	LOS B	2.1	15.2	0.93	0.79	0.93	38.0
11	T1	All MCs	79	2.7	79	2.7	0.295	11.9	LOS B	2.1	15.2	0.93	0.79	0.93	40.7
12	R2	All MCs	26	0.0	26	0.0	0.295	14.9	LOS B	2.1	15.2	0.93	0.79	0.93	40.2
12u	U	All MCs	2	0.0	2	0.0	0.295	17.7	LOS B	2.1	15.2	0.93	0.79	0.93	40.1
Approach			134	2.4	134	2.4	0.295	12.6	LOS B	2.1	15.2	0.93	0.79	0.93	40.2
All Vehicles			2023	0.8	2023	0.8	0.864	13.8	LOS B	18.3	129.1	0.95	0.90	1.26	40.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 3 [Mann St / Racecourse Rd / Etna St (Site Folder: Existing PM - Existing + Development)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

NA

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 97 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			m				km/h
South: Mann St															
1	L2	All MCs	146	3.6	146	3.6	0.166	20.8	LOS C	3.8	27.2	0.58	0.72	0.58	32.6
2	T1	All MCs	453	1.2	453	1.2	* 0.840	41.5	LOS D	22.5	159.0	1.00	0.98	1.15	33.2
Approach			599	1.8	599	1.8	0.840	36.4	LOS D	22.5	159.0	0.90	0.92	1.01	33.1
East: Etna St															
4	L2	All MCs	11	0.0	11	0.0	0.210	49.0	LOS D	2.1	14.4	0.94	0.71	0.94	21.5
5	T1	All MCs	146	0.0	146	0.0	0.850	51.4	LOS D	8.0	56.3	0.99	0.92	1.25	11.2
6	R2	All MCs	40	0.0	40	0.0	* 0.850	63.8	LOS E	8.0	56.3	1.00	0.98	1.35	22.9
Approach			197	0.0	197	0.0	0.850	53.8	LOS D	8.0	56.3	0.99	0.92	1.25	14.9
North: Mann St															
7	L2	All MCs	25	0.0	25	0.0	0.303	17.7	LOS B	8.0	56.9	0.57	0.51	0.57	30.4
8	T1	All MCs	295	2.5	295	2.5	0.303	12.2	LOS B	8.0	56.9	0.57	0.51	0.57	48.1
9	R2	All MCs	318	0.7	318	0.7	* 0.673	41.2	LOS D	12.3	86.9	0.95	0.98	0.95	27.4
Approach			638	1.5	638	1.5	0.673	26.9	LOS C	12.3	86.9	0.76	0.74	0.76	35.9
West: Racecourse Rd															
10	L2	All MCs	517	0.8	517	0.8	0.655	35.9	LOS D	16.2	114.4	0.72	0.80	0.72	37.3
11	T1	All MCs	176	0.0	176	0.0	0.634	49.7	LOS D	11.5	82.4	0.94	0.93	0.94	14.7
12	R2	All MCs	105	6.0	105	6.0	* 0.634	61.9	LOS E	11.5	82.4	0.94	0.93	0.94	23.8
Approach			798	1.3	798	1.3	0.655	42.4	LOS D	16.2	114.4	0.80	0.85	0.80	24.3
All Vehicles			2232	1.4	2232	1.4	0.850	37.4	LOS D	22.5	159.0	0.83	0.84	0.89	29.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay per movement.

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Green.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

* Critical Movement (Signal Timing)

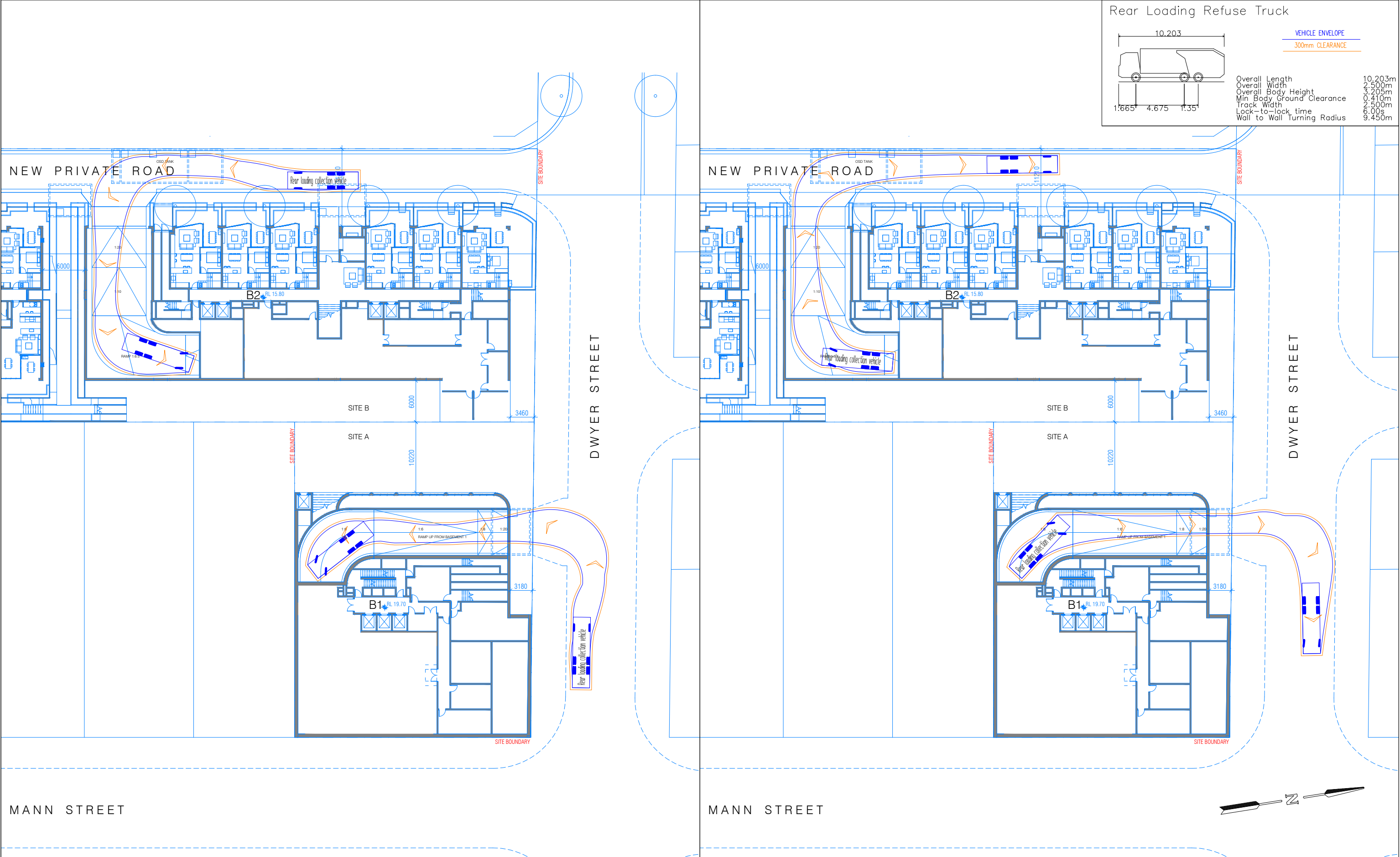
Pedestrian Movement Performance												
Mov ID	Crossing	Input Vol.	Dem. Flow	Aver. Delay	Level of Service	AVERAGE BACK OF QUEUE		Prop. Que	Eff. Stop Rate	Travel Time	Travel Dist.	Aver. Speed
		ped/h	ped/h	sec		[Ped ped	Dist] m			sec	m	m/sec
East: Etna St												
P2	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
North: Mann St												
P3	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02

West: Racecourse Rd												
P4	Full	10	11	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
All		30	32	42.7	LOS E	0.0	0.0	0.94	0.94	196.6	200.0	1.02
Pedestrians												

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix C. Vehicle Swept Paths

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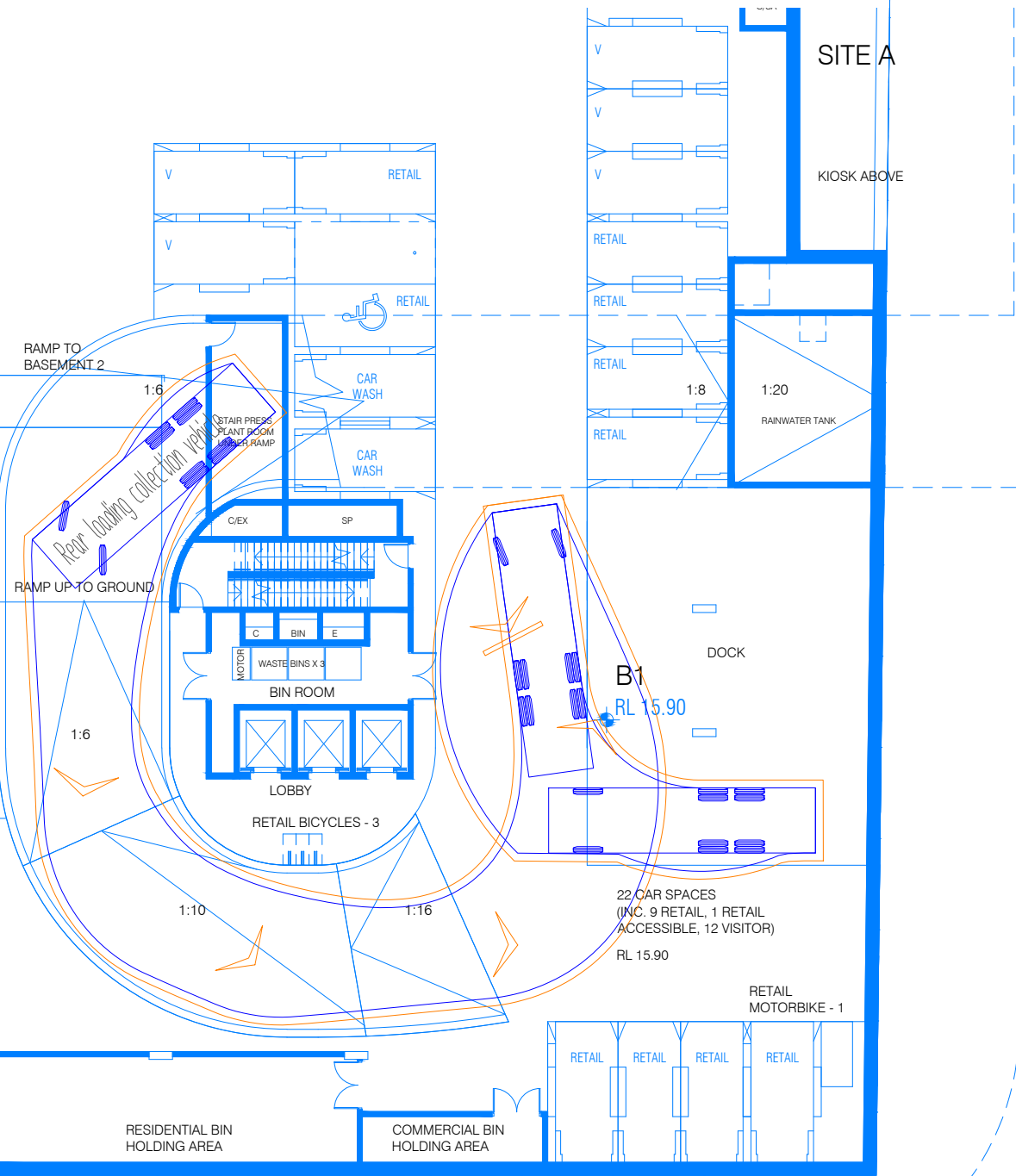


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	APPROVED BY Rhys Hazell	DATE 13.05.2025	PROJECT 2437		
	SCALE 1:500	0 5 10	372-374 Mann Street and 35-37 Dwyer Street, North Gosford	FILE NAME AG2437-04-v02.dwg	SHEET AG01

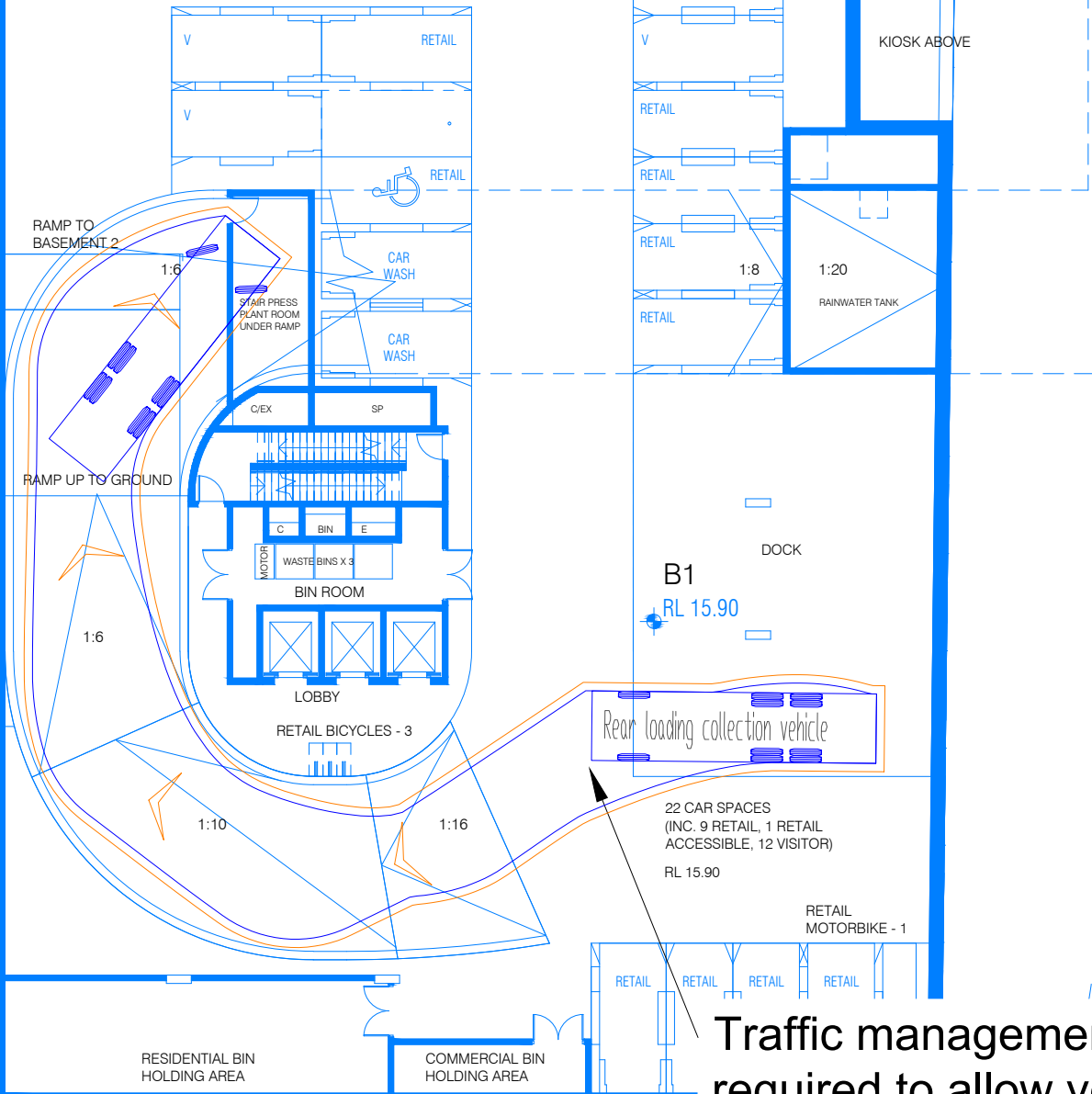
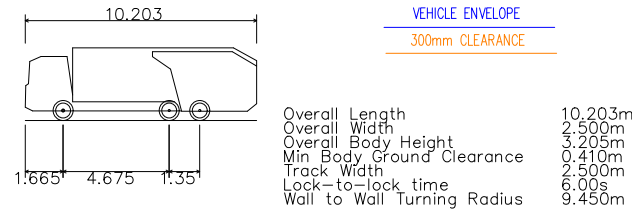


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Management measures will be required to facilitate service vehicle access to each building basement



Rear Loading Refuse Truck



Traffic management required to allow vehicles to pass when trucks are using the loading zone

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APPROVED BY Rhys Hazell	DATE 13.05.2025
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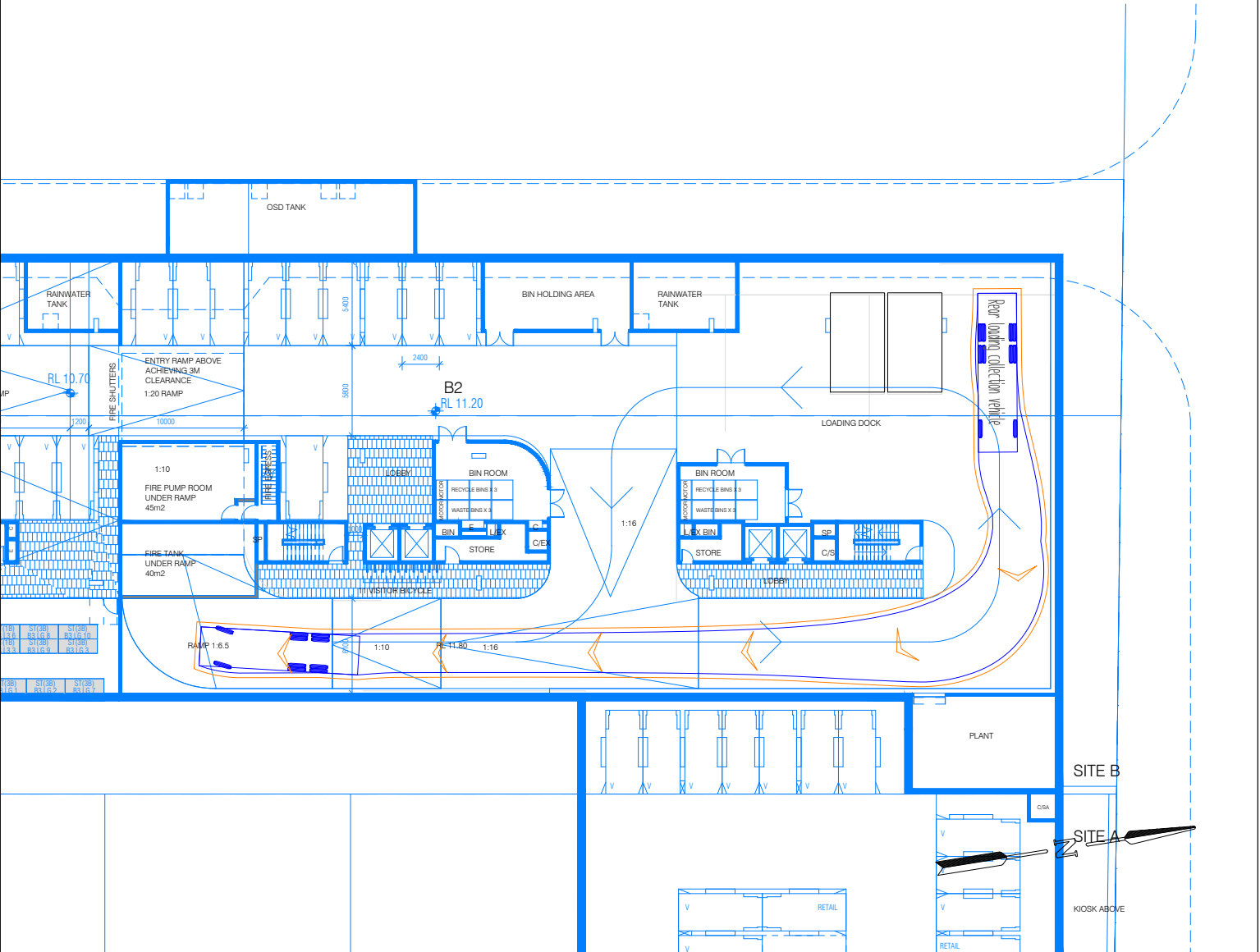
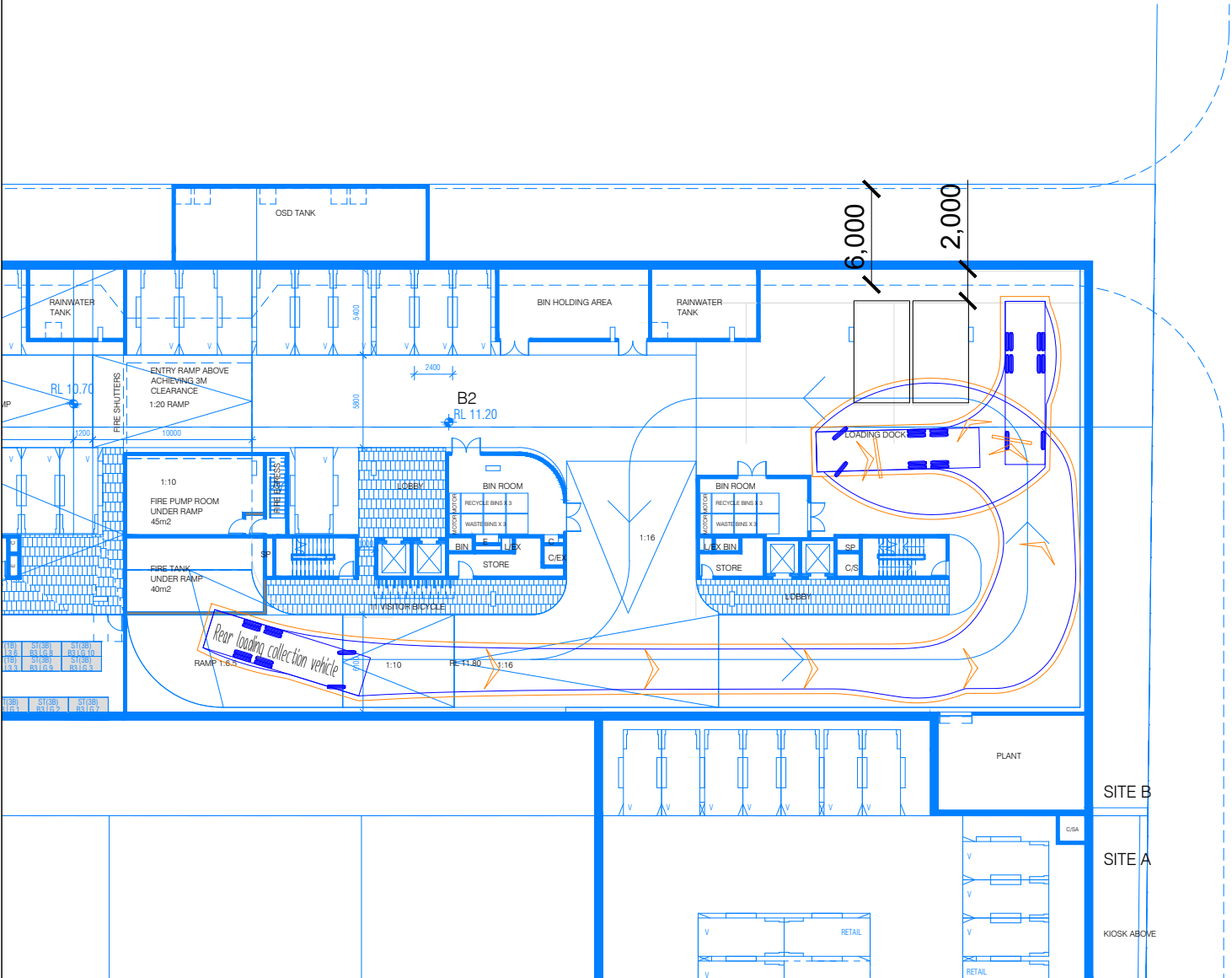
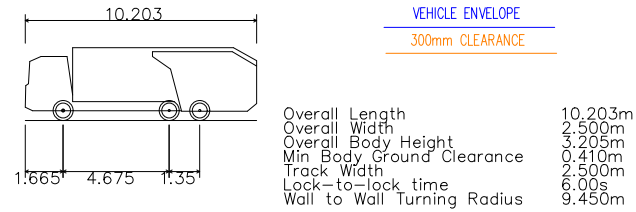
CLIENT Stockbridge Properties Pty Ltd
PROJECT 2437
372-374 Mann Street and 35-37 Dwyer Street, North Gosford

DOCUMENT INFORMATION	
Waste Vehicle	
Building B1	
FILE NAME	SHEET
AG2437-04-v02.dwg	AG02

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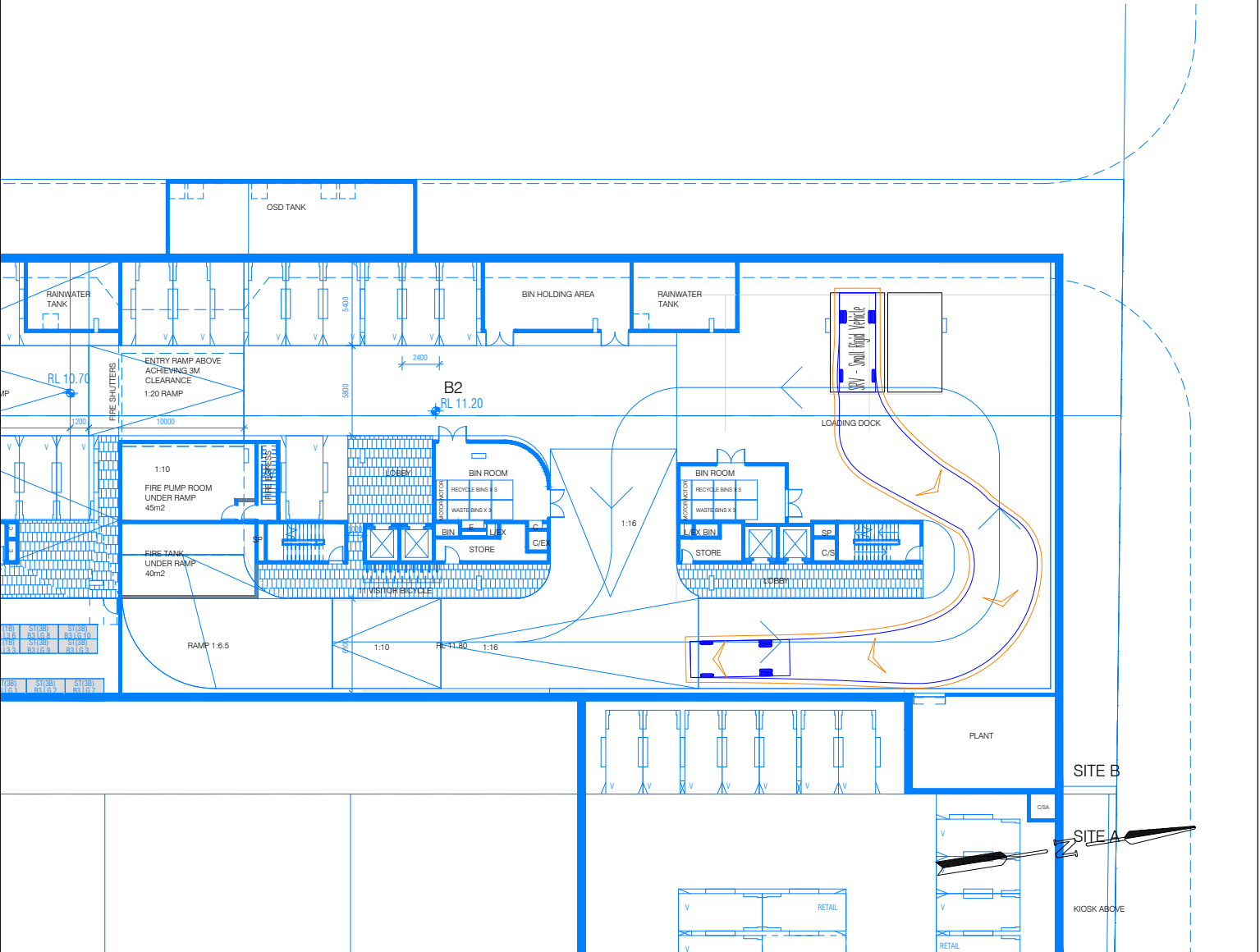
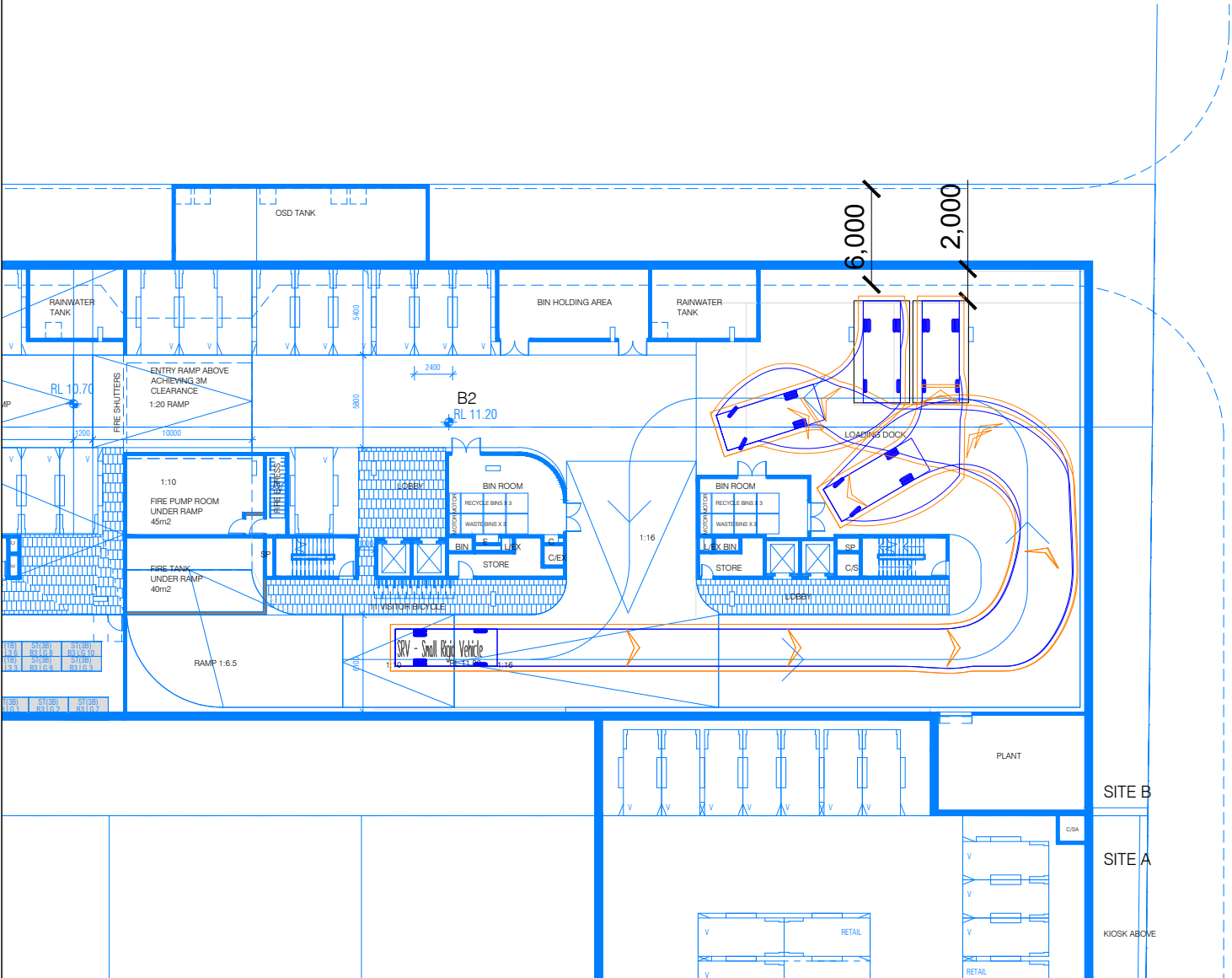
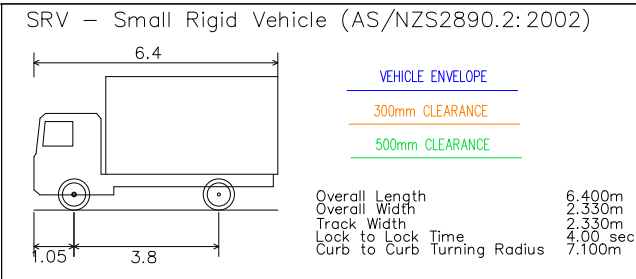
Management measures will be required to facilitate service vehicle access to each building basement

Rear Loading Refuse Truck



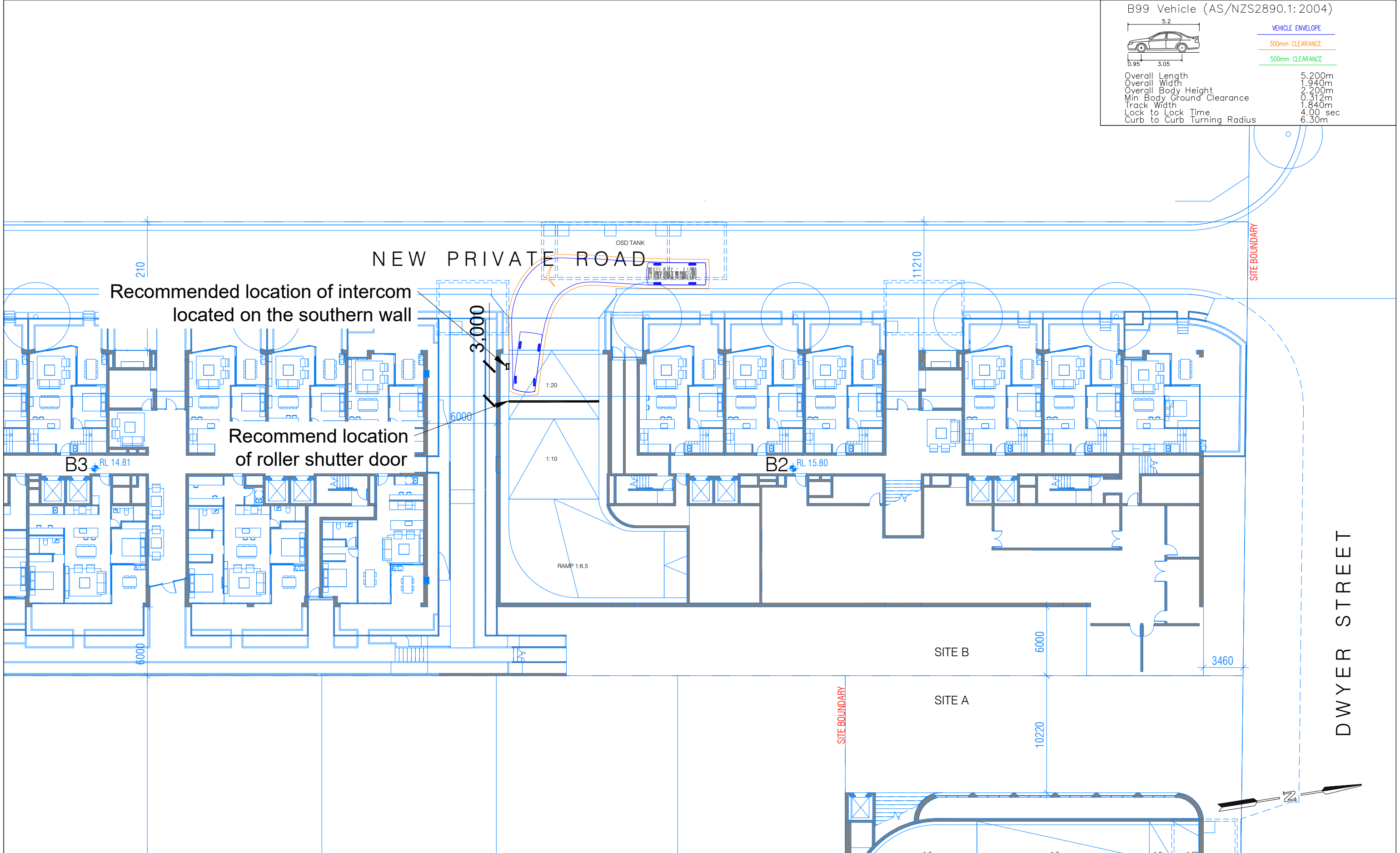
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	SCALE 1:400		372-374 Mann Street and 35-37 Dwyer Street, North Gosford	FILE NAME AG2437-04-v02.dwg	SHEET AG03
				 Suite 17.02, Level 17, 1 Castlereagh St Sydney NSW 2000 info@asongroup.com.au	

Management measures will be required to facilitate service vehicle access to each building basement



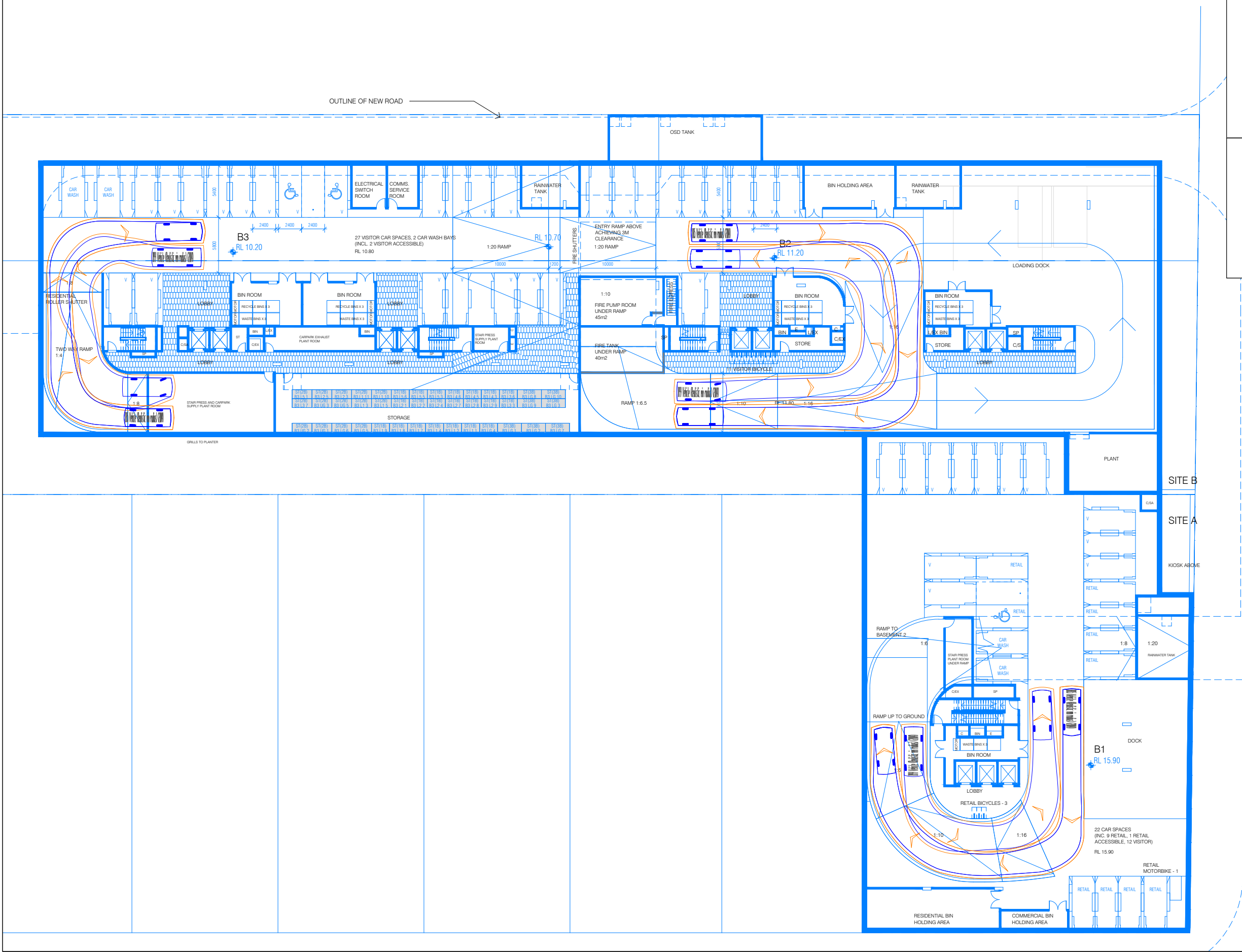
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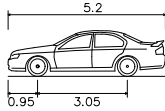


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	APPROVED BY Rhys Hazell	DATE 13.05.2025	PROJECT 2437			
	SCALE 1:300		372-374 Mann Street and 35-37 Dwyer Street, North Gosford	FILE NAME AG2437-04-v02.dwg	SHEET AG06	

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B99 Vehicle (AS/NZS2890.1: 2004)



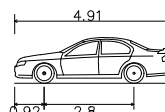
VEHICLE ENVELOPE

300mm CLEARANCE

500mm CLEARANCE

Overall Length 5.200m
Overall Width 1.940m
Overall Body Height 2.200m
Min Body Ground Clearance 0.312m
Track Width 1.840m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 6.30m

B85 Vehicle (AS/NZS2890.1: 2004)



VEHICLE ENVELOPE

300mm CLEARANCE

500mm CLEARANCE

Overall Length 4.910m
Overall Width 1.870m
Overall Body Height 1.421m
Min Body Ground Clearance 0.159m
Track Width 1.770m
Lock to Lock Time 4.00 sec
Curb to Curb Turning Radius 5.80m

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APPROVED BY Rhys Hazell	DATE 13.05.2025	PROJECT 2437
SCALE 1:400	0 4 8	372-374 Mann Street and 35-37 Dwyer Street, North Gosford

DOCUMENT INFORMATION

Waste Vehicle

Building B2

FILE NAME
AG2437-04-v02.dwg

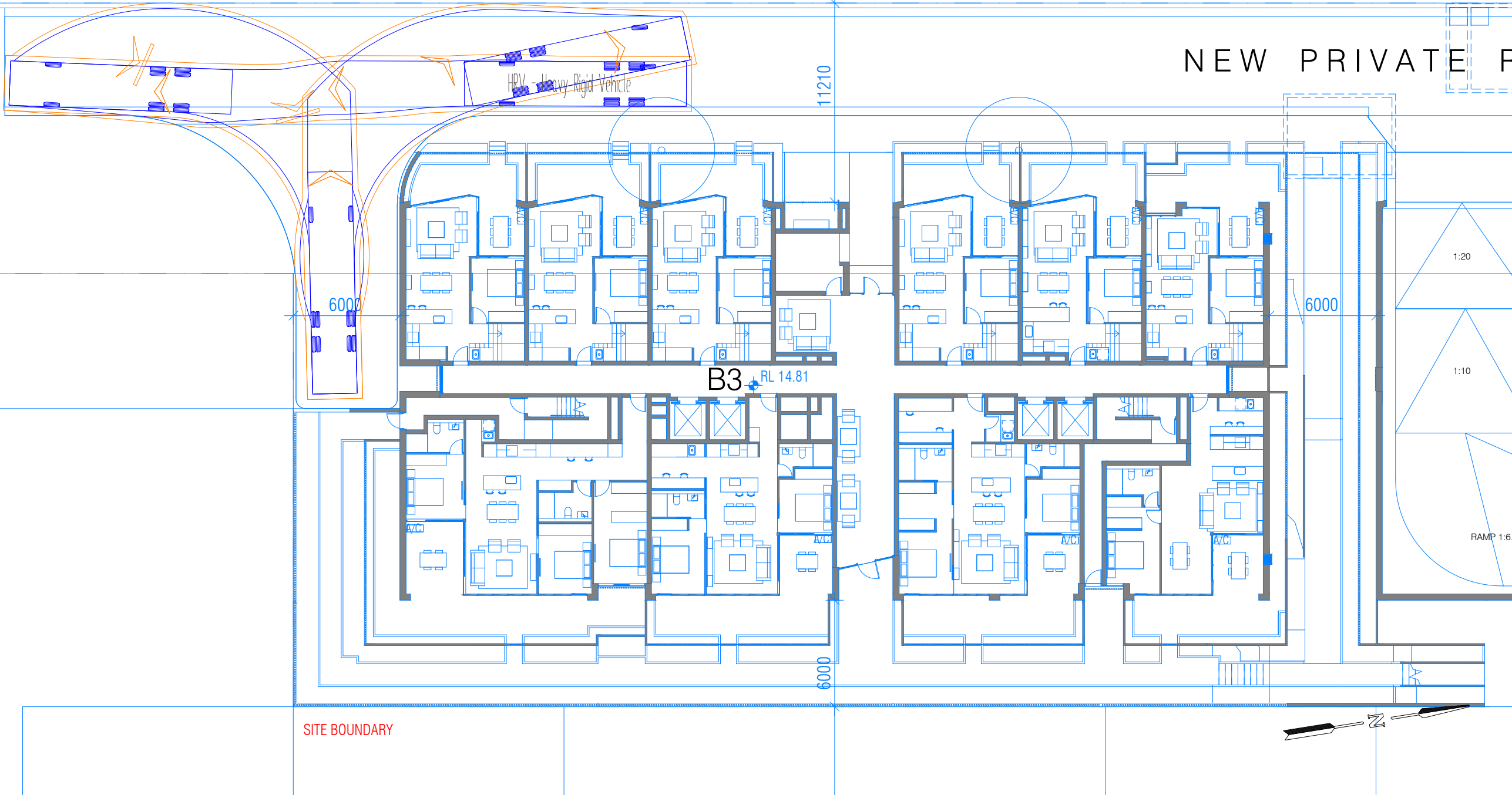
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SITE BOUNDARY



NEW PRIVATE P

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SCALE 1:250	0 2.5 5	372-374 Mann Street and 35-37 Dwyer Street, North Gosford

DOCUMENT INFORMATION	
Waste Vehicle	
Building B1	
FILE NAME AG2437-04-v02.dwg	SHEET AG08

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