



# TRAFFIC IMPACT ASSESSMENT (TIA)

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**Proposed Waste Management facility  
2-4 Hale Street, Botany**



Reference: 23.464r01v13  
Date: March 2025

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## DOCUMENT VERIFICATION

Job Number	23.464r01	
Project	4 Hale Street, Botany	
Client	EME Advisory	
Revision	Date	Details
v01	22/11/2023	Draft for comments
v02	29/02/2024	WIP to address client comments
v03	01/03/2024	WIP to address client comments
v04	01/03/2024	Final submission (1)
v05	16/05/2024	WIP to address REAP comments
v06	29/05/2024	WIP to address REAP comments
v07	30/05/2024	WIP to address REAP comments
v08	30/05/2024	WIP to address REAP comments
v09	06/06/2024	Final submission (2)
V10	22/10/2024	WIP to address agency comments
V11	11/11/2024	WIP to address agency comments
v12	05/12/2024	Draft submission
v13	12/03/2025	WIP to address provide estiamted construciton traffic volumes
V14	20/03/2025	WIP to Address DPHI comments

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# CONTENTS

1. Introduction	1
2. Response to Request for Information	3
2.1 DPFI RFI	3
2.2 Bayside Council RFI	9
3. Location and Site	15
4. Assessment Requirements	18
4.1 SEARs Requirements	18
4.2 Council Requirements	19
5. Existing Traffic Conditions	21
5.1 Road Network	21
5.2 Crash Data Analysis	24
5.3 Key Intersection	26
5.4 Public Transport	29
6. Description of Proposed Development	31
7. Site Operations	32
7.1 On-Site Activities	32
7.2 Hours of Operations	33
7.3 Waste Material Volumes	33
7.4 Vehicular Access	33
7.5 Car Parking	34
7.6 Truck Types	34
7.7 Weigh Bridges and Vehicle Control	34
7.8 Loading/Unloading Areas	34
7.9 Truck Routes	35
7.10 Turn Restriction Signages	36
7.11 Internal Speed Limits	36
7.12 Driver Facilities	36
7.13 Driver Code of Conduct	36

**DRAFT**  
NOT FOR SUBMISSION

7.14 Site Induction	37
<b>8. Parking Requirements</b>	<b>38</b>
8.1 Car Parking	38
8.2 Accessible Parking	40
8.3 Bicycle Parking	40
8.4 Motorcycle Parking	40
8.5 Refuse Collection and Servicing	41
8.6 Loss of On-Street Parking	41
<b>9. Traffic and Transport Impacts</b>	<b>43</b>
9.1 Existing Site Generation	43
9.2 Development Trip Generation	43
9.3 Net Traffic Generation	47
9.4 Traffic Distribution	48
9.5 Peak Period Intersection Performance	50
9.6 Construction Traffic Volumes	57
9.7 Cumulative Impacts	58
9.8 Queuing Assessment	61
<b>10. Access and Internal Design Aspects</b>	<b>63</b>
10.1 Site Vehicular Access	63
10.2 Internal Design	64
10.3 Summary	65
<b>11. Conclusions</b>	<b>66</b>

## Appendices

- Appendix A: Reduced Plans
- Appendix B: Signage Plan
- Appendix C: SIDRA Movement Summaries
- Appendix D: Queuing Analysis
- Appendix E: Swept Path Analysis

## 1. INTRODUCTION

TRAFFIX has been commissioned by EME Advisory to undertake a revised Traffic Impact Assessment (TIA) for a State Significant Development application (SSD-62855708) involving a proposed Construction and Demolition (C & D) waste management facility at 2-4 Hale Street, Botany. The proposed development is located within the Bayside Local Government Area (LGA) and has been assessed under that Council's controls.

This revised TIA has been prepared to accompany an amended SSD application to address comments concerning the proposal from Department of Planning, Housing and Infrastructure (DPHI) as contained in a letter dated 13 September 2024 (DPHI Reference: SSD-62855708), and Bayside Council as contained in a letter dated 9 September 2024 (Council Reference: SSD-2024/10).

It is pertinent to note that agency comments from Transport for NSW (TfNSW) confirms that there are no further requirements, and the proposed development is unlikely to have a significant impact on the classified road network as contained in a letter dated 30 August 2024 (TfNSW Reference: SYD24-00365/02).

The proposal remains unchanged and involves demolition of existing structures to facilitate the construction of a facility that would operate as a waste transfer station for the receipt, basic sorting and recycling with aggregation of material for bulk transport to an advanced resource recovery facility within the KLF Group (KLF) where more advanced sorting and recycling would be undertaken.

The purpose of this revised report documents the findings of our investigations and should be read in the context of the updated Environmental Impact Statement (EIS), prepared separately.

The report is structured as follows:

- Section 2: Documents response to DPHI and Council's RFI
- Section 3: Describes the site and its location
- Section 4: Documents the assessment requirements (SEARs)
- Section 5: Documents existing traffic conditions
- Section 6: Describes the proposed development
- Section 7: Discusses site operational characteristics
- Section 8: Assesses the parking requirements
- Section 9: Assesses traffic impacts
- Section 10: Discusses access and internal design aspects
- Section 11: Presents the overall study conclusions

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## 2. RESPONSE TO REQUEST FOR INFORMATION

### 2.1 DPHI RFI

TRAFFIX has been forwarded comments from DPHI concerning the proposal as contained in a letter dated 13 September 2024 (DPHI Reference: SSD-62855708) and meeting with DPHI on 12 December 2024.

Response to the issues raised is provided in the **Table 1** including references to sections of this revised report where applicable.

**Table 1: Response to DPHI Comments**

Comments from Letter dated 13 September 2024 (DPHI Reference: SSD-62855708)	
DPHI Comments	TRAFFIX Response
<p><b><u>Impact on Road Safety</u></b></p> <p>The TIA has not assessed the predicted impacts of construction and operational traffic on road safety, as required by the Planning Secretary's Environmental Assessment Requirements (SEARs) and the RTA Guide to Traffic Generating Developments (2002).</p> <p><b>Recommendation: An assessment of the predicted impacts of construction and operational traffic on road safety in accordance with relevant transport for NSW guidance. This should include an assessment of the safety and efficiency of access between the site and the adjacent road network and consideration of queuing on Hale Street.</b></p>	<ul style="list-style-type: none"> <li>The TIA has been updated to assess the most recent five (5) year crash data in the vicinity of the site as summarised in <b>Section 5.2</b> of this report. The recorded crashes reveal there are no clear indication of recurring crash themes, and all crashes are likely attributed to driver error and are not indicative of any underlying road safety issues.</li> <li>The predicted impacts of construction and operational traffic have been assessed to result in a net reduction of the traffic generation potential of the site as assessed in <b>Section 9</b> of this report, and therefore could not expected to have any negative impact on road safety. Accordingly, the assessment is deemed to have satisfied the Planning Secretary's Environmental Assessment Requirements (SEARs) and the RTA Guide to Traffic Generating Developments (2002).</li> <li>Also refer to <b>Section 9</b> of this report for traffic modelling conclusions for the Foreshore Road / Hale Street intersection.</li> </ul>

<p><b><u>Site Access Performance</u></b></p> <p>The RTA Guide to Traffic Generating Developments recommends that driveways with high traffic volumes are not positioned close to intersections. The proposed site access is positioned very close (approximately 15-20 metres) to the Luland Street / Hale Street roundabout. Slowing down and queuing of eastbound vehicles at this roundabout has the potential to impact on the performance of the proposed site access. The performance of this intersection and its impact on the efficiency of the site access has not been considered in the TIA.</p> <p><b>Recommendation: Further analysis of the site access intersection, including SIDRA modelling, must be undertaken to evaluate the performance of Hale Street at the proposed future site access location.</b></p>	<ul style="list-style-type: none"> <li>Updated traffic modelling has been undertaken demonstrating the proposed site access driveways will operate satisfactorily as assessed in <b>Section 9</b> of this report.</li> <li>The proposed position of the driveway has been satisfactorily designed in accordance with AS 2890.1 (2004) and AS 2890.2 (2018) and will operate safely and efficiently.</li> <li>The driveway has been strategically positioned to satisfy site operational requirements and is located as far practicable from Foreshore Road being the critical classified road.             <ul style="list-style-type: none"> <li>Vehicles must reduce their speed to an appropriate and safe level when making a turn to maintain control and ensure the safety of all road users, especially in the context of large heavy vehicles. In this regard, vehicles slowing down on approach to the roundabout is favourable in the circumstance.</li> </ul> </li> </ul>
<p><b><u>Operational Traffic Management</u></b></p> <p>While B-doubles are limited to accessing the site from Foreshore Road based on NHVR B-double approved routes, there does not appear to be any restriction for smaller trucks accessing the site from Botany Road and then traveling west along Hale Street to the site access. It is not clear how smaller trucks will be prevented from turning right from Hale Street into the access driveway. This movement has the potential to obstruct through traffic travelling West on Hale Street.</p> <p>Section 6.12 Queuing of the TIA states that on-site staff will be trained to re-direct trucks should vehicle queues extend near the site access on Hale Street. Insufficient information has been provided to demonstrate the movements of re-directed trucks on-site.</p> <p><b>Recommendation: Additional details of how operational traffic will be managed to prevent right- hand turns from Hale Street and how on-site truck movements will be</b></p>	<ul style="list-style-type: none"> <li>A future operational plan of management will be implemented requiring all heavy vehicles to arrive/depart via General Holmes Drive (M1). This plan of management will specifically note that no heavy vehicles are to access the site from the east via Hale Street (east of Luland Street) or Luland Street.</li> <li>A "NO RIGHT TURN" sign will be installed opposite the commercial vehicle driveway facing westbound traffic on Hale Street.</li> <li>A "NO LEFT TURN" sign will be installed within the site on the exit side of the commercial vehicle driveway.</li> <li>Detailed queuing analysis has been undertaken in <b>Section 9.8</b> of this report and confirm it is statistically improbable trucks to queue on the public road under extremely conservative operational assumptions, and sufficient space will be made available on site prior to any truck arrivals at all times. Therefore, the former assessment stating that</li> </ul>

<p>managed in the event of vehicle queues near the site access, is required.</p>	<p>traffic will be rerouted is no longer relevant nor required.</p>
<p><b><u>Future Traffic Growth</u></b></p> <p>SIDRA modelling has not been carried out for a future traffic scenario accounting for background traffic growth on the surrounding road network.</p> <p><b>Recommendation: SIDRA modelling must be carried out for a future traffic scenario with a 10- year horizon that predicts the performance of key intersections, including the intersections of Foreshore Road / Hale Street, Hale Street / site access and Hale Street / Luland Street. The impact of queue lengths and delays on the safety and efficiency of the future road network must be assessed. Details of any required mitigation measures, such as road widening, must be provided.</b></p>	<ul style="list-style-type: none"> <li>• SIDRA modelling has been updated to include a 10-year horizon in accordance with DHPI request, including additional assessment of the Hale Street / Luland Street intersection, refer to <b>Section 9</b> of this report.</li> </ul>
<p><b><u>Swept Path Analysis</u></b></p> <p>The swept path analysis for the site access driveway provided at Appendix D of the TIA is unclear and indicates there may be conflict between two B-doubles travelling eastbound and westbound on Hale Street.</p> <p><b>Recommendation: Revised swept path analyses are required for 20 metre articulated vehicles and B-doubles accessing the site that clearly demonstrates the centreline of Hale Street will not be crossed and there will be no conflict with on-street parking. All line marking on Hale Street must be clearly marked.</b></p>	<ul style="list-style-type: none"> <li>• Swept path analysis have been updated with recent Nearmap aerial georeferenced in the background clearly demonstrating 26m B-double vehicles will be able to ingress and egress the site satisfactorily in accordance with AS 2890.2 (2018).</li> </ul>
<p><b><u>Daily Heavy Vehicle (HV) Movements</u></b></p> <p>Section 6.10: Truck Frequencies of the TIA outlines the anticipated truck volumes for the development. It is not clear how these vehicle numbers have been determined. Bayside Council has also raised several queries regarding the traffic generation analysis.</p> <p><b>Recommendation: Additional information is required to justify the predicted truck volumes, including the breakdown of vehicle types.</b></p>	<ul style="list-style-type: none"> <li>• TIA has been updated to provide detailed calculations on how the anticipated heavy vehicle trip generation associated with the proposed development has been estimated including a breakdown of the vehicle types, refer to <b>Section 9</b>.</li> </ul>

<p><b><u>Peak Period Vehicle Movements</u></b></p> <p>Section 8.4.1: Critical Intersection of the TIA states that the proposed development is expected to generate 35 vehicle trips per hour during both the morning and afternoon peaks. This is inconsistent with the statement made in Section 8.2.3: Combined Generation of the TIA, which states that the development is predicted to generate 41 vehicle trips per hour.</p> <p><b>Recommendation: The TIA must be revised to ensure traffic volumes used are consistent throughout the report. All updated SIDRA modelling must be based on the correct traffic volumes.</b></p>	<ul style="list-style-type: none"> <li>The TIA has been updated to ensure traffic volumes used are consistent throughout the report, SIDRA modelling has been undertaken based on the correct traffic volumes.</li> </ul>
<p><b><u>Street Parking</u></b></p> <p>Section 9.1.3 Loss of On-Street Parking notes the development will result in a loss of five on-street parking spaces on the northern side of Hale Street. The impact of this has not been assessed and no mitigation measures or offsets have been proposed.</p> <p><b>Recommendation: The TIA must be revised to assess the impact of the loss of five on-street parking spaces and confirm how this reduction in parking will be mitigated or offset. Evidence of in principle support from the local traffic committee for the removal of the on-street parking spaces should be provided.</b></p>	<ul style="list-style-type: none"> <li>Refer to Section 8.6 of this report.</li> <li>The local traffic committee does not have a concurrence role for any increase or decrease of on-street car parking but needs to be consulted on changes to the <b>on-street parking restrictions</b> which is not relevant in the context of the development proposal.</li> </ul>
<p><b><u>Construction Traffic</u></b></p> <p>The SEARs require impacts of all key stages of construction and operation of the development to be assessed. This is a standard requirement for all SSDs. A construction traffic impact assessment cannot be carried out post-determination, as proposed in the Preliminary Construction Traffic &amp; Pedestrian Management Plan (CTPMP) prepared by TRAFFIX, dated 15 July 2024.</p> <p><b>Recommendation: A construction traffic impact assessment must be provided, particularly given existing traffic issues in the area.</b></p>	<ul style="list-style-type: none"> <li>Construction traffic impacts have now been assessed based on estimated actual construction traffic volumes provided by the client in consultation with a Construction Company.</li> <li>This TIA has been updated to also include an assessment of expected construction impacts, consistent with the assessment methodology that were deemed satisfactory by DPHI for SSD-48411467.</li> </ul>

Comments from Meeting dated 12 December 2024

DPHI Comments	TRAFFIX Response
<p>DPHI raised concerns about the roundabout near the site that is associated with congestion and can cause queuing. DPHI wants to ensure that road safety and performance have been considered when trucks are exiting right out of the development and if there is any conflict with queuing traffic from the roundabout, as the trucks will have to cross this lane.</p> <p>Additionally, DPHI also requested that evidence be provided to support our position that the Traffic Committee does not have a concurrence role on removal of street parking – how did you form this opinion and what sort of 'evidence' could be provided?</p>	<ul style="list-style-type: none"> <li>Detailed SIDRA modelling results are discussed in <b>Section 9.5</b> of this TIA. SIDRA movement summary output identifies a maximum 95th percentile queue of 22.1m during road network peak periods under existing plus development scenarios, and a maximum 95th percentile queue of 31.1m during road network peak periods under future (10 year horizon) plus development scenarios.</li> </ul> <p>The proposed site egress driveway being positioned approximately 32m away from the Luland Street west approach to the roundabout will therefore not have any interaction with the 95th percentile queue and will operate safely and efficiently.</p> <ul style="list-style-type: none"> <li>TfNSW defines the role of Local Traffic Committee as follows (<a href="#">LINK</a>):</li> </ul> <p><i>Local Traffic Committee (LTC)</i></p> <p><i>One of the conditions applied to the delegation is that councils establish a Local Traffic Committee composed of four formal members. These four members are representatives from each of Council, TfNSW, NSW Police, and the relevant State Member of Parliament.</i></p> <p><i>The Local Traffic Committee is an advisory body only, with no decision-making powers. It is a technical review committee that advises the council on matters related to regulation of traffic that are referred to it by Council.</i></p> <p><i>For more detail, refer to A Guide to the Delegation to Councils for the Regulation of Traffic linked in the Downloads section.</i></p> <p>It is our understanding that submitting a S138 application for the construction of an approved driveway does not involve the LTC.</p>

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	<p>In any event the LTC has no decision-making powers and therefore does not have a concurrence role on any application.</p> <p>Separately, there is no reason whatsoever for Council to consult with LTC on development application matters, and in the circumstances where on-street parking changes are tied with a DA, these simply gets conditioned in the development consent.</p> <p>Furthermore, Council is the only member in the LTC that is primarily concerned with the quantum supply of on-street parking, and there is no need for Council to refer such matter to TfNSW, NSW Police and the relevant State Member of Parliament regarding loss/gain of on-street parking as a consequence of a development application.</p>
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## 2.2 Bayside Council RFI

TRAFFIX has been forwarded comments from Bayside Council concerning the proposal as contained in a letter dated 9 September 2024 (Council Reference: SSD-2024/10) and email correspondence dated 3 December 2024.

Response to the issues raised is provided in the **Table 2** including references to sections of this revised report where applicable.

**Table 2: Response to Bayside Council Comments**

Bayside Council Comments dated 9 September 2024	
Council Comments	TRAFFIX Response
<p>The intersection of Hale Street and Foreshore Road (East Hale Street Right turn) operates at intersection Level of Service (LOS) F in the post development scenario which is not supported. The intersection requires improvements to provide a satisfactory level of service.</p>	<ul style="list-style-type: none"> <li>• RTA Guide to Traffic Generating Developments (2002) specify that traffic modelling for signalised intersections should be based on the average delay over all movements, and not individual approaches.</li> <li>• Refer to updated SIDA modelling results and findings in <b>Section 9</b> of this report, which demonstrates the intersection of Hale Street and Foreshore Road operates satisfactorily at LoS C or better under all assessment scenarios.</li> <li>• If Council requires traffic signals at the Foreshore Road / Hale Street intersection to be optimised to improve LoS of the local road over the classified road network, this is a matter that Council need to directly liaise with TfNSW and the onus should not be place on the applicant to investigate these matters.</li> </ul>
<p>Council has significant concerns for vehicle &amp; truck queueing on Hale Street both eastbound and westbound. This precinct has a single entry and exit point for large trucks being the intersection of Hale Street and Foreshore Road.</p>	<ul style="list-style-type: none"> <li>• All trucks will be required to enter the site from M1 and there will be no queueing of trucks westbound direction.</li> <li>• The commercial driveway will remain open at all times during operational hours to facilitate free flow for all truck ingress and egress movements such</li> </ul>

	<p>there would be no queuing of trucks in the eastbound direction.</p> <ul style="list-style-type: none"> <li>Detailed queuing analysis has been undertaken in <b>Section 9.8</b> of this report and confirm it is statistically improbable trucks to queue on the public road under extremely conservative operational assumptions, and sufficient space will be made available on site prior to any truck arrivals at all times. Therefore, the former assessment stating that traffic will be rerouted is no longer relevant nor required.</li> </ul>
<p>Hale Street at the intersection with Foreshore Road already experiences lengthy queues over the bridge in peak hours. The existing configuration of this intersection with limited queueing capacity results in queues building up quickly. Additionally, the large trucks proposed in this development (26m long B-doubles) will add significantly to these queues. There is a high likelihood that these westbound queues on Hale Street will extend in front of the driveway, resulting in queuing of trucks on-site.</p>	<ul style="list-style-type: none"> <li>Refer to updated SIDA modelling results and findings in <b>Section 9</b> of this report, which demonstrates the intersection of Hale Street and Foreshore Road operates satisfactorily at LoS C or better under all assessment scenarios.</li> <li>Any queuing extending to the site access driveway, which has been strategically positioned as far practicable from General Holmes Drive is not expected to impact site operations. In any event, any queueing internal to the site has no implications to the road network operations.</li> </ul>
<p>Concerns are raised that if the site is at capacity, there is no possibility for trucks to turn around on Hale Street and hence trucks will be forced to queue on the road blocking traffic.</p>	<ul style="list-style-type: none"> <li>Detailed queuing analysis has been undertaken in <b>Section 9.8</b> of this report and confirm it is statistically improbable trucks to queue on the public road under extremely conservative operational assumptions, and sufficient space will be made available on site prior to any truck arrivals at all times. Therefore, the former assessment stating that traffic will be rerouted is no longer relevant nor required.</li> <li>Council's concerns can be satisfactorily addressed in a site operational management plan which can be prepared in response to a suitable condition of consent.</li> </ul>
<p>Section 6.12 states that queuing will be managed by staff who will re-direct trucks if the site becomes congested. This is not a feasible management measure.</p>	<ul style="list-style-type: none"> <li>Detailed queuing analysis has been undertaken in <b>Section 9.8</b> of this report and confirm it is statistically improbable trucks to queue on the public road</li> </ul>

<p>It's expected that many different types of trucks and drivers will be visiting this site and there is limited opportunity to control arrivals/departures to avoid congestion. A slip lane needs to be investigated along the frontage of the site to allow room for truck queuing whilst allowing for other vehicles to pass and continue driving eastbound. The development is proposing to remove the vast majority of on-street parking on the northern side of Hale Street given the driveways and swept paths. Some road widening will be necessary. There is also the ability for the Hale Street centreline to be better aligned with the bridge centreline as part of this upgrade.</p>	<p>under extremely conservative operational assumptions, and sufficient space will be made available on site prior to any truck arrivals at all times. Therefore, the former assessment stating that traffic will be rerouted is no longer relevant nor required.</p>
<p>It's not clear as to how the vehicle trips per day were determined using first principles in section 6.10 of the traffic report and this needs to be clarified. It should also be supplemented by traffic surveys of a similar sized facility.</p>	<ul style="list-style-type: none"> <li>• TIA has been updated to provide detailed calculations on how the anticipated heavy vehicle trip generation associated with the proposed development has been estimated including a breakdown of the vehicle types, refer to <b>Section 9</b>.</li> </ul>
<p>The duration that trucks will be present on site for sorting &amp; unloading of waste, including loading/collection of materials, needs to be determined. A survey of similar developments shall be provided to understand the time necessary for trucks to be on-site to undertake these activities.</p>	<ul style="list-style-type: none"> <li>• Refer to <b>Section 9.8</b> of this report.</li> </ul>
<p>It's not clear how off-site removal of waste will be organised and how that will be managed with incoming deliveries.</p>	<ul style="list-style-type: none"> <li>• Council's concerns can be satisfactorily addressed in a site operational management plan which can be prepared in response to a suitable condition of consent.</li> </ul>
<p>Concerns are raised regarding the swept paths of 20m long AV and 26m B-Double conflicting with on-street parking on the southern side of Hale Street. The appendix D swept paths shall be revised with that southern on-street parking shown as minimum 2.4m wide from face of kerb. Swept paths can be undertaken on the assumption that parking on the northern side will be removed. Truck movements including 300mm clearance are not to impact on-street parking.</p>	<ul style="list-style-type: none"> <li>• Swept path analysis have been updated with recent Nearmap aerial georeferenced in the background clearly demonstrating 26m B-double vehicles will be able to ingress and egress the site satisfactorily in accordance with AS 2890.2 (2018).</li> </ul>

<p>The appendix D swept path analysis details an unrealistic kink in the truck wheel movement near the car entry/exit. See figure below.</p>	<ul style="list-style-type: none"> <li>All swept path analysis has been undertaken using the latest version of the industry leading software AutoTURN Pro, we can provide animated swept paths in a video file or live demonstration to Council upon request to prove our professional integrity.</li> </ul>
<p>The swept path analysis shall be revised to better depict all line marking on Hale Street. Vehicles shall not cross over the road centreline.</p>	<ul style="list-style-type: none"> <li>Swept path analysis have been updated with recent Nearmap aerial georeferenced in the background clearly demonstrating 26m B-double vehicles will be able to ingress and egress the site satisfactorily in accordance with AS 2890.2 (2018).</li> </ul>
<p>The parking rate derived in section 7 of the traffic report is insufficient for this site. 1 car parking space shall be provided for each staff member in addition to the 4 visitor spaces. Additionally, given the swept paths and the two driveways proposed, the on- street parking on the northern side of Hale Street is effectively entirely removed by this development. The loss of public parking needs to be supplemented by the development.</p>	<ul style="list-style-type: none"> <li>The proposed development has been amended to provide a minimum of one (1) car parking space per FTE staff in addition to the four (4) visitor spaces in accordance with Council's request.</li> <li>It is unclear how on-street parking can be supplemented by a private development that is not open to the public notwithstanding the security and legal challenges if this was permitted to occur.</li> <li>Refer to <b>Section 8.6</b> of this report.</li> </ul>
<p>A longitudinal driveway profile is to be submitted for each driveway. The profiles shall start in the centre of the road and be along the critical edge (worst case) of the driveway. Gradients and transitions shall be in accordance with AS2890.1:2004 &amp; AS2890.2:2018. The profile shall include all relevant levels, grades (%), headroom clearances and lengths. The existing boundary levels shall be clearly shown on the profile. Any change to the existing boundary levels requires approval from Bayside Council.</p>	<ul style="list-style-type: none"> <li>A longitudinal driveway profile has been prepared demonstrating compliance with AS 2890.1 (2004) and AS 2890.2 (2018) and has been submitted as part of the updated SSD package.</li> </ul>
<p>Internal driveway gradients shall be clearly shown on the plans complying with AS2890.1:2004 and AS2890.2:2018.</p>	<ul style="list-style-type: none"> <li>Internal gradients have been clearly shown on the plans demonstrating compliance with AS 2890.1 (2004) and AS 2890.2 (2018) and has been submitted as part of the updated SSD package.</li> </ul>

<p>The swept paths indicate all turning movements (to allow trucks to enter and exit the site in a forward direction) will occur within the warehouse where waste is being sorted. More details need to be provided demonstrating why this is acceptable and, as to how a dedicated area will be kept clear for vehicle manoeuvring particularly when unloading/sorting is occurring.</p>	<ul style="list-style-type: none"> <li>The site will operate in a sequential arrangement which the likelihood of vehicles needing to overtake another truck is statistically improbable.</li> </ul>
<p>"Do not queue" marking signs need to be provided on the driveway entry/passing area and the turn around area.</p>	<ul style="list-style-type: none"> <li>Council requirements noted, this can be satisfactorily conditioned as part of the development consent.</li> </ul>
<p>The traffic modelling does not consider additional delays at the intersections from the follow issues:</p> <ol style="list-style-type: none"> <li>Delays from slow moving trucks are not considered in the SIDRA modelling.</li> <li>Delays from trucks occupying multiple travel lanes are not considered in the SIDRA modelling.</li> <li>Additional queue lengths from large vehicles (B-Doubles).</li> </ol>	<ul style="list-style-type: none"> <li>Delays from slow moving trucks are in fact adequately considered in the SIDRA modelling by assigning respective volumes to appropriate vehicle classes. It is noted in this regard that the development related heavy vehicle trips has been assigned as 'Large Trucks'.</li> <li>Trucks do not need to occupy multiple lanes at the Foreshore Road/Hale Street intersection to perform any manoeuvres. The intersection is situated within a heavy industrial area along an existing NHVR 25/26m B-double approved route in all directions, it is unclear as to why Council deem the existing intersection or road network provides inadequate geometry to accommodate the movement of large trucks up to and including 25/26m B-double vehicles.</li> <li>Additional queue lengths from large vehicle has been adequately considered by assigning all development related heavy vehicle trips as 'Large Trucks'.</li> <li>Notwithstanding the above, the proposed development results in a net traffic generation reduction during both the AM and PM peak periods. Under normal circumstances, no further traffic modelling would be warranted, and the proposed development is considered supportable</li> </ul>

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	<p>from a traffic planning perspective and no external network improvements would be required.</p>
<p><b>Bayside Council Comments dated 3 December 2024</b></p>	
<p><b>Council Comments</b></p>	<p><b>TRAFFIX Response</b></p>
<p>The responses to the Bayside Council RFI are acceptable except for the issue raised regarding the LOS and queuing experienced at the intersection of Hale Street and Foreshore Road. Council disagrees with the applicant's argument that the average delay of all movements means the intersection is operating satisfactorily. The Hale Street approach experiences excessive queuing in peak hours which is reflected in the poor LOS experienced on the Hale Street approach. This issue is evidenced in aerial data and site observations where westbound queuing often extends well beyond the bridge.</p> <p>The applicant needs to implement measures as part of this development to improve the LOS, queue length, degree of saturation etc. experienced on the Hale Street approach.</p> <p>Additionally, the applicant should investigate having the car entry/exit driveway revised to be in a location that reduces the loss of on-street parking.</p>	<ul style="list-style-type: none"> <li>• Traffic modelling has been undertaken and interpreted in accordance with TfNSW Guide to Traffic Impact Assessment (TS 00085, Ver 1.1) and TfNSW Traffic Modelling Guidelines (Ver 1.0) which demonstrates the Foreshore Road / Hale Street intersection will continue to operate at satisfactory levels of service C or better.</li> <li>• The proposed development results in a net reduction in the vehicle generation potential of the site compared to the existing approved development which aligns with Council's objective of alleviating road network capacity and street parking concerns.</li> <li>• In the circumstance where the development results in a net reduction in the traffic generation of the site and SIDRA modelling undertaken in accordance with TfNSW guidelines demonstrates satisfactory operation of the key intersections, there are no evidence or analysis to support any road infrastructure improvements sought by Council.</li> <li>• The applicant has investigated alternate location of the entry/exit driveway and reaffirms the current proposed location is optimal in terms of operational efficiency and safety as well as to minimise any impacts to the existing road network to address DPPI and Council concerns. It should also be noted the width of the driveway does not change with its location, hence impacts on on-street parking is not a function of the driveway location.</li> </ul>

### 3. LOCATION AND SITE

The subject site is known as 2-4 Hale Street, Botany (Lot 1 of DP562374) and is located on the northern side of Hale Street, about 140 metres east of Foreshore Road. It is also located adjacent Sydney Airport, and 8.6 kilometres south of the Sydney CBD.

The site has a total site area of approximately 7,439m<sup>2</sup> and has a southern frontage of 150 metres to Hale Street. It is bounded to the north and west by vacant land, and industrial developments to the east.

At present the site is leased by multiple tenants including, Frontline Fabrications, Ripe Providores, Powder Coaters, a mechanic, Meat Storage, Smash Repairs a timber workshop and storage units.

Vehicular access to the site is currently provided via Hale Street.

A Location Plan is presented in **Figure 1**, with a Site Plan presented in **Figure 2**.

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Figure 1: Location Plan



Figure 2: Site Plan

## 4. ASSESSMENT REQUIREMENTS

### 4.1 SEARs Requirements

The Planning Secretary’s Environmental Assessment Requirements (SEARs) outlines the transport and accessibility requirements for the SSD as stated below in **Table 3**.

**Table 3: SEARs Requirements and References**

SEARs Requirements	Reference
<b>Transport and Accessibility (Construction and Operation)</b>	
Details of all daily and peak traffic volumes likely to be generated during all key stages of construction and operation, including a description of key access / haul routes, vehicle types and potential queuing impacts	Refer to Section 7 & 9
An assessment of the predicted impacts of this traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts on existing performance levels at key intersections, using a calibrated SIDRA (or similar) traffic model	Refer to Section 9
Details of road upgrades, infrastructure works or new roads or access points required for the development	Refer to Section 9
Plans demonstrating how all vehicles likely to be generated during construction and operation and awaiting loading, unloading or servicing can be accommodated on the site to avoid queuing in the street network	Refer to Section 9
Details and plans of the site access, internal road network, on-site parking, and sufficient pedestrian and cyclist facilities, in accordance with the relevant Australian Standards	Refer to Section 10
Details of the largest vehicle anticipated to access and move within the site, including swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site.	Refer to Section 10

## 4.2 Council Requirements

The Bayside Council has reviewed the above SEARs and provides the comments outlined in **Table 4** below.

**Table 4: Council Requirements and References**

Council Requirements	Reference
<p>3. The Bayside DCP 2022 Section 3.5 specifies parking requirements for development of this type. General Industrial uses are required to provide the following car parking rates: 2 spaces; or 1 space/80 m<sup>2</sup> GFA (whichever greater); plus 1 space/40 m<sup>2</sup> of ancillary office.</p>	<p><b>Refer to Section 8</b></p>
<p>4. A Traffic and Parking Impact Assessment Report is required for waste and resource management facilities applications and must include:</p> <ul style="list-style-type: none"> <li>a. Full details of the proposed operation (including maximum number of vehicles to be stored on-site and frequency of movements),</li> <li>b. Proposed vehicular access, off-street parking, vehicle storing area, pickup/drop off zones, movements and manoeuvrability of all vehicles,</li> <li>c. Truck routes to and from the site (for the transport of vehicles),</li> <li>d. Details of any potential impacts on traffic and the road network system (including intersection performance analysis),</li> <li>e. Details of site access, road signs, pedestrian safety etc,</li> <li>f. Signal/warning system and passing bay requirement at vehicle intersection areas,</li> <li>g. Parking &amp; manoeuvring of vehicles. The report should address adequacy of site and parking layout for the largest vehicle to be accessing the site,</li> <li>h. Traffic engineer shall certify the parking layout, access and visibility requirement for the proposed parking facility in accordance with AS/NZS 2890.1:2004, AS2890.2:2018, AS2890.3:2015 &amp; AS/NZS 2890.6:2009,</li> <li>i. Construction traffic management concept plan,</li> <li>j. Details of the Traffic consultant and author of the report must be included.</li> </ul>	<p><b>Addressed throughout the report, noting a Construction Traffic Management Concept Plan is to be prepared at Construction Certificate (CC) stage after development approval.</b></p>
<p>5. Swept path analysis (using Autoturn software or similar) shall be provided (for B85 vehicle) for all parking spaces and demonstrate area required to manoeuvre vehicle in and out from the site and parking spaces in forward direction. A 300mm clearance shall be provided either side of the turning path.</p>	<p><b>Refer to Section 10</b></p>
<p>6. Swept path analysis (using Autoturn software or similar) shall be provided for the largest service vehicle accessing the site and demonstrate the area required to manoeuvre vehicle around the site and exit in a forward direction</p>	<p><b>Refer to Appendix D</b></p>

<p>7. An assessment and certificate from a qualified traffic engineer shall be provided demonstrating compliance with Australian Standards 2890 series for parking facility design, layout and access to the site.</p>	<p>Refer to Section 10, a design certificate is to be prepared addressing relevant conditions of consent relating to AS2890 compliance <u>after</u> development approval.</p>
<p>8. A longitudinal profile of the driveway shall be provided incorporating the driveway ramp crest level protecting the basement from flooding as per any flood advice letter. Also a longitudinal profile is to be provided for the loading dock and internal ramps demonstrating compliance with the relevant Australian Standard.</p>	<p>Not applicable, the proposed development does not propose internal ramps, recessed docks or basement levels.</p>
<p>9. A Traffic Study is required to be undertaken for the development by a qualified and experienced traffic engineer to assess the traffic impacts of the development. The study shall be undertaken in accordance with the RTA Guide to Traffic Generating Developments and shall include, but not be limited to, the following topics:</p> <ul style="list-style-type: none"> <li>a. Existing site conditions,</li> <li>b. Route assignment, traffic flows and traffic generation (existing &amp; future),</li> <li>c. Intersection performance and levels of service (existing and future),</li> <li>d. Traffic safety,</li> <li>e. Access requirements – details shall be provided for existing access and proposed access for maximum safety of pedestrian and vehicles, and</li> <li>f. Traffic and parking survey shall be done on peak period (not in school holidays) – two/three typical days</li> </ul>	<p>Addressed throughout the report.</p>

## 5. EXISTING TRAFFIC CONDITIONS

### 5.1 Road Network

The road hierarchy in the vicinity of the site is shown in **Figure 3** with the following roads of particular interest:

- **General Holmes Drive:** a TfNSW Main Road (MR 194) that traverses in an east-west direction between Joyce Drive in the east and The Grand Parade in the west. In the vicinity of the site, General Holmes Drive generally accommodates three (3) lanes of traffic in westbound and four (4) lanes eastbound with opposing traffic flows separated by a central median island and is subject to a 70km/h speed zoning. Parking is not permitted along General Holmes Drive.
- **Foreshore Road:** a TfNSW Main Road (MR 617) that traverse in a north-south direction between Botany Road in the south and General Holmes Drive in the north. In the vicinity of the site, Foreshore Road accommodates two (2) lanes of traffic in each direction with opposing traffic flows separated by a central median island and is subject to an 80km/h speed zoning. Kerbside parking is prohibited along Foreshore Drive.
- **Botany Road:** a TfNSW Main Road (MR 170) that traverses in a north-south direction between Regent Street in the north and Bunnerong Road in the south. In the vicinity of the site, Botany Road accommodates a single lane of traffic in each direction and is subject to a 50km/h speed zoning. Kerbside parking is generally permitted in both directions, with restrictions.

- Hale Street: a local road that generally traverses in an east-west direction between Botany Road in the east and Foreshore Road in the west. In the vicinity of the site, Hale Street accommodates single lane of traffic in both directions and is subject to a 50km/h speed zoning. Kerbside parking is generally permitted in both directions.
  
- Luland Street: a local road that generally traverses in an north-south direction between Hale Street in the north and cul-de-sac in the south. In the vicinity of the site, Luland Street accommodates single lane of traffic in both directions and is subject to a 50km/h speed zoning. Kerbside parking is generally permitted in both directions.

It can also be seen from **Figure 3** that the site is conveniently located with respect to local and arterial roads serving the region. It is therefore able to effectively distribute traffic onto the wider road network, minimising traffic impacts.

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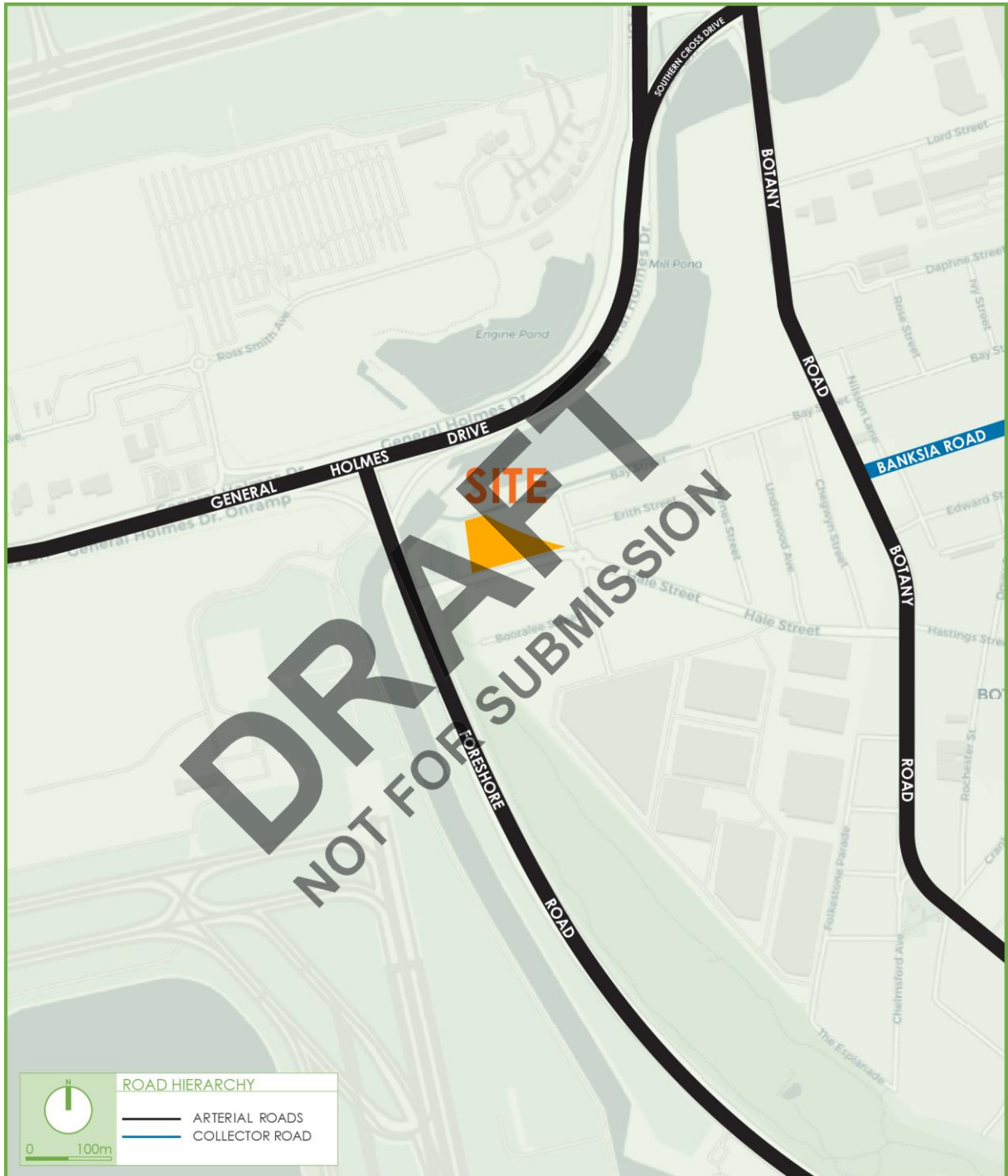


Figure 3: Road Hierarchy

## 5.2 Crash Data Analysis

TRAFFIX has reviewed publicly available crash data along Hale Street between Foreshore Road and Luland Street for the most recent five (5) year period between 2019 and 2023. The crash data was analysed in the following degree categories:

- **Fatal** – a crash in which at least one person was killed
- **Serious injury** – a crash involving at least one person identified in a police report and matched to a health record indicating a hospital stay due to injuries sustained in a crash, or is identified as an iCare (Lifetime Care) participant AND no one was killed in the crash
- **Moderate injury** – a crash involving at least one person identified in a police report who is matched to a health record that indicates that they were treated at an emergency department but were not admitted for a hospital stay, or is matched to a CTP claim indicating a moderate or higher injury AND no one was killed or seriously injured
- **Minor/Other injury** – a crash involving at least one person identified as an injury in a police report who is not matched to a health record that indicates the level of injury severity, or is matched to a minor injury CTP claim AND no one was killed, seriously injured or moderately injured
- **Non-casualty (towaway)** – a crash in which no one was killed or injured but at least one motor vehicle was towed away.

A crash summary provided in Table 5 below:

**Table 5: Crash Degree Summary (2019-2023)**

Year	Crash Degree					TOTAL
	Fatal	Serious Injury	Moderate Injury	Minor/other Injury	Non-casualty (towaway)	
2019	-	-	-	-	-	-
2020	-	-	1	2	-	3
2021	-	1	1	-	-	2
2022	-	-	-	-	2	2
2023	-	-	-	-	-	-
<b>TOTAL</b>	-	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>7</b>



Figure 4: Crashes within Vicinity of School

The key outcomes from the seven (7) reported crashes between January 2019 and December 2023 include:

- No fatalities reported and no crashes involved pedestrians;
- Crashes occurred in both daylight and darkness on Hale Street and Foreshore Road;
- Most incidents result in minor injury or non-casualties;
- Four (4) crashes occurred along Foreshore Road with no clear indication of recurring crash themes, all these crashes are therefore likely attributed to driver error and are not indicative of any underlying road safety issues;
- Two (2) crashes occurred at the Foreshore Road / Hale Street intersection with no clear indication of recurring crash themes, all of these crashes are therefore likely attributed to driver error and are not indicative of any underlying road safety issues; and,
- One (1) crash occurred near the Hale Street / Luland Street intersection with no clear indication of recurring crash themes, all of these crashes are therefore likely attributed to driver error and are not indicative of any underlying road safety issues.

In summary, no crashes were recorded near the accessway of the site.

### 5.3 Key Intersection

The key intersection in the vicinity of the site is shown below and provide an understanding of the existing road geometry and alignment.

### 5.3.1 Hale Street / Foreshore Road Intersection

It can be seen from **Figure 5** that Hale Street / Foreshore Road intersection is a signal-controlled T-intersection without any pedestrian crossing facilities.



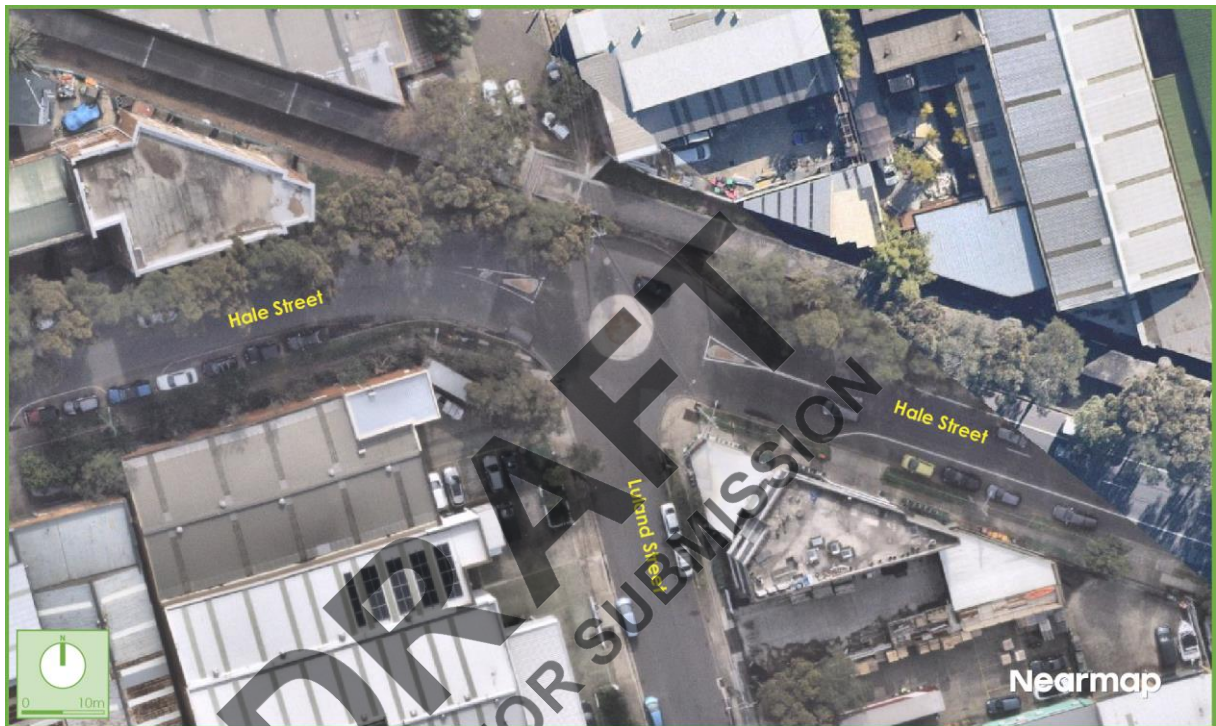
**Figure 5: Intersection of Hale Street and Foreshore Road**

The main attributes of each approach are outlined as follows:

- Hale Street (east)
  - The eastern leg provides a total of three (3) approach lanes, comprising one (1) continuous right turn lane, one (1) short right turn lane, and one (1) left turn slip lane.
- Foreshore Drive (north-south)
  - The northern leg provides a total of three (3) approach lanes, comprising two (2) through lanes, and one (1) short left turn lane.
  - The southern leg provides a total of three (3) approach lanes, comprising two (2) through lanes, and one (1) short right turn lane.

### 5.3.2 Hale Street / Luland Street Intersection

It can be seen from **Figure 6** that Hale Street / Luland Street intersection is a signal-controlled T-intersection without any pedestrian crossing facilities.



**Figure 6: Hale Street / Luland Street Intersection**

The main attributes of each approach are outlined as follows:

- Hale Street (east-west)
  - The western leg provides a single approach lane permitting all movements; and,
  - The eastern leg provides a single approach lane permitting all movements.
- Luland Street
  - Luland Street Provides a single approach lane permitting all movements.

## 5.4 Public Transport

The existing bus services that operate in the locality are shown in **Figure 7**. It is evident that the development benefits from good bus services with five (5) bus stops within a 600m radius. These services provide connections to such centres as Mascot, Eastgardens, Rosebury, Waterloo, Port Botany and Central. These bus routes provide frequent services during the weekday peak hour periods.

It is also noted that Mascot Railway Station is located approximately 2.5 kilometres from site and can be conveniently accessed via the surrounding bus network. This station provides services on the T8 line, connecting the site to the City and the wider rail network.

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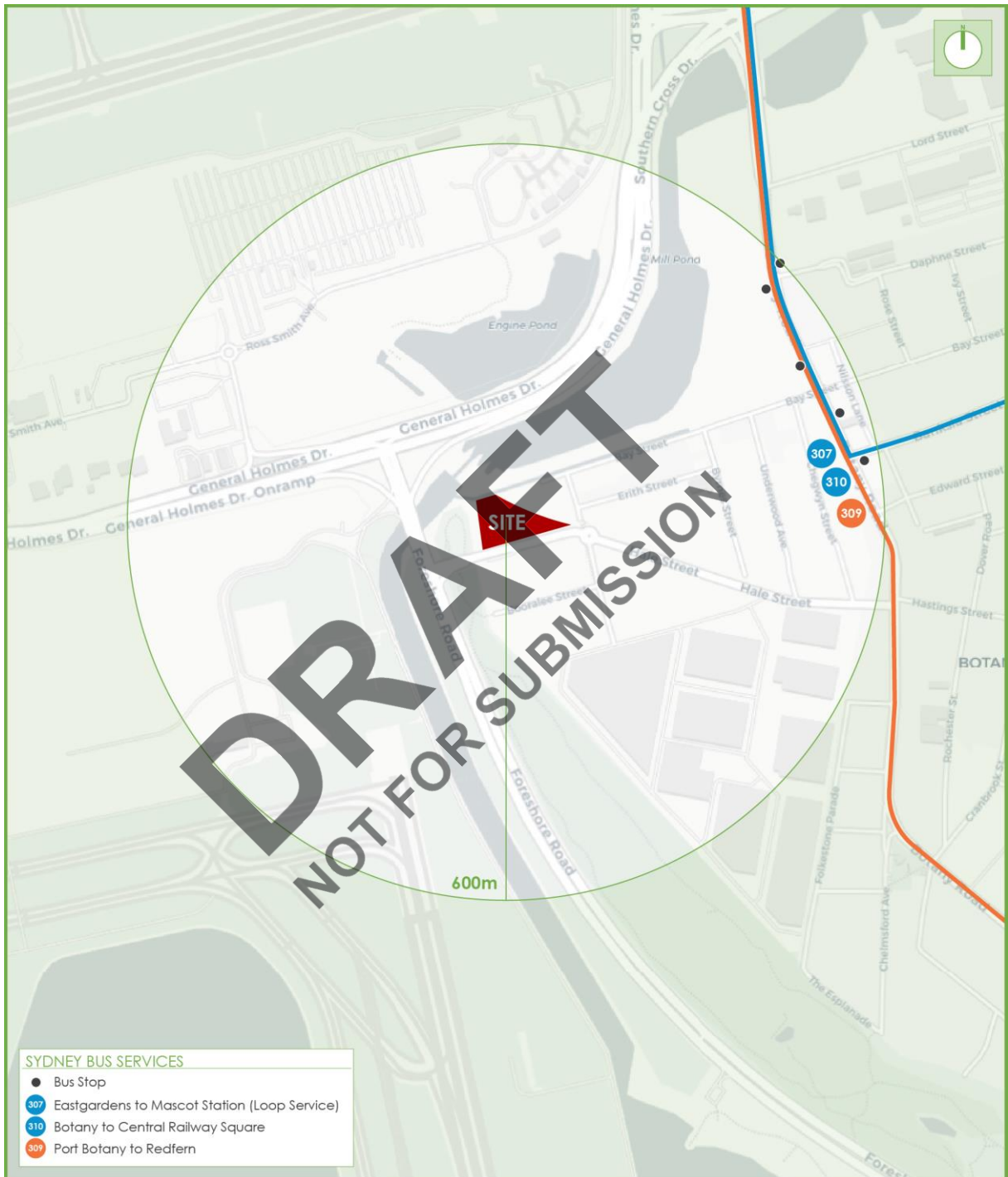


Figure 7: Public Transport

## 6. DESCRIPTION OF PROPOSED DEVELOPMENT

A detailed description of the proposed development is provided in the Environmental Impact Statement prepared separately. In summary, the State Significant Development Application (SSDA) seeks approval to develop a Construction and Waste (C & D) waste management facility. The associated works include:

- Demolition of existing structures;
- Construction of new purpose-built warehouse of 3,647m<sup>2</sup> for the receipt, basic sorting and recycling with aggregation of material;
- Construction of a site office of 260m<sup>2</sup> including amenities;
- Construction of a new at-grade hardstand area including:
  - Two (2) in-ground weighbridges; and,
  - Provision for 15 car parking spaces.
- Construction of two (2) separate vehicular access driveways off Hale Street facilitating safe light and heavy vehicle movements.

The parking and traffic impacts of the proposed development are discussed in **Section 8** and **Section 9**. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **Appendix A**.

## 7. SITE OPERATIONS

### 7.1 On-Site Activities

The C & D waste management facility has the capacity to process up to 300,000 tonnes per annum of waste. These types of waste include recyclable, non-recyclable, organic, metal, and demolition waste. The proposed waste transfer centre will be capable of receipt, basic sorting, and aggregation of basic material. The facility will primarily sort construction and demolition waste, preparing it for dispatch to other facilities for further treatment.

Specifically, the proposed development will operate as a construction and demolition waste facility, with the following staging:

- **Delivery:** Trucks will deliver segregated heavy waste and co-mingled and other reclassified waste.
- **Waste Procedure:** Truck pass over the weighbridge and are visually inspected. Visibly unacceptable loads are rejected, logged and are transported offsite by the customer.  
  
Where entry to the site is permitted and trucks drive to the off-load inspection area – tip zone, in the waste transfer building where the waste (including co-mingled waste) is tipped, spread, turned, and inspected. Unacceptable loads are rejected and reloaded into the vehicle, logged on a register available to the EPA and directed to leave the facility. The customer is charged for the reload.
- **Stockpiling:** Accepted loads are stockpiled for sorting.

- **Sorting:** Waste is pre-sorted via a front-end loader/zero swing excavators within the incoming waste area. Following pre-sorting the waste is sorted by a front-end loader/excavator into four categories; Plant feed, clean concrete and brick, metal, and Light mixed waste.
- **Stockpiling:** Material are stockpiled into designated bays including, light waste, heavy waste, and metals.
- **Dispatch:** Plant feed and light mixed waste would be dispatched to other KLF advanced resource recovery facilities. Clean concrete, brick and metal is dispatched to recycling partners.

## 7.2 Hours of Operations

The facility has been designed to operate 24 hours a day, 7 days a week.

## 7.3 Waste Material Volumes

The facility has been designed for the following material volumes:

- **Daily incoming volumes:** approx. 1,150 tonnes per day;
- **On-site waste storage:** 6,000 to 10,000 tonnes.

## 7.4 Vehicular Access

The development proposes two (2) driveway crossings, including:

- A driveway crossing to Hale Street (west). This driveway will be exclusively for light vehicles used by staff and visitors, generally at the end/beginning of each shift.
- A driveway crossing to Hale Street (east). This driveway will permit truck ingress/egress only.

## 7.5 Car Parking

The proposed development makes provision for a total of 15 at-grade parking spaces for staff and visitors which will satisfactorily accommodate the nominal parking demands generated by the proposed development which is discussed further in **Section 8.1** of this report. The carparking areas including access/egress has been separated from heavy vehicle manoeuvring areas to facilitate safe site operations by segregating light and heavy vehicle movements.

## 7.6 Truck Types

The development has been designed to accommodate the following commercial vehicles:

- Articulated vehicles up to and including 26 metre B-doubles;
- Truck and dog trailers up to 19.6 metres long; and
- Single rigid trucks up to and including 12.5m Heavy Rigid Vehicles (HRV).

## 7.7 Weigh Bridges and Vehicle Control

The development provides two (2) in-ground weighbridges. Vehicles will first be weighed upon entry to the site, and after loading/unloading they will be weighed again preparing for exit. The critical entry weighbridge (eastern most weighbridge) provides sufficient queuing space for two (2) 26m B-doubles, which is significant more than the expected arrival rate for vehicles utilising this weighbridge. More details relating to this queuing is discussed below.

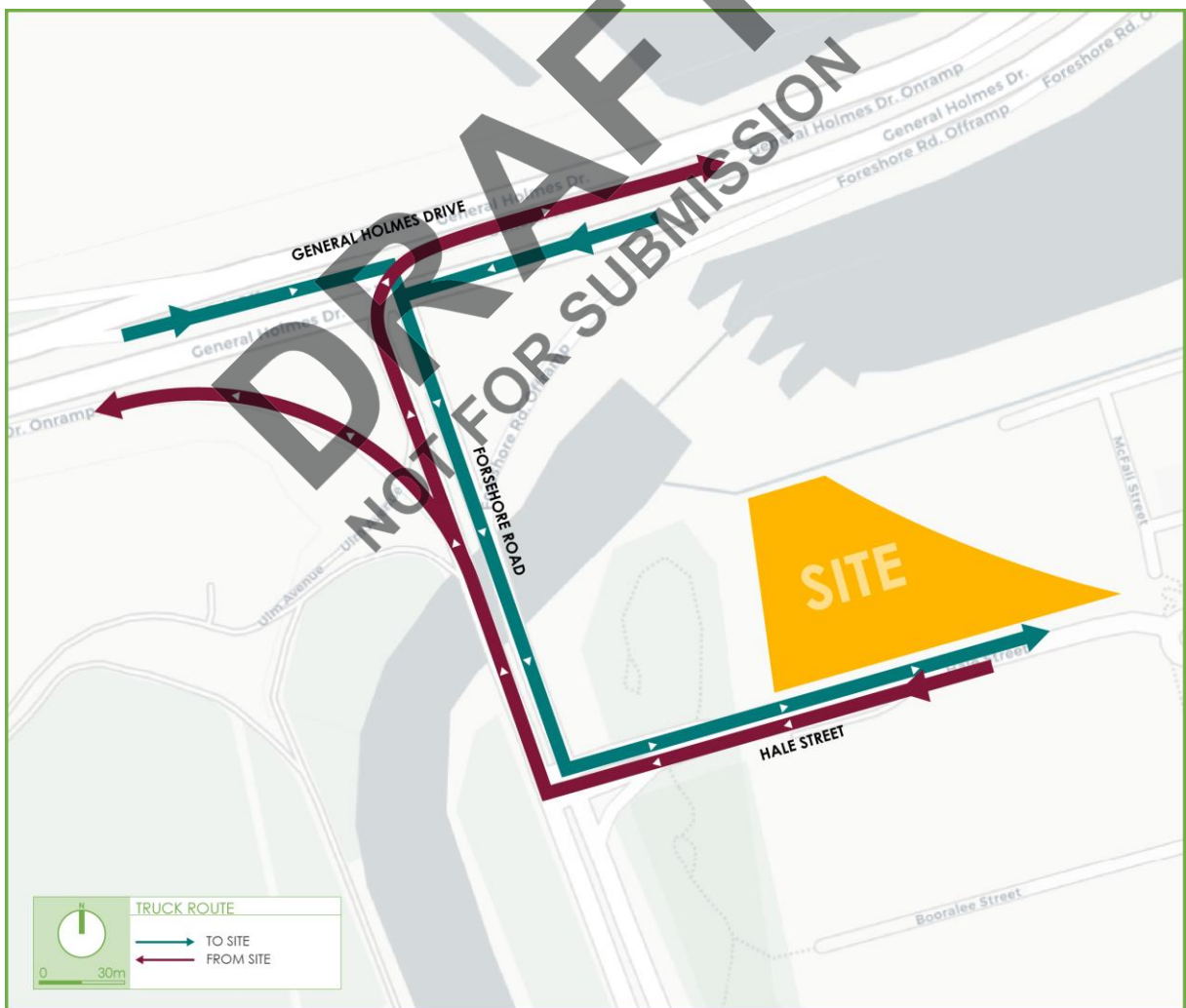
## 7.8 Loading/Unloading Areas

All sized vehicles will be loaded/unloaded within the purpose-built enclosed warehouse area. The Tip Zone has been designed to accommodate commercial vehicles up to and including 26m B-doubles, allowing them to drive in and out of the warehouse in a forward direction at all times.

### 7.9 Truck Routes

As part of a future operational plan of management, the operator will advise their vehicle fleet to strictly adhere to the heavy vehicle route provided in **Figure 8**, which will require all heavy vehicles to arrive/depart via General Holmes Drive (M1). This plan of management will specifically note that no heavy vehicles are to access the site from the east via Hale Street east of Luland Street or Luland Street.

The designated heavy vehicle route is in accordance with existing approved NHVR 25/26m B-double route and will operate safely and efficiently for future traffic movements, and no concerns are raised in relation to vehicle manoeuvrability at public intersections.



**Figure 8: Truck Routes**

## 7.10 Turn Restriction Signages

Additional signages are to be installed in Hale Street and the heavy vehicle access driveway to enforce the truck route as provided in **Figure 8**, reference should be made to the signage plan provided in **Appendix B**.

## 7.11 Internal Speed Limits

The following speed limits will be enforced within the site:

- 10km/h for vehicle traffic areas;
- Walking pace in loading/unloading areas;
- Walking pace in pedestrian designated areas; and
- 5km/h in vehicle parking areas.

## 7.12 Driver Facilities

Noting that the proposed facility is a waste management facility, the proposed development will not provide amenities for truck drivers such as rest areas. It is expected that the majority of drivers will not be required to leave their vehicles. Facilities will however be provided within the ancillary office for on-site staff.

## 7.13 Driver Code of Conduct

The operator will include the following in all contract procurement packages:

- A copy of the approved truck routes as provided in **Figure 8**;
- The approved maximum truck size; and,
- Any other entry restrictions, or site access restrictions as agreed to by the authorities.

The site manager will be responsible for managing all site access points and monitoring subcontractor behaviour and subcontractor truck access arrangements to ensure compliance with conditions of the contract. They will be responsible for ensuring there is no heavy vehicles are to access the site from the east via Hale Street east of Luland Street or Luland Street.

## 7.14 Site Induction

All staff including sub-contractors would be required to undergo a site induction. The induction would include permitted access routes to and from the site, parking arrangements, as well as standard environmental, workplace health and safety, driver protocols and emergency procedures.

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## 8. PARKING REQUIREMENTS

### 8.1 Car Parking

#### 8.1.1 Council Controls

The Bayside Development Control Plan (DCP) 2022, Section 3.5 prescribes minimum parking requirements for general industrial uses which are summarised in **Table 6**.

**Table 6: Council Car Parking Rates and Provision for the Proposed Development**

Type	Area / Units	Car Parking Rate	Car Parking Requirement
General Industry	Warehouse: 3,647m <sup>2</sup> Ancillary Office: 260m <sup>2</sup>	2 spaces; or 1 space / 80m <sup>2</sup> GFA, whichever is greater; plus 1 space / 40m <sup>2</sup> GFA of ancillary office	52 spaces
<b>Totals</b>			<b>52 spaces</b>

It is evident from **Table 6** that a general industry development is nominally required to provide 52 car spaces under Council's DCP.

Notwithstanding, adoption of the generic industry parking rate is not considered appropriate in the circumstance, which does not reflect the daily operations and actual parking demands of the proposed C & D waste facility – noting the small number of operational staff on-site at any one time, as well as substantial warehouse floor area being used to accommodate the receipt, basic sorting and recycling with aggregation of material as well as manoeuvring requirements for trucks up to 26-metres-long B-Doubles (26m B-Double).

On the above basis, it is reasonable in the circumstance that the car parking demands of the site is determined using a first principles method as detailed in the section below.

**8.1.2 First Principles Parking Assessment**

Operational data provided by the C & D waste facility operator KLF informs that there will be a maximum of 11 Full Time Equivalent (FTE) staff on-site at any one time.

Further reference is made to the Journey to Work (JTW) data published by the Australian Bureau of Statistics (ABS) for the Botany (SA2) which revealed that 78.5% of staff drive to work. A breakdown of the method of travel to work is provided in **Table 7** below.

**Table 7: Journey to Work Data – SA2 Area: Botany**

Method of Travel to Work	Percentage (%)
Car, as driver	78.5%
Car, as passenger	3.9%
Train	7.3%
Truck	1.7%
Bus	4.0%
Walked only	2.3%
Motorbike/scooter	1.0%
Other Mode	0.5%
Taxi	0.1%
Bicycle	0.6%
Ferry	0%
Tram	0%

\*Travel mode categories 'Not Stated', 'Not Applicable', 'Did not go to work', and 'Worked from home' have been excluded from this analysis.

Application of this to the 11 FTE staff on-site at any one-time results in an off-street car parking demand of nine (9) space. It is further noted that this is considered a conservative assessment as it does not take into account any sustainable transport initiatives such as carpooling.

In any event, the proposed development makes provision for a total of 15 car parking spaces comprising 11 staff spaces and four (4) visitor spaces in accordance with Council's post-lodgement requirements, and is superior to the nominal parking demands expected to be generated by the proposed development based on current JTW data.

## 8.2 Accessible Parking

Council's DCP requires that all parking areas provide for accessible parking in accordance with the provisions of the Building Code of Australia (BCA). The BCA requires one (1) accessible space for every 100 car parking spaces or part thereof. In response, a single accessible parking space is proposed, meeting the BCA requirement.

## 8.3 Bicycle Parking

The Bayside DCP 2022, Section 3.5 prescribes minimum bicycle parking requirements for all new developments greater than 600m<sup>2</sup> GFA in the following terms:

- 1 space per 600m<sup>2</sup> GFA

Accordingly, applying this rate to the cumulative warehouse/office floor area of 3907m<sup>2</sup> results in a requirement of seven (7) bicycle spaces.

In response, the proposed development makes provision for a total of 10 bicycle spaces satisfying the requirements of the DCP, promoting alternative modes of transport in line with Council and state government objectives.

## 8.4 Motorcycle Parking

The Bayside DCP 2022, Section 3.5 prescribes minimum motorcycle parking requirements for all new developments greater than 600m<sup>2</sup> GFA in the following terms:

- 1 space per 15 car spaces

Accordingly, applying this rate to the proposed provision of 15 car spaces results in a requirement of one (1) motorcycle space.

In response, the proposed development makes provision for a total of one (1) motorcycle space satisfying the requirements of the DCP, promoting alternative modes of transport in line with Council and state government objectives.

## 8.5 Refuse Collection and Servicing

The site has been designed to accommodate 26-metres-long B-Double vehicles circulating around the site. Therefore, all waste collection vehicles (whether private or Council) can be accommodated within the site. Reference should be made to the waste consultant's report in this regard.

## 8.6 Loss of On-Street Parking

The proposed development provides separate driveways for the car park and truck manoeuvring areas. This is in accordance with best industry practice to improve road user safety by segregating large trucks up to 25/26m B-double vehicles from staff and visitors accessing the site.

Accordingly, the proposed driveways will result in a net loss of five (5) on-street parking spaces on the northern side of Hale Street when assessed under AS 2890.5 (2020) dimensional requirements which specifies the following:

- On-street parking at this location is to be provided with minimum 2.3m width; and,
- On-street parking at this location is to be provided with minimum 8m length as vehicles reversing into parking spaces at this location in our view cannot be readily tolerated.

It is pertinent to note in this regard that the site is zoned for industrial use, situated next to a 25/26m B-double vehicle approved route, and any new industrial development designed to cater for 25/26m B-double vehicles would need to provide separated light and heavy vehicle access driveways for road users safety. Having considered this, it is reasonable to expect any new development would require the same span of driveway to achieve safe operational standards.

Furthermore, an off-street car parking assessment has also been undertaken for the existing development on the site to determine the adequacy of its existing off-street car parking provision as summarised in **Table 8**.

**Table 8: Council Car Parking Rates and Provision for the Existing Development**

Type	Area	Car Parking Rate	Car Parking Requirement	Car Parking Provision
General Industry	4,556m <sup>2</sup>	2 spaces; or 1 space / 80m <sup>2</sup> GFA, whichever is greater; plus 1 space / 40m <sup>2</sup> GFA of ancillary office	57 spaces	37 spaces
<b>Totals</b>			<b>52 spaces</b>	<b>37 spaces</b>

It is evident from **Table 8** that the existing development is nominally required to provide 52 car spaces under Council's DCP. Accordingly, on the basis that the current development is operating with 37 car spaces, there is an existing shortfall or "car parking credit" of 17 spaces which is expected to be contributing to the on-street car parking demand in the local area.

In the circumstances where the proposed development has demonstrated to provide sufficient on-site parking to accommodate its maximum operational demands, it is expected that there will be a net reduction in the on-street parking demand as a consequence of the development proposal, in the order of up to 12 car spaces (i.e. existing car parking credit of 17 car spaces less the loss of 5 on-street car spaces).

Accordingly, the proposed development is expected to result in a net positive parking outcome, ensuring that all parking needs are met without reliance on Hale Street. As a result, the development will significantly alleviate pressure on existing on-street parking on Hale Street, contributing to a substantial improvement in the availability and management of street parking in the area.

## 9. TRAFFIC AND TRANSPORT IMPACTS

### 9.1 Existing Site Generation

The subject site is currently occupied by a multi-unit industrial development approved with a cumulative industrial GFA in the order of 4,556m<sup>2</sup> comprising a variety of tenants including Frontline Fabrications, Ripe Proveedores, Powder Coaters, a mechanic, Meat Storage, Smash Repairs a timber workshop and storage units.

Reference is therefore the general industrial trip generation rate of "1 peak hour vehicle trip per 100m<sup>2</sup> of GFA" published in the TfNSW Guide to Traffic Generating Developments (GTTGD) 2002 which has been adopted to estimate the trip generation potential associated with the existing approved industrial land use on the site.

Accordingly, application of the general industrial trip rates to the existing approved development and adopting a 60:40 directional split results in the following predicted trip generation volumes:

- 46 vehicle trips per hour during the AM peak period (28 in, 18 out); and,
- 46 vehicle trips per hour during the PM peak period (18 in, 28 out).

### 9.2 Development Trip Generation

The TfNSW Guide to Traffic Generating Developments (GTTGD) 2002 and TfNSW Technical Direction (TDT 2013) do not specify a trip generation for a materials recycling facility. Accordingly, a first principles approach has been used to assess the traffic generation of the site.

**9.2.1 Staff Trip Generation**

It has been conservatively assumed that all 11 staff spaces will be accessed in a one-hour period during commuter peak periods. Application of these assumptions and adopting an 80:20 directional split results in the following traffic generation:

- 11 vehicle trips per hour during the AM peak period (9 in, 2 out); and
- 11 vehicle trips per hour during the PM peak period (2 in, 9 out).

**9.2.2 Heavy Vehicle Trip Generation – Inbound**

The number of inbound truck movements has been calculated in accordance with waste input parameters provided by the future operator of the site and is summarised in **Table 9**.

**Table 9: Inbound Truck Calculation**

Operational Parameters	HRV – Skip Bin Truck	Truck & Dog, Semi-trailer or B-double	Equation Reference
Waste Input Capacity	300,000T per year		[A]
Work Year	354 days (excludes public holidays)		[B]
Composition	70%	30%	[C]
Average Payload	4.4T	33.5T	[D]
Trucks per Day	135 inbound trucks per day	8 inbound trucks per day	$[E] = \frac{A}{B} \times C \div D$
Truck Movements during Daytime	80% (7am to 6pm)		[F]
Truck Movements during Nighttime	20% (6pm to 7am)		-
Inbound Trucks during Daytime	108 trucks during daytime	6 trucks during daytime	$[G] = E \times F$
Daytime Operational Hours	11 hours		[H]
Truck Inbound	10 inbound trucks per hour	1 inbound truck per hour	$[I] = G \div H$
<b>Total Number of Truck Movements</b>	<b>20 truck movements per hour (in and out combined)</b>	<b>2 truck movements per hour (in and out combined)</b>	$2 \times I$

### 9.2.3 Heavy Vehicle Trip Generation – Outbound

The number of outbound truck movements has been calculated in accordance with the waste output parameters provided by the operator of the site and is summarised in **Table 10**.

**Table 10: Outbound Truck Calculation**

Operational Parameters	Truck & Dog		Semi-trailer		Equation Reference
	Brick and Concrete	Heavy Waste	Light Waste	Metal	
Waste Output Capacity	60,000T per year	114,000T per year	114,000T per year	12,000T per year	[A]
Work Year	354 days (excludes public holidays)				[B]
Average Payload	35T		21T	15T	[C]
Trucks per Day	14 outbound trucks per day		18 outbound trucks per day		$[D] = \frac{A}{B + C}$
Truck Movements during Daytime	80% (7am to 6pm)				[E]
Truck Movements during Nighttime	20% (6pm to 7am)				-
Truck Movements during Daytime	11 outbound trucks during daytime		14 outbound trucks during daytime		$[F] = D \times E$
Daytime Operational Hours	11 hours				[G]
Truck Outbound	1 outbound truck per hour		1 outbound truck per hour		$[H] = F \div G$
<b>Total Number of Truck Movements</b>	<b>2 truck movements per hour (in and out combined)</b>		<b>2 truck movements per hour (in and out combined)</b>		$2 \times H$

#### 9.2.4 Cumulative Heavy Vehicle Trip Generation

Based on the detailed calculations having considered the proposed waste facility's input and output capacity as provided in **Table 8 and 9**, the proposed development results in the following heavy vehicle traffic generation potential:

- Articulated vehicle combinations:
  - 6 vehicle trips per hour in the morning peak period (3 in, 3 out); and
  - 6 vehicle trips per hour in the evening peak period (3 in, 3 out).
- Heavy rigid vehicles:
  - 20 vehicle trips per hour in the morning peak period (10 in, 10 out); and
  - 20 vehicle trips in the evening peak period (10 in, 10 out).
- Total heavy vehicle trips:
  - 26 vehicle trips per hour in the morning peak period (13 in, 13 out); and
  - 26 vehicle trips per hour in the evening peak period (13 in, 13 out).

#### 9.2.5 Cumulative Trip Generation

The combined staff and heavy vehicle generation of the proposed development can therefore be summarised as follows:

- 37 vehicle trips per hour during the AM peak period (22 in, 15 out); and
- 37 vehicle trips per hour during the PM peak period (15 in, 22 out).

### 9.3 Net Traffic Generation

Taking into account the existing approved industrial uses on site, the net traffic generation as a result of the proposed development can be summarised as follows:

- -9 vehicle trips per hour during the AM peak period (-6 in, -3 out); and
- -9 vehicle trips per hour during the PM peak period (-3 in, -3 out).

As seen from the above, the proposed development will result in a **net traffic generation reduction** during both the AM and PM peak periods.

Under a standard development application planning pathway, when a development has been demonstrated to generate minimal traffic (typically being less than 50 vehicle trips in the peak hour), and in this case, a net reduction of the traffic generation potential of the site, no further traffic modelling would be warranted to facilitate development approval from a transport planning perspective, and it would not be reasonable to impose external network improvements on the applicant to address existing road network deficiencies with or without background traffic growth, if any.

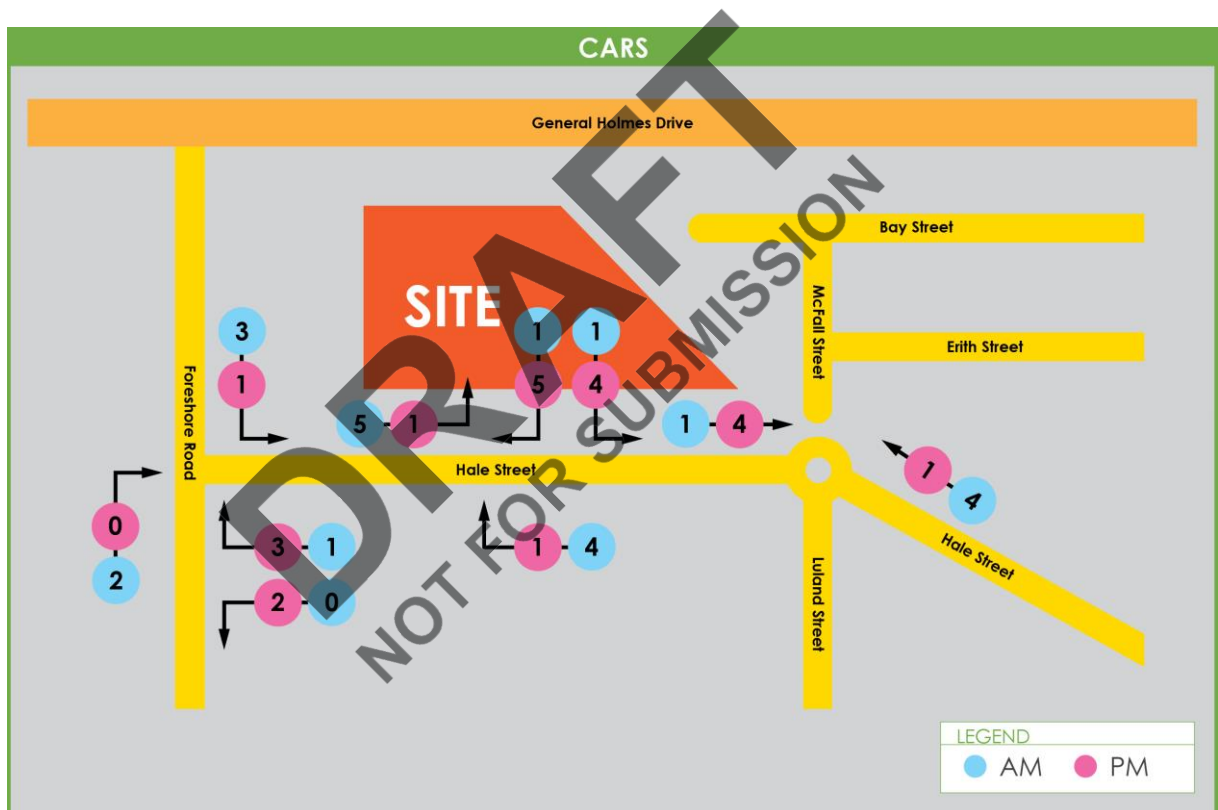
Notwithstanding, traffic modelling has been undertaken for the purposes of addressing the SEARs and subsequent comments received from the DPHI and Council, and is considered conservative in the instance where a proposed development results in a net reduction in the traffic generated by the site.

## 9.4 Traffic Distribution

### 9.4.1 Staff Trip Distribution

An analysis of the existing turning movements has been used to determine the future distribution of staff traffic to and from the proposed development.

In this regard the localised distribution of staff traffic at the key intersection in the vicinity of the site is summarised in **Figure 9**.

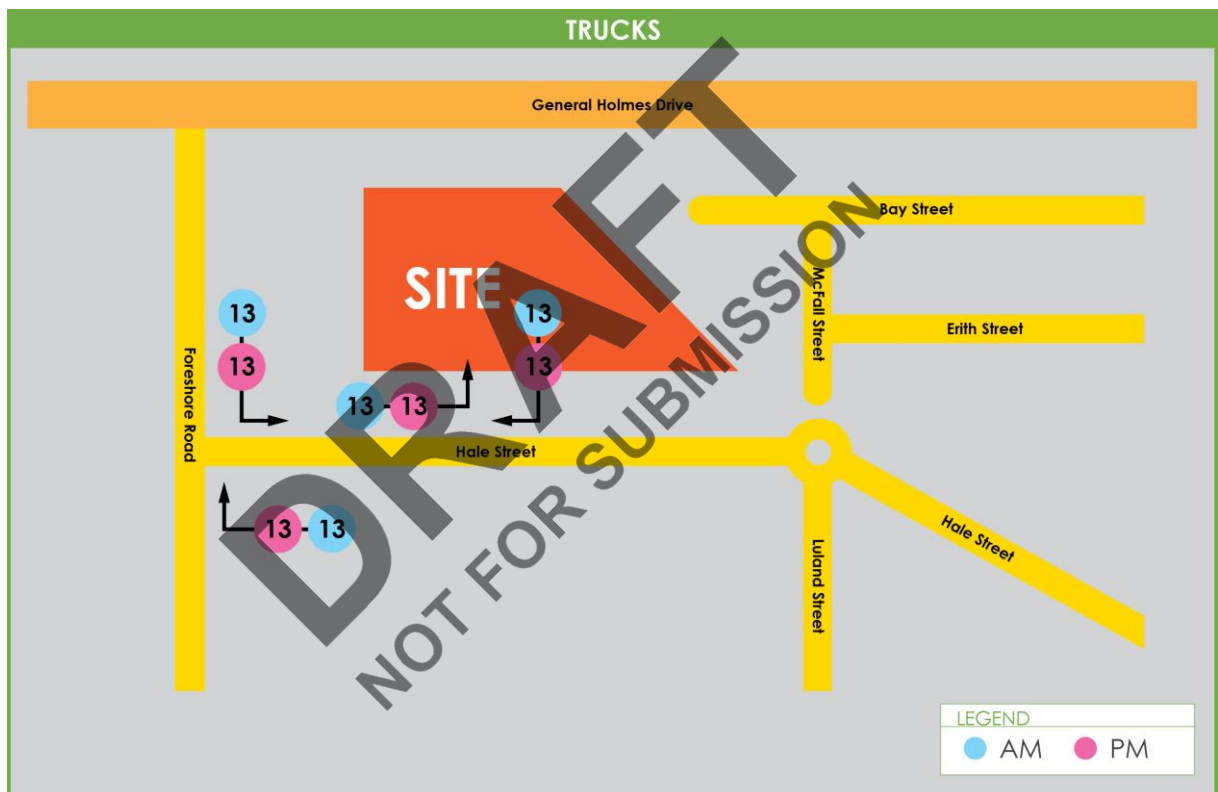


**Figure 9: Staff AM and PM Peak Hour Traffic Distribution**

**9.4.2 Heavy Vehicle Distribution**

The trip distribution of trucks arriving and departing during the peak hours has been determined by the proposed truck route which provides a connection to and from the M1. The traffic distribution has been split evenly between the westbound and eastbound route to the M1.

In this regard the localised distribution of heavy vehicle traffic at the key intersection in the vicinity of the site is summarised in **Figure 10**.



**Figure 10: Heavy Vehicle AM and PM Peak Hour Traffic Distribution**

## 9.5 Peak Period Intersection Performance

### 9.5.1 Critical Intersection

Reference is made to TfNSW's advice on EIS dated 30 August 2024 (TfNSW Reference: SYD24-00365/02) with the view that the proposed development is unlikely to have a significant impact on the classified road network.

Accordingly, the subsequent traffic modelling primarily concern the local road network comprising the following critical intersections for the purposes of assessing the traffic impacts of the proposed development:

- Foreshore Road and Hale Street; and,
- Hale Street and Luland Street as requested by DPHI and Council during the review process.

### 9.5.2 Traffic Surveys

Traffic surveys were initially obtained at the critical intersection of Hale Street and Foreshore Road on Tuesday the 24<sup>th</sup> of October 2023, during network peak periods between 7:00am to 9:00am and 4:30pm to 6:30pm.

Subsequent traffic surveys have also been collected at the intersection of Hale Street and Luland Street to address DPHI and Council concerns, and were undertaken on Wednesday the 18<sup>th</sup> September 2024, during network peak periods between 7:00am to 9:00am and 4:30pm to 6:30pm.

The traffic volumes in the above mentioned surveys formed the base case for modelling purposes to assess intersection performance characteristics under existing traffic conditions.

### 9.5.3 Traffic Modelling Scenarios

During the EIS assessment process, DPHI requested SIDRA modelling to be carried out to consider a future traffic scenario with a 10- year horizon that predicts the performance of key intersections.

In this regard, a conservative background traffic growth rate of 2.0% per annum over a 10 year period has been applied, which is consistent with the traffic assessment methodology of the recently approved State Significant Industrial Development at 2-8 Barker Street, Banksmeadow (SSD-48411467 )

Accordingly, the following scenarios were identified:

- 2023/2024 Base Case;
- Future Year Scenario (10 year horizon);
- 2023/2024 Base Case + Development; and,
- Future Year Scenario (10 year horizon) + Development.

### 9.5.4 SIDRA INTERSECTION Analysis

The SIDRA INTERSECTION model produces a range of outputs, the most useful of which are the Degree of Saturation (DoS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LoS) criteria. These performance measures can be interpreted using the following explanations:

**DoS** the DoS is a measure of the operational performance of individual intersections. As both queue length and delay increase rapidly as DoS approaches 1, it is usual to attempt to keep DoS to less than 0.9. When DoS exceeds 0.9 residual queues can be anticipated, as occurs at many major intersections throughout the metropolitan area during peak periods. In this regard, a practical limit at 1.1 can be assumed. For intersections controlled by roundabout or give way / stop control, satisfactory intersection operation is generally indicated by a DoS of 0.8 or less.

**AVD** the AVD for individual intersections provides a measure of the operational performance of an intersection. In general, levels of acceptability of AVD for individual intersections depend on the time of day (motorists generally accept higher delays during peak commuter periods) and the road system being modelled (motorists are more likely to accept longer delays on side streets than on the main road system).

**LoS** this is a comparative measure which provides an indication of the operating performance of an intersection as shown in **Table 11**.

**Table 11: Intersection Performance Indicators (TfNSW)**

Level of Service (LoS)	Average Delay per Vehicle (secs/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 and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode	At capacity and requires other control mode
F	More than 70	Unsatisfactory and requires additional capacity.	Unsatisfactory and requires other control mode or major treatment.

### 9.5.5 Hale Street and Foreshore Road Intersection

A summary of the SIDRA results for the intersection of Hale Street and Foreshore Road is provided in **Table 12**, reference should also be made to the SIDRA outputs provided in **Appendix C** which provide detailed results for each movement.

**Table 12: Hale Street / Foreshore Road SIDRA INTERSECTION Modelling Results**

Intersection	Control Type	Scenario	Peak Period	DoS	AVD	LoS
Hale Street and Foreshore Road	Signalised	Base Case	AM	1.041	31.5s	C
			PM	0.714	7.8s	A
		Base Case + Development	AM	1.041	32.0	C
			PM	0.740	8.4	A
		Future Year	AM	0.965	15.8	B
			PM	0.903	11.0	A
		Future Year + Development	AM	0.995	23.3	B
			PM	0.903	11.8	A

It can be seen from **Table 12** that, even taking into consideration a conservative 2% background traffic growth rate, the critical intersection of Hale Street and Foreshore Road is expected to operate satisfactorily under all assessment scenarios at satisfactory LoS C or better specifically noting that the signal time has been equalised to increase output of Hale Street to address Council concerns which may not reflect real life conditions and agreeable by TfNSW. In any event, the potential traffic reduction as a result of the proposed development could not be expected to impact the operation of the intersection.

Notwithstanding, it is appreciated that the Hale Street approach worsens to a LoS E and F during the future year scenario AM and PM peak period respectively, with or without the development as summarised in **Table 13**. On this basis, the onus should not be placed on the developer to address deterioration of a minor approach of a critical intersection primarily attributed to background traffic growth on the classified road network carrying substantial volume of traffic contributing to increased queues and delays on the lower order road,

especially in the circumstances where the proposed development has been assessed to result in a net reduction in terms of the traffic generated by the site.

**Table 13: Hale Street Approach SIDRA INTERSECTION Modelling Results**

Intersection	Control Type	Scenario	Peak Period	95 <sup>th</sup> Back of Queue	AVD	Level of Service
Hale Street Approach (Hale Street and Foreshore Road)	Signalised	Future Year	AM	103.4m	141.7s	F
			PM	78.1m	58.4s	E
		Future Year + Development	AM	123.6m	148.6s	F
			PM	97.5m	66.3s	E

The TfNSW Modelling Guidelines, Version 1.0, Table 14.3 specifies LoS definition used in NSW and notes that for traffic signals, the average movement delay and level of service over all movements should be taken. It should also be noted that capacity of the classified road network is prioritised, and a certain level of delay and queuing is to be expected for the lower order roads (i.e. local roads), especially in the context of determining development or road infrastructure project approvals.

On the above basis, no external infrastructure improvements (intersection upgrades etc.) are required at the Hale Street and Foreshore Road from a transport planning perspective to accommodate the proposed development.

**9.5.6 Hale Street and Luland Street Intersection**

A summary of the SIDRA results for the intersection of Hale Street and Luland Street is provided in **Table 14**, reference should also be made to the SIDRA outputs provided in **Appendix C** which provide detailed results for each movement.

**Table 14: Hale Street / Luland Street SIDRA INTERSECTION Modelling Results**

Intersection	Control Type	Scenario	Peak Period	DoS	AVD	LoS
Hale Street and Luland Street	Roundabout	Base Case	AM	0.417	5.0s	A
			PM	0.290	4.4s	A
		Base Case + Development	AM	0.417	5.0s	A
			PM	0.293	4.5s	A
		Future Year	AM	0.502	5.2s	A
			PM	0.352	4.5s	A
		Future Year + Development	AM	0.503	5.2s	A
			PM	0.356	4.6s	A

It can be seen from **Table 14** that, even taking into consideration a conservative 2% background traffic growth rate, the critical intersection of Hale Street and Luland Street is expected to operate satisfactorily under all assessment scenarios at satisfactory LoS A, and the potential traffic reduction as a result of the proposed development could not be expected to impact the operation of the intersection.

In addition to the above, detailed SIDRA movement summary output identifies a maximum 95<sup>th</sup> percentile queue of 22.1m during road network peak periods under existing plus development scenarios, and a maximum 95<sup>th</sup> percentile queue of 31.1m during road network peak periods under future (10 year horizon) plus development scenarios. The proposed site egress driveway being positioned approximately 32m away from the Luland Street west approach to the roundabout will therefore not have any interaction with the modelled 95<sup>th</sup> percentile queue and will operate safely and efficiently.

On the above basis, no external infrastructure improvements (intersection upgrades etc.) are required at the Hale Street and Luland Street intersection from a transport planning perspective to accommodate the proposed development.

**9.5.7 Hale Street and Site Access Driveways Intersections**

A summary of the SIDRA results for the intersection of Hale Street and Site Access Driveways Intersections are provided in **Table 15**, reference should also be made to the SIDRA outputs provided in **Appendix C** which provide detailed results for each movement.

**Table 15: Hale Street and Site Access Driveways SIDRA INTERSECTION Modelling Results**

Intersection	Control Type	Scenario	Peak Period	DoS	AVD	LoS
Hale Street and LV Access Driveway	Priority	Base Case + Development	AM	0.150	8.1s	A
			PM	0.196	36.5s	C
Hale Street and HV Access Driveway			AM	0.173	44.5	D
			PM	0.161	40.7	C

It can be seen from **Table 15** that both site access driveways are expected to operate satisfactorily under the assessment scenarios at satisfactory LoS D or better, it is specifically noted that this is assessment is based on the worse movement, being the site access approach, and the proposed development will have no notable traffic impacts to Hale Street which has been demonstrated to operate at LoS A under all scenarios.

Furthermore, the level of service of a vehicular egress driveway is wholly contained within the site and could not be expected to impact the capacity and safety implications on the frontage road network.

On the above basis, the site access driveways will satisfactorily accommodate the proposed development.

## 9.6 Construction Traffic Volumes

Estimated construction traffic volumes has been provided by the client in consultation with a Construction Company and has been summarised in **Table 16** below.

**Table 16: Estimated Construction Traffic Volumes**

Key Construction Phases	Light vehicle movements (in and out combined)		Heavy vehicle movements (in and out combined)	
	per day	max. per hour	per day	max. per hour
Phase 1 - Civil and Enabling works	20 to 50	5 <sup>(i)</sup>	2 to 54	5 <sup>(i)</sup>
Phase 2 - Structural Construction and Envelope	70	28 <sup>(ii)</sup>	44	4 <sup>(i)</sup>
Phase 3 - Base Build Service and Fit-Out	76	28 <sup>(ii)</sup>	48	4 <sup>(i)</sup>

(i). Based on averaging truck movements over normal construction hours between 7am to 6pm (total 11 hours).  
(ii). Based on actual peak provided by the Construction Company which is expected to occur around 7am and 5pm.

Given the anticipated combined light and heavy construction traffic volumes being less than the operational traffic of the existing approved development on the site as assessed in **Section 9.1** of this report, it is therefore reasonable to conclude the surrounding road network can satisfactorily accommodate this volume of traffic.

## 9.7 Cumulative Impacts

The NSW Department of Planning, Housing and Infrastructure (DPHI) published the Cumulative Impact Assessment Guidelines for State Significant Projects in July 2021. The Guidelines require the cumulative assessment of relevant projects to determine their combined cumulative impacts on the operation of the nearby transport network and recommend suitable mitigation measures to address any impacts.

The Guideline sets out criteria for the identification of relevant projects. Applying these criteria a review of the NSW Planning Portal has identified multiple State Significant Developments in the vicinity of the subject site. These projects are detailed in **Table 17**.

**Table 17: Nearby Major Projects**

Application No.	Type	Address	Proposal	Status
SSD-59024711	SSD Application	350 King Street, Mascot	Construction of multilevel warehouse and distribution centre	Prepare EIS
SSD-11508731	SSD Application	121 Robey Street, Mascot	Mixed use developing comprising a hotel, office space, and other uses	Preparing EIS
SSD-5855-Mod-2	SSD Application	34 & 36 McPherson Street, Banksmeadow	Road transport of putrescible waste to the Woodlawn Eco Precinct and/or Lucas Heights Resource Recovery Park during railway shutdowns and road transport of Food, Organics and Garden Organics (FOGO) waste to a processing facility in Forbes, NSW	Approved
SSD-48411467	SSD Application	2-8 Baker Street, Banksmeadow	Construction and operation of a multi-level warehouse and distribution facility.	Approved

Application No.	Type	Address	Proposal	Status
SSD-49734709	SSD Application	297 King Street, Mascot	Construction and operation of a multi-level warehouse and distribution centre, with ancillary office spaces, car parking and landscaping.	Response to Submission

A review of the impacts of the above projects has been undertaken and the following has been found:

- **SSD-59024771** is an SSD project for the construction and operation of a multi-level warehouse facility which received SEARS in July 2023. No Transport Impact Assessment is available for review, however, the proposed development would not directly impact the development as the site is accessed via roads some 3.5-kilometres away from the site and the likelihood of crossover trips in the immediate vicinity of the site is very unlikely.
- **SSD-11508731** is an SSD project for the construction of a mixed-use development which received SEARS in December 2023. No Transport Impact Assessment is available for review; however, the proposed development would not directly impact the development as the site is accessed via roads some 3-kilometres away from the site and the likelihood of crossover trips in the immediate vicinity of the site is very unlikely.
- **SSD-5855-Mod-2** is an approved development for a waste transfer centre at 34-36 McPherson Street and 14 Beauchamp Road, Banksmeadow. The development when during construction would utilise the Foreshore Road/Botany Road for site access. A review of the Traffic Impact Assessment submitted with the proposal identifies that approximately 6 additional truck and dogs will travel past the intersection of Hale Street and Foreshore Road. Given that the future level of service has been revealed to operate at LOS A, the minor increase in through traffic volumes on the major approach of the road could not be expected to result in any negative implications in terms of road network capacity.

- **SSD-48411467** is an approved SSD project for the construction and operation of a multilevel warehouse and distribution facility which received approval in December 2023. A review of the proposed development indicates that it would not directly impact the development as vehicular traffic associated with the site will access/egress via Wentworth Avenue, it is reasonable to conclude that the likelihood of crossover trips in the immediate vicinity of the site is very unlikely.
- **SSD-48411467** is an SSD project for the construction and operation of a multilevel warehouse and distribution facility which is currently at the response to submissions stage. A review of the proposed development indicates that it would not directly impact the development as vehicular traffic associated with the site will access/egress via roads that are approximately 4-kilometres away from the site, it is reasonable to conclude that the likelihood of crossover trips in the immediate vicinity of the site is very unlikely.

Based on the above assessment, it is considered that the cumulative traffic impacts of the proposal would result in minimal and acceptable impacts on the surrounding road network.

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NOT FOR SUBMISSION

## 9.8 Queuing Assessment

Reference to the traffic generation assessment provided in **Section 9.2.2 and 9.2.3** reveal the site is expected to generate 13 inbound truck movements and 13 outbound truck movements during the busiest hour, corresponding to an average of one (1) vehicle every 4.6 minutes, noting only six (6) of those in and out vehicle movements are comprised of articulated vehicle combinations.

The future operator of the site has provided a breakdown of the operational process as summarised in **Table 17** indicating the total dwell time for a HRV on site is less than seven (7) minutes and the total dwell time of a B-double vehicle on site is approximately 10 minutes.

**Table 17: Truck On Site Dwell Times**

Activity	Time – HRV	Time – B-Double
<b>Arrival</b>		
Arrive on site, visual inspection carried out by spotter, then directed to weighbridge	Less than 30 seconds	Less than 1 minute
Weighbridge	Less than 30 seconds	Less than 30 seconds
<b>Waste Sorting</b>		
Proceed into warehouse, manoeuvre into position for tip face	Less than 1 minute	Less than 2 minutes
Tip and spread of material	1 minute	2-3 minutes
Visual inspection of spread load	1 minute	2 minutes
<b>Departure</b>		
Proceed to weighbridge (noting already manoeuvred into exit position)	30 seconds	30 seconds
Weighbridge	Less than 30 seconds	Less than 30 seconds
<b>Total</b>	<b>Less than 7 minutes</b>	<b>Approx. 10 minutes</b>

Accordingly, a queuing analysis has been undertaken using the following conservative parameters:

- All vehicles have been assumed to comprise 25/26m B-doubles;
- All vehicles have been assumed to have an average dwell time of 10 minutes; and,
- The site has the capacity to accommodate up to seven (7) × 25/26m B-double vehicles at any one time as demonstrated in the swept path analysis provided in **Appendix E**.

The queueing analysis has been undertaken in accordance with conventional queuing theory published in Section 4.4 of Austroads Guide to Traffic Management Part 2, Traffic Theory Concepts 2020, and is provided in **Appendix D** revealing the following:

- The site has been designed to satisfactorily accommodate the 98<sup>th</sup> percentile queue expected on site under extremely conservative assessment assumptions, and that it is statistically improbable for any vehicles to queue beyond the site on Hale Street, being less than 0.008%.

On the above basis, all nominal queuing demands is expected to be satisfactorily accommodated entirely within the site under extremely conservative operational conditions, and the development is expected to operate satisfactorily without impacting the operation of Hale Street.

## 10. ACCESS AND INTERNAL DESIGN ASPECTS

### 10.1 Site Vehicular Access

#### 10.1.1 Carpark Access

The development proposes less than 100 parking spaces with access to Hale Street, a local access road. It will therefore require a Category 1 driveway under AS2890.1 (2004), being a combined entry and exit width of 3.0 to 5.5 metres. In response, a minimum 5.5 metre driveway has been provided for the light vehicle entry to site.

The proposed light vehicle access driveway has been provided separate to the heavy vehicle access driveway to improve road user safety by segregating light and heavy vehicle movements.

The proposed light vehicle driveway is located at least 6 metres away from either Foreshore Road and Luland Street in accordance with AS 2890.1 (2004).

#### 10.1.2 Truck Access

A new approximate 29 metres wide access driveway at the property boundary is proposed to satisfactorily accommodate the manoeuvring requirements of a 25/26m B-double vehicle to safely access and egress the site, and will be restricted to truck entry/exit movements only.

A future operation plan of management is to be implemented by the operator to restrict trucks to left-in and right-out only movements, and will be achieved through the following:

- NO RIGHT TURN sign on both sides of Hale Street facing westbound traffic;
- NO LEFT TURN sign on the exit driveway;
- All staff including sub-contractors would be required to undergo a site induction which will detail the permitted access routes to and from the site;
- The site manager will be responsible for managing all site access points and monitoring subcontractor behaviour and subcontractor truck access arrangements to ensure compliance with conditions of the contract; and,

- All phone enquiries will be advised of site entry restrictions.

The operator has advised that the target catchment area for the proposed C & D waste management facility is the southern Sydney region as well as the CBD. Therefore, the large majority of approaching traffic can only be expected to arrive/depart by General Holmes Drive / Foreshore Road and there is no reason for vehicles to arrive or depart via Botany Road.

Reference should also be made to the swept path analysis provided in **Appendix E** demonstrating satisfactory and safe vehicle movements at the proposed access in accordance with AS 2890.2 (2018).

## 10.2 Internal Design

The internal car park complies with the requirements of AS2890.1 (2004), AS2890.2 (2018) and AS2890.6 (2022), and the following characteristics are noteworthy:

### 10.2.1 Parking Modules

- All standard car parking spaces have been designed in accordance with User Class 2. These spaces are provided with a minimum space length of 5.4m, a minimum width of 2.5m and a minimum aisle width of 5.8m.
- All spaces located adjacent to obstructions of greater than 150mm in height are provided with an additional width of 300mm.
- Dead-end aisles are provided with the required 1.0m aisle extension in accordance with Figure 2.3 of AS2890.1 (2004).
- All accessible parking spaces have been designed in accordance with AS 2890.6 (2009), being 2.4m wide, 5.4m long and situated immediately adjacent to a dedicated shared area of the same dimension. Dedicated shared area bollard is to be located 750mm-1750mm from end of the shared area.
- Wheel stops is to be positioned 820mm from front of parking space in accordance with Figure 2.6 of AS2890.1.

### **10.2.2 Loading**

- Service and manoeuvring areas have been designed in accordance with AS2890.2 (2018) for articulated vehicles up to and including 26m B-doubles.
- A minimum clear head height of 4.5 metres is to be provided for all trafficable areas of the service vehicles, as required under AS2890.2 (2018).

### **10.2.3 Other Considerations**

- Visual splay has been provided at the access driveway in accordance with Figure 3.3 of AS 2890.1 (2004).
- Whilst TRAFFIX can appreciate the request from Council to undertake swept path analysis for each and every car space, it is unnecessary in the circumstance where the proposed car parking layout is in full compliance with AS2890.1 (2004) dimensional requirements, also noting Clause B4.4 of AS2890.1 (2004) specifically acknowledges that drivers can manoeuvre vehicles within smaller spaces than swept turning paths would suggest.

## **10.3 Summary**

In summary, the internal configuration of the car parking and loading/serving areas has been designed in accordance with AS2890.1 (2004), AS2890.2 (2018) and AS2890.6 (2022). It is however envisaged that a condition of consent would be imposed requiring compliance with these standards and as such any minor amendments considered necessary (if any) can be dealt with prior to the release of a Construction Certificate.

## 11. CONCLUSIONS

In summary:

- The proposal seeks approval for a C&D waste transfer facility at 2-4 Hale Street, Botany. The waste transfer facility will process up to a total 300,000 tonnes of waste per annum and is proposed to operate 24 hours, seven (7) days a week.
- The proposed development provides two (2) separate vehicular access driveways off Hale Street safe site operations by segregating light and heavy vehicle movements.
- The proposed development provides 15 car parking spaces within an at-grade carpark comprising 11 staff spaces and four (4) visitor spaces in accordance with Council's post-lodgement requirements, and is superior to the nominal parking demands expected to be generated by the proposed development based on current JTW data.
- An off-street car parking assessment has been undertaken for the existing uses of the site and reveal the proposal is expected to contribute to a net reduction in the on-street parking demand in the order of up to 12 car spaces (i.e. existing car parking credit of 17 car spaces less the loss of 5 on-street car spaces). Accordingly, the proposed development is expected to result in a net positive parking outcome, ensuring that all parking needs are met without reliance on Hale Street. As a result, the development will significantly alleviate pressure on existing on-street parking on Hale Street, contributing to a substantial improvement in the availability and management of street parking in the area.
- The proposed development provides 10 bicycle spaces and one (1) motorcycle space on site, in accordance with Bayside DCP 2022 requirements.
- The proposed development provides two in-ground weighbridges. The weighbridges are located well within the site providing ample space for on-site queuing, noting the modest hourly truck arrivals.
- The future operator is to implement a plan of management to require all heavy vehicles to arrive/depart via General Holmes Drive (M1), such that no heavy vehicles are permitted to access the site from the east via Hale Street east of Luland Street or Luland Street. This is to be enforced by appropriate turn restriction signages in the vicinity of the heavy vehicle access driveway.

- Traffic generation arising from the proposal has been assessed having regard for the proposed site operations and results in a net traffic generation reduction during both the AM and PM peak periods. Notwithstanding, conservative SIDRA modelling has been undertaken for existing and future year (10 year horizon) scenarios demonstrating all key intersections will operate satisfactorily at LoS C or better with spare capacity. As such, no external infrastructure improvements (intersection upgrades etc.) are required from a transport planning perspective to accommodate the proposed development.
- Construction traffic impacts has been assessed to be less than the operational traffic of the existing approved development on the site, it is therefore reasonable to conclude the surrounding road network can satisfactorily accommodate this volume of traffic.
- A cumulative traffic impact assessment has been undertaken in accordance with DPHI Guidelines and reveal the proposal would result in minimal and acceptable impacts on the surrounding road network.
- A crash analysis has been undertaken for the most recent five (5) year period between 2019 and 2023 and reveal no clear indication of recurring crash themes with no indication of any existing underlying road safety issues. The proposed development, which has been assessed to result in a net reduction in the traffic generation potential of the site, could not be expected to contribute to any notable change in relation to the number of crashes in the vicinity of the site.
- A queuing analysis has been undertaken in accordance with conventional queuing theory under extremely conservative operational conditions and reveal the site has been designed to satisfactorily accommodate the 98<sup>th</sup> percentile queue, and that it statistically improbable for any vehicles to queue beyond the site on Hale Street, being less than 0.008%.
- The internal configuration of the car parking and loading/serving areas has been designed in accordance with AS2890.1 (2004), AS2890.2 (2018) and AS2890.6 (2022) to ensure safe and efficient operation.
- The proposed servicing/loading areas have been satisfactorily designed to accommodate the largest design vehicle up to and including a 26m B-double in accordance with AS2890.2 (2018).

- Swept path analysis has been undertaken the largest design vehicle being a 26m B-double, demonstrating satisfactory ingress/egress in accordance with AS 2890.2 (2018).

This traffic impact assessment therefore demonstrates that the subject application is supportable on traffic planning grounds. TRAFFIX anticipates an ongoing involvement during the development approval process.

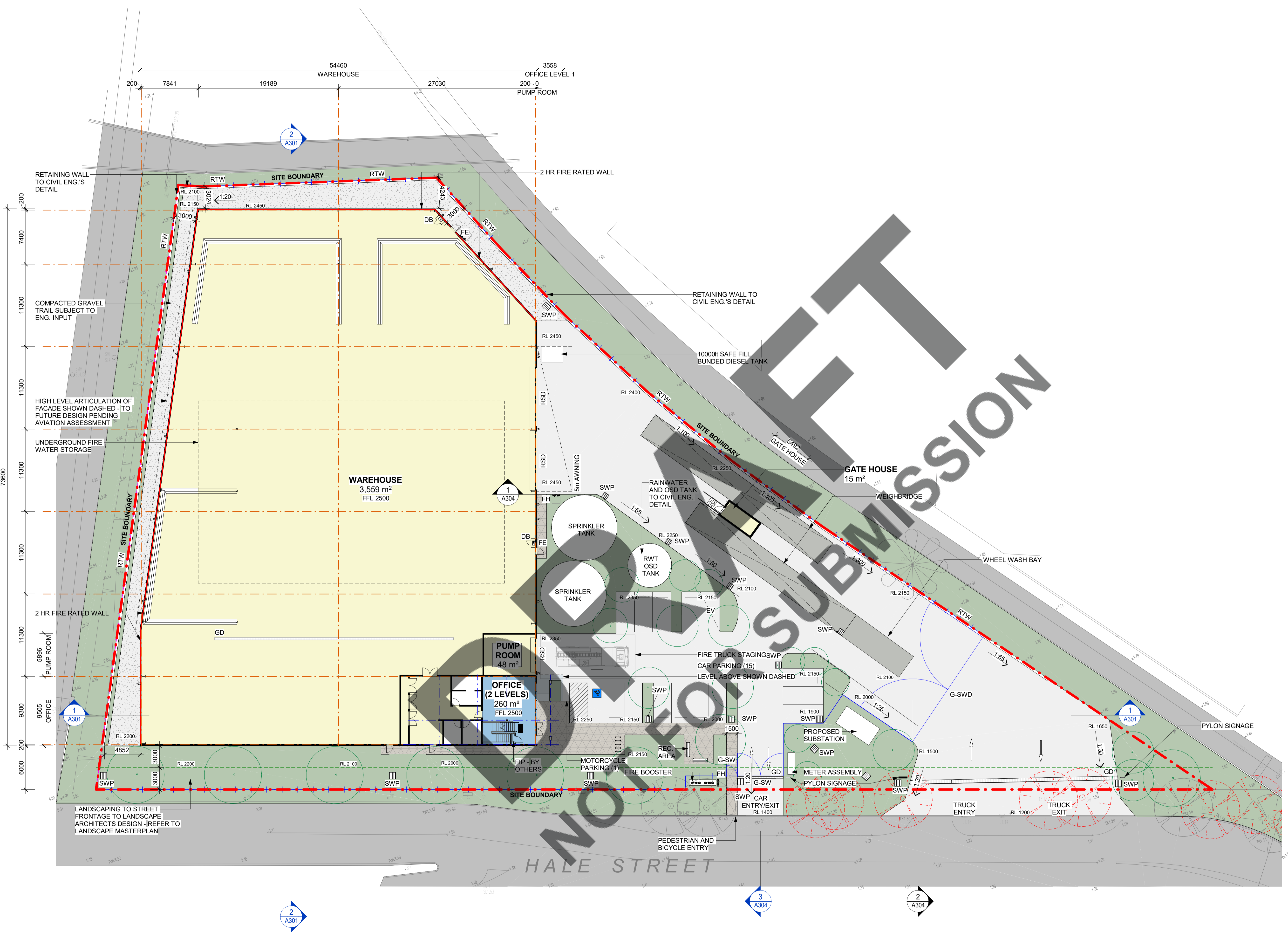
**DRAFT**  
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## APPENDIX A

Reduced Plans

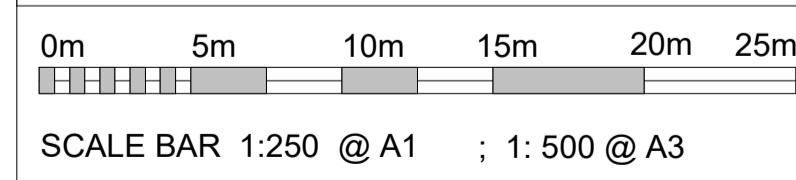


DEVELOPMENT AREA SCHEDULE	
<b>SITE AREA</b>	<b>7,439 m<sup>2</sup></b>
WAREHOUSE	3,559 m <sup>2</sup>
OFFICE - GROUND FLOOR - FIRST FLOOR	260 m <sup>2</sup> (60 m <sup>2</sup> ) (200 m <sup>2</sup> )
GATEHOUSE	15 m <sup>2</sup>
PUMP ROOM	48 m <sup>2</sup>
<b>TOTAL BUILDING AREA</b>	<b>3,882 m<sup>2</sup></b>
TOTAL PARKING PROVIDED	15 SPACES

LEGEND	
	SITE BOUNDARY
	LANDSCAPE SETBACK
	FNC-1: 2.1 M PALISADE FENCE
	FNC-2: 2.1 M CHAINLINK FENCE
	WAREHOUSE
	LOADING ZONE
	OFFICE
	HEAVY DUTY PAVEMENT
	LIGHT DUTY PAVEMENT
	COMPACTED GRAVEL TRAIL
	PEDESTRIAN PAVEMENT
	LANDSCAPING
	PROPOSED TREE TO LANDSCAPE DETAIL
	TREE RETAINED
	TREE REMOVED

ABBREVIATION	
DB	DISTRIBUTION BOARD
EV	ELECTRIC VEHICLE PARKING
FE	FIRE EXIT DOOR
FH	FIRE HYDRANT
G-SW	GATE SINGLE (SWING)
G-SWD	GATE DOUBLE (SWING)
RSD	ROLLER SHUTTER DOOR
GD	GRATED DRAIN

- NOTES**
- ALL LEVELS AND EXTENTS ARE INDICATIVE & SHOULD BE READ IN CONJUNCTION WITH CIVIL ENG. DWGS FOR FINAL LEVELS OF ALL EARTH WORKS AND EXCAVATION.
  - ALL LANDSCAPING TO LANDSCAPE ARCHITECT'S DETAILS.
  - ALL INFORMATION SUBJECT TO DETAILED DESIGN AND ENGINEERING INPUT.
  - HYD, MECH, ELECTRICAL, AND FIRE ELEMENTS ARE INDICATIVE ONLY.
  - ALL MEASUREMENTS OF EXISTING STRUCTURES ARE APPROXIMATE ONLY, AND TO BE CONFIRMED ON SITE.
  - TENANT FITOUT ITEMS SHOWN BLUE.



Issue	Description	Date	By	QA
D	Development Application	23.02.2024	CL	MF
E	Development Application Updates	01.03.2024	CL	MF
F	Development Application Updates	07.03.2024	CL	MF
G	Development Application Updates	13.03.2024	CL	MF
H	Development Application	15.03.2024	CL	MF
J	Development Application	22.03.2024	CL	MF
K	Development Application - Tree Updates	03.04.2024	CL	MF
L	Issue for Information	11.10.2024	PY	MF
M	Issue for Information	03.11.2024	PY	MF
N	Issue for Information	03.12.2024	PY	MF

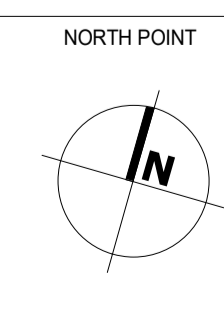


STRATEGY | DESIGN | DELIVERY  
ACN: 002 033 801 ABN: 29 317 825 875  
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Website: www.reidcampbell.com

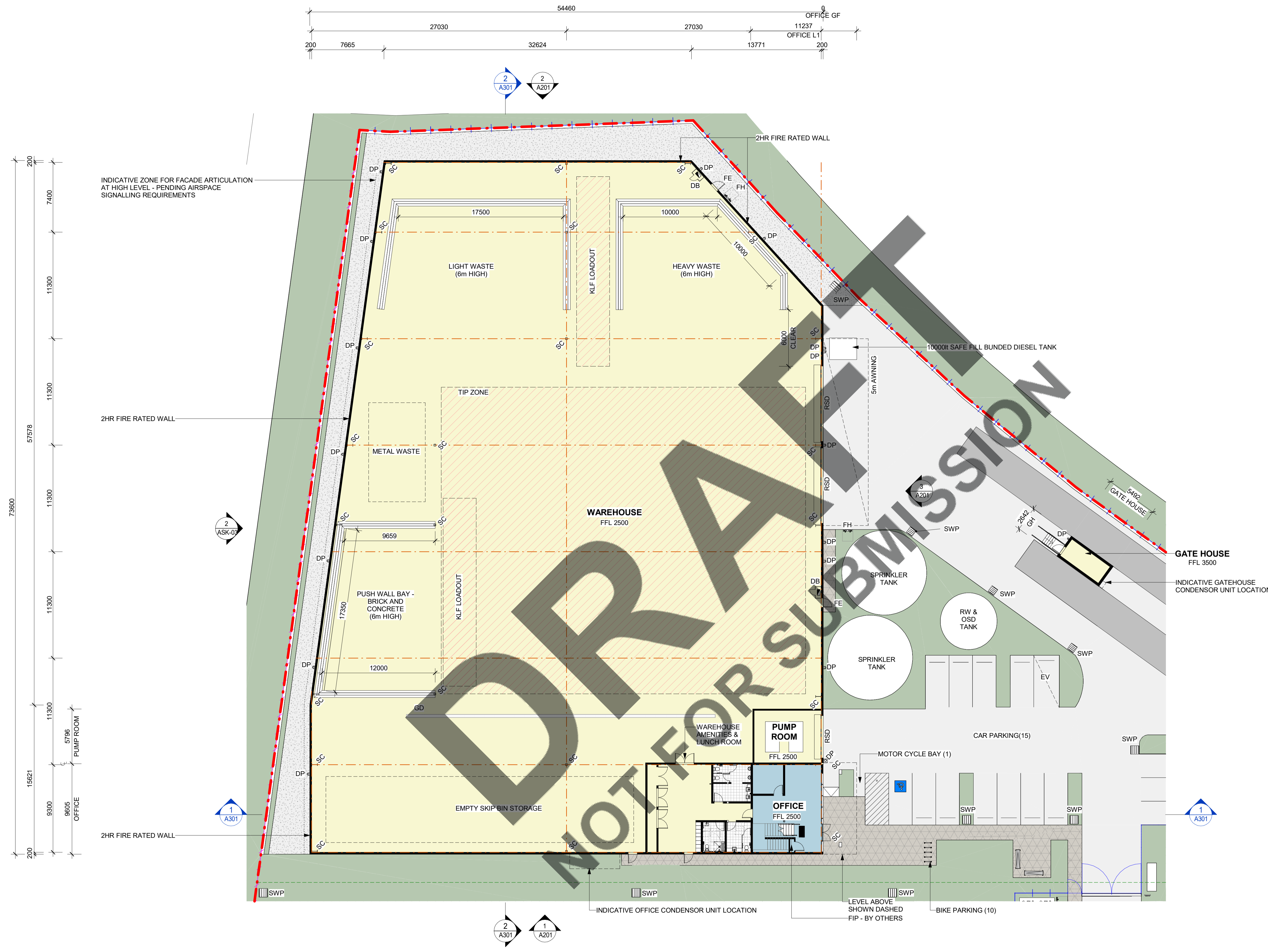
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PROJECT MANAGER  
PROJECT  
WASTE MANAGEMENT FACILITY  
2-4 HALE ST, BOTANY  
Drawn DT  
Checked LA  
PRINT DATE  
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Drawing Title  
**SITE PLAN**  
SHEET NUMBER  
**1220011\_A005**  
ISSUE  
**N**



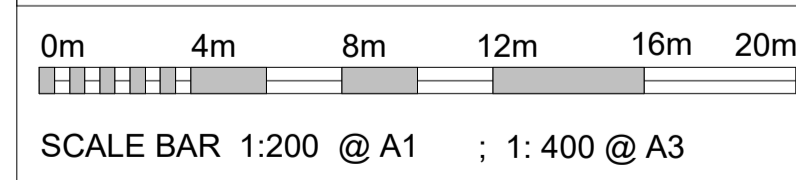
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- SITE BOUNDARY
- LANDSCAPE SETBACK
- FNC-1: 2.1 M PALISADE FENCE
- FNC-2: 2.1 M CHAINLINK FENCE
- WAREHOUSE
- LOADING ZONE
- OFFICE
- HEAVY DUTY PAVEMENT
- LIGHT DUTY PAVEMENT
- COMPACTED GRAVEL TRAIL
- PEDESTRIAN PAVEMENT
- LANDSCAPING
- PROPOSED TREE TO LANDSCAPE DETAIL
- TREE RETAINED
- TREE REMOVED

**ABBREVIATION**

DB	DISTRIBUTION BOARD
DP	DOWN PIPE
EV	ELECTRIC VEHICLE PARKING
FE	FIRE EXIT DOOR
FH	FIRE HYDRANT
RSD	ROLLER SHUTTER DOOR
SC	STRUCTURAL COLUMN
SWP	STORM WATER PIT
GD	GRATED DRAIN

- NOTES**
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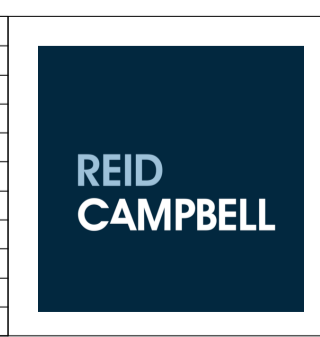


**Notes**

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- Contractor to verify all dimensions on site before commencing work.
- Report all discrepancies to project manager prior to construction.
- Figured dimensions to be taken in preference to scaled drawings.
- All work is to conform to relevant Australian Standards and other Codes as applicable, together with other Authorities' requirements and regulations.

Michael Morony NSWARB No. 8218. QLD Reg. No. 5852. ARBV No. VIC00002. APBSA No. s3931. WA00026

Issue	Description	Date	By	QA
A	Issue for Information	05.01.2024	RCI	LA
B	Issue for Information	16.02.2024	RCI	SW
C	Development Application	23.02.2024	CL	MF
D	Development Application Updates	07.03.2024	CL	MF
E	Development Application Updates	13.03.2024	CL	MF
F	Development Application	15.03.2024	CL	MF
G	Development Application	22.03.2024	CL	MF
H	Issue for Information	11.10.2024	PY	MF
J	Issue for Information	03.11.2024	PY	MF
K	Issue for Information	03.12.2024	PY	MF



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# DEVELOPMENT APPLICATION

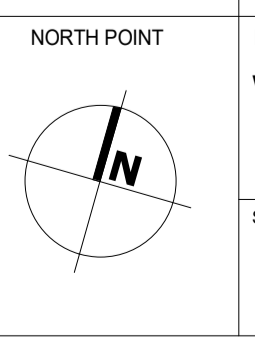


CLIENT

PROJECT MANAGER

PROJECT  
WASTE MANAGEMENT FACILITY  
2-4 HALE ST, BOTANY

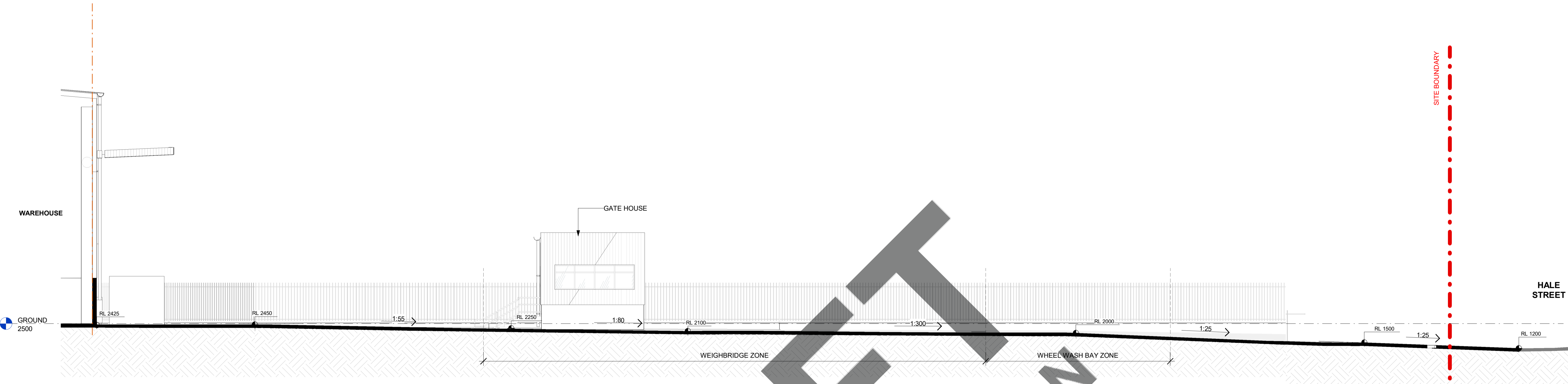
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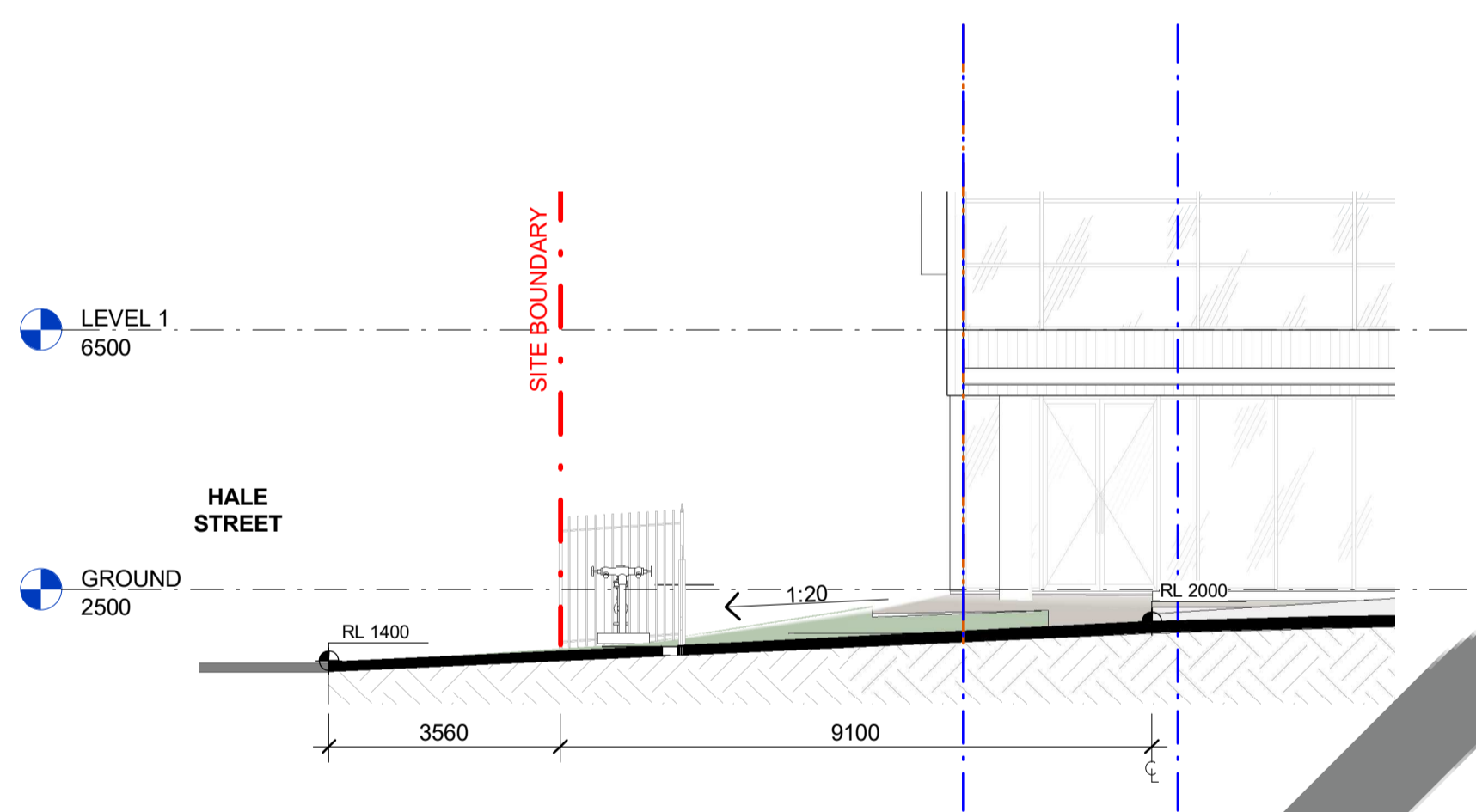
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SHEET NUMBER  
**1220011\_A101**

ISSUE  
**K**



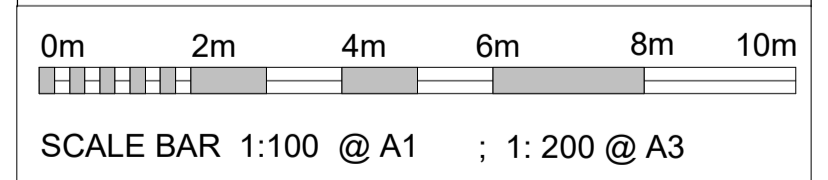
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1 : 100



3 CAR DRIVEWAY SECTION  
1 : 100

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- NOTES**
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Issue	Description	Date	By	QA
A	Issue for Information	03.12.2024	PY	MF



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Email: sydney@reidcampbell.com  
Website: www.reidcampbell.com

DEVELOPMENT  
APPLICATION



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PROJECT MANAGER

PROJECT  
WASTE MANAGEMENT  
FACILITY  
2-4 HALE ST, BOTANY

Drawn Checked PRINT DATE  
Author Approver/2024 5:02:49 PM

NORTH POINT  
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Drawing Title  
**DRIVEWAY SECTION**

SHEET NUMBER  
**1220011\_A304**

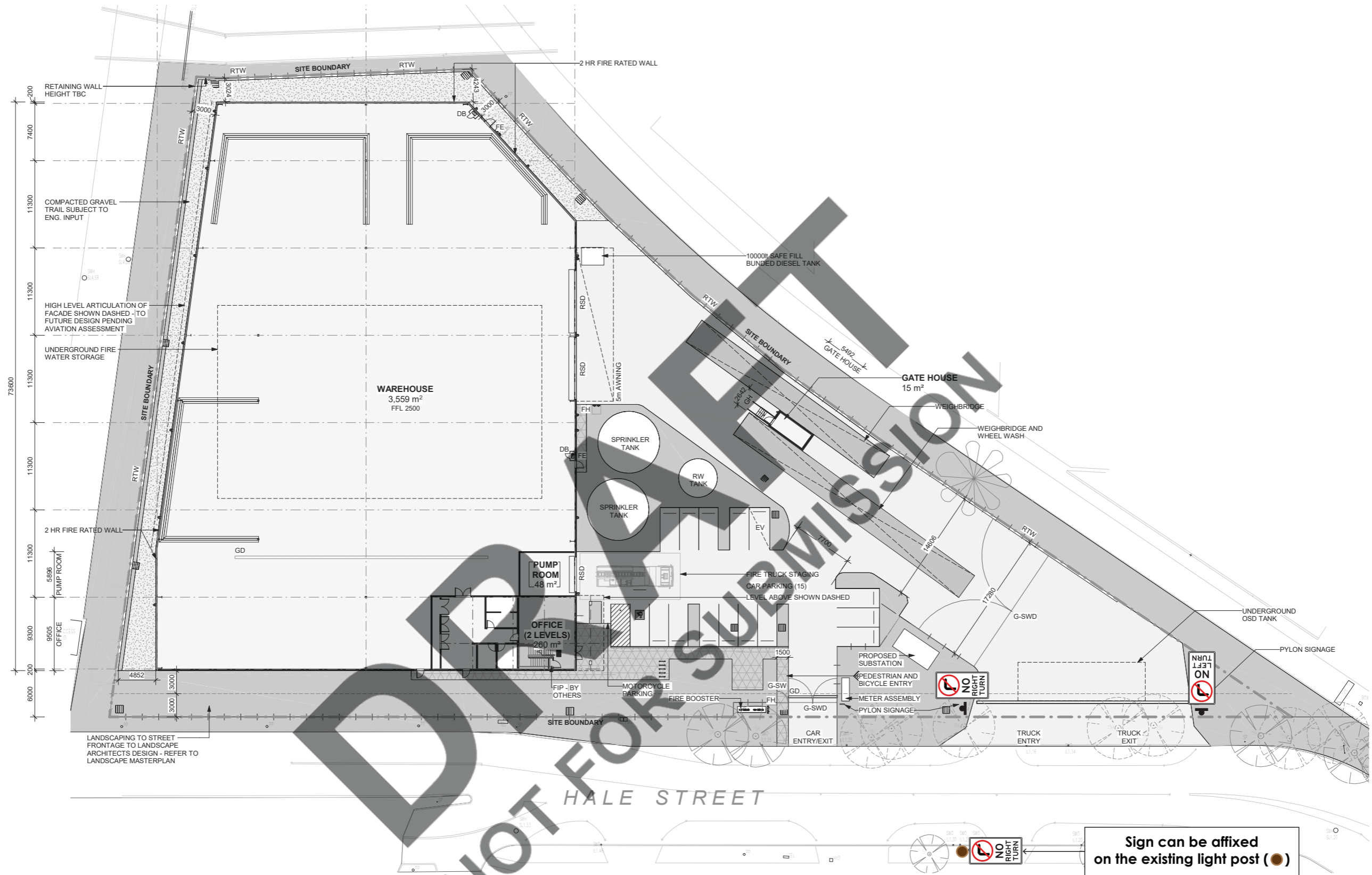
ISSUE  
**A**

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APPENDIX B

Signage Plan



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## APPENDIX C

SIDRA Movement Summaries

# SITE LAYOUT

Site: 1.01 [1.01 AM EX Hale St x Foreshore Rd (Site Folder: General)]

Intersection: Hale St x Foreshore

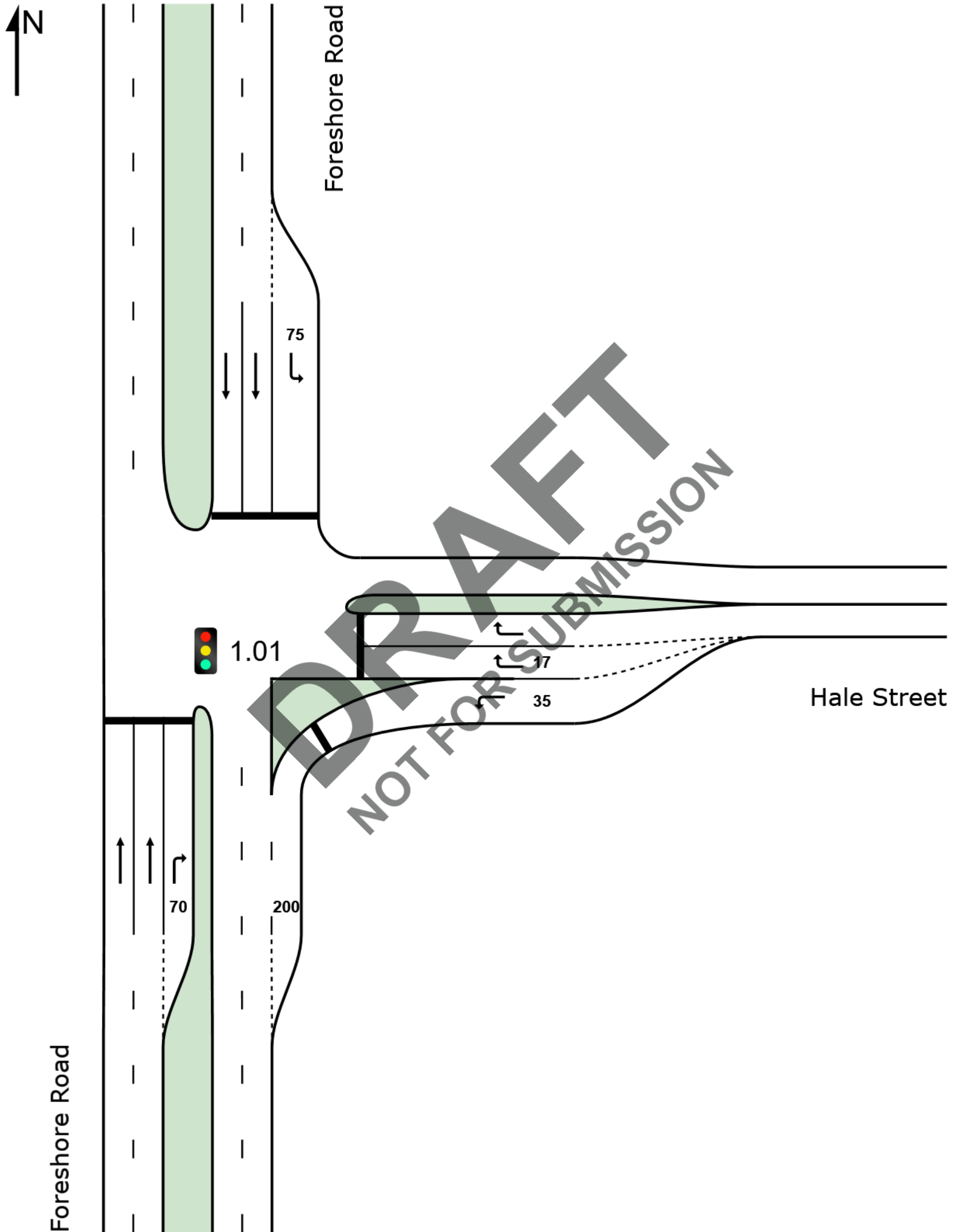
Period: AM Peak Hour

Scenario: Existing

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## MOVEMENT SUMMARY

Site: 1.01 [1.01 AM EX Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore

Period: AM Peak Hour

Scenario: Existing

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 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: Foreshore Road															
2	T1	All MCs	963	32.3	963	32.3	0.509	0.4	LOS A	1.0	9.1	0.04	0.04	0.04	78.8
3	R2	All MCs	46	40.9	46	40.9	* 0.355	53.9	LOS D	2.3	21.7	0.91	0.71	0.91	28.6
Approach			1009	32.7	1009	32.7	0.509	2.9	LOS A	2.3	21.7	0.08	0.07	0.08	72.0
East: Hale Street															
4	L2	All MCs	24	52.2	24	52.2	0.052	34.3	LOS C	0.8	8.5	0.68	0.65	0.68	31.4
6	R2	All MCs	225	18.7	225	18.7	* 0.359	49.4	LOS D	5.0	40.7	0.86	0.76	0.86	19.8
Approach			249	21.9	249	21.9	0.359	47.9	LOS D	5.0	40.7	0.85	0.75	0.85	19.2
North: Foreshore Road															
7	L2	All MCs	559	11.9	559	11.9	0.373	6.2	LOS A	0.9	7.1	0.03	0.63	0.03	42.7
8	T1	All MCs	1812	17.5	1812	17.5	* 1.041	52.9	LOS D	70.0	563.2	1.00	1.34	1.45	28.2
Approach			2371	16.2	2371	16.2	1.041	41.9	LOS C	70.0	563.2	0.77	1.17	1.11	29.8
All Vehicles			3629	21.2	3629	21.2	1.041	31.5	LOS C	70.0	563.2	0.59	0.84	0.81	35.1

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

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

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)

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Project: T:\Synergy\Projects\23\23.464\Modelling\23.464m01v03 TRAFFIX C&D Waste Transfer Station Botany.sip9

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## MOVEMENT SUMMARY

Site: 1.02 [1.02 PM EX Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore

Period: PM Peak Hour

Scenario: Existing

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

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				
South: Foreshore Road															
2	T1	All MCs	1568	11.9	1568	11.9	*0.714	0.4	LOS A	2.3	17.6	0.07	0.07	0.07	79.0
3	R2	All MCs	40	42.1	40	42.1	0.172	10.1	LOS A	0.2	1.7	0.11	0.62	0.11	52.5
Approach			1608	12.6	1608	12.6	0.714	0.6	LOS A	2.3	17.6	0.07	0.08	0.07	77.8
East: Hale Street															
4	L2	All MCs	26	20.0	26	20.0	0.043	24.8	LOS B	0.7	5.9	0.66	0.64	0.66	37.4
6	R2	All MCs	406	5.2	406	5.2	*0.705	54.9	LOS D	8.6	63.2	0.97	0.87	1.06	20.1
Approach			433	6.1	433	6.1	0.705	53.1	LOS D	8.6	63.2	0.95	0.86	1.04	17.8
North: Foreshore Road															
7	L2	All MCs	365	7.5	365	7.5	0.244	6.2	LOS A	0.4	3.1	0.03	0.62	0.03	42.8
8	T1	All MCs	1016	14.0	1016	14.0	0.597	0.5	LOS A	1.1	8.4	0.05	0.05	0.05	78.6
Approach			1381	12.3	1381	12.3	0.597	2.0	LOS A	1.1	8.4	0.05	0.20	0.05	68.7
All Vehicles			3422	11.7	3422	11.7	0.714	7.8	LOS A	8.6	63.2	0.17	0.23	0.18	57.6

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

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

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)

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Project: T:\Synergy\Projects\23\23.464\Modelling\23.464m01v03 TRAFFIX C&D Waste Transfer Station Botany.sip9

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## MOVEMENT SUMMARY

Site: 1.03 [1.03 AM EX + DEV Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore

Period: AM Peak Hour

Scenario: Existing + Development

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 110 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: Foreshore Road															
2	T1	All MCs	963	32.3	963	32.3	0.509	0.4	LOS A	1.0	9.1	0.04	0.04	0.04	78.8
3	R2	All MCs	48	39.1	48	39.1	* 0.367	53.9	LOS D	2.4	22.5	0.91	0.71	0.91	28.6
Approach			1012	32.7	1012	32.7	0.509	3.0	LOS A	2.4	22.5	0.08	0.07	0.08	71.7
East: Hale Street															
4	L2	All MCs	24	52.2	24	52.2	0.052	34.3	LOS C	0.8	8.5	0.68	0.65	0.68	31.4
6	R2	All MCs	240	23.2	240	23.2	* 0.451	55.3	LOS D	5.5	50.0	0.89	0.78	0.89	19.4
Approach			264	25.9	264	25.9	0.451	53.3	LOS D	5.5	50.0	0.87	0.76	0.87	17.9
North: Foreshore Road															
7	L2	All MCs	576	13.9	576	13.9	0.396	6.2	LOS A	1.0	8.0	0.04	0.63	0.04	42.5
8	T1	All MCs	1812	17.5	1812	17.5	* 1.041	53.2	LOS D	70.1	564.1	1.00	1.34	1.45	28.1
Approach			2387	16.6	2387	16.6	1.041	41.9	LOS C	70.1	564.1	0.77	1.17	1.11	29.7
All Vehicles			3663	21.7	3663	21.7	1.041	32.0	LOS C	70.1	564.1	0.59	0.84	0.81	34.7

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

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

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

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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)

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Project: T:\Synergy\Projects\23\23.464\Modelling\23.464m01v03 TRAFFIX C&D Waste Transfer Station Botany.sip9

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## MOVEMENT SUMMARY

Site: 1.04 [1.04 PM EX + DEV Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore

Period: PM Peak Hour

Scenario: Existing + Development

Site Category: (None)

Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 90 seconds (Site Optimum Cycle Time - Minimum Delay)

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				
South: Foreshore Road															
2	T1	All MCs	1568	11.9	1568	11.9	*0.740	0.4	LOS A	2.5	19.3	0.08	0.07	0.08	78.9
3	R2	All MCs	40	42.1	40	42.1	0.178	11.4	LOS A	0.3	2.6	0.17	0.63	0.17	51.3
Approach			1608	12.6	1608	12.6	0.740	0.7	LOS A	2.5	19.3	0.08	0.09	0.08	77.6
East: Hale Street															
4	L2	All MCs	28	18.5	28	18.5	0.043	23.4	LOS B	0.8	6.1	0.64	0.64	0.64	38.3
6	R2	All MCs	423	8.2	423	8.2	*0.730	55.8	LOS D	9.1	71.9	0.96	0.89	1.09	20.2
Approach			452	8.9	452	8.9	0.730	53.8	LOS D	9.1	71.9	0.94	0.87	1.06	17.7
North: Foreshore Road															
7	L2	All MCs	380	10.8	380	10.8	0.267	6.2	LOS A	0.4	3.6	0.03	0.62	0.03	42.6
8	T1	All MCs	1016	14.0	1016	14.0	0.625	1.2	LOS A	2.5	19.3	0.12	0.11	0.12	76.8
Approach			1396	13.1	1396	13.1	0.625	2.6	LOS A	2.5	19.3	0.09	0.25	0.09	67.1
All Vehicles			3456	12.3	3456	12.3	0.740	8.4	LOS A	9.1	71.9	0.20	0.25	0.21	56.5

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

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

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)

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## MOVEMENT SUMMARY

Site: 1.05 [1.05 AM FUT Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore  
 Period: AM Peak Hour  
 Scenario: Future (10 Year)  
 Site Category: (None)  
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site Practical Cycle Time)  
 Design Life Analysis (Final Year): Results for 10 years

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				
South: Foreshore Road															
2	T1	All MCs	1156	32.3	1156	32.3	0.505	0.4	LOS A	1.6	14.7	0.04	0.04	0.04	79.0
3	R2	All MCs	56	40.9	56	40.9	*0.557	9.5	LOS A	0.3	2.9	0.07	0.63	0.07	53.2
Approach			1211	32.7	1211	32.7	0.557	0.8	LOS A	1.6	14.7	0.04	0.07	0.04	77.0
East: Hale Street															
4	L2	All MCs	29	52.2	29	52.2	0.101	75.3	LOS F <sup>11</sup>	1.7	17.1	0.82	0.70	0.82	24.4
6	R2	All MCs	270	18.7	270	18.7	*0.965	148.9	LOS F <sup>11</sup>	12.7	103.4	1.00	1.14	1.53	9.9
Approach			299	21.9	299	21.9	0.965	141.7	LOS F <sup>11</sup>	12.7	103.4	0.98	1.10	1.47	8.8
North: Foreshore Road															
7	L2	All MCs	671	11.9	671	11.9	0.425	6.2	LOS A	1.6	12.6	0.04	0.63	0.04	42.7
8	T1	All MCs	2174	17.5	2174	17.5	*0.959	9.7	LOS A	33.5	269.3	0.31	0.34	0.36	59.9
Approach			2845	16.2	2845	16.2	0.959	8.9	LOS A	33.5	269.3	0.24	0.40	0.29	56.4
All Vehicles			4355	21.2	4355	21.2	0.965	15.8	LOS B	33.5	269.3	0.24	0.36	0.30	47.6

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

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

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.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

\* Critical Movement (Signal Timing)

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## MOVEMENT SUMMARY

Site: 1.06 [1.06 PM FUT Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore  
 Period: PM Peak Hour  
 Scenario: Future (10 Year)  
 Site Category: (None)  
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 70 seconds (Site Practical Cycle Time)  
 Design Life Analysis (Final Year): Results for 10 years

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: Foreshore Road															
2	T1	All MCs	1882	11.9	1882	11.9	* 0.884	3.4	LOS A	7.0	54.3	0.16	0.19	0.22	71.7
3	R2	All MCs	48	42.1	48	42.1	0.202	12.9	LOS A	0.4	4.2	0.29	0.65	0.29	49.9
Approach			1930	12.6	1930	12.6	0.884	3.6	LOS A	7.0	54.3	0.16	0.20	0.22	70.8
East: Hale Street															
4	L2	All MCs	32	20.0	32	20.0	0.048	20.2	LOS B	0.7	5.4	0.64	0.64	0.64	40.1
6	R2	All MCs	488	5.2	488	5.2	* 0.903	60.9	LOS E <sup>11</sup>	10.7	78.1	1.00	1.16	1.56	17.9
Approach			519	6.1	519	6.1	0.903	58.4	LOS E <sup>11</sup>	10.7	78.1	0.98	1.13	1.50	16.7
North: Foreshore Road															
7	L2	All MCs	438	7.5	438	7.5	0.315	6.2	LOS A	0.4	3.2	0.03	0.63	0.03	42.8
8	T1	All MCs	1219	14.0	1219	14.0	0.809	4.2	LOS A	9.1	71.3	0.43	0.41	0.47	69.8
Approach			1657	12.3	1657	12.3	0.809	4.7	LOS A	9.1	71.3	0.33	0.46	0.35	62.9
All Vehicles			4107	11.7	4107	11.7	0.903	11.0	LOS A	10.7	78.1	0.33	0.42	0.43	53.0

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

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

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.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

\* Critical Movement (Signal Timing)

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## MOVEMENT SUMMARY

Site: 1.07 [1.07 AM FUT + DEV Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore  
 Period: AM Peak Hour  
 Scenario: Future + Development  
 Site Category: (None)  
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 150 seconds (Site Practical Cycle Time)  
 Design Life Analysis (Final Year): Results for 10 years

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				
South: Foreshore Road															
2	T1	All MCs	1156	32.3	1156	32.3	0.514	0.4	LOS A	1.7	14.9	0.04	0.04	0.04	78.9
3	R2	All MCs	58	39.4	58	39.4	*0.540	39.0	LOS C	3.1	29.0	0.69	0.79	0.69	33.9
Approach			1213	32.7	1213	32.7	0.540	2.2	LOS A	3.1	29.0	0.07	0.08	0.07	73.4
East: Hale Street															
4	L2	All MCs	29	52.2	29	52.2	0.092	77.6	LOS F <sup>11</sup>	1.6	16.6	0.80	0.69	0.80	25.0
6	R2	All MCs	285	22.5	285	22.5	*0.975	155.8	LOS F <sup>11</sup>	13.8	123.6	1.00	1.16	1.56	9.6
Approach			314	25.3	314	25.3	0.975	148.6	LOS F <sup>11</sup>	13.8	123.6	0.98	1.12	1.49	8.4
North: Foreshore Road															
7	L2	All MCs	688	13.6	688	13.6	0.444	6.3	LOS A	1.7	13.9	0.04	0.63	0.04	42.6
8	T1	All MCs	2174	17.5	2174	17.5	*0.995	22.4	LOS B	78.3	630.0	0.58	0.65	0.71	45.1
Approach			2861	16.5	2861	16.5	0.995	18.5	LOS B	78.3	630.0	0.45	0.65	0.55	44.6
All Vehicles			4389	21.6	4389	21.6	0.995	23.3	LOS B	78.3	630.0	0.38	0.52	0.48	40.5

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

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

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.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

\* Critical Movement (Signal Timing)

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## MOVEMENT SUMMARY

Site: 1.08 [1.08 PM FUT + DEV Hale St x Foreshore Rd (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Foreshore  
 Period: PM Peak Hour  
 Scenario: Future + Development  
 Site Category: (None)  
 Signals - EQUISAT (Fixed-Time/SCATS) Coordinated Cycle Time = 80 seconds (Site Practical Cycle Time)  
 Design Life Analysis (Final Year): Results for 10 years

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: Foreshore Road															
2	T1	All MCs	1882	11.9	1882	11.9	* 0.886	3.4	LOS A	7.8	60.5	0.16	0.19	0.21	71.5
3	R2	All MCs	48	42.1	48	42.1	0.208	11.7	LOS A	0.4	3.4	0.20	0.64	0.20	51.0
Approach			1930	12.6	1930	12.6	0.886	3.6	LOS A	7.8	60.5	0.17	0.20	0.21	70.7
East: Hale Street															
4	L2	All MCs	34	18.8	34	18.8	0.049	23.3	LOS B	0.8	6.4	0.62	0.64	0.62	39.6
6	R2	All MCs	504	7.7	504	7.7	* 0.903	69.2	LOS E <sup>11</sup>	12.5	97.5	1.00	1.13	1.50	16.9
Approach			538	8.4	538	8.4	0.903	66.3	LOS E <sup>11</sup>	12.5	97.5	0.98	1.10	1.45	15.3
North: Foreshore Road															
7	L2	All MCs	453	10.3	453	10.3	0.321	6.2	LOS A	0.5	4.1	0.03	0.62	0.03	42.6
8	T1	All MCs	1219	14.0	1219	14.0	0.774	2.6	LOS A	6.6	52.1	0.28	0.26	0.30	73.4
Approach			1672	13.0	1672	13.0	0.774	3.6	LOS A	6.6	52.1	0.22	0.36	0.23	65.0
All Vehicles			4140	12.2	4140	12.2	0.903	11.8	LOS A	12.5	97.5	0.29	0.38	0.38	51.9

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

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

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.

<sup>11</sup> Level of Service is worse than the Level of Service Target specified in the Parameter Settings dialog.

\* Critical Movement (Signal Timing)

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## SITE LAYOUT

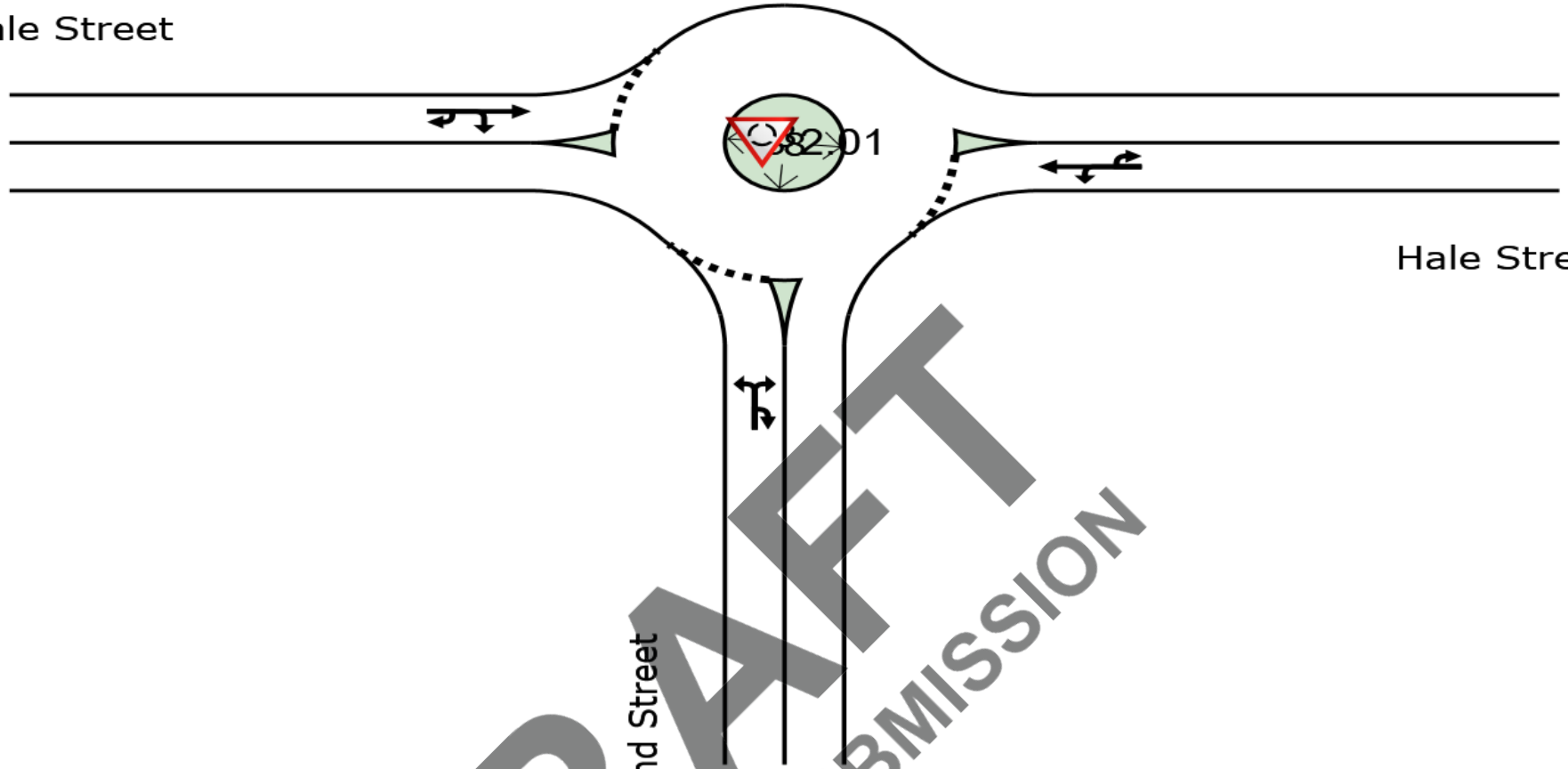
Site: 2.01 [2.01 AM EX Hale St x Luland Street (Site Folder: General)]

Intersection: Hale St x Luland Street  
Period: AM Peak Hour  
Scenario: Existing  
Site Category: (None)  
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



Hale Street



Hale Street

Luland Street

## MOVEMENT SUMMARY

Site: 2.01 [2.01 AM EX Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: AM Peak Hour  
 Scenario: Existing  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Luland Street															
1	L2	All MCs	36	47.1	36	47.1	0.063	6.8	LOS A	0.3	2.8	0.49	0.62	0.49	43.8
3	R2	All MCs	13	0.0	13	0.0	0.063	8.3	LOS A	0.3	2.8	0.49	0.62	0.49	44.2
3u	U	All MCs	1	0.0	1	0.0	0.063	9.8	LOS A	0.3	2.8	0.49	0.62	0.49	44.2
Approach			49	34.0	49	34.0	0.063	7.3	LOS A	0.3	2.8	0.49	0.62	0.49	43.9
East: Hale Street															
4	L2	All MCs	24	0.0	24	0.0	0.280	5.1	LOS A	1.8	13.9	0.42	0.48	0.42	45.3
5	T1	All MCs	266	14.6	266	14.6	0.280	5.2	LOS A	1.8	13.9	0.42	0.48	0.42	45.5
6u	U	All MCs	4	25.0	4	25.0	0.280	9.9	LOS A	1.8	13.9	0.42	0.48	0.42	44.7
Approach			295	13.6	295	13.6	0.280	5.2	LOS A	1.8	13.9	0.42	0.48	0.42	45.4
West: Hale Street															
11	T1	All MCs	459	5.3	459	5.3	0.417	3.9	LOS A	2.9	22.0	0.12	0.48	0.12	46.0
12	R2	All MCs	146	20.9	146	20.9	0.417	7.1	LOS A	2.9	22.0	0.12	0.48	0.12	45.2
12u	U	All MCs	17	12.5	17	12.5	0.417	8.4	LOS A	2.9	22.0	0.12	0.48	0.12	45.4
Approach			622	9.1	622	9.1	0.417	4.8	LOS A	2.9	22.0	0.12	0.48	0.12	45.8
All Vehicles			966	11.8	966	11.8	0.417	5.0	LOS A	2.9	22.0	0.23	0.48	0.23	45.6

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

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

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.

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## MOVEMENT SUMMARY

Site: 2.02 [2.02 PM EX Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: PM Peak Hour  
 Scenario: Existing  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: Luland Street															
1	L2	All MCs	34	3.1	34	3.1	0.049	6.0	LOS A	0.2	1.7	0.50	0.61	0.50	44.7
3	R2	All MCs	9	0.0	9	0.0	0.049	8.7	LOS A	0.2	1.7	0.50	0.61	0.50	44.6
3u	U	All MCs	1	0.0	1	0.0	0.049	10.2	LOS A	0.2	1.7	0.50	0.61	0.50	44.6
Approach			44	2.4	44	2.4	0.049	6.7	LOS A	0.2	1.7	0.50	0.61	0.50	44.7
East: Hale Street															
4	L2	All MCs	16	13.3	16	13.3	0.290	4.5	LOS A	1.9	13.9	0.24	0.42	0.24	45.6
5	T1	All MCs	362	5.5	362	5.5	0.290	4.2	LOS A	1.9	13.9	0.24	0.42	0.24	46.0
6u	U	All MCs	1	0.0	1	0.0	0.290	8.6	LOS A	1.9	13.9	0.24	0.42	0.24	45.6
Approach			379	5.8	379	5.8	0.290	4.2	LOS A	1.9	13.9	0.24	0.42	0.24	46.0
West: Hale Street															
11	T1	All MCs	287	4.8	287	4.8	0.231	3.8	LOS A	1.3	9.9	0.08	0.45	0.08	46.3
12	R2	All MCs	44	54.8	44	54.8	0.231	7.3	LOS A	1.3	9.9	0.08	0.45	0.08	45.0
12u	U	All MCs	11	0.0	11	0.0	0.231	8.2	LOS A	1.3	9.9	0.08	0.45	0.08	45.9
Approach			342	11.1	342	11.1	0.231	4.4	LOS A	1.3	9.9	0.08	0.45	0.08	46.2
All Vehicles			765	8.0	765	8.0	0.290	4.4	LOS A	1.9	13.9	0.18	0.45	0.18	46.0

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

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

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.

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## MOVEMENT SUMMARY

Site: 2.03 [2.03 AM EX + DEV Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: AM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: Luland Street															
1	L2	All MCs	36	47.1	36	47.1	0.063	6.8	LOS A	0.3	2.8	0.49	0.62	0.49	43.8
3	R2	All MCs	13	0.0	13	0.0	0.063	8.4	LOS A	0.3	2.8	0.49	0.62	0.49	44.2
3u	U	All MCs	1	0.0	1	0.0	0.063	9.8	LOS A	0.3	2.8	0.49	0.62	0.49	44.2
Approach			49	34.0	49	34.0	0.063	7.3	LOS A	0.3	2.8	0.49	0.62	0.49	43.9
East: Hale Street															
4	L2	All MCs	24	0.0	24	0.0	0.283	5.1	LOS A	1.8	14.1	0.42	0.48	0.42	45.3
5	T1	All MCs	271	14.4	271	14.4	0.283	5.2	LOS A	1.8	14.1	0.42	0.48	0.42	45.5
6u	U	All MCs	4	25.0	4	25.0	0.283	9.9	LOS A	1.8	14.1	0.42	0.48	0.42	44.7
Approach			299	13.4	299	13.4	0.283	5.2	LOS A	1.8	14.1	0.42	0.48	0.42	45.4
West: Hale Street															
11	T1	All MCs	460	5.3	460	5.3	0.417	3.9	LOS A	2.9	22.1	0.12	0.48	0.12	46.0
12	R2	All MCs	146	20.9	146	20.9	0.417	7.1	LOS A	2.9	22.1	0.12	0.48	0.12	45.2
12u	U	All MCs	17	12.5	17	12.5	0.417	8.4	LOS A	2.9	22.1	0.12	0.48	0.12	45.4
Approach			623	9.1	623	9.1	0.417	4.8	LOS A	2.9	22.1	0.12	0.48	0.12	45.8
All Vehicles			972	11.7	972	11.7	0.417	5.0	LOS A	2.9	22.1	0.23	0.48	0.23	45.6

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

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

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.

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## MOVEMENT SUMMARY

Site: 2.04 [2.04 PM EX + DEV Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: PM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
South: Luland Street															
1	L2	All MCs	34	3.1	34	3.1	0.049	6.0	LOS A	0.2	1.7	0.50	0.61	0.50	44.7
3	R2	All MCs	9	0.0	9	0.0	0.049	8.8	LOS A	0.2	1.7	0.50	0.61	0.50	44.6
3u	U	All MCs	1	0.0	1	0.0	0.049	10.2	LOS A	0.2	1.7	0.50	0.61	0.50	44.6
Approach			44	2.4	44	2.4	0.049	6.7	LOS A	0.2	1.7	0.50	0.61	0.50	44.7
East: Hale Street															
4	L2	All MCs	16	13.3	16	13.3	0.293	4.5	LOS A	1.9	14.1	0.25	0.42	0.25	45.6
5	T1	All MCs	363	5.5	363	5.5	0.293	4.2	LOS A	1.9	14.1	0.25	0.42	0.25	46.0
6u	U	All MCs	1	0.0	1	0.0	0.293	8.6	LOS A	1.9	14.1	0.25	0.42	0.25	45.6
Approach			380	5.8	380	5.8	0.293	4.3	LOS A	1.9	14.1	0.25	0.42	0.25	46.0
West: Hale Street															
11	T1	All MCs	287	4.8	287	4.8	0.234	3.8	LOS A	1.3	10.1	0.08	0.46	0.08	46.3
12	R2	All MCs	48	50.0	48	50.0	0.234	7.2	LOS A	1.3	10.1	0.08	0.46	0.08	45.1
12u	U	All MCs	11	0.0	11	0.0	0.234	8.2	LOS A	1.3	10.1	0.08	0.46	0.08	45.9
Approach			346	10.9	346	10.9	0.234	4.4	LOS A	1.3	10.1	0.08	0.46	0.08	46.1
All Vehicles			771	7.9	771	7.9	0.293	4.5	LOS A	1.9	14.1	0.19	0.45	0.19	46.0

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

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

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.

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## MOVEMENT SUMMARY

Site: 2.05 [2.05 AM FUT Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street

Period: AM Peak Hour

Scenario: Future (10 years)

Site Category: (None)

Roundabout

Design Life Analysis (Final Year): Results for 10 years

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: Luland Street															
1	L2	All MCs	43	47.1	43	47.1	0.081	7.4	LOS A	0.4	3.7	0.54	0.64	0.54	43.5
3	R2	All MCs	15	0.0	15	0.0	0.081	8.7	LOS A	0.4	3.7	0.54	0.64	0.54	44.0
3u	U	All MCs	1	0.0	1	0.0	0.081	10.2	LOS A	0.4	3.7	0.54	0.64	0.54	44.0
Approach			59	34.0	59	34.0	0.081	7.8	LOS A	0.4	3.7	0.54	0.64	0.54	43.7
East: Hale Street															
4	L2	All MCs	29	0.0	29	0.0	0.347	5.4	LOS A	2.4	18.4	0.49	0.50	0.49	45.1
5	T1	All MCs	320	14.6	320	14.6	0.347	5.6	LOS A	2.4	18.4	0.49	0.50	0.49	45.3
6u	U	All MCs	5	25.0	5	25.0	0.347	10.3	LOS A	2.4	18.4	0.49	0.50	0.49	44.5
Approach			354	13.6	354	13.6	0.347	5.6	LOS A	2.4	18.4	0.49	0.50	0.49	45.2
West: Hale Street															
11	T1	All MCs	551	5.3	551	5.3	0.502	3.9	LOS A	4.1	31.1	0.15	0.47	0.15	45.9
12	R2	All MCs	176	20.9	176	20.9	0.502	7.1	LOS A	4.1	31.1	0.15	0.47	0.15	45.2
12u	U	All MCs	20	12.5	20	12.5	0.502	8.5	LOS A	4.1	31.1	0.15	0.47	0.15	45.3
Approach			747	9.1	747	9.1	0.502	4.8	LOS A	4.1	31.1	0.15	0.47	0.15	45.7
All Vehicles			1160	11.8	1160	11.8	0.502	5.2	LOS A	4.1	31.1	0.27	0.49	0.27	45.5

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

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

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 (Akcelik 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.

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## MOVEMENT SUMMARY

Site: 2.06 [2.06 PM FUT Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: PM Peak Hour  
 Scenario: Future (10 years)  
 Site Category: (None)  
 Roundabout  
 Design Life Analysis (Final Year): Results for 10 years

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: Luland Street															
1	L2	All MCs	40	3.1	40	3.1	0.062	6.5	LOS A	0.3	2.3	0.55	0.64	0.55	44.5
3	R2	All MCs	11	0.0	11	0.0	0.062	9.3	LOS A	0.3	2.3	0.55	0.64	0.55	44.3
3u	U	All MCs	1	0.0	1	0.0	0.062	10.7	LOS A	0.3	2.3	0.55	0.64	0.55	44.3
Approach			53	2.4	53	2.4	0.062	7.2	LOS A	0.3	2.3	0.55	0.64	0.55	44.4
East: Hale Street															
4	L2	All MCs	19	13.3	19	13.3	0.352	4.6	LOS A	2.5	18.2	0.29	0.43	0.29	45.5
5	T1	All MCs	435	5.5	435	5.5	0.352	4.3	LOS A	2.5	18.2	0.29	0.43	0.29	45.9
6u	U	All MCs	1	0.0	1	0.0	0.352	8.7	LOS A	2.5	18.2	0.29	0.43	0.29	45.5
Approach			455	5.8	455	5.8	0.352	4.4	LOS A	2.5	18.2	0.29	0.43	0.29	45.9
West: Hale Street															
11	T1	All MCs	345	4.8	345	4.8	0.278	3.8	LOS A	1.7	12.8	0.09	0.45	0.09	46.3
12	R2	All MCs	53	54.8	53	54.8	0.278	7.3	LOS A	1.7	12.8	0.09	0.45	0.09	45.0
12u	U	All MCs	13	0.0	13	0.0	0.278	8.2	LOS A	1.7	12.8	0.09	0.45	0.09	45.8
Approach			411	11.1	411	11.1	0.278	4.4	LOS A	1.7	12.8	0.09	0.45	0.09	46.1
All Vehicles			918	8.0	918	8.0	0.352	4.5	LOS A	2.5	18.2	0.21	0.45	0.21	45.9

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

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

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.

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## MOVEMENT SUMMARY

Site: 2.07 [2.07 AM FUT + DEV Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street

Period: AM Peak Hour

Scenario: Future + Development

Site Category: (None)

Roundabout

Design Life Analysis (Final Year): Results for 10 years

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: Luland Street															
1	L2	All MCs	43	47.1	43	47.1	0.082	7.4	LOS A	0.4	3.7	0.55	0.64	0.55	43.5
3	R2	All MCs	15	0.0	15	0.0	0.082	8.8	LOS A	0.4	3.7	0.55	0.64	0.55	43.9
3u	U	All MCs	1	0.0	1	0.0	0.082	10.2	LOS A	0.4	3.7	0.55	0.64	0.55	43.9
Approach			59	34.0	59	34.0	0.082	7.8	LOS A	0.4	3.7	0.55	0.64	0.55	43.6
East: Hale Street															
4	L2	All MCs	29	0.0	29	0.0	0.351	5.4	LOS A	2.4	18.7	0.49	0.50	0.49	45.1
5	T1	All MCs	324	14.4	324	14.4	0.351	5.6	LOS A	2.4	18.7	0.49	0.50	0.49	45.3
6u	U	All MCs	5	25.0	5	25.0	0.351	10.3	LOS A	2.4	18.7	0.49	0.50	0.49	44.5
Approach			358	13.4	358	13.4	0.351	5.6	LOS A	2.4	18.7	0.49	0.50	0.49	45.2
West: Hale Street															
11	T1	All MCs	552	5.3	552	5.3	0.503	3.9	LOS A	4.1	31.2	0.15	0.47	0.15	45.9
12	R2	All MCs	176	20.9	176	20.9	0.503	7.1	LOS A	4.1	31.2	0.15	0.47	0.15	45.2
12u	U	All MCs	20	12.5	20	12.5	0.503	8.5	LOS A	4.1	31.2	0.15	0.47	0.15	45.3
Approach			748	9.1	748	9.1	0.503	4.8	LOS A	4.1	31.2	0.15	0.47	0.15	45.7
All Vehicles			1165	11.7	1165	11.7	0.503	5.2	LOS A	4.1	31.2	0.27	0.49	0.27	45.5

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

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

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 (Akcelik 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.

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## MOVEMENT SUMMARY

Site: 2.08 [2.08 PM EX + DEV Hale St x Luland Street (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Luland Street  
 Period: PM Peak Hour  
 Scenario: Future + Development  
 Site Category: (None)  
 Roundabout  
 Design Life Analysis (Final Year): Results for 10 years

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: Luland Street															
1	L2	All MCs	40	3.1	40	3.1	0.062	6.6	LOS A	0.3	2.3	0.56	0.64	0.56	44.5
3	R2	All MCs	11	0.0	11	0.0	0.062	9.3	LOS A	0.3	2.3	0.56	0.64	0.56	44.3
3u	U	All MCs	1	0.0	1	0.0	0.062	10.7	LOS A	0.3	2.3	0.56	0.64	0.56	44.3
Approach			53	2.4	53	2.4	0.062	7.2	LOS A	0.3	2.3	0.56	0.64	0.56	44.4
East: Hale Street															
4	L2	All MCs	19	13.3	19	13.3	0.356	4.7	LOS A	2.5	18.4	0.30	0.43	0.30	45.5
5	T1	All MCs	436	5.5	436	5.5	0.356	4.4	LOS A	2.5	18.4	0.30	0.43	0.30	45.9
6u	U	All MCs	1	0.0	1	0.0	0.356	8.7	LOS A	2.5	18.4	0.30	0.43	0.30	45.4
Approach			456	5.8	456	5.8	0.356	4.4	LOS A	2.5	18.4	0.30	0.43	0.30	45.9
West: Hale Street															
11	T1	All MCs	345	4.8	345	4.8	0.281	3.8	LOS A	1.7	12.9	0.09	0.46	0.09	46.3
12	R2	All MCs	58	50.0	58	50.0	0.281	7.3	LOS A	1.7	12.9	0.09	0.46	0.09	45.0
12u	U	All MCs	13	0.0	13	0.0	0.281	8.2	LOS A	1.7	12.9	0.09	0.46	0.09	45.8
Approach			416	10.9	416	10.9	0.281	4.4	LOS A	1.7	12.9	0.09	0.46	0.09	46.1
All Vehicles			925	7.9	925	7.9	0.356	4.6	LOS A	2.5	18.4	0.22	0.45	0.22	45.9

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

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

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 (Akcelik 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.

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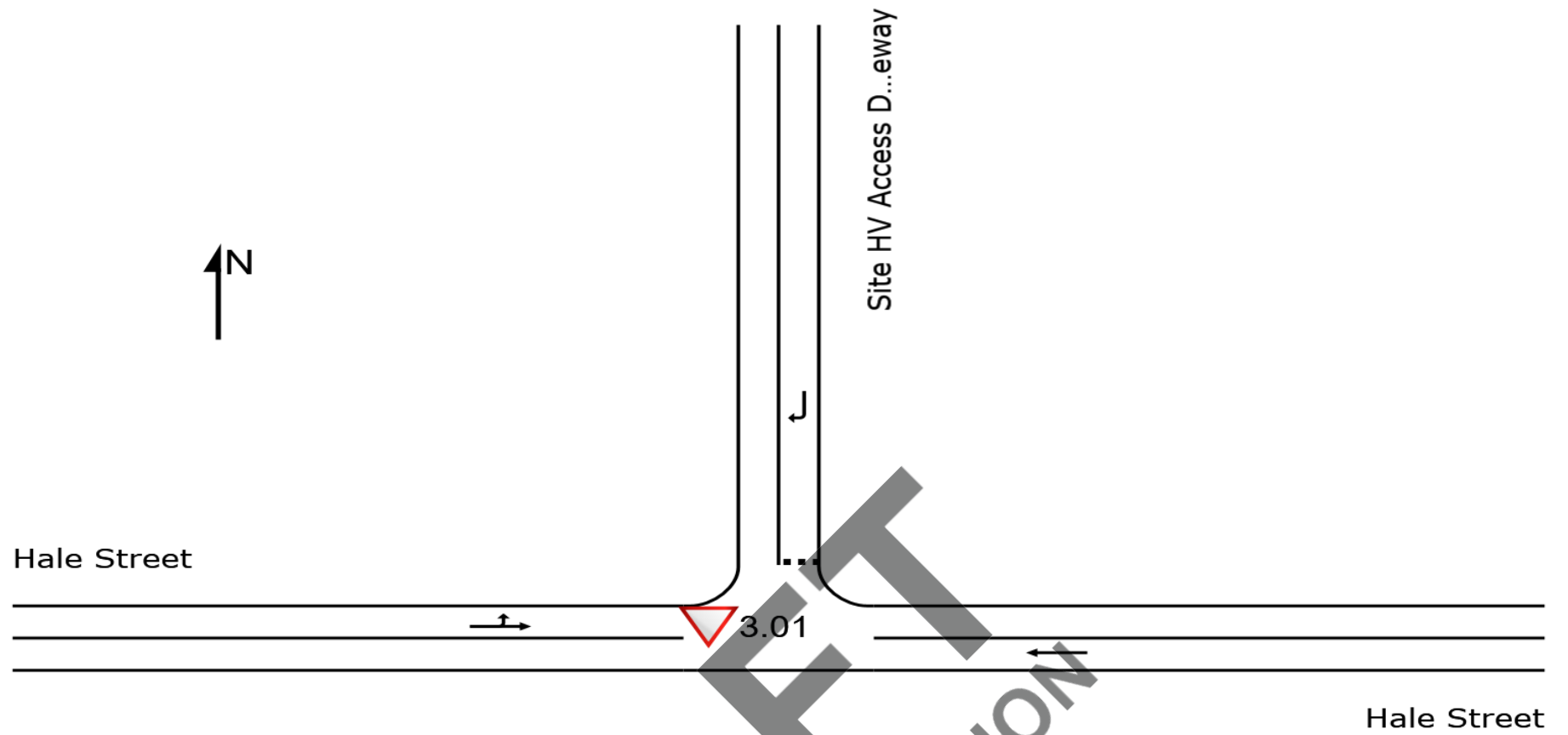
NOT FOR SUBMISSION

## SITE LAYOUT

▽ Site: 3.01 [3.01 AM EX + DEV Hale St x Site HV Access DW (Site Folder: General)]

Intersection: Hale St x Site HV Access DW  
Period: AM Peak Hour  
Scenario: Existing + Development  
Site Category: (None)  
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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## MOVEMENT SUMMARY

Site: 3.01 [3.01 AM EX + DEV Hale St x Site HV Access DW (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Site HV Access DW  
 Period: AM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				
East: Hale Street															
5	T1	All MCs	254	0.0	254	0.0	0.130	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
Approach			254	0.0	254	0.0	0.130	0.0	NA	0.0	0.0	0.00	0.00	0.00	50.0
North: Site HV Access Driveway															
9	R2	All MCs	14	100.0	14	100.0	0.173	44.5	LOS D	0.5	12.7	0.88	0.92	0.91	20.3
Approach			14	100.0	14	100.0	0.173	44.5	LOS D	0.5	12.7	0.88	0.92	0.91	20.3
West: Hale Street															
10	L2	All MCs	14	100.0	14	100.0	0.330	5.9	LOS A	0.0	0.0	0.00	0.01	0.00	46.1
11	T1	All MCs	606	0.0	606	0.0	0.330	0.1	LOS A	0.0	0.0	0.00	0.01	0.00	49.7
Approach			620	2.2	620	2.2	0.330	0.3	NA	0.0	0.0	0.00	0.01	0.00	49.7
All Vehicles			887	3.1	887	3.1	0.330	0.9	NA	0.5	12.7	0.01	0.02	0.01	48.7

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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## MOVEMENT SUMMARY

Site: 3.02 [3.02 PM EX + DEV Hale St x Site HV Access DW (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Site HV Access DW  
 Period: PM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m			km/h	
East: Hale Street															
5	T1	All MCs	434	0.0	434	0.0	0.222	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach			434	0.0	434	0.0	0.222	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
North: Site HV Access Driveway															
9	R2	All MCs	14	100.0	14	100.0	0.161	40.7	LOS C	0.5	11.8	0.87	0.90	0.89	20.7
Approach			14	100.0	14	100.0	0.161	40.7	LOS C	0.5	11.8	0.87	0.90	0.89	20.7
West: Hale Street															
10	L2	All MCs	14	100.0	14	100.0	0.230	5.9	LOS A	0.0	0.0	0.00	0.02	0.00	46.1
11	T1	All MCs	411	0.0	411	0.0	0.230	0.1	LOS A	0.0	0.0	0.00	0.02	0.00	49.8
Approach			424	3.2	424	3.2	0.230	0.3	NA	0.0	0.0	0.00	0.02	0.00	49.6
All Vehicles			872	3.1	872	3.1	0.230	0.8	NA	0.5	11.8	0.01	0.02	0.01	48.7

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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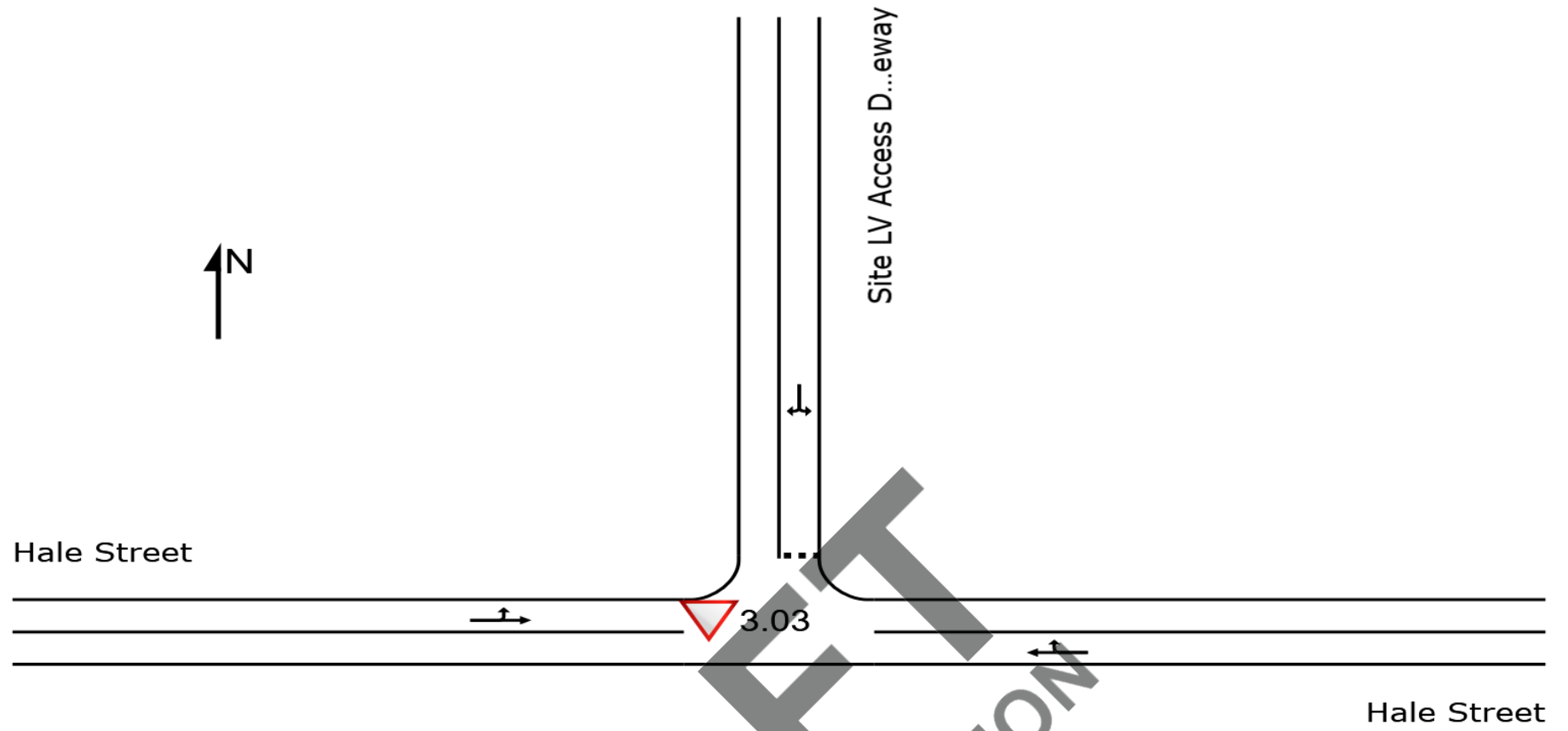
DRAFT  
NOT FOR SUBMISSION

## SITE LAYOUT

▽ Site: 3.03 [3.03 AM EX + DEV Hale St x Site LV Access DW (Site Folder: General)]

Intersection: Hale St x Site LV Access DW  
Period: AM Peak Hour  
Scenario: Existing + Development  
Site Category: (None)  
Give-Way (Two-Way)

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



## MOVEMENT SUMMARY

Site: 3.03 [3.03 AM EX + DEV Hale St x Site LV Access DW (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Site LV Access DW  
 Period: AM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: Hale Street															
5	T1	All MCs	263	5.2	263	5.2	0.150	0.1	LOS A	0.1	0.5	0.03	0.04	0.03	49.9
6	R2	All MCs	5	0.0	5	0.0	0.150	8.1	LOS A	0.1	0.5	0.03	0.04	0.03	52.1
Approach			268	5.1	268	5.1	0.150	0.2	NA	0.1	0.5	0.03	0.04	0.03	50.0
North: Site LV Access Driveway															
7	L2	All MCs	2	0.0	2	0.0	0.004	2.1	LOS A	0.0	0.1	0.53	0.36	0.53	27.4
9	R2	All MCs	1	0.0	1	0.0	0.004	4.2	LOS A	0.0	0.1	0.53	0.36	0.53	27.3
Approach			3	0.0	3	0.0	0.004	2.8	LOS A	0.0	0.1	0.53	0.36	0.53	27.4
West: Hale Street															
10	L2	All MCs	5	0.0	5	0.0	0.331	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	48.6
11	T1	All MCs	619	2.2	619	2.2	0.331	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.8
Approach			624	2.2	624	2.2	0.331	0.2	NA	0.0	0.0	0.00	0.00	0.00	49.8
All Vehicles			896	3.1	896	3.1	0.331	0.2	NA	0.1	0.5	0.01	0.02	0.01	49.7

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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## MOVEMENT SUMMARY

Site: 3.04 [3.04 PM EX + DEV Hale St x Site LV Access DW (Site Folder: General)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Intersection: Hale St x Site LV Access DW  
 Period: PM Peak Hour  
 Scenario: Existing + Development  
 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.	Dist ]				
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
East: Hale Street															
5	T1	All MCs	446	3.1	446	3.1	0.241	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	50.0
6	R2	All MCs	2	0.0	2	0.0	0.241	5.8	LOS A	0.0	0.2	0.01	0.00	0.01	52.1
Approach			448	3.1	448	3.1	0.241	0.0	NA	0.0	0.2	0.01	0.00	0.01	50.0
North: Site LV Access Driveway															
7	L2	All MCs	4	0.0	4	0.0	0.196	2.4	LOS A	0.5	8.5	0.81	0.89	0.87	22.8
9	R2	All MCs	19	72.2	19	72.2	0.196	36.5	LOS C	0.5	8.5	0.81	0.89	0.87	22.3
Approach			23	59.1	23	59.1	0.196	30.3	LOS C	0.5	8.5	0.81	0.89	0.87	22.3
West: Hale Street															
10	L2	All MCs	1	0.0	1	0.0	0.226	4.7	LOS A	0.0	0.0	0.00	0.00	0.00	48.6
11	T1	All MCs	419	3.3	419	3.3	0.226	0.1	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach			420	3.3	420	3.3	0.226	0.1	NA	0.0	0.0	0.00	0.00	0.00	49.9
All Vehicles			892	4.6	892	4.6	0.241	0.8	NA	0.5	8.5	0.02	0.03	0.03	48.4

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

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

Minor Road Approach LOS values are based on average delay for all vehicle movements.

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

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

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

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

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

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

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## APPENDIX D

Queuing Analysis

### USER INPUT

Average Vehicle Arrivals (r)	13	veh/hr
Capacity	7	25/26m B-double spaces
Service rate	10	minutes

### CALCULATED QUEUEING PARAMETERS

Service Time (T)	85.71	sec
Service Rate (s)	42.00	veh/hr
Utilisation Factor ( $\rho$ )	0.31	
Average Queue Length	0.45	veh

### FORMULAS

Travel Speed	$v = \text{spd} / 3.6$
Lift Travel Time - Single Trip	$t = d / v$
Service Time (T)	$T = t \times 2 + t_{\text{delay}}$
Average Service Rate	$s = 3600 / T$
Utilisation Factor	$\rho = r / s$
Probability of 'n' Vehicles in the System	$P_n = (1 - \rho) \rho^n$
Probability of more than 'n' Vehicles in the System	$P(>n) = \rho^{n+1}$
Average Queue Length	$E(n) = \rho / 1 - \rho$

### PROBABILITY OF (n) VEHICLES (including one vehicle in the system)

No of Vehicles (n)	P(n)	P(>n)
0	69.0%	30.952%
1	21.4%	9.580%
2	6.6%	2.965%
3	2.0%	0.918%
4	0.6%	0.284%
5	0.2%	0.088%
6	0.1%	0.027%
7	0.0%	0.008%

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## APPENDIX E

Swept Path Analysis



Notes:  
 This drawing is prepared for information purposes only. It is not to be used for construction.  
 TRAFFIX is responsible for vehicle swept path diagrams and/or drawing mark-ups only. Base drawing prepared by others.  
 Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards [AS/NZS 2890.1:2004 Parking facilities - Off-street car parking, and/or AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities]. These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

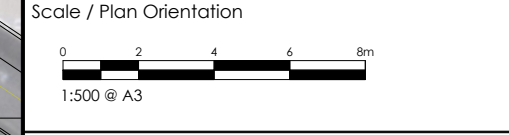
Rev.	Revision Note	By.	Date
A	Swept Path Analysis	TY	04-12-24

Swept Path Legend

	Wheel Path
	Vehicle Body Envelope
	Clearance Envelope (300mm)

Architect  
 Reid Campbell

Client  
 KLF Group



Project Description  
 C&D Waste Transfer Station, Botany

Drawing Prepared By

**TRAFFIX**  
 TRAFFIC AND TRANSPORT PLANNERS

Suite 2.08, 50 Holt Street t: +61 2 8324 8700  
 Surry Hills, NSW 2010 f: +61 2 9830 4481  
 PO Box 1124 w: www.traffix.com.au  
 Strawberry Hills, NSW 2012

Drawing Title  
 Site Plan (Rev. L)  
 Design Vehicle: 26m B-Double  
 Movement: Left-turn Ingress via Hale Street

Drawn: AB	Checked: TY	Date: 04-12-24
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23.46401v07 TRAFFIX [241204 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
23.464	RFI	TX.01	A

PRELIMINARY



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 Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (AS/NZS 2890.1:2004 Parking facilities - Off-street car parking, and/or AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

Rev.	Revision Note	By.	Date
A	Swept Path Analysis	TY	04-12-24

Swept Path Legend

	Wheel Path
	Vehicle Body Envelope
	Clearance Envelope (300mm)

Architect  
 Reid Campbell

Client  
 KLF Group

Scale / Plan Orientation  
  
 1:500 @ A3

Project Description  
 C&D Waste Transfer Station, Botany

Drawing Prepared By

**TRAFFIX**  
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 PO Box 1124 w: www.traffix.com.au  
 Strawberry Hills, NSW 2012

Drawing Title  
 Site Plan (Rev. L)  
 Design Vehicle: 26m B-Double  
 Movement: Site Circulation including Queuing

Drawn: AB	Checked: TY	Date: 04-12-24
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23.46401v07 TRAFFIX [241204 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
23.464	RFI	TX.02	A

PRELIMINARY



Notes:  
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 Vehicle swept path diagrams prepared using computer generated turning path software and associated CAD drawing platforms. Vehicle data based upon relevant Australian Standards (AS/NZS 2890.1:2004 Parking facilities - Off-street car parking, and/or AS2890.2:2002 Parking facilities - Off-street commercial vehicle facilities). These standards embody a degree of tolerance, however the vehicle characteristics in these standards represent a suitable design vehicle and do not account for all variations in vehicle dimensions / specifications and/or driver ability or behaviour.

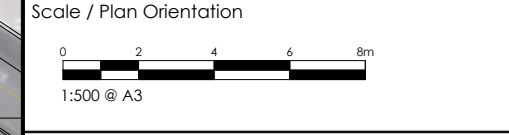
Rev.	Revision Note	By.	Date
A	Swept Path Analysis	TY	04-12-24

Swept Path Legend

	Wheel Path
	Vehicle Body Envelope
	Clearance Envelope (300mm)

Architect  
 Reid Campbell

Client  
 KLF Group



Project Description  
 C&D Waste Transfer Station, Botany

Drawing Prepared By

**TRAFFIX**  
 TRAFFIC AND TRANSPORT PLANNERS

Suite 2.08, 50 Holt Street t: +61 2 8324 8700  
 Surry Hills, NSW 2010 f: +61 2 9830 4481  
 PO Box 1124 w: www.traffix.com.au  
 Strawberry Hills, NSW 2012

Drawing Title  
 Site Plan (Rev. L)  
 Design Vehicle: 26m B-Double  
 Movement: Right-turn Egress onto Hale Street

Drawn: AB	Checked: TY	Date: 04-12-24
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23.464d01v07 TRAFFIX [241204 Plans] Design Review.dwg

Project No.	Drawing Phase	Drawing No.	Rev.
23.464	RFI	TX.03	A

PRELIMINARY