TRAFFIC AND TRANSPORT

ASSESSMENT REPORT

FOR

HALGAN LIQUID WASTE PROPOSAL

10 DAVIS ROAD

WETHERILL PARK

Ref. 19144r

Updated 5 June 2020

Prepared By

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CONTENTS

ILLUSTRATIONS

APPENDICES

1.0 INTRODUCTION

1.1 Introduction

Halgan Pty Ltd (Halgan) currently occupy an industrial site at 10 Davis Road Wetherill Park (**Figure 1**) where they store and distribute a range of plastic water treatment tanks.

Halgan are proposing to construct and operate a new Liquid Waste Facility on a portion of the existing site at 10 Davis Road Wetherill Park to process up to 50,000tpa.

This report documents the assessment of the traffic, transport and parking impacts of the proposed facility, as part of the EIS for the proposal.

Halgan intends to manufacture plastic water treatment tanks at the site in the future, in order to quickly respond to local market requirements. Whilst this operation is not within the scope of this EIS, the traffic, access, parking and manoeuvrability of the projected manufacturing are included within this traffic assessment in order to ensure the cumulative impacts of the proposed operation are considered. This also enables the internal activities of the site to be optimised.

The manufacturing, storage and distribution of the water tanks is described in this assessment report as the existing operation on the site and the employment numbers, truck numbers including the existing traffic volumes using the driveways represent the manufacturing of the tanks as well as the storage and distribution of the tanks.

1.2 Authority Requirements

The Project's Secretary's Environmental Assessment Requirements (SEAR's) for traffic and transport are summarised in Table 1.1, together with where each requirement is addressed in this report.

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FIGURE 1

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

SITE LOCATION

JOB NO. 19144 27/03/20

TABLE 1.1

TRAFFIC AND ROAD TRANSPORT SEARS

Stakeholder	EIS Requirement Traffic and Road Transport		Comment
Department of Planning and Environment	i)	Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes. Traffic flows are to be shown diagrammatically to a level of detail sufficient for easy interpretation.	See section 2 and section 4. See Figure 7
	ii)	An assessment of the predicted impacts of traffic on road safety and the capacity of the road network, including consideration of cumulative traffic impacts at key intersections, using SIDRA or similar traffic modelling.	See section 4.
	iii)	Plans demonstrating how all construction and operation vehicles, including those awaiting loading, unloading or servicing can be accommodated on the site to avoid queueing in the street network.	See Figures 8 and 9A-9C
	iv)	Detailed plans of the proposed site access and parking provision on site in accordance with the relevant Australian Standards.	See Figure 3
	v)	Swept path diagrams depicting vehicles entering, exiting and manoeuvring throughout the site; and	See Figures 8 & 9A
	vi)	Plans of any proposed road upgrades, infrastructure works or new roads required for the development.	No road upgrades are required as the proposal will have very minor impacts.

TABLE 1.1 CONTINUED

Stakeholder	EIS Requirement Traffic and Road Transport		Comment
	i)	Details all daily and peak traffic and transport movements likely to be generated (light and heavy vehicle, public transport, pedestrian and cycle trips) during construction and operation of the development;	See Section 4.
	ii)	Details of the current daily and peak hour vehicle, public transport, pedestrian and bicycle movements and existing traffic and transport facilities provided on the road network located adjacent to the proposed development.	See Section 3.
	iii)	An assessment of the operation of existing and future transport networks including public transport, pedestrian and bicycle provisions and their ability to accommodate the forecast number of trips to and from the development;	See Sections 3 and 4.
	iv)	Details the type of heavy vehicles likely to be used (eg. B-doubles) during the operation of the development and the impacts of heavy vehicles on nearby intersections;	See Section 2 and Section 4.
Transport for NSW	v)	Details of access to, from and within the site to/from the local road and strategic (motorway) network including intersection location, design and sight distance (i.e. turning lanes, swept paths, sight distance requirements);	See Sections 3 and 4.
	vi)	Impact of the proposed development on existing and future public transport, walking and cycling infrastructure within and surrounding the site;	See Section 4
	vii)	An assessment of the existing and future performance of key intersections providing access to the site and any upgrades (road/intersections) required as a result of the development;	See section 4. No upgrades are required given the small impacts of the proposal.
	viii)	An assessment of predicted impacts on road safety and the capacity of the road network to accommodate the development;	See Section 4.4.
	ix)	Demonstrate the measures to be implemented to encourage employees of the development to make sustainable travel choices,	No measures are required. The proposal will employ an additional 5 people. Three (3) of these will start work at 4.00am

Stakeholder	EIS Requirement Traffic and Road Transport		Comment
		including walking, cycling, public transport and car sharing;	and two (2) employees will start at 7.00am. it would be difficult for these workers to make sustainable travel choices.
	x)	Appropriate provision, design and location of on-site bicycle parking, and how bicycle provision will be integrated with the existing bicycle network;	See Section 5.
	xi)	Details of the proposed number of car parking spaces and compliance with appropriate parking codes and justify the level of car parking provided on the site;	See Section 5.
	xii)	Details of access and parking arrangements for emergency vehicles;	Emergency vehicles can be accommodated on site, but no specific parking is required.
	xiii)	Detailed plans of the proposed layout of the internal road network and parking provision on-site in accordance with the relevant Australian Standards;	See Figure 3
	xiv)	The existing and proposed pedestrian and bicycle routes and end of trip facilities within the vicinity of and surrounding the site and to public transport facilities as well as measures to maintain road and personal safety in line with CPTED principles;	See Sections3.3, 3.4 and 5.3
	xv)	Preparation of a draft Construction Traffic Management Plan;	Draft CTMP is not considered to be required for the Development Application due to the small impacts of the construction traffic.
	xvi)	Cumulative traffic impacts of proposed and other known proposed developments in the area;	See section 4.3.
	xvii)	A package of traffic and transport infrastructure measures required to support the development if any.	No traffic and transport infrastructure measures are required/warranted by the proposed development.

1.3 Structure of this Report

Structure of Report

This report has been prepared to assess the traffic, transport and parking impacts associated with the proposed liquid waste facility and will inform the preparation of the Environmental Impact Statement (EIS).

The assessment also includes the manufacturing of water tanks at the site, so that the cumulative impacts of the proposed operation are fully considered. This also enables the internal activities on the site to be optimised.

The assessment has been undertaken in accordance with the requirements of Roads and Traffic Authority now Transport for NSW (RMS) *Guide to Traffic Generating Developments October 2002*.

Other technical standards/publications referenced in this assessment include:

- Austroads Guide to Road Design and RMS supplements.
- Austroads Guide to Traffic Management and RMS supplements.
- Austroads Guide to Traffic Management Part 12. Traffic Impacts of Developments.
- AS/NZS2890.1 (2002), AS2890.2 (2018) and AS/NZS2890.6 (2009).

The remaining sections of this report document the following;

- Section 2 describes the site, existing operation and details of the proposal;
- Section 3 describes the existing traffic and transport conditions in the area;
- Section 4 documents the assessment of the traffic and transport impacts of the proposal;
- Section 5 examines parking, on site circulation and other matters; and
- Section 6 presents the conclusions.

2.0 SITE AND PROPOSAL

2.1 Site

The site, 10 Davis Road Wetherill Park is located on the south eastern corner of Davis Road/Elizabeth Street intersection (**Figure 2**).

The existing development on the site includes an industrial building located at the rear of the site and a paved concrete parking and vehicle manoeuvring area at the front of the site.

The building has a production and storage (factory) area and vehicle loading area, as well as a smaller office area. Vehicle access to the building is via a high roller door 5 metres wide.

Vehicle parking is provided for 29 vehicles, in the external concrete paved area.

Vehicle access is via a combined entry/exit driveway 8.0 metres wide in Davis Road which is located approximately 40 metres east of Elizabeth Street.

A second driveway 6.0 metres wide is located in Elizabeth Street some 62 metres south of Davis Road. This driveway is currently not used by Halgan, but will be used with the proposal.

The sight distance to and from the driveways in Davis Road and in Elizabeth Street is considered to be satisfactory and meets the requirements of AS2890.1 for the posted speed limits in Davis Road and Elizabeth Street.

The site is located in the Wetherill Park Industrial area and the adjoining development includes a range of industrial uses.

2.2 Existing Operation (Includes Future Manufacturing of Water Tanks)

Halgan currently store and distribute water tanks from the site and intend at a future time to manufacture water tanks on the site.

This operation is described below:

- A total of 13 employees with 6 people in the factory and 7 people in the office;
- The hours of operation are 7.00am – 4.00pm Monday to Friday (i.e. no Saturday or Sundays);
- Current deliveries are 3 to 4 trucks per week which are typically rigid vehicles (trucks) up to 12.5 metres long. These are external transport company trucks and do not have to be parked on the site;
- Halgan has one (1) small rigid truck (6.4 metres long), which it parks on site.

2.3 Proposed Liquid Waste Facility

2.3.1 Proposal

Halgan propose to provide the liquid waste treatment plant inside the existing building at the south western end of the building near the Elizabeth Street driveway. Tankers

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FIGURE 2

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

SITE

JOB NO. 19144 27/03/20

will unload inside the building, within the facility. Sufficient queueing storage inside the building is available for four (4) tankers.

The proposed liquid waste treatment plant will process up to a maximum of 50,000tpa of liquid waste comprising of 50,000tpa of grease trap waste.

The proposed hours of operation will be 4.00am to 4.00pm Monday to Friday with provision for emergency situations 24 hours 7 days per week.

The facility will require a total of 5 new employees including 3 drivers and 2 in the facility. The facility's operation will be as follows:

- Halgan will have a total of 3 trucks/tankers which will be parked on site overnight. These are/will be 8.3 metres long rigid trucks.

- At maximum capacity approximately 190 tonnes of liquid waste will be delivered and processed per day. This will require 15 tankers to deliver per day. It is Halgan's intention that it will allow other companies to bring liquid waste to be processed at the facility. These companies will use similar/the same tanker vehicles as Halgan.

- Halgan's 3 tankers will typically do 2 deliveries per day with the rest made up by the other companies.

- The waste sludge to be removed from the facility (which will occur from time to time) can be transported in one of the 8.3 metre long tankers and would typically leave the facility first thing in the morning.

- Vehicle access to the building will be via the existing roller door. A new internal roller door will be provided as part of the proposal.

With the provision of an accessible parking space, to AS2890.6 requirements, total parking for the proposal will be 29 car spaces.

The Halgan site with the proposed Liquid Waste Treatment Facility will continue to use the existing driveway in Davis Road as an entry/exit driveway for cars.

With the proposal all trucks associated with the existing operation and the proposed liquid waste treatment facility will use the Davis Road driveway as the entry driveway and the Elizabeth Street driveway as an exit driveway (left turn out) with a one way drive through arrangement for all trucks.

Figure 3 shows a layout of the site with the proposal.

2.3.2 Transport Routes

Transport routes to and from the facility include Davis Road, Elizabeth Street, Victoria Street, Widemere Road, Cowpasture Road, The Horsley Drive, the M7 and other state roads in the regional area.

Davis Road, Elizabeth Street, Widemere Road, Victoria Street and Cowpasture Road (north of Horsley Drive) are collector roads within the Wetherill Park Industrial area. The other roads are state roads.

Figure 4 shows the main transport routes adjacent the site.

Table 2.1 provides a description of the roads that form the transport routes.

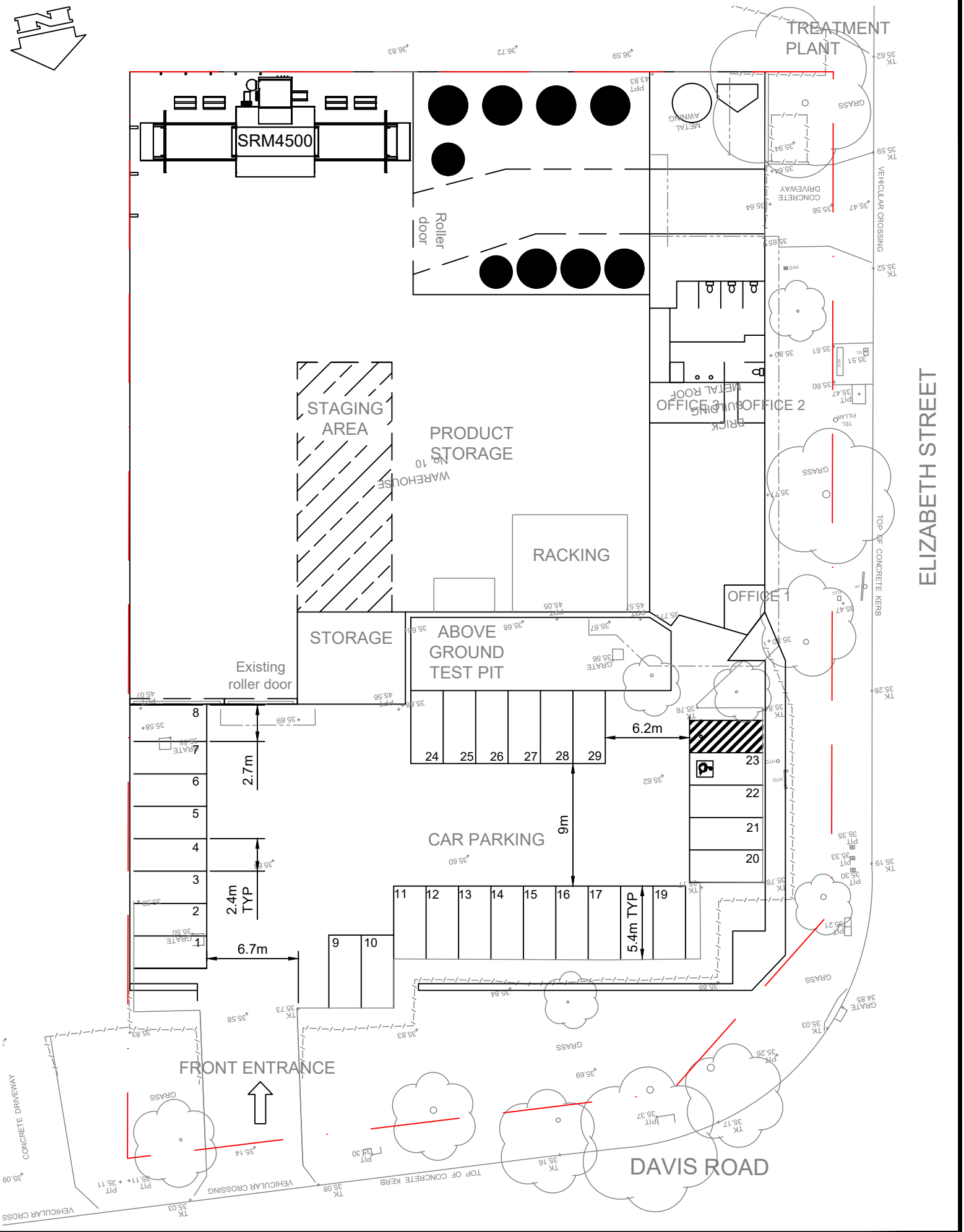

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FIGURE 3

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

SITE PLAN FOR PROPOSAL

JOB NO.19144

27/03/20

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FIGURE 4

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

TRANSPORT ROUTES

JOB NO.19144

27/03/20

TABLE 2.1

DESCRIPTION OF ROADS THAT FORM THE TRANSPORT ROUTES

Road	Functional Classification	Description of Road
Davis Road	Collector Road (Industrial Area)	Two lane road with single travel lane in each direction plus parking on both sides.
Elizabeth Street	Collector Road (Industrial Area)	Two lane road with single travel lane in each direction plus parking on both sides.
Victoria Street	Collector Road (Industrial Area)	Multi lane (4-6 lanes) divided road.
Widemere Street	Collector Road (Industrial Area)	2-4 lane road. Four lane section is divided road.
Cowpasture Road	Collector Road (Industrial Area) And State Road south of Horsley Drive	Four lane divided road.
Horsley Drive	State Road	4-6 lane divided road.
M7 Motorway	State Road	Four lane Motorway.

3.0 EXISTING CONDITIONS

3.1 Existing Road Network

The immediate road network that serves the site includes Davis Road, Elizabeth Street, Widemere Road and Victoria Street.

Davis Road in the section between Elizabeth Street and Widemere Road and Elizabeth Street are major collector roads in the Wetherill Park industrial area.

Davis Road adjacent the site is 13.0 metres wide providing for one (1) travel lane in each direction plus room for parking on both sides.

Elizabeth Street adjacent the site is 18.4 metres wide catering for one (1) travel lane in each direction plus a wide parking lane (5.4 metres wide) on both sides.

Davis Road connects to Widemere Road at its eastern end which links to Reconciliation Road to the north, and Hassal Street to the east.

Elizabeth Street connects to Victoria Street and Horsley Drive south of the site, and to Davis Road at its northern end.

Victoria Street connects between Cumberland Highway in the east and Cowpasture Road North in the west.

Victoria Street, adjacent Elizabeth Street is a multi lane divided road and forms part of the Liverpool Parramatta Transit Way (TWay) (between Canley Vale Road and Walter Street). Bus Only lanes are provided in Victoria Street in both approaches at the Elizabeth Street intersection.

Traffic controls on the immediate road network adjacent the site includes:

- Give Way (Priority Control) on Elizabeth Street at Davis Road;
- Traffic signal control at the intersections of:
    - Davis Road/Widemere Road
    - Elizabeth Street/Victoria Street
    - Elizabeth Street/Horsley Drive
    - Elizabeth Street/Daniel Street

The speed limit on Davis Road and in Elizabeth Street is 60km/h.

Sight distance at the intersection of Davis Road/Elizabeth Street for vehicles turning out of Elizabeth Street is satisfactory and exceeds 100 metres in each direction and meets Austroad requirements.

Figure 5 shows the existing traffic controls on the road network adjacent the site.

3.2 Existing Traffic Conditions

Traffic counts were undertaken during the weekday AM (7.00am – 9.00am) and PM (4.00pm and 6.00pm) periods at the following intersections/locations:

- Davis Road/Elizabeth Street intersection;
- Elizabeth Street/Victoria Road intersection;

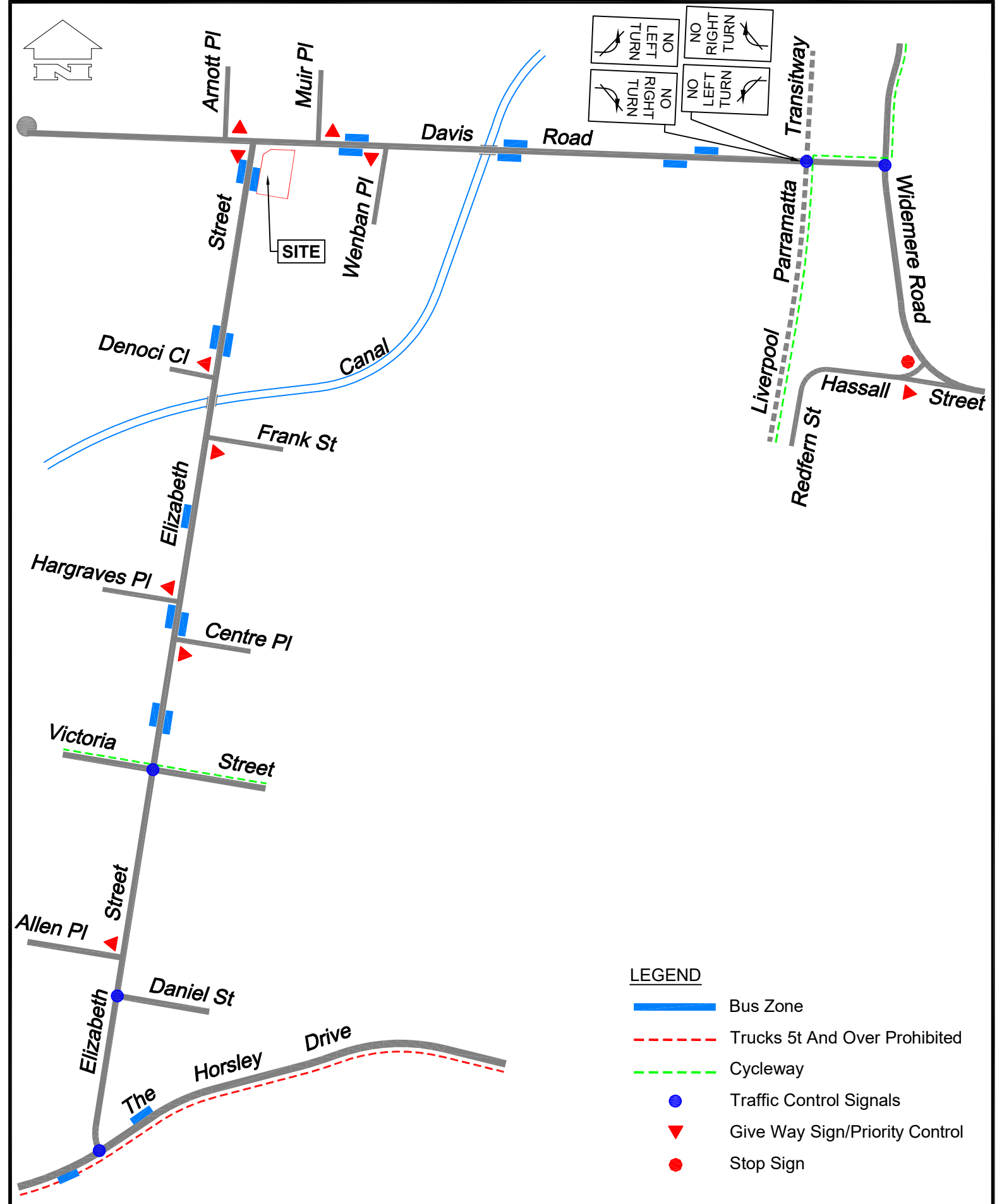

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FIGURE 5

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

EXISTING TRAFFIC CONTROLS

JOB NO.19144 27/03/20

- Davis Road/Entry and Exit Driveway to Halgan site: and
- Elizabeth Street/Victoria Street intersection.

The peak hours at the intersections and at the site driveway occurred at different times in the AM and PM peak periods.

At the Davis Road/Elizabeth Street intersection the AM peak hour occurred between 7.45am-8.45am and the PM peak hour between 3.00pm and 4.00pm.

The peak hours at the Elizabeth Street/Victoria Street intersection occurred between 7.15am-8.15am (AM Peak) and 3.30pm and 4.30pm (PM peak).

The peak traffic generation of the Halgan site driveway occurred between 7.30am-8.30am (AM peak) and 4.00pm to 5.00pm (PM peak hour).

The AM and PM peak hours for the above locations are shown in **Figures 6A** (Davis Road/Elizabeth Street) **6B** (Elizabeth Street/Victoria Street and **6C** (Davis Road/Halgan's driveway).

Intersections

Reference to **Figure 6A** shows that the major movements at the Davis Road/Elizabeth Street intersections are the right turn out of Elizabeth Street (436vph and 234vph in the AM and PM peak hours respectively) and the left turn from Davis Road into Elizabeth Street (214vph and 234vph in the AM and PM peak hours). The other movements at the intersection are relatively light and number between 13-69vph, in the peak hours.

Figure 6B shows the peak hour volumes at the Elizabeth Street/Victoria Street intersection.

Victoria Street carries higher volumes than Elizabeth Street with through volumes numbering 665-739vph in the AM peak hour and 640-692vph in the PM peak hour. The other major movement is the left turn from Victoria Street into Elizabeth Street to travel north which numbers between 223-338vph in the AM and PM peak hours.

In Elizabeth Street, the major movements include the through volumes and the right turn from the northern approach of Elizabeth Street into Victoria Street to travel west.

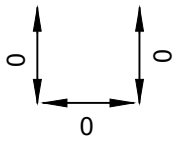
The northbound through volumes in Victoria Street number between 151-439vph in the peak hours and the southbound through volumes number 93-319vph.

The right turn out of Elizabeth Street to travel west in Victoria Street numbers 195-232vph in the peak hours.

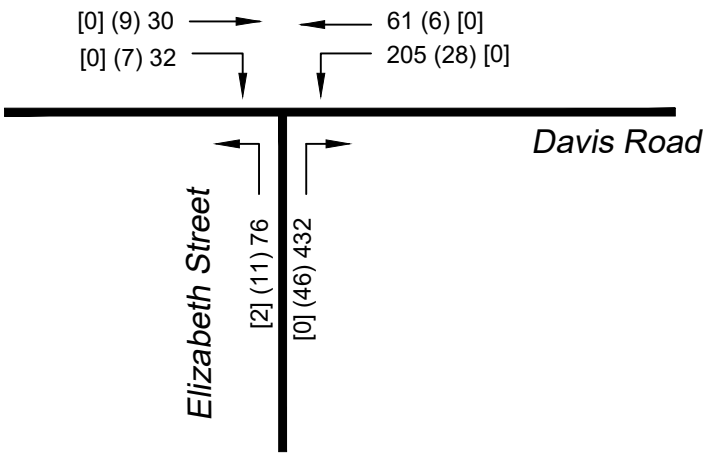
A review of on site traffic conditions and traffic modelling of the AM and PM peak hour traffic volumes indicates that traffic conditions at the Davis Road/Elizabeth Street intersection in terms of vehicle delay and level of service are good. (see Section 4.2).

Traffic conditions at the Elizabeth Street/Victoria Street intersection are busier during the peak hours and the intersection operates close to capacity with a Level of Service E operation.

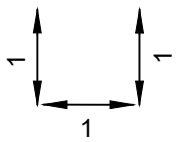
Davis Road/Halgan's Driveway



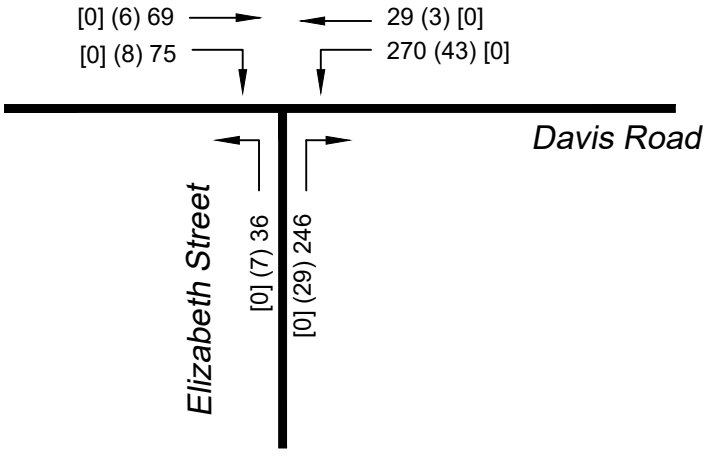
Pedestrian Volumes



AM PEAK HOUR
0745 - 0845



Pedestrian Volumes



KEY
344 TOTAL VEHICLES
(27) HEAVY VEHICLES
[1] CYCLISTS

PM PEAK HOUR
1500 - 1600

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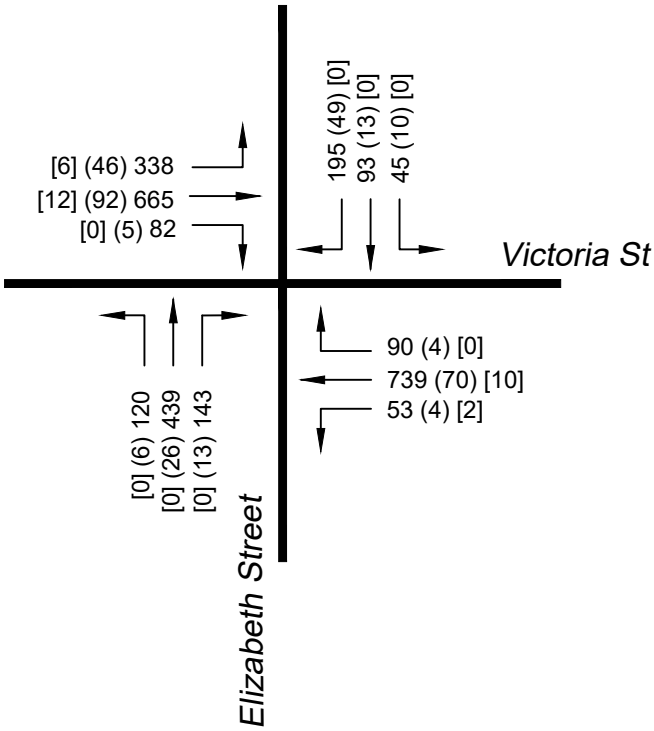
FIGURE 6A

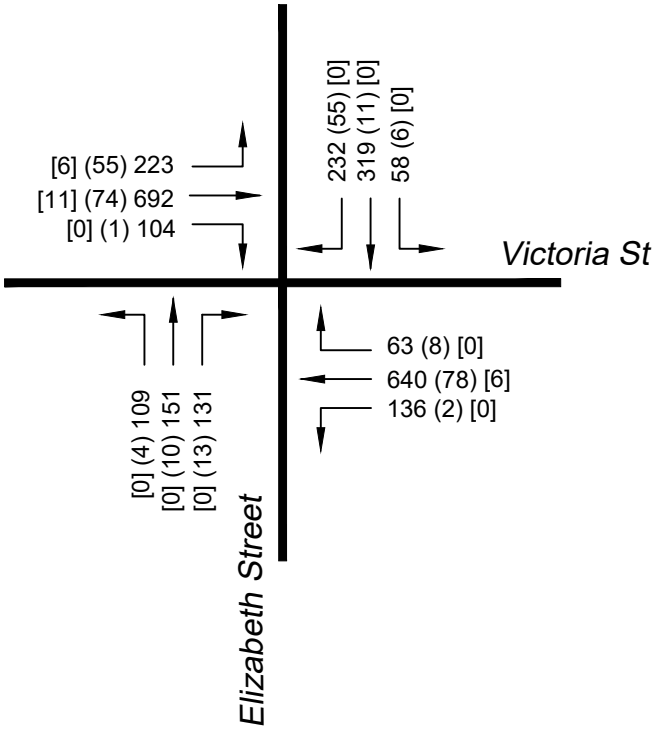
HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

EXISTING AM & PM PEAK HOUR VOLUMES ELIZABETH ST/DAVIS ST INTERSECTION

JOB NO.19144 27/03/20



AM PEAK HOUR
0715 - 0815



KEY
344 TOTAL VEHICLES
(27) HEAVY VEHICLES
[1] CYCLISTS

PM PEAK HOUR
1530 - 1630

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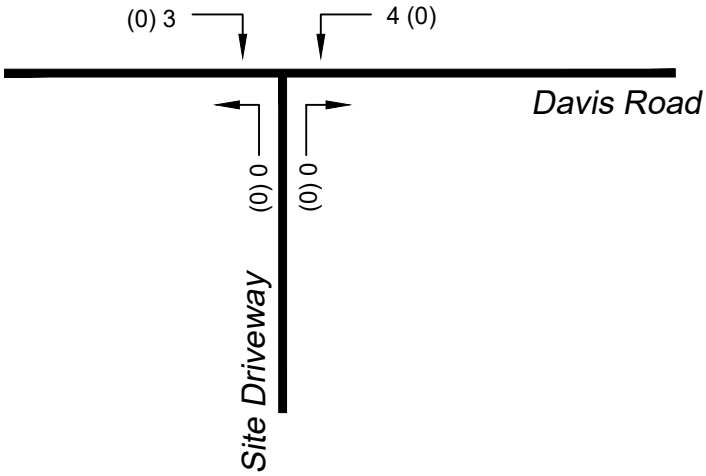
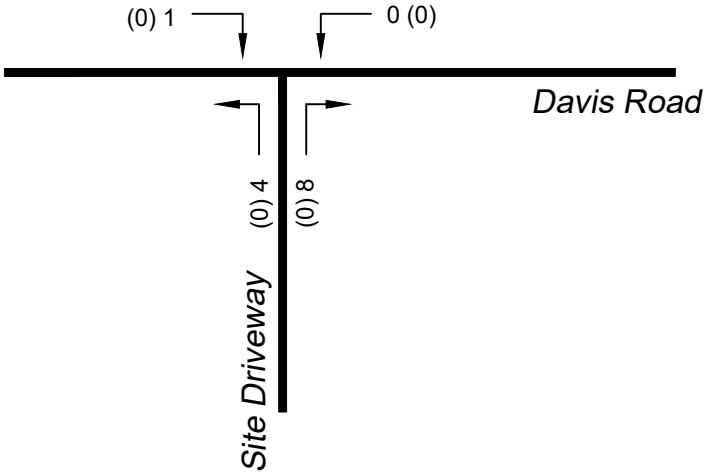
FIGURE 6B
HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK
EXISTING AM & PM PEAK HOUR VOLUMES
ELIZABETH ST/VICTORIA ST INTERSECTION
JOB NO.19144 27/03/20



AM PEAK HOUR
0730 - 0830



KEY
344 TOTAL VEHICLES
(27) HEAVY VEHICLES
[1] CYCLISTS

PM PEAK HOUR
1600 - 1700

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FIGURE 6C
HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK
EXISTING AM & PM PEAK HOUR VOLUMES
HALGAN DRIVEWAY, DAVIS ROAD
JOB NO.19144 27/03/20

Figure 6C shows the maximum peak hour volumes using the Halgan Driveway at 10 Davis Road. As noted previously, the peak hour for the driveway occurred at different times to the intersection in both peak hours.

During the 7.30am – 8.30am hour a maximum of 7 vehicles entered the site with no vehicles exiting.

During the 4.00pm – 5.00pm hour a total of 1 vehicle entered the site and 12 vehicles exited the site.

3.3 Public Transport

Public transport services in the area include a number of bus routes operated by Transit Systems.

The 812 bus service between Fairfield and Blacktown operates along Elizabeth Street and Davis Road. Bus stops for this service are located in Elizabeth Street, adjacent the site.

Other bus services in the area with bus stops within convenient walking distance of the site include the 800 route between Fairfield and Blacktown. This route operates along Frank Street (south of Davis Road) and Elizabeth Street between Frank Street and Victoria Street.

Bus stops for the 800 route are 400-500 metres walking distance from the site.

The bus routes are contained in Appendix 1.

3.4 Bicycle Facilities

Bicycle facilities include the following off road bicycle routes, near Wetherill Park.

- Liverpool to Blacktown route that travels via Canley Vale Road, Victoria Street and Water Street;
- The Horsley Drive route;
- Orphan School Creek route; and
- Prospect Creek Route.

Bicycle routes are contained in Appendix 1.

4.0 ASSESSMENT OF TRAFFIC IMPACTS

4.1 Traffic Generation of Proposal

Daily Traffic Generation

The increase in the traffic generation using the Halgan site due to the proposed Liquid Waste Facility operating at full capacity will be:

- 5 additional light vehicle trips associated with the additional employees entering and exiting the site per day. The entry trips will occur between 3.30am (drivers and 7.00am (plant operators) in the morning. The exit trips will occur between 4.00pm to 5.00pm.

- 15 tanker deliveries per day (i.e. 15 in/15 out). Halgan tankers which number 3 in total will exit the site at 4.00am and return twice during the day with the final return trip before 4.00pm.

Table 4.1 shows the maximum daily increase in vehicles generated by the proposed liquid waste facility, which will be a total of 40 vehicles a day consisting of 10 light vehicles, and 30 tankers. The 30 tanker movements (15 in/15 out) assumes the facility is operating at 50,000tpa.

TABLE 4.1

TRAFFIC GENERATION OF PROPOSAL ON A WEEKDAY

TYPE OF VEHICLE	IN	OUT	TOTAL
Light Vehicles (Austroad Class 1 and 2)	5	5	10
Tankers (Austroad Class 3)	15	15	30
Total	**20**	**20**	**40**

Peak Hours

When the facility is operating at 50,000tpa, the traffic generation during the day will be 1-2 tankers per hour entering and exiting the site.

All employees associated with the liquid waste facility will arrive before 7.00am, which is before the AM peak hour, so employee trips will not overlap with the AM peak hour on the road network.

For the purposes of the assessment it is assumed that 2 tankers per hour may arrive and depart the facility in the AM peak hour.

During the PM period, between 3.00pm and 4.00pm, up to 3 Halgan tankers are expected to return to the facility and park there overnight. Between the 4.00pm – 5.00pm period 5 employees will exit the site.

For the purposes of the analysis, it is assumed that these traffic movements will occur between 3.30pm and 4.30pm and have been modelled for the PM peak hour.

Table 4.2 summarises expected additional traffic movement associated with the proposal during the AM and PM periods.

TABLE 4.1

ADDITIONAL TRAFFIC DURING WEEKDAY AM AND PM PEAK HOURS GENERATED BY PROPOSAL

TYPE OF VEHICLE	AM PEAK		PM PEAK	
	In	Out	In	Out
Light Vehicles (Austroad Class 1 and 2)	-	-	-	5
Tankers (Austroad Class 3)	2	2	3	-
Total	**2**	**2**	**3**	**5**

4.2 Traffic Impacts on Road Network

Figure 7 shows the additional vehicles generated by the proposal during the AM and PM peak period assigned to the road network.

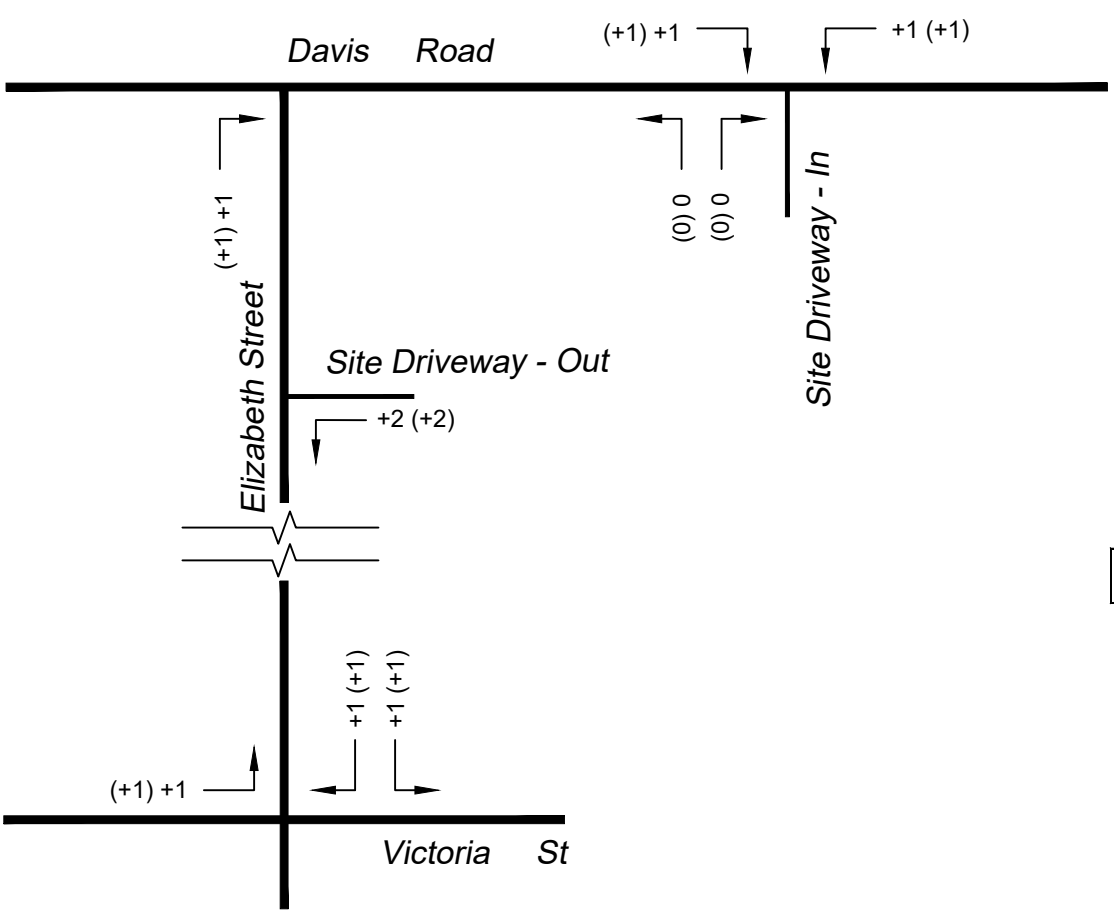
The impacts of these additional trips on the adjacent road network will be relatively minor, given the small number of vehicles generated by the proposal which number 4-8 vehicles per hour spread over a number of roads.

To examine the impacts at the Davis Road/Elizabeth Street and Elizabeth Street/Victoria Street intersections and the Halgan driveway entrances in Davis Road and in Elizabeth Street, traffic modelling using the SIDRA 8 software has been undertaken.

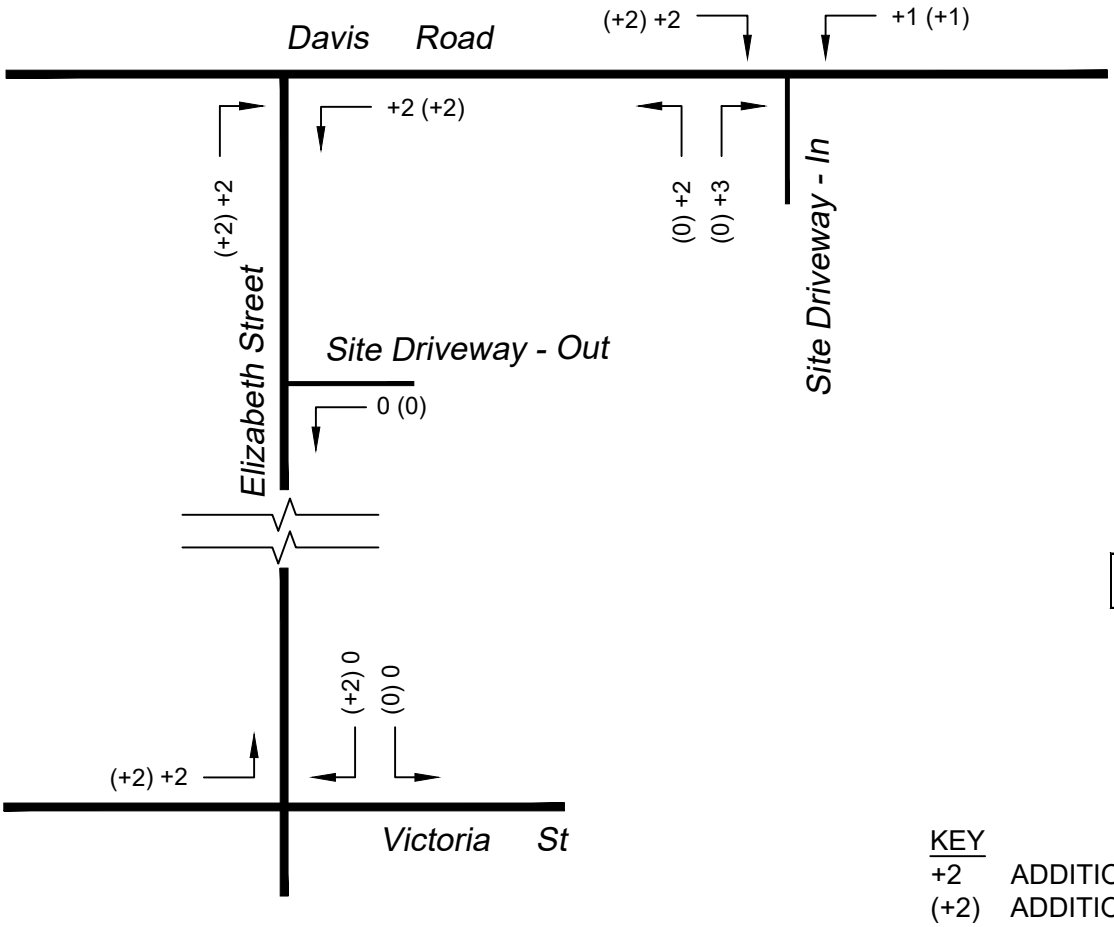
The modelling has adopted the existing traffic management and parking controls at both intersections and in Davis Road and Elizabeth Street along the frontage of the site, adjacent the site's driveways.

SIDRA assess the operational performance of intersections under traffic signal, roundabout or sign control. The best criteria for assessing intersections controlled by traffic signals are Level of Service (LS), Degree of Saturation (DS) and Average Vehicle Delay (AVD). Table 4.2 shows the Level of Service Criteria for intersections as reproduced from the RTA's Guide to Traffic Generating Developments. The desirable design criteria for intersections is a Level of Service D or better (i.e. A, B, C or D).

For intersections controlled by Give Way or Priority Control the Level of Service is determined by movement with the highest average vehicle delay (i.e. highest individual movement delay).



AM PEAK HOUR



PM PEAK HOUR

KEY
+2 ADDITIONAL VEHICLES
(+2) ADDITIONAL HEAVY VEHICLES

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FIGURE 7

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

ADDITIONAL TRAFFIC FROM PROPOSAL IN AM & PM PEAK PERIOD

JOB NO.19144 27/03/20

TABLE 4.3

LEVEL OF SERVICE CRITERIA FOR INTERSECTIONS

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way & Stop Signs
A	<14	Good operation	Good operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory, but accident study required
D	43 to 56	Operating near capacity	Near capacity and accident study required
E	57 to 70	At capacity; at signals, incidents will cause excessive delays. Roundabouts require other control mode	At capacity, requires other control mode
F	>70	Intersection is oversaturated	Oversaturated, requires other control mode

Source: Table 4.2 Guide to Traffic Generating Developments October 2002. Roads and Traffic Authority

The modelling has been undertaken for the existing conditions using the existing peak volumes as well as for the proposal, using the additional volumes shown on **Figure 7** for the same periods.

The results of the modelling are shown in Tables 4.4 to 4.7.

Reference to Table 4.4 which shows the modelling for the intersection of Davis Road/Elizabeth Street shows that the intersection will retain a Level of Service A operation with the proposal in place with very little change in vehicle delays. Level of Service A represents a good operation.

Reference to Table 4.5, which shows the modelling result for the intersection of Elizabeth Street/Victoria Street, shows that the intersection will retain a Level of Service E operation (same as existing) with a very small increase in vehicle delay. This demonstrates that the proposal will have minimal impact on this intersection.

Reference to Table 4.6 and 4.7 which shows the modelling for the Halgan driveway entrance in Davis Road and also the exit driveway in Elizabeth Street also shows that the driveways will retain a Level of Service A operation, which indicates a good operation. The exit driveway in Elizabeth Street, which is a truck exit is not used in the PM peak hour as no trucks will leave the site during the PM peak hour.

The SIDRA modelling outputs are contained in Appendix 2.

TABLE 4.4

SIDRA MODELLING RESULTS FOR INTERSECTION OF DAVIS ROAD/ELIZABETH STREET FOR EXISTING CONDITIONS AND WITH PROPOSAL

Criteria	Existing AM Peak	With Proposal AM Peak	Existing PM Peak	With Proposal PM Peak
LS	A	A	A	A
DS	0.505	0.506	0.322	0.381
AVD	7.0	7.0	6.3	6.3
HMD	9.1	9.2	8.7	8.8

Where: LS - Level of Service
DS - Degree of Saturation
AVD - Average Vehicle Delay in seconds
HMD - Highest Movement Delay in seconds

TABLE 4.5

SIDRA MODELLING RESULTS FOR INTERSECTION OF ELIZABETH STREET/VICTORIA STREET FOR EXISTING CONDITIONS AND WITH PROPOSAL

Criteria	Existing AM Peak	With Proposal AM Peak	Existing PM Peak	With Proposal PM Peak
LS	E	E	E	E
DS	0.965	0.965	0.958	0.961
AVD	64.9	65.1	62.3	63.1
HMD	-	-	-	-

Where: LS - Level of Service
DS - Degree of Saturation
AVD - Average Vehicle Delay in seconds
HMD - Highest Movement Delay in seconds

TABLE 4.6

SIDRA MODELLING RESULTS FOR HALGAN'S DRIVEWAY ENTRANCE IN DAVIS ROAD FOR EXISTING CONDITIONS AND WITH PROPOSAL

Criteria	Existing AM Peak	With Proposal AM Peak	Existing PM Peak	With Proposal PM Peak
LS	A	A	A	A
DS	0.247	0.247	0.157	0.160
AVD	0.1	0.1	0.1	0.2
HMD	7.2	7.3	6.7	8.5

Where: LS - Level of Service
DS - Degree of Saturation
AVD - Average Vehicle Delay in seconds
HMD - Highest Movement Delay in seconds

TABLE 4.7

SIDRA MODELLING RESULTS FOR HALGAN'S TRUCK EXIT DRIVEWAY IN ELIZABETH STREET FOR EXISTING CONDITIONS AND WITH PROPOSAL

Criteria	Existing AM Peak	With Proposal AM Peak	Existing PM Peak	With Proposal PM Peak
LS	Driveway	A	Driveway	Nil
DS	Not	0.257	Not	Use in
AVD	Used	0.0	Used	PM
HMD	-	5.6	-	Peak

Where: LS - Level of Service
DS - Degree of Saturation
AVD - Average Vehicle Delay in seconds
HMD - Highest Movement Delay in seconds

The traffic impacts on the wider road network will also be small with no measurable impact likely to occur at any of the adjacent intersections, given the small increase in traffic movements associated with the proposal.

4.3 Construction Impacts

Construction of the liquid waste treatment facilities will comprise of a new roller door, new solid internal walls, bunds, installation of tanks and treatment units, pipe work and fittings, ducting and controls. Works will take approximately 3 months, followed by one month commissioning.

Construction hours will be 7.00am – 6.00pm Monday to Friday.

There will be a maximum of four construction workers on site at any one time that will require parking for two vehicles.

Delivery vehicles will number up to 2 HRV vehicles per day and will use HIAB cranes. There may also be the use of small mobile cranes from time to time.

All trucks and worker vehicles will enter and exit via the entry/exit driveway in Davis Road.

Heavy vehicles will arrive and depart via the transport routes identified in Section 2.3.2 and shown in **Figure 4**.

The impacts of the construction traffic will be similar to, but less than the impacts of the operational traffic which has been assessed as satisfactory, with relatively minor impact.

The construction traffic impacts will therefore have minor impacts on the road system.

4.4 Road Safety

The proposal is not expected to have any negative impacts on road safety on the road network, adjacent the site.

The proposal will generate relatively small volumes of traffic. The proposal will use the existing driveways to the site which are assessed as satisfactory in terms of sight distance. All trucks exiting the Elizabeth Street driveway will turn left out of the site.

Traffic controls at the intersection adjacent the site can accommodate the additional traffic that will be generated by the proposal during its construction and operation.

Traffic modelling of principal intersections adjacent the site shows that the proposal will have no impact of the level of service of these intersections and minimal increase in vehicle delay.

4.5 Cumulative Impact

The proposal will have very small traffic and transport impacts including cumulative impacts on the road network and public transport operations in the area. As noted previously the proposal requires 5 employees and will generate 40 vehicle trips a day (i.e. 20 in/20 out). Ten (10) of these trips will be light vehicles (i.e. 5 in/5 out) and the remaining 30 trips (15 in/15 out) medium size tankers 8.3 metres long.

The additional 5 employee trips will have no measurable impact on public transport, and or bicycle and pedestrian network.

5.0 PARKING AND INTERNAL OPERATION

5.1 Internal Operation

5.1.1 Manufacturing Deliveries

The manufacturing operation receives 3-4 deliveries per truck (i.e. maximum of one (1) per day) used in a range of rigid trucks up to a HRV. These occur in the mornings and trucks are on site for around 10 minutes.

These trucks will unload within the building. **Figure 8** shows a 12.5 metre long HRV entering the site and then the building from Davis Road, manoeuvring within the building and exiting into Elizabeth Street via a left turn. Reference to **Figure 8** shows that the manoeuvring is satisfactory and fully in accordance with AS2890.2.

5.1.2 Liquid Waste Facility

The proposal at maximum capacity will deliver and process 190 tonnes of liquid waste, which is 15 tankers per day, over a 12 hour period.

Halgan's own trucks will total 6 tankers per day (i.e. 2 deliveries each truck per day) with the remainder made up of vehicles from other companies.

Halgan will manage this facility so that tankers are spread over the day.

The frequency of tankers arriving at the facility would typically be 1-2 tankers per hour. Most tankers will require 15 minutes to unload, with a maximum time of 20 minutes.

Figure 9A shows an 8.3 metre long tanker entering via Davis Road, unloading at the facility and then exiting the site to Elizabeth Street via a left turn. Reference to **Figure 9A** shows that this manoeuvring is satisfactory and fully in accordance with AS2890.2.

In the event that additional tankers arrive at the facility while a tanker is unloading, the facility can easily accommodate this.

Reference to **Figure 9B** shows that up to 3 additional tankers can be accommodated within the building while another truck is unloading at the facility (ie. total of 4 tankers).

It is therefore considered that the proposal will have adequate queueing storage area within the building to easily accommodate the maximum demand.

<u>Overnight Parking</u>

Halgan will park its 3 tankers on site overnight.

Figure 9C shows that this parking can be easily accommodated within the building.

5.2 Car Parking Assessment

The proposal will retain 29 parking spaces including one (1) disabled parking space. This is a reduction of one (1) space from the existing parking capacity within the car park due to revised standards (AS2890.6) for disabled parking.

Fairfield DCP City Wide 2013 does not have a parking rate for waste, or resource recovery recycling facilities. Therefore, the parking assessment is based on a merit's assessment based on the operational characteristics of the facility and the existing operation of the Halgan industrial use.

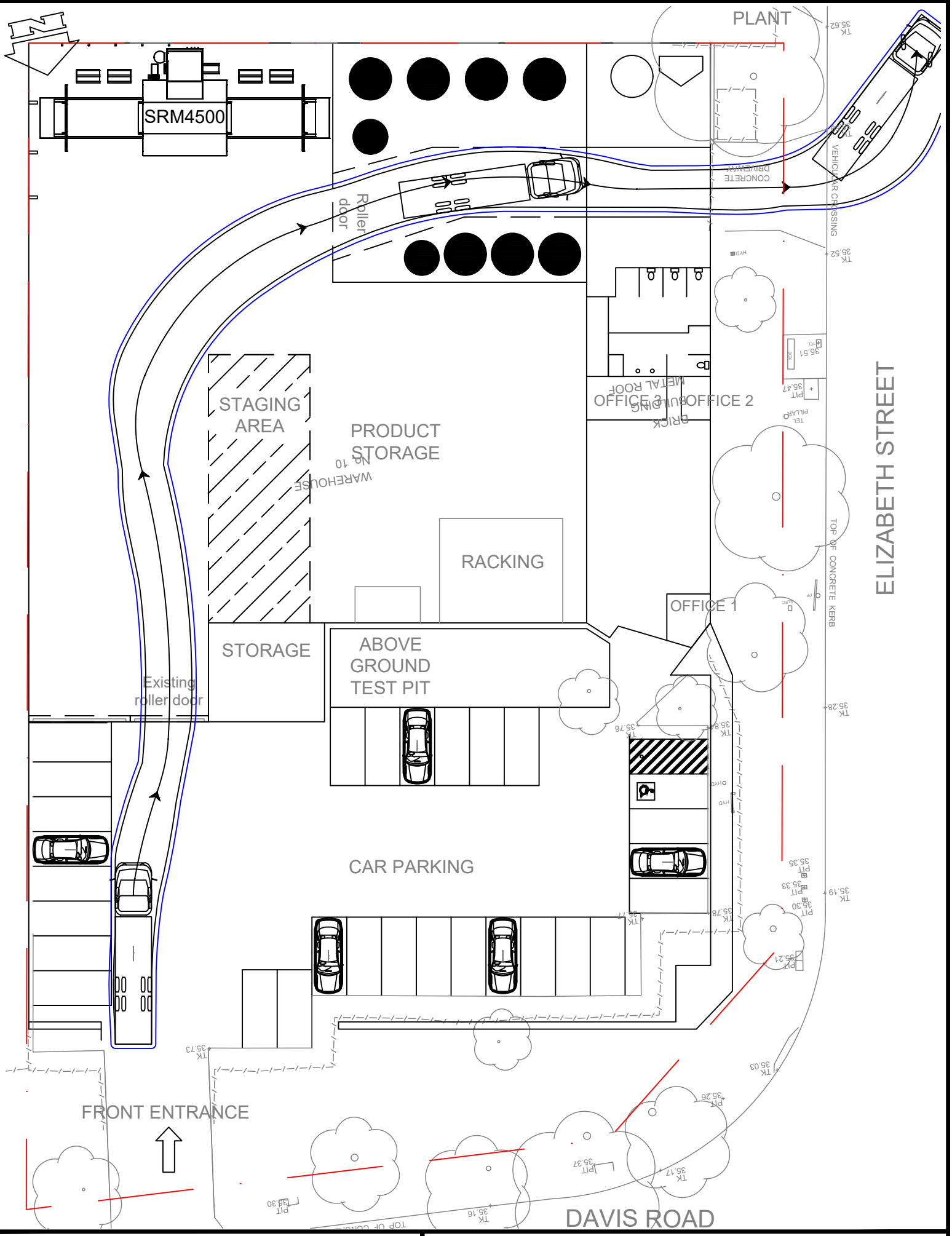

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FIGURE 8

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

MANUFACTURING 12.5m HRV MANOEUVRING ON SITE

JOB NO.19144

27/03/20

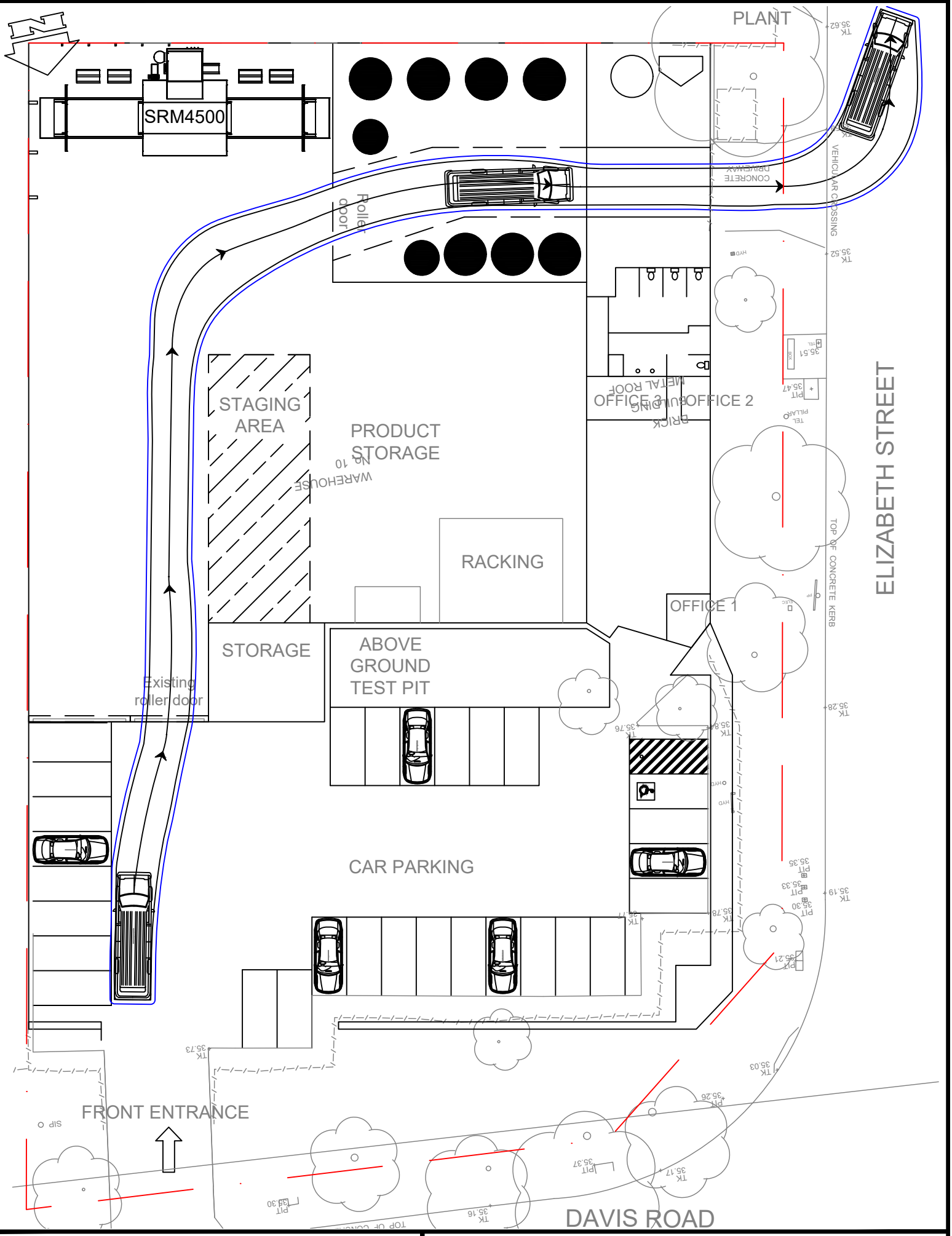

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FIGURE 9A

HALGAN LIQUID WASTE

10 DAVIS ROAD, WETHERILL PARK

8.3m TANKER MANOEUVRING ON SITE

JOB NO.19144

27/03/20

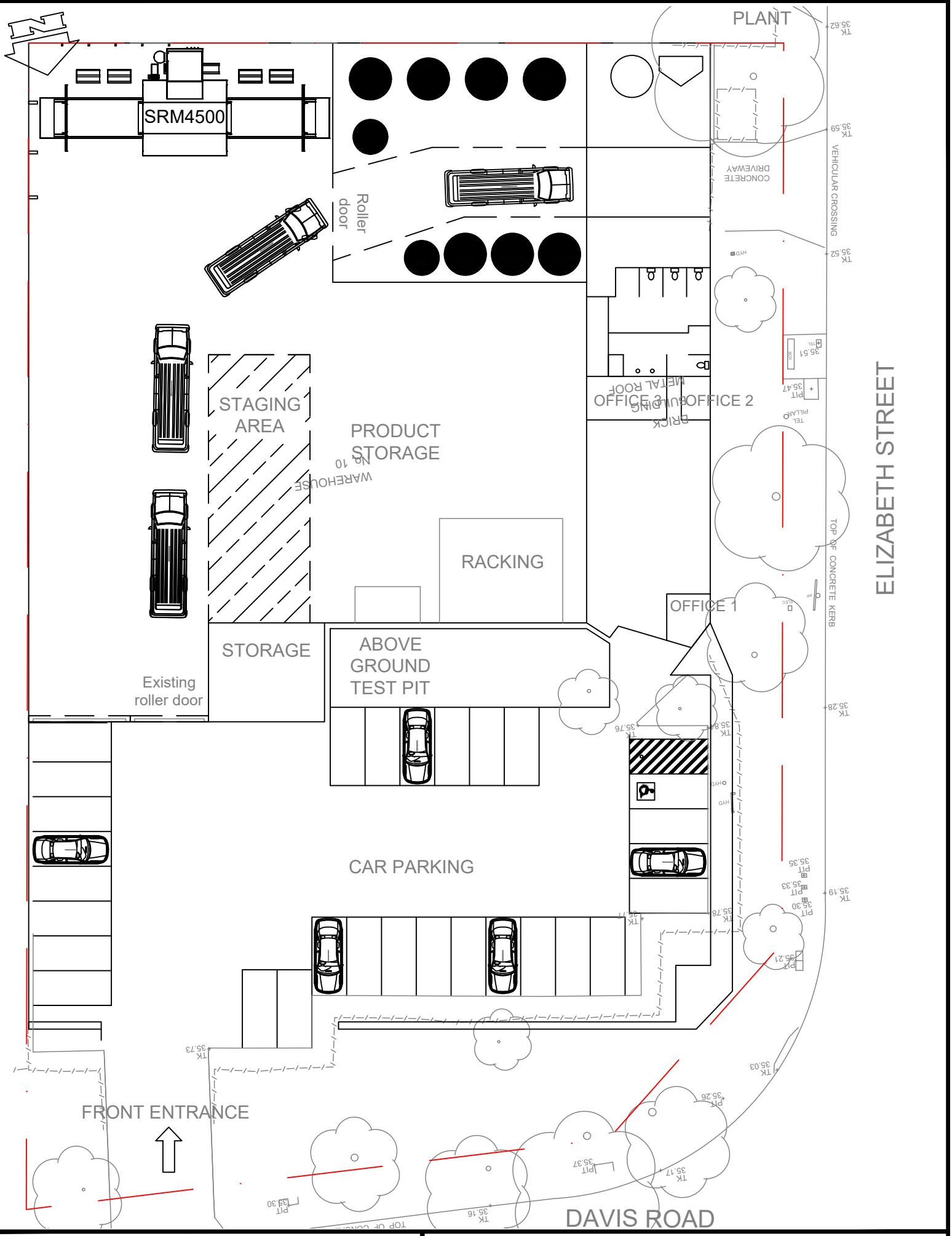

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FIGURE 9B

HALGAN LIQUID WASTE

10 DAVIS ROAD, WETHERILL PARK

8.3m TANKER

QUEUEING CAPACITY INSIDE BUILDING

JOB NO.19144

27/03/20

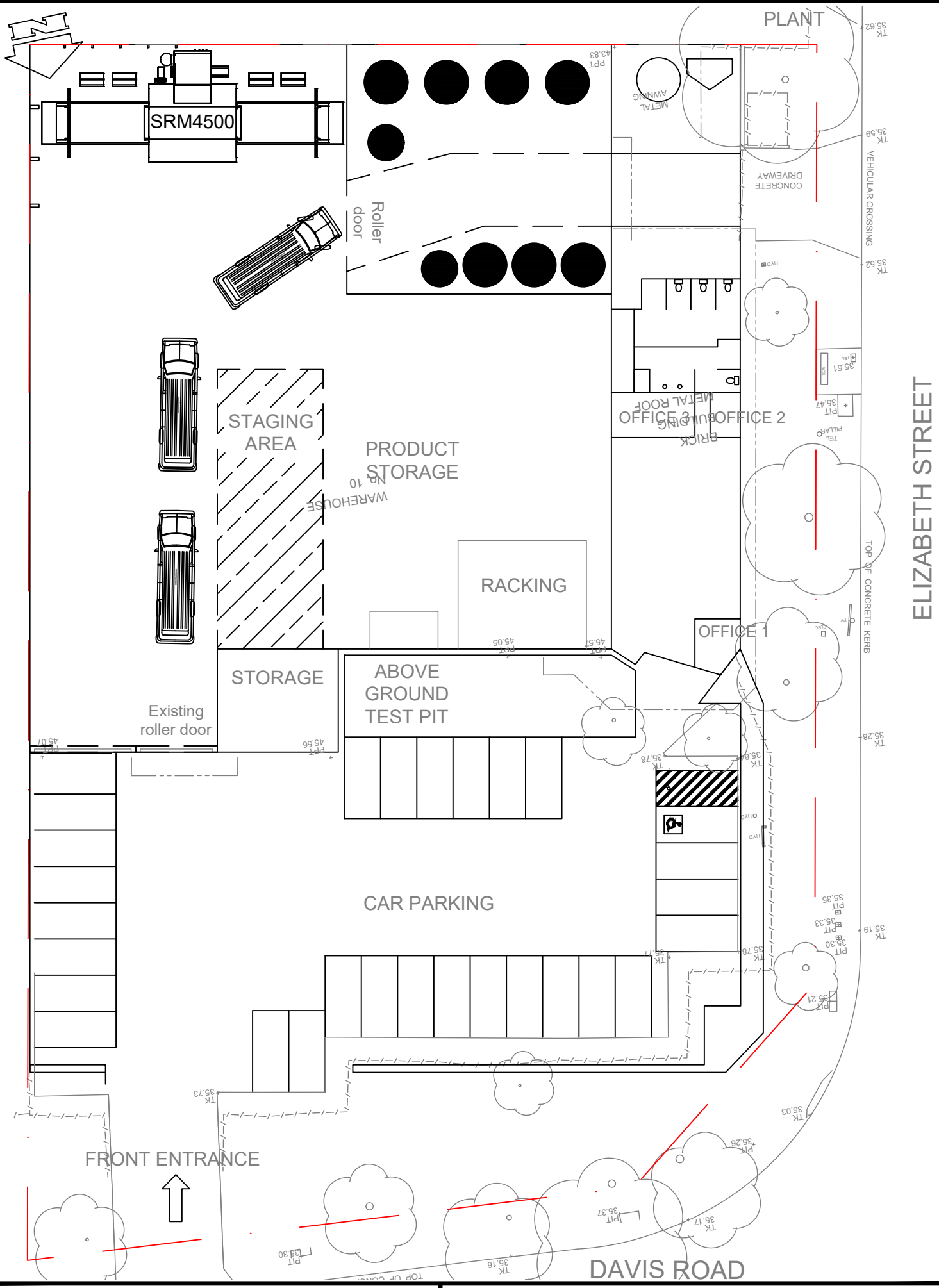

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FIGURE 9C

HALGAN LIQUID WASTE
10 DAVIS ROAD, WETHERILL PARK

8.3m TANKER OVERNIGHT PARKING

JOB NO.19144

27/03/20

Halgan currently employs 13 people on the site with 6 people in the factory and 7 people in the office.

The proposed Liquid Waste Facility will employ a total of 5 people with 3 drivers and 2 in the Liquid Waste Facility.

Total employees and cars on site requiring parking for the existing operation plus the proposal will be a maximum of 18 people and or 18 cars.

As noted above the Halgan site will retain 29 car spaces including one (1) disabled space, which is more than adequate for employees and any visitor parking.

The car park layout complies with AS2890.1 and AS2890.2 as appropriate.

5.3 Bicycle Parking

Fairfield City Wide DCP 2013 does not specify a rate for bicycle parking for industrial/resource recovery facility developments. The DCP nominates AS2890.3 (2015) as the appropriate control, but AS2890.3 does not specify bicycle parking rates.

Council can condition and specify an amount of bicycle parking as part of the conditions of consent. However, the Halgan proposal is a relatively small development with a total of 5 new employees, and not likely to require formal bicycle parking, given the early start times of the future employees associated with the proposal.

6.0 CONCLUSIONS

This report documents the assessment of traffic, transport and parking impacts of a proposal by Halgan to provide a Liquid Waste Facility at its site at 10 Davis Road Wetherill Park.

The assessment has found that:

i. The facility will employ an additional 5 employees (3 drivers and 2 in the facility) and generate an additional 10 light vehicle trips (5 in/5 out) and 30 medium size tanker trips (15 in/15 out) per day;

ii. The proposed facility will have relatively minor impacts on the road network adjacent the site and traffic conditions on the road network will be satisfactory, with the proposal in place;

iii. The site and facility will have sufficient queueing storage within the building to accommodate the maximum demand of the tankers unloading at the facility. Tanker demand will be 1-2 tankers per hour. The facility can accommodate 4 tankers within the building. The average service time for each tanker will be 15 minutes;

iv. The facility, which has 29 off street car spaces including one (1) disabled parking space to AS2890.6 requirements, will have adequate car parking to accommodate its maximum car parking demand;

v. Halgan has sufficient parking at the facility for its tanker fleet overnight. Other trucks that need to be accommodated on site include a 6.4 metre long SRV, which can be accommodated in the external car park;

vi. The driveways and internal operation with regard to trucks entering and exiting the site and manoeuvring within the site is fully compliant with AS2890.2;

vii. The car park spaces and adjacent aisle widths on the site are compliant with AS2890.1 and AS2890.6;

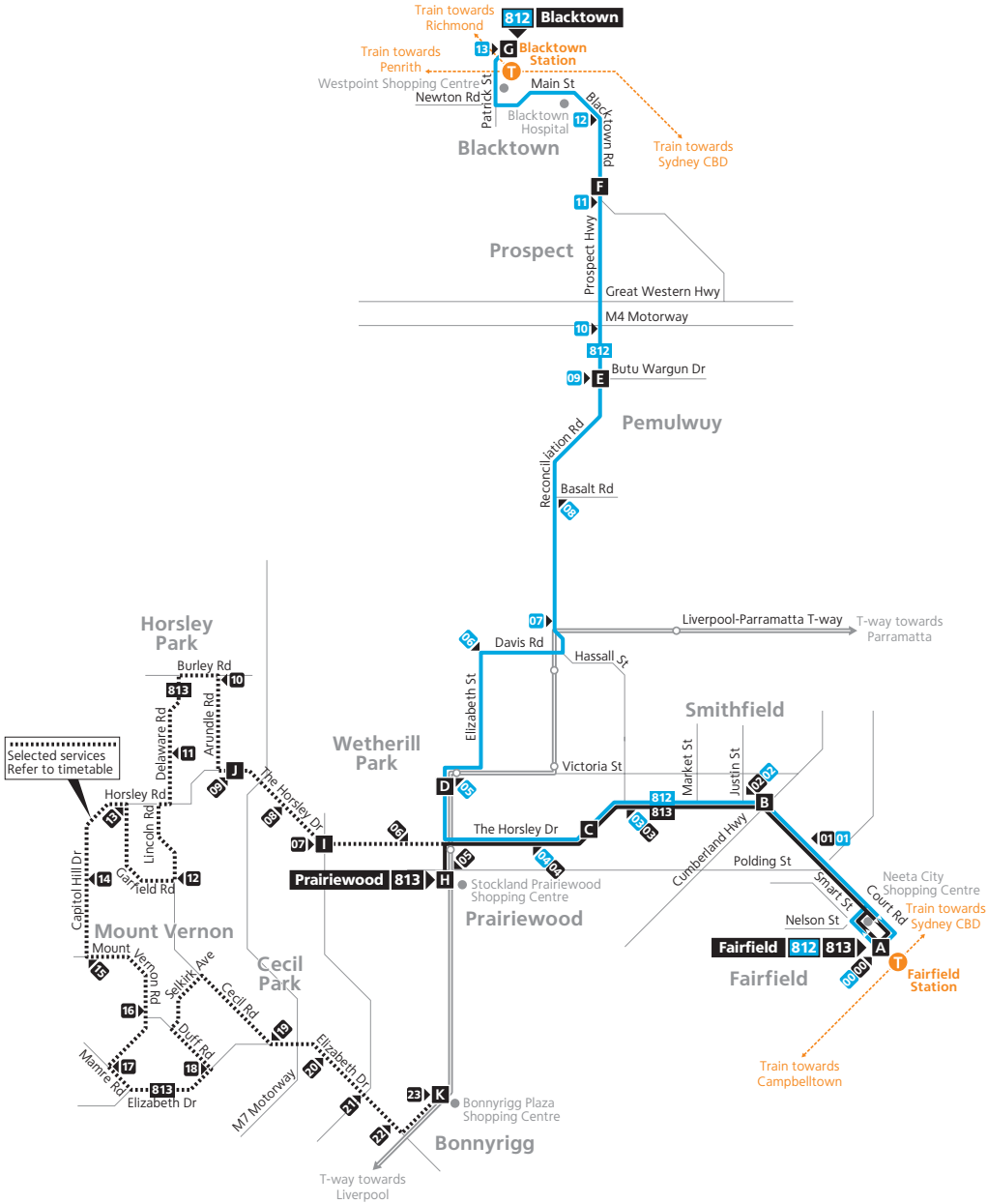
viii. As the proposed development is a relatively small industrial type development the proposal will have minimal cumulative impacts on the adjacent road network, public transport, bicycle network and pedestrian network in the area;

ix. As the proposal has relatively minor impacts, no upgrades to the road, public transport, bicycle and or pedestrian network are required;

x. Construction impacts of the proposal have been examined and these impacts are assessed as satisfactory.

APPENDIX 1

BUS ROUTES AND BICYCLE NETWORK



Diagrammatic Map
Not to Scale
North

Legend

- Bus route
- 812 Bus route number
- A Timing point
- 04 Section point
- T Train line/station

Transport

FAIRFIELD CITY CYCLEWAYS

Carwarra Place Park Playground. Artist: Joe Hurst.

CYCLE NETWORK

- PROPOSED REGIONAL CYCLEWAY ROUTE
- EXISTING REGIONAL CYCLEWAY ROUTE
- PROPOSED LOCAL CYCLEWAY ROUTE
- EXISTING LOCAL CYCLEWAY ROUTE
- M7 ROUTE CYCLEWAY ROUTE
- RAIL TRAIL/TRANSITWAY ROUTES

- TRANSITWAY
- TRANSITWAY STATIONS
- RAILWAY LINE
- OPEN SPACE
- SCHOOLS
- RETAIL OUTLETS
- EMPLOYMENT PRECINCTS
- TAFE

- POLICE — POLICE
- HOSPITAL — HOSPITAL
- CYCLE SHOP — CYCLE SHOP
- LEISURE CENTRE — LEISURE CENTRE
- SKATE — SKATE PARKS
- CLUB HOUSE — WESTERN SYDNEY CYCLING NETWORK
- LIBRARIES
- MUSEUMS
- COUNCIL
- EXERCISE EQUIPMENT

PUBLIC ARTWORKS

- 1A - 1B WARALI WALI (HOLROYD)
- 1C - 1D WARALI WALI (FAIRFIELD)
- 2A - 2D CYCLEWAY MARKERS
- 3A SEATING WALL
- 3B FISH HABITAT PROJECT
- 3C FISH AND DRAGONS PROJECT

FairfieldCity
Celebrating diversity

APPENDIX 2

SIDRA MODELLING EXTRACTS

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Elizabeth St - Ex AM]

Existing AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	76	14.5	0.053	5.9	LOS A	0.2	1.7	0.15	0.54	0.15	52.5
3	R2	432	10.6	0.505	9.1	LOS A	4.0	30.5	0.54	0.76	0.69	50.9
Approach		508	11.2	0.505	8.7	LOS A	4.0	30.5	0.48	0.73	0.61	51.1
East: Davis Rd												
4	L2	205	13.7	0.121	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
5	T1	61	9.8	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		266	12.8	0.121	4.4	NA	0.0	0.0	0.00	0.44	0.00	54.5
West: Davis Rd												
11	T1	30	30.0	0.052	1.2	LOS A	0.2	2.0	0.35	0.32	0.35	55.8
12	R2	32	21.9	0.052	7.3	LOS A	0.2	2.0	0.35	0.32	0.35	53.7
Approach		62	25.8	0.052	4.3	NA	0.2	2.0	0.35	0.32	0.35	54.7
All Vehicles		836	12.8	0.505	7.0	NA	4.0	30.5	0.32	0.61	0.40	52.4

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

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Elizabeth St - Ex PM]

Existing PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	36	19.4	0.025	5.9	LOS A	0.1	0.8	0.10	0.54	0.10	52.5
3	R2	246	11.8	0.322	8.7	LOS A	1.6	12.2	0.52	0.73	0.55	51.1
Approach		282	12.8	0.322	8.3	LOS A	1.6	12.2	0.46	0.71	0.49	51.3
East: Davis Rd												
4	L2	270	15.9	0.162	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.9
5	T1	29	10.3	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		299	15.4	0.162	5.2	NA	0.0	0.0	0.00	0.52	0.00	53.5
West: Davis Rd												
11	T1	69	8.7	0.116	1.4	LOS A	0.6	4.2	0.39	0.33	0.39	55.8
12	R2	75	10.7	0.116	7.4	LOS A	0.6	4.2	0.39	0.33	0.39	54.2
Approach		144	9.7	0.116	4.5	NA	0.6	4.2	0.39	0.33	0.39	55.0
All Vehicles		725	13.2	0.322	6.3	NA	1.6	12.2	0.26	0.55	0.27	52.9

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

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Elizabeth St - AM with Prop]

AM with Proposal
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	76	14.5	0.053	5.9	LOS A	0.2	1.7	0.15	0.54	0.15	52.5
3	R2	433	10.9	0.506	9.2	LOS A	4.0	30.8	0.54	0.76	0.69	50.8
Approach		509	11.4	0.506	8.7	LOS A	4.0	30.8	0.49	0.73	0.61	51.1
East: Davis Rd												
4	L2	205	13.7	0.121	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	53.0
5	T1	61	9.8	0.033	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		266	12.8	0.121	4.4	NA	0.0	0.0	0.00	0.44	0.00	54.5
West: Davis Rd												
11	T1	30	30.0	0.052	1.2	LOS A	0.2	2.0	0.35	0.32	0.35	55.8
12	R2	32	21.9	0.052	7.3	LOS A	0.2	2.0	0.35	0.32	0.35	53.7
Approach		62	25.8	0.052	4.3	NA	0.2	2.0	0.35	0.32	0.35	54.7
All Vehicles		837	12.9	0.506	7.0	NA	4.0	30.8	0.32	0.61	0.40	52.4

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

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Elizabeth St - PM with Proposal]

With Proposal - 3-4PM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	36	19.4	0.025	5.9	LOS A	0.1	0.8	0.10	0.54	0.10	52.5
3	R2	250	13.2	0.331	8.8	LOS A	1.7	13.0	0.52	0.74	0.56	51.0
Approach		286	14.0	0.331	8.5	LOS A	1.7	13.0	0.47	0.71	0.50	51.2
East: Davis Rd												
4	L2	270	15.9	0.162	5.7	LOS A	0.0	0.0	0.00	0.57	0.00	52.9
5	T1	29	10.3	0.016	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		299	15.4	0.162	5.2	NA	0.0	0.0	0.00	0.52	0.00	53.5
West: Davis Rd												
11	T1	69	8.7	0.116	1.4	LOS A	0.6	4.2	0.39	0.33	0.39	55.8
12	R2	75	10.7	0.116	7.4	LOS A	0.6	4.2	0.39	0.33	0.39	54.2
Approach		144	9.7	0.116	4.5	NA	0.6	4.2	0.39	0.33	0.39	55.0
All Vehicles		729	13.7	0.331	6.3	NA	1.7	13.0	0.26	0.56	0.27	52.9

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

MOVEMENT SUMMARY

Site: 101 [Elizabeth St & Victoria St -Ex AM]

Ex AM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	120	5.0	0.965	96.4	LOS F	27.8	204.0	1.00	1.33	1.97	23.6
2	T1	413	6.3	0.965	90.4	LOS F	27.8	204.0	1.00	1.31	1.84	23.9
3	R2	143	9.1	0.965	95.6	LOS F	26.7	199.1	1.00	1.29	1.67	23.7
Approach		676	6.7	0.965	92.6	LOS F	27.8	204.0	1.00	1.31	1.83	23.8
East: Victoria St												
4	L2	53	11.3	0.749	47.3	LOS D	22.4	169.5	0.96	0.85	0.98	34.8
5	T1	739	10.8	0.749	42.1	LOS C	22.4	169.5	0.95	0.85	0.98	35.4
6	R2	90	4.4	0.515	63.9	LOS E	5.2	38.1	1.00	0.78	1.00	28.8
Approach		882	10.2	0.749	44.6	LOS D	22.4	169.5	0.96	0.84	0.98	34.5
North: Elizabeth St												
7	L2	45	22.2	0.523	48.6	LOS D	6.8	54.2	0.97	0.80	1.03	33.8
8	T1	93	14.0	0.523	42.8	LOS D	6.8	54.2	0.97	0.80	1.03	34.8
9	R2	195	25.1	0.857	70.5	LOS E	12.7	108.4	1.00	0.97	1.32	27.5
Approach		333	21.6	0.857	59.8	LOS E	12.7	108.4	0.99	0.90	1.20	30.0
West: Victoria St												
10	L2	338	15.4	0.929	67.5	LOS E	36.0	281.8	0.99	1.13	1.55	28.5
11	T1	665	15.6	0.929	65.2	LOS E	36.0	281.8	0.99	1.15	1.43	28.9
12	R2	82	6.1	0.474	63.7	LOS E	4.8	35.0	0.99	0.77	0.99	28.9
Approach		1085	14.8	0.929	65.8	LOS E	36.0	281.8	0.99	1.12	1.44	28.7
All Vehicles		**2976**	**12.4**	**0.965**	**64.9**	**LOS E**	**36.0**	**281.8**	**0.98**	**1.05**	**1.36**	**28.9**

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	2	55.1	LOS E	0.0	0.0	0.96	0.96
P2	East Full Crossing	1	55.1	LOS E	0.0	0.0	0.96	0.96
P3	North Full Crossing	3	55.1	LOS E	0.0	0.0	0.96	0.96
P4	West Full Crossing	4	55.1	LOS E	0.0	0.0	0.96	0.96
All Pedestrians		**10**	**55.1**	**LOS E**			**0.96**	**0.96**

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

MOVEMENT SUMMARY

Site: 101 [Elizabeth St & Victoria St -Ex PM]

Ex PM
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	109	24.8	0.890	63.0	LOS E	11.6	92.5	1.00	1.10	1.70	29.6
2	T1	151	6.6	0.890	59.4	LOS E	11.9	89.0	1.00	1.09	1.63	29.7
3	R2	144	9.0	0.890	70.0	LOS E	11.9	89.0	1.00	1.06	1.46	28.0
Approach		404	12.4	0.890	64.2	LOS E	11.9	92.5	1.00	1.08	1.59	29.1
East: Victoria St												
4	L2	136	1.5	0.777	47.9	LOS D	21.2	159.3	0.99	0.90	1.05	34.2
5	T1	640	13.1	0.777	42.3	LOS C	21.2	159.3	0.97	0.89	1.05	35.2
6	R2	63	12.7	0.295	55.0	LOS D	3.2	24.8	0.95	0.76	0.95	30.9
Approach		839	11.2	0.777	44.2	LOS D	21.2	159.3	0.97	0.88	1.04	34.6
North: Elizabeth St												
7	L2	58	10.3	0.958	86.0	LOS F	23.5	171.2	1.00	1.28	1.83	25.4
8	T1	308	3.6	0.958	80.7	LOS F	23.5	171.2	1.00	1.27	1.81	25.6
9	R2	232	23.7	0.958	88.7	LOS F	20.6	169.4	1.00	1.22	1.73	24.4
Approach		598	12.0	0.958	84.3	LOS F	23.5	171.2	1.00	1.25	1.78	25.1
West: Victoria St												
10	L2	223	27.4	0.931	67.3	LOS E	30.9	248.6	0.99	1.15	1.58	28.8
11	T1	692	12.3	0.931	63.6	LOS E	30.9	248.6	1.00	1.18	1.50	29.3
12	R2	104	1.0	0.450	55.8	LOS D	5.4	37.9	0.98	0.78	0.98	30.9
Approach		1019	14.4	0.931	63.6	LOS E	30.9	248.6	0.99	1.13	1.46	29.2
All Vehicles		**2860**	**12.7**	**0.958**	**62.3**	**LOS E**	**30.9**	**248.6**	**0.99**	**1.08**	**1.42**	**29.5**

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	50.1	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	2	50.1	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	50.1	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	4	50.1	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		**12**	**50.1**	**LOS E**			**0.95**	**0.95**

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

MOVEMENT SUMMARY

Site: 101 [Elizabeth St & Victoria St -AM with Proposal]

With Proposal
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 120 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	120	5.0	0.965	96.4	LOS F	27.8	204.0	1.00	1.33	1.97	23.6
2	T1	413	6.3	0.965	90.4	LOS F	27.8	204.0	1.00	1.31	1.84	23.9
3	R2	143	9.1	0.965	95.6	LOS F	26.7	199.1	1.00	1.29	1.67	23.7
Approach		676	6.7	0.965	92.6	LOS F	27.8	204.0	1.00	1.31	1.83	23.8
East: Victoria St												
4	L2	53	11.3	0.749	47.3	LOS D	22.4	169.5	0.96	0.85	0.98	34.8
5	T1	739	10.8	0.749	42.1	LOS C	22.4	169.5	0.95	0.85	0.98	35.4
6	R2	90	4.4	0.515	63.9	LOS E	5.2	38.1	1.00	0.78	1.00	28.8
Approach		882	10.2	0.749	44.6	LOS D	22.4	169.5	0.96	0.84	0.98	34.5
North: Elizabeth St												
7	L2	46	23.9	0.529	48.5	LOS D	6.8	54.8	0.97	0.80	1.03	33.8
8	T1	93	14.0	0.529	42.7	LOS D	6.8	54.8	0.97	0.80	1.03	34.8
9	R2	196	25.5	0.863	71.2	LOS F	12.9	110.1	1.00	0.98	1.34	27.3
Approach		335	22.1	0.863	60.2	LOS E	12.9	110.1	0.99	0.90	1.21	29.9
West: Victoria St												
10	L2	339	15.6	0.931	67.9	LOS E	36.1	283.5	0.99	1.13	1.56	28.4
11	T1	665	15.6	0.931	65.7	LOS E	36.1	283.5	0.99	1.16	1.44	28.8
12	R2	82	6.1	0.474	63.7	LOS E	4.8	35.0	0.99	0.77	0.99	28.9
Approach		1086	14.9	0.931	66.2	LOS E	36.1	283.5	0.99	1.12	1.44	28.6
All Vehicles		2979	12.5	0.965	65.1	LOS E	36.1	283.5	0.98	1.06	1.37	28.9

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	2	55.1	LOS E	0.0	0.0	0.96	0.96
P2	East Full Crossing	1	55.1	LOS E	0.0	0.0	0.96	0.96
P3	North Full Crossing	3	55.1	LOS E	0.0	0.0	0.96	0.96
P4	West Full Crossing	4	55.1	LOS E	0.0	0.0	0.96	0.96
All Pedestrians		10	55.1	LOS E			0.96	0.96

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

MOVEMENT SUMMARY

Site: 101 [Elizabeth St & Victoria St PM with Proposal]

PM with Proposal
Site Category: (None)
Signals - Fixed Time Isolated Cycle Time = 110 seconds (Site Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Elizabeth St												
1	L2	109	24.8	0.890	63.0	LOS E	11.6	92.5	1.00	1.10	1.70	29.6
2	T1	151	6.6	0.890	59.4	LOS E	11.9	89.0	1.00	1.09	1.63	29.7
3	R2	144	9.0	0.890	70.0	LOS E	11.9	89.0	1.00	1.06	1.46	28.0
Approach		404	12.4	0.890	64.2	LOS E	11.9	92.5	1.00	1.08	1.59	29.1
East: Victoria St												
4	L2	136	1.5	0.777	47.9	LOS D	21.2	159.3	0.99	0.90	1.05	34.2
5	T1	640	13.1	0.777	42.3	LOS C	21.2	159.3	0.97	0.89	1.05	35.2
6	R2	63	12.7	0.295	55.0	LOS D	3.2	24.8	0.95	0.76	0.95	30.9
Approach		839	11.2	0.777	44.2	LOS D	21.2	159.3	0.97	0.88	1.04	34.6
North: Elizabeth St												
7	L2	58	10.3	0.961	87.6	LOS F	23.8	173.7	1.00	1.29	1.85	25.1
8	T1	309	3.6	0.961	82.3	LOS F	23.8	173.7	1.00	1.28	1.83	25.4
9	R2	233	23.6	0.961	90.3	LOS F	20.9	171.8	1.00	1.23	1.75	24.1
Approach		600	12.0	0.961	85.9	LOS F	23.8	173.7	1.00	1.26	1.80	24.8
West: Victoria St												
10	L2	225	28.0	0.934	69.1	LOS E	31.4	253.6	0.99	1.17	1.61	28.4
11	T1	692	12.3	0.934	64.9	LOS E	31.4	253.6	1.00	1.19	1.51	29.0
12	R2	104	1.0	0.450	55.8	LOS D	5.4	37.9	0.98	0.78	0.98	30.9
Approach		1021	14.6	0.934	64.9	LOS E	31.4	253.6	0.99	1.14	1.48	28.9
All Vehicles		2864	12.7	0.961	63.1	LOS E	31.4	253.6	0.99	1.08	1.43	29.3

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Pedestrian Back of Queue ped	Distance m	Prop. Queued	Effective Stop Rate
P1	South Full Crossing	1	50.1	LOS E	0.0	0.0	0.95	0.95
P2	East Full Crossing	2	50.1	LOS E	0.0	0.0	0.95	0.95
P3	North Full Crossing	5	50.1	LOS E	0.0	0.0	0.95	0.95
P4	West Full Crossing	4	50.1	LOS E	0.0	0.0	0.95	0.95
All Pedestrians		12	50.1	LOS E			0.95	0.95

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

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Site Driveway - Ex AM]

Ex AM
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site Driveway												
1	L2	1	0.0	0.003	4.3	LOS A	0.0	0.1	0.41	0.56	0.41	49.0
3	R2	1	0.0	0.003	7.2	LOS A	0.0	0.1	0.41	0.56	0.41	48.5
Approach		2	0.0	0.003	5.8	LOS A	0.0	0.1	0.41	0.56	0.41	48.7
East: Davis Rd												
4	L2	3	0.0	0.144	5.6	LOS A	0.0	0.0	0.00	0.01	0.00	56.2
5	T1	266	12.8	0.144	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.9
Approach		269	12.6	0.144	0.1	NA	0.0	0.0	0.00	0.01	0.00	59.9
West: Davis Rd												
11	T1	460	12.0	0.247	0.0	LOS A	0.0	0.2	0.01	0.00	0.01	59.9
12	R2	3	0.0	0.247	6.8	LOS A	0.0	0.2	0.01	0.00	0.01	55.9
Approach		463	11.9	0.247	0.1	NA	0.0	0.2	0.01	0.00	0.01	59.9
All Vehicles		734	12.1	0.247	0.1	NA	0.0	0.2	0.01	0.01	0.01	59.9

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

MOVEMENT SUMMARY

▽ Site: 101 [Davis Rd & Site Driveway - Ex PM]

4-5 PM with Proposal
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Site Driveway												
1	L2	4	0.0	0.014	4.4	LOS A	0.0	0.3	0.42	0.61	0.42	49.3
3	R2	8	0.0	0.014	6.1	LOS A	0.0	0.3	0.42	0.61	0.42	48.8
Approach		12	0.0	0.014	5.5	LOS A	0.0	0.3	0.42	0.61	0.42	49.0
East: Davis Rd												
4	L2	1	0.0	0.151	5.6	LOS A	0.0	0.0	0.00	0.00	0.00	56.3
5	T1	284	10.9	0.151	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		285	10.9	0.151	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
West: Davis Rd												
11	T1	295	10.5	0.157	0.0	LOS A	0.0	0.1	0.00	0.00	0.00	60.0
12	R2	1	0.0	0.157	6.7	LOS A	0.0	0.1	0.00	0.00	0.00	56.0
Approach		296	10.5	0.157	0.0	NA	0.0	0.1	0.00	0.00	0.00	60.0
All Vehicles		**593**	**10.5**	**0.157**	**0.1**	**NA**	**0.0**	**0.3**	**0.01**	**0.01**	**0.01**	**59.8**

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