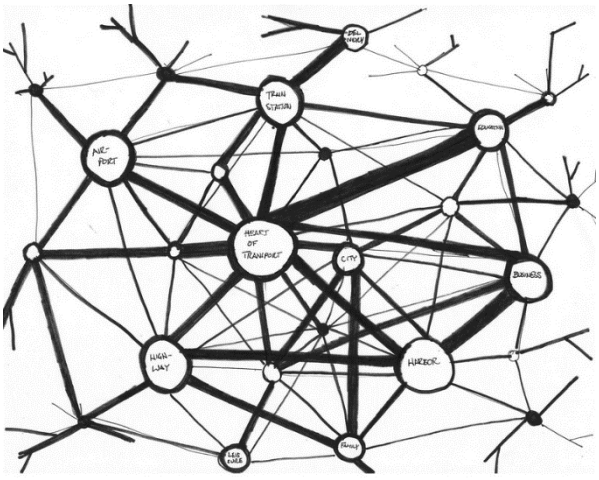
THOMPSON STANBURY ASSOCIATES

ABN: 79 943 737 368

PARKING TRAFFIC & TRANSPORT IMPACT ASSESSMENT

PROPOSED RESOURCE RECOVERY & RECYCLING CENTRE
24 DAVIS ROAD
WETHERILL PARK



Date:
December 2016

Office:
Suite 15/9 Hoyle Ave., Castle Hill NSW 2154

All Correspondence:
75 Gindurra Ave., Castle Hill NSW 2154

Ph: (02) 8850 2788

Mob:
0418 262 125 (David Thompson)
0450 747 401 (Yafeng Zhu)

Email:
david@thompsonstanbury.com.au
yafeng@thompsonstanbury.com.au

Website:
www.thompsonstanbury.com.au

TABLE OF CONTENTS

PAGE NO.

APPENDICES

SUMMARY RESPONSE TO SECREATARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)

The following provides a summary of the relevant sections of the report which directly addresses the SEARs requirements relating to *Traffic and Transport* as outlined in NSW Planning and Environment letter to Bettergrow Pty. Ltd., dated 16/12/2015.

SEARs TRAFFIC AND TRANSPORT REQUIREMENTS (SSD 7401)	
Requirements	**Pertinent sections of report for reference**
Details of all traffic types and volumes likely to be generated during the construction and operation, including a description of the haul routes	**Section 3** - details the different vehicle types and traffic volumes. **Section 6** – provides a description of the vehicular routes during the operation of the facility **Appendix 1** - provides a description of the vehicular routes during the construction of the facility
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 at key intersections using SIDRA or similar traffic model.	**Section 6** – addresses the projected impacts of the development on the surrounding road network.
Detailed plans of the proposed layout of the internal road network and parking on site in accordance with relevant Australian Standards.	**Section 4** – addresses internal site design with respect to access, parking and internal circulation and its compliance with relevant Australian Standards.
Plans of any proposed road upgrades, infrastructure works or new roads required for development.	No changes are proposed to the adjoining and surrounding road network, as our Traffic Impact Assessment report has assessed the surrounding road hierarchy to be readily capable of accommodating all vehicle types associated with the development in a safe and efficient manner. Notwithstanding the above, it is noted that our observations have indicated that the current road network in the immediate vicinity of the site is already servicing heavy vehicle types associated with adjoining developments similar to the proposed resource recovery facility.

SUMMARY RESPONSE TO ROADS AND MARITIME SERVICES (RMS) REQUIREMENTS

The following provides a summary of the relevant sections of the report which directly addresses the additional comments specified by the RMS contained within their email dated 19/12/2016, upon review of our draft report.

SEARs TRAFFIC AND TRANSPORT REQUIREMENTS (SSD 7401)	
Requirements	**Pertinent sections of report for reference**
It is noted that the traffic impact assessment has not modelled the impact of heavy vehicles (generated from the development) on the road network. Only traffic impacts of staff and visitors have been assessed. The cumulative impacts of passenger vehicles and heavy vehicles is to be assessed/modelled for the proposed development (both peak hour and daily). The report should be modified reflecting this requirement.	**Section 3 (and Table 2)-** presents both passenger and heavy vehicle generation associated with the development, which have been used as the basis for modelling contained in later sections of our report (this has not changed from our draft report). **Section 6** – addressed the cumulative impacts of passenger and heavy vehicles based on the results of the SIDRA modelling.
In accordance with Roads and Maritime's response on the request for SEARs (attached), the following additional intersection is to be examined / modelled as part of the application: - Victoria Street / Elizabeth Street	**Section 6** – contains additional modelling incorporating this signalised intersection.
The Traffic Impact Statement should include the SIDRA output data for all intersections assessed.	**Appendices 1 and 2** – provides the full SIDRA modelling output results as requested.

1. INTRODUCTION

Thompson Stanbury Associates has been engaged by Bettergrow to prepare a traffic impact assessment to accompany a development application lodged with NSW's Department of Planning & Environment for the establishment of a Resource Recovery & Waste Recycling Facility at 24 Davis Road, Wetherill Park.

The purpose of this report is to assess and document likely traffic impacts resulting from the proposal and to recommend, where appropriate, treatments to alleviate such impacts. This assessment is provided in response to the Department of Planning & Environment's Secretary Environmental Assessment Requirements (SEARs) for the preparation of an Environmental Impact Assessment for the subject development dated 16 December 2015. Further, this report addresses the recent Roads and Maritime Services' (RMS) comments presented within their letter dated 19 December 2016. In this regard, assessment is made of the following:

- The suitability or otherwise of the proposed site access arrangements and internal circulation servicing the development with respect to the projected operational requirements of the proposed use;

- The suitability or otherwise of the proposed parking and internal circulation / manoeuvring with respect to the projected operational requirements of the proposed use;

- The existing road network conditions within the vicinity of the site including traffic volumes and general traffic safety;

- The traffic likely to be generated by the subject development with particular regard to the movement of heavy vehicles; and

- The ability of the surrounding road network to accommodate additional traffic movements projected by the proposal.

Reference has been made to the following documents throughout this report:

- The Roads & Maritime Services' *Guide to Traffic Generating Developments*;

- The Australian Standard for *Parking Facilities Part 1: Off-Street Car Parking* (AS2890.1-2004), *Part 2: Off-Street Commercial Vehicle Facilities* (AS2890.2-2002) and *Part 6: Off-Street Parking for People with Disabilities* (AS2890.6-2009); and

- Fairfield City Council's *Fairfield Citywide Development Control Plan 2013* (DCP2013).

The report has been prepared in accordance with State Environmental Planning Policy (Infrastructure) 2007.

The report should be read in conjunction with site plans prepared by Style Developments.

2. SITE DETAILS

2.1 Site Location

The subject site is located on the northern side of Davis Road, approximately 55m west of its intersection with Arnott Place, Wetherill Park. This location is illustrated within a neighbourhood context by **Figure 1** shown overleaf, being an extract of UBDs *Australian City Streets* – Version 4.

2.2 Site Description

The subject site provides a real property description of Lot 18 DP 249417 and a street address of 24 Davis Road, Wetherill Park. The subject allotment forms a rectangular shaped parcel of land providing a single frontage to Davis Road of approximately 90m and a depth (extending north from the southern property boundary) of approximately 225m. Total site area is 20,292m^2.

2.3 Existing Use

The subject land currently accommodates a series of outbuildings previously associated with an oil refinery operated by Mobil. This industrial processing development has been decommissioned and rehabilitated since operations by Mobil ceased in 2004, but the remaining buildings and infrastructure will be retained for use by the proposed recycling centre.

The existing vehicular driveway connecting the on-site facilities with the adjoining public road is proposed to be widened to readily accommodate heavy commercial vehicles (being the largest to frequent the site) in accordance with the requirements stated in The Australian Standard for *Parking Facilities Part 2: Off-Street Commercial Vehicle Facilities (2002)*.

2.4 Surrounding Uses

The site is located is surrounded by large scale industrial developments contained within the Wetherill Park industrial estate.

FIGURE 1 – SITE LOCATION WITHIN A NEIGHBOURHOOD CONTEXT

3. PROPOSED DEVELOPMENT

3.1 Built Form

The subject DA seeks consent for the retention of the existing site structures (e.g. workshop, office/amenities, existing off-street parking area, etc.) and the construction of the following supplementary structures that will collectively facilitate the proposed waste recycling/resource recovery purpose of the site:

- Two new weighbridges (one entry and one exit), located immediately adjacent to the main office area within the southern-western portion of the site;

- Two large industrial buildings to be used for receiving, storing and processing of organic materials. These building are to be located within the northern portion of the site and are designed to provide industrial floor areas of 2,240m^2 and 969m^2, receptively;

- A secondary office & amenities building, situated within the north-eastern corner of the site, that is to provide an office floor space of 80m^2; and

- A CD enviro drill mud plant for managing hydro-excavated drill muds.

Vehicular access to the subject premises is proposed to be accommodated via a 12.5m wide combined ingress/egress access driveway connecting with Davis Road along the southern property boundary, located approximately 20m east of the western property boundary. This proposed driveway facilitates access into the proposed on-site developments including provision for separate off-street passenger vehicle parking areas for staff, yielding a total of 36 spaces.

3.2 Site Operations

The subject site is proposed to function as a resource recovery and waste recycling facility that will be responsible for receiving and processing up to 200,000 tonnes per annum of the following wastes:

- 60,000 tonnes of hydro-excavation and drill mud/fluids;

- 40,000 tonnes bulk landscaping supplies; and

- 100,000 tonnes of garden organics, commingled food, garden organics and food waste.

As part of the proposal, the subject site is anticipated to perform the following activities with respect to the quantities of waste mentioned above:

- Receipt of consolidated hydro-excavation and drill muds/fluid and removal from site for use as structural fill or feedstock;

- Receipt of bulk landscaping supplies for distribution within surrounding areas; and

- Receipt of wood offcuts, timber and garden organics as well as food/food waste for consolidation and redistribution.

The waste is to be transported, mechanically deposited, sorted and collected on site by various types of commercial vehicles ranging from Small Rigid Vehicles (SRVs) to 19m long B-doubles.

The annual operational management of up to 200,000 tonnes of waste per year is equivalent to a total daily quantity of approximately 770 tonnes per day. Such a level of activity could be expected to generate (based on information provided by the applicant) a maximum of 304 truck movements per day to and from the site at peak trading, comprising 24 truck and dog combination vehicles, 23 six to eight tonne hooklift bin trucks, 90 Council's garbage collection trucks, 8 B-doubles (19m long), 30 six to eight tonne wheeler rigid tippers, 12 semi-tippers (25-tonne), 92 wheeler sucker trucks, 18 semi sucker trucks, 4 semi liquid tankers and 3 flattop trucks.

The business is proposed to be operational over 24 hours a day from Monday to Friday and also on Saturday from 6:00am – 2:30pm. Generally, office hours will occur between 6:00am – 5:00pm, Monday to Friday only. However, the proposed facility is also proposed to cater for afterhours deliveries of materials resulting from the need for contractors to carry out works within metropolitan areas at night, where construction and maintenance work times are largely defined by various authorities.

Further to the above, on Sundays, the site will undergo maintenance activities in conjunction with minimal deliveries and outgaining consignments, under minimal staff supervision.

In addition to the above, the business is anticipated to have the following maximum number of staff with respect to each division of the future on-site operations:

- 1 staff to monitor/control the weighbridge;
- 4 staff allocated to the drill mud operation of the business;
- 14 staff allocated to the organic waste processing division;
- 1 Bulk Landscaping Supplies division;
- 2 maintenance staff; and
- 3 office staff

The projected daily work schedule of the abovementioned employees are illustrated in **Table 1** overleaf, being an extract of the information provided by the applicant (Bettergrow).

TABLE 1 PROJECTED STAFF ROSTER							
TIME	DIVISION OF OPERATION						
	W/bridge	Mud	Bulk L/scape	Organics, GO, FO & FOGO	Supervision Management Security	Office	Total
12:00am - 5.00am		2			1		3
5.00am - 6.00am	1	4	1	14	2		22
6.00am- 7.00am	1	4	1	14	2	1	23
7.00am - 8.00am	1	4	1	14	2	2	24
8.00am - 9.00am	1	4	1	14	2	3	25
9.00am - 10.00am	1	4	1	14	2	3	25
10.00am - 11.00am	1	4	1	14	2	3	25
11.00am -12.00pm	1	4	1	14	2	3	25
12.00pm - 1.00pm	1	4	1	14	2	3	25
1.00pm - 2.00pm	1	4	1	14	2	3	25
2.00pm - 3.00pm	1	4	1	14	2	2	24
3.00pm - 4.00pm	1	3	1	14	2	2	23
4.00pm - 5.00pm	1	3	1	14	2	1	22
5.00pm - 6.00pm		2	1	12	2		17
6.00pm - 7.00pm		2		12	1		15
7.00pm - 8.00pm		2		2	1		5
8.00pm - 9.00pm		2		2	1		5
9.00pm - 10.00pm		2		2	1		5
10.00pm - 11.00pm		2		2	1		5
11.00pm - 12.00pm		2		2	1		5

Table 1 indicates that the maximum number of staff expected to be on site at any one time is 25, which is anticipated to occur between 8:00am – 2:00pm.

Based on the proposed operations and staff employment levels of the recycling facility, an estimation of the weekly hour by hour traffic generation (comprising both staff and heavy vehicle traffic movements) is provided by the applicant and summarised in **Table 2** overleaf.

Table 2 indicates the following:

- During peak weekly operations, the recycling facility is anticipated to generate between 30 – 40 vehicle movements (comprising both passenger and heavy vehicles) per hour to and from the site during the time period between 1:00pm – 3:00pm;

- During peak commuter hourly periods (between 7:00am – 9:00am and 4:00pm – 6:00pm), the recycling facility is envisaged to generate a traffic demand of between 15 - 30 vehicle movements (comprising both passenger and heavy vehicles) per hour to and from the site;

- The maximum passenger vehicle generation associated with staff is 18 ingress trips to the site;

- The maximum passenger vehicle generation associated with visitors is two trips to and from the site; and

- The maximum heavy vehicle generation during peak operation of the facility is 38 trips to and from the site.

TABLE 2 - SUMMARY OF ANTICIPATED AVERAGE AND PEAK DAILY VEHICLE MOVEMENTS IN AND OUT OF GREENSPOT WETHERILL PARK IN FULL OPERATION

	Hydro Exc & Drill Mud					Estimated arrival and departure times for site vehicles based on Peak daily movements only. Numbers shown are a total of both in and out movements by vehcile category and operation																							
	Average		Peak		Total Peak	Monday to Friday a.m.												Monday to Friday p.m.											
Vehicle Type	in	out	in	out	Movements	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
Semi Tippers 25 tonne	3	3	4	4	8							1	1			2	2		1	1									
4, 6 or 8 wheeler sucker trucks	38	38	46	46	92	4	4	4	4	4	4	2		2	4		4	8	4	6	8	10	11	4	1	1	1	1	1
Semi Sucker trucks	7	7	9	9	18								1	2	2	2	2			2	2	3	2						
Semi liquid tankers	0	0	0	0	0																								
	Bulk Landscape Materials																												
	Average		Peak		Total Peak																								
Vehicle Type	in	out	in	out	Movements																								
Truck and Dog 32 t pay load	5	2	6	3	9						2	1			2			3	1										
19m B' Doubles	3	0	4	0	4					2																		2	
6 or 8 wheeler rigid tippers	10	10	15	15	30						4	8	8	4			3	3											
Semi Tippers 25 tonne	1	1	2	2	4							2						2											
	GO and comingled Food and Garden Organics																												
	Average		Peak		Total Peak																								
Vehicle Type	in	out	in	out	Movements																								
6 or 8 wheeler with Hook lift bin	1	1	1.5	1.5	3											2	1												
Truck and Dog 32 t pay load	3	6	5	8	13						4	3			1			2	1			2							
Side arm Council kerbside collection	32	32	42	42	84						4	15	15	10				15	15	10									
19m B' Doubles	0	3	0	4	4					2																		2	
	Food Organics																												
	Average		Peak		Total Peak																								
Vehicle Type	in	out	in	out	Movements																								
6 or 8 wheeler Hook lift bin or murrels	8	8	10	10	20				2	3							4	4	4	2	1								
Truck and Dog 32 t pay load	1	1	1	1	2							1	1																
Side arm Council kerbside collection	2	2	3	3	6							1	2	1				1	1										
Tortliners / Flat top	0.5	0.5	1.5	1.5	3						1	1							0.5	0.5									
Semi liquid tankers	1.5	1.5	2	2	4					2						2													
	Miscallaneous																												
	Average		Peak		Total Peak																								
Vehicle Type	in	out	in	out	Movements																								
Staff Cars	20	20	22	22	44	2				18	1	1							8	5	5	2	2						
Visitor Cars	2	2	4	4	8									2			2	2		2									
Fuel Deliveries	1	1	1	1	2							2																	
Total movements by Hour						6	4	4	6	31	20	38	28	21	9	8	18	40	35.5	28.5	16	17	15	4	1	1	1	5	1

4. SITE ACCESS & INTERNAL CONSIDERATIONS

4.1 Access Arrangements

The subject site is proposed to be serviced by a combined ingress/egress access driveway, providing a 12.5m width at the southern property boundary and facilitating connectivity between the off-street parking and internal circulation areas with the adjoining frontage road (Davis Road).

4.1.1 Passenger Vehicles

The suitability of the proposed access driveway with respect to accommodating passenger vehicles is assessed based on guidelines provided within the Australian Standard for Off-Street Car parking (AS2890.1-2004). This publication provide driveway design recommendations based on a number of site characteristics such as the number and classification of vehicles to be accommodated on-site and the functional role of the frontage road. **Table 3** below highlights the minimum driveway widths required to accommodate passenger in accordance with.

TABLE 3
DRIVEWAY DESIGN SPECIFICATIONS

AS2890.1-2004 (Passenger Vehicles)		**Minimum Width of Driveway**
Class of Parking Facility	Class 1 (The majority of car parking spaces on site are to be allocated for staff/employees of the proposed development.)	Combined entry and exit width of between 3.0m – 5.5m (Category 1 type driveway)
Frontage Road Type	Local (The frontage road (Davis Road) adjoining the proposed driveways at the eastern site boundary is deemed to perform a local road function under the care and control of Fairfield City Council.)	
Number of Parking Spaces (Proposed)	36	

Based on **Table 3**, it is evident that the proposed 12.5m wide combined ingress/egress driveway suitably accords with the design criteria specified within AS2890.1-2004 and is therefore considered to be satisfactory in terms of servicing passenger vehicles.

4.1.2 Heavy Vehicles

In order to demonstrate the suitability of the proposed access driveway design in being capable of accommodating heavy vehicles up to the size of 19.0m long b-doubles (being the largest vehicles to frequent the site), this Practice has prepared a number of swept path plans, which have been overlaid on the site plan prepared by the architect.

These plans have been formulated utilising Autoturn software and based on standard b-double truck turning specifications provided within AustRoads. These swept paths

indicate that such vehicles are able to enter and exit the site without any unreasonable encroachment on the opposing Davis Road eastbound travel lane, formalised road verge and/or internal development kerbing.

In addition to the above, it is noted that the entry and exit weighbridges are located approximately 18.0m inside the property boundary. It has been previously mentioned that the largest vehicles to frequent the site is a 19.0m long B-double and **Table 3** has indicated that up to two of these vehicles can be expected to be on site at any one time. The proposed length of the entry weighbridge (22.0m) and the waiting space behind it is such that it is capable of wholly accommodating up to two 19.0m long B-doubles on–site without extension/encroachment onto the adjoining frontage road. As such, the weighbridge location is assessed to be appropriate with respect to minimising the potential for queuing onto the public road due to the operational requirements of the development. In consideration of this and the above, the proposed driveway design is therefore deemed to be capable of satisfactorily accommodating the largest vehicles required to service the site.

4.1.3 Site Access Safety Assessment

The safety and efficiency of access / egress movements are also proposed to be assisted by the provision of a relatively level grade within at least the first 6m of the property boundary and the provision of a triangular area measuring 2.5m into the site and 2m along the boundary that is clear of obstructions to visibility adjoining the side of the driveway accommodating exiting traffic.

The consistent horizontal and vertical alignment of Davis Road in the immediate vicinity of the subject site will provide motorists with good sight distance between the public roadway and the site access driveway.

In consideration of this and the abovementioned discussion, the proposed site access arrangements are considered to be satisfactory.

4.2 Parking Provision

The subject development is proposing to provide a total of 36 off-street passenger vehicle parking spaces, distributed throughout the site within standard 90 degree angled parking rows serviced by an adjoining parking aisle.

Fairfield City Council does not provide specific parking rates for a resource recovery facility within Fairfield Citywide Development Control Plan 2013, however it requires the parking demand to be assessed based on a car parking study of a comparable facility. In this regard, the parking impact assessment should be based on the operational characteristics of the proposed site operations provided by the applicant (Bettergrow), which is understood to be based on a similar existing development within the Sydney Metropolitan area, owned and operated by Bettergrow.

Parking demand associated with the proposed use is most likely to be limited to that generated by staff and any potential visitors. It has previously been presented that the proposed site operations will generate a demand for up to 25 employees and two visitors on-site at any one time. Accordingly, assuming a worst case scenario that all

staff and visitors drive themselves to and from the site, a peak passenger vehicle parking demand of 27 is anticipated. The proposed parking provision of 36 spaces is therefore expected to readily accommodate operational demands and accordingly, is considered to be satisfactory.

4.3 Vehicle Circulation

4.3.1 Passenger Vehicles

Upon entry to the subject site, passenger vehicles will move in a forward direction to access the at-grade passenger vehicle parking areas located within the front and rear of the site. The passenger vehicle parking areas are proposed to comprise 90 degree angled parking rows, being serviced by adjoining parking aisles.

The internal circulation of the parking areas have been designed to accord with the relevant requirements of AS2890.1-2004 and AS2890.6-2009, providing the following minimum dimensions:

- Standard vehicle parking space width = 2.5m;
- Disabled (if required) vehicle parking space width = 2.5m (plus an adjoining 2.5m wide shared area);
- Additional space width adjoining obstruction = 0.3m;
- Standard and disabled (if required) vehicle parking space length = 5.4m; and
- Parking aisle width = 5.8m.

The above compliance with the relevant AS2890.1-2004 and AS2890.6-2009 specifications is anticipated to result in safe and efficient internal manoeuvring and parking space accessibility. As such, this Practice is satisfied that the internal circulation and manoeuvring arrangements of the subject development are suitable incorporating the recommendations provided within this section given the likely operational characteristics of the site.

4.3.2 Heavy Vehicles

The facility is proposed to accommodate vehicles up to and including 19.0m long B-doubles. These vehicles will access the site in a simple forward direction and undertake all loading / unloading activities and manoeuvring within the on-site circulation areas, as well as within the four internal loading bays within the proposed FGO building, located at the north-western corner of the site. Three of these internal loading bays adjoining the southern building wall are capable of accommodating up to three trucks similar in size to a Medium Rigid Vehicle (MRV), whilst the loading bay along the eastern building wall is designed to service up to one tuck and dog combination vehicle.

Upon completion of the loading / unloading activities, these vehicles exit the site via the site access driveway to Davis Road in a simple forward manoeuvre.

In order to demonstrate the ability of the internal circulation arrangements to accommodate the required manoeuvring throughout the site, a turning path analysis has been undertaken, whereby a number of swept path plans have been prepared incorporating turning specifications of MRVs, truck and dog combination vehicles and 19.0m long B-doubles provided within Austroads. This analysis has indicated that all heavy vehicles proposed to service the facility are capable of manoeuvring within the site in a safe and efficient manner without any unreasonable encroachment on internal passenger vehicle parking areas or structures. Accordingly, the internal heavy vehicle manoeuvring arrangements are considered to be satisfactory.

5. EXISTING TRAFFIC CONDITIONS

5.1 Road Network

The following provides a description of the surrounding road network that services connectivity between the proposed and adjoining developments within the Wetherill Park Industrial Precinct:

Davis Road performs a local industrial access function under the care and control of Fairfield City Council. In this regard, it facilitates an east/west connection between Prospect Highway/Widemere Road in the east and Elizabeth Street in the west, with which it intersects under traffic signal and unsigned priority control respectively. At its western extremity, Davis Road terminates in a cul-de-sac.

Davis Road provides a 12.0m wide pavement, providing one through lane of traffic in each direction in conjunction with parallel parking lane along both formalised kerb and gutter alignments.

Elizabeth Street performs a collector function under the care and control of Fairfield City Council. It provides a north/south route connecting Davis Road in the north to The Horsley Drive (a State Road) to the south, with midblock connections to Victoria Street (a regional road). Elizabeth Street provides an 18.0m wide carriageway comprising two 3.0m wide travel lanes and two 6.0m wide parking lanes. At its southern extremity, Elizabeth Street intersects with The Horsley Drive under traffic signal control. Traffic flow is governed by a sign posted speed limit of 60km/hr.

5.2 Traffic Volumes

In order to obtain an indication of the existing operation of the primary access intersection servicing Davis Road, reference is made to morning and evening peak hour traffic surveys undertaken by staff of this Practice at the intersection of Elizabeth Street and Davis Road. Further, traffic surveys during peak hour periods were undertaken at the following intersections in the vicinity of the site associated with separate projects:

- Junction of Elizabeth Street and Frank Street; and

- Intersection of Victoria Street and Elizabeth Street.

Surveys of the above intersections were undertaken recently between 7.00am – 8.00am and 4.00pm – 5.00pm. Our observations have identified that traffic demands within the surrounding road network, outside of these peak times and during weekends were significantly lower.

Figure 2 overleaf provides a graphical representation of the surveyed peak hour traffic movement profile obtained from the above manual traffic surveys whilst full details are available upon request.

FIGURE 2
EXISTING WEEKDAY PEAK HOUR TRAFFIC VOLUMES
7.00AM - 8.00AM & 4.00PM - 5.00PM

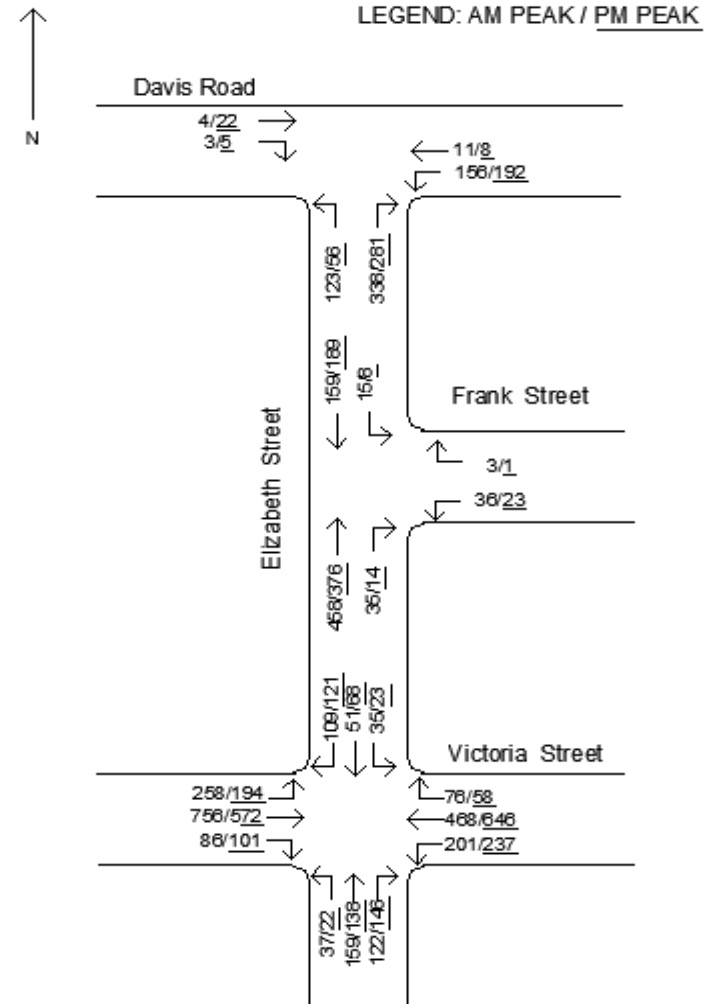


Figure 2 indicates the following:

- Bidirectional traffic demands within Davis Road are approximately between 150 – 250 vehicles during peak times;
- Bidirectional traffic demands within Frank Street are approximately between 50 – 100 vehicles during peak times;
- Elizabeth Street at its junction with Frank Street accommodates bidirectional traffic demands in the order of between 600 – 700 vehicles during peak times;
- Elizabeth Street at its junction with Victoria Street accommodates bidirectional traffic demands in the order of between 500 – 600 vehicles during peak times;
- Bidirectional traffic demands within Victoria Street are approximately between 1,800 – 1,900 vehicles during peak times;

5.3 Existing Intersection Operation

5.3.1 Davis Road & Elizabeth Street

In order to estimate the existing peak efficiency of the critical road network, a SIDRA computer network analysis has been undertaken at the junction of Elizabeth Street/Davis Road and the intersection of Victoria Street/Elizabeth Street. SIDRA is a computerised traffic arrangement program which, when volume and geometrical configurations of a network of intersections are imputed, provides an objective assessment of the operation efficiency under varying types of control (i.e. signs, signal and roundabouts). Key indicators of SIDRA include level of service where results are placed on a continuum from A to F, with A providing the greatest intersection efficiency and therefore being the most desirable by the Roads and Maritime Services.

SIDRA uses detailed analytical traffic models coupled with an iterative approximation method to provide estimates of the abovementioned key indicators of capacity and performance statistics. Other key indicators provided by SIDRA are average vehicle delay, the number of stops per hour and the degree of saturation. Degree of saturation is the ratio of the arrival rate of vehicles to the capacity of the approach. Degree of saturation is a useful and professionally accepted measure of intersection performance.

SIDRA provides analysis of the operating conditions that can be compared to the performance criteria set out in **Table 4** overleaf (being the RMS NSW method of calculation of Level of Service).

TABLE 4
LEVELS OF SERVICE CRITERIA FOR INTERSECTION

Level of Service	Average Delay per Vehicle (secs/veh)	Expected Delay
SIGNALISED INTERSECTIONS AND ROUNDABOUTS		
A	Less than 14	Little or no delay
B	15 to 28	Minimal delay and spare capacity
C	29 to 42	Satisfactory delays with spare capacity
D	43 to 56	Satisfactory but near capacity
E	57 to 70	At capacity, incidents will cause excessive delays
F	> 70	Extreme delay, unsatisfactory
GIVE WAY & STOP SIGNS		
A	Less than 14	Good
B	15 to 28	Acceptable delays and spare capacity
C	29 to 42	Satisfactory
D	43 to 56	Near capacity
E	57 to 70	At capacity and requires other control mode
F	> 70	Unsatisfactory and requires other control mode

The existing conditions have been modelled utilising the peak hour traffic volumes presented within **Figure 2**. **Table 5** provides a summary of the SIDRA output data whilst more detailed summaries are provided in **Appendix 2**.

TABLE 5 SIDRA NETWORK MODELLING ANALYSIS EXISTING CONDITIONS		
Junction of Elizabeth Street and Davis Road	**AM**	**PM**
Elizabeth Street South		
Delay	7.0	7.5
Degree of Saturation	0.42	0.37
Level of Service	A	A
Davis Road East		
Delay	5.5	5.7
Degree of Saturation	0.10	0.13
Level of Service	A	A
Davis Road West		
Delay	3.2	1.6
Degree of Saturation	0.00	0.02
Level of Service	A	A
Total Intersection		
Delay	6.5	6.5
Degree of Saturation	0.42	0.37
Level of Service	A	A
Junction of Victoria Street and Elizabeth Street	**AM**	**PM**
Elizabeth Street South		
Delay	46.8	39.9
Degree of Saturation	0.88	0.76
Level of Service	D	C
Victoria Street East		
Delay	23.2	30.1
Degree of Saturation	0.58	0.80
Level of Service	B	C
Elizabeth Street North		
Delay	44.2	41.8
Degree of Saturation	0.83	0.79
Level of Service	D	C
Victoria Street West		
Delay	33.0	26.8
Degree of Saturation	0.85	0.77
Level of Service	C	C
Total Intersection		
Delay	32.7	31.2
Degree of Saturation	0.88	0.80
Level of Service	C	C

Table 5 indicates the following:

- The junction of Davis Road and Elizabeth Street currently provides motorists with a level of service 'A', representing good operation with spare capacity during both commuter peaks; and

- The intersection of Victoria Street and Elizabeth Street is assessed to currently provide motorists with a level of service 'C', representing satisfactory conditions with some delays.

5.4 Public Transport

5.4.1 Bus

Transit Systems operates a single bus service (Route 812) in the immediate vicinity of subject site, with the closest bus stop being 200m walking distance to the south-east of the subject site, along the western side of Elizabeth Street.

Route 812 operates from Fairfield to Blacktown with generally 30 minute frequencies.

6. PROJECTED TRAFFIC CONDITIONS

6.1 Traffic Generation

The traffic generation of the proposal is essentially a function of the employment levels in conjunction with the level of waste disposal and collection vehicle traffic generated by the operation. **Table 2** of Section 3.2 of this report has previously presented that the projected traffic generation associated with staff and visitors (comprising both passenger and heavy vehicles) during AM and PM peak hour commuter periods is estimated to be between 15 – 30 vehicle movements to and from the site. Incorporating the worst case scenario, the upper bound traffic generation of 30 vehicle movements comprising 15 inbound trips and 15 outbound trips anticipated to be generated during peak hour will be used for the purposes of this assessment.

6.2 Trip Assignment

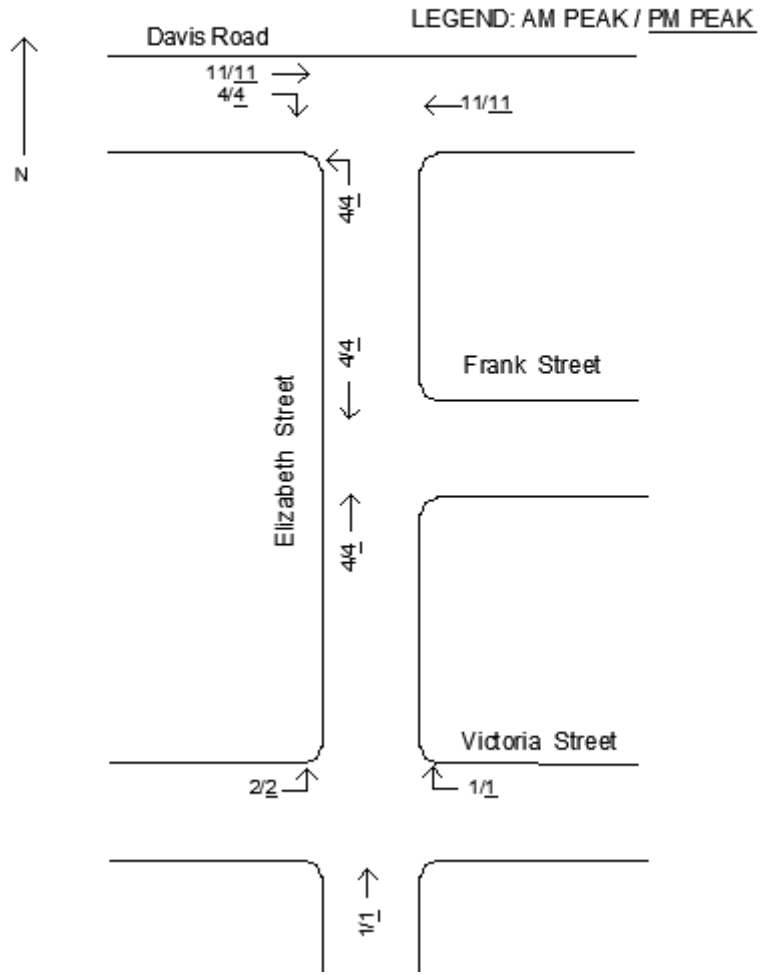
It is reasonable to assign traffic generated by the subject use in accordance with existing traffic distributions and the location of the site with respect to the surrounding road network. Based our observations, it is noted that the large majority of traffic associated with existing developments within Davis Road originate from the east via Prospect Highway/Widemere Road, with a small number of trips originating from the south via Elizabeth Street. In this regard, it is expected that 70% of traffic generated by the development is projected to arrive from the east via Davis Road, whilst the remaining 30% are projected to originate from the south via Elizabeth Street. The same assignment has been applied to vehicles exiting the site.

The following peak hour trip assignment has therefore been formulated:

- 4 vehicles approach the site from the south via Elizabeth Street, left turn into Davis Road and thence a right turn into the site;
- 11 vehicles approach the site from the east via Davis Road and thence a right turn into the site;
- 4 vehicles exit the site via a left turn into Davis Road and thence a right turn into Elizabeth Street to the south; and
- 11 vehicles exit the site via a left turn into the Davis Road travelling towards the east.

Figure 3 overleaf provides a graphical representation of the development generated trip assignment throughout the local road network.

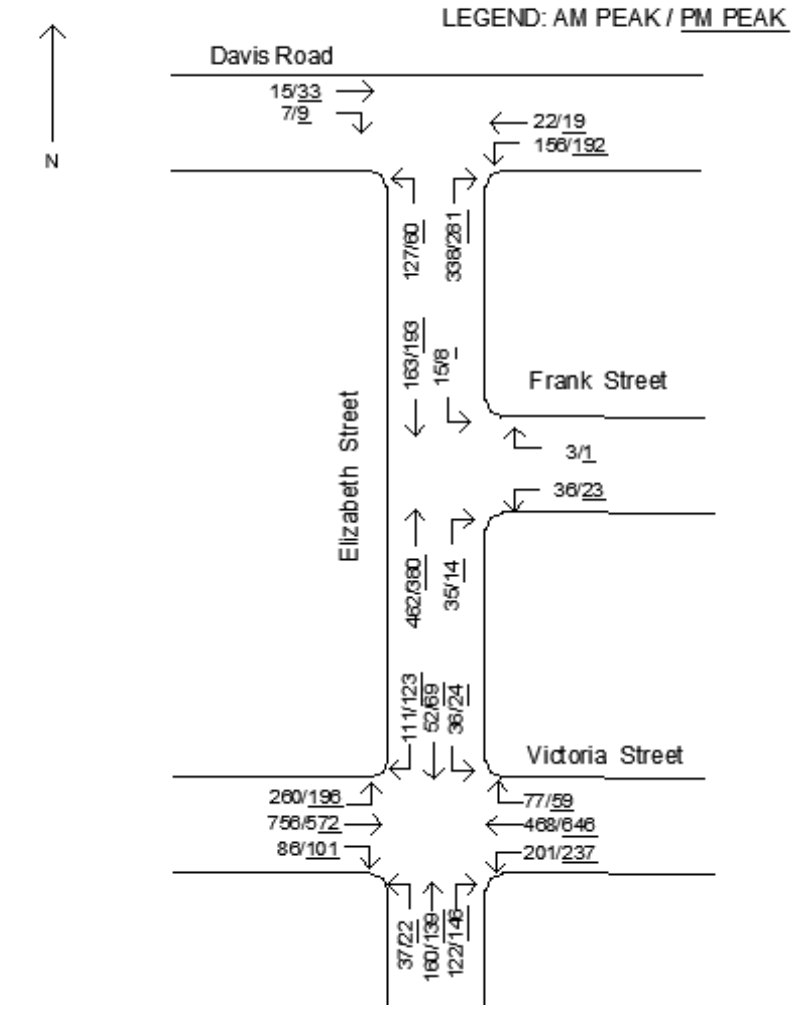
FIGURE 3
SUBJECT DEVELOPMENT TRIP ASSIGNMENT
7.00AM - 8.00AM & 4.00PM - 5.00PM



6.3 Projected Traffic Volumes

Based on the discussion provided previously on likely traffic generation and trip assignment, the projected peak hour traffic volumes have been formulated by adding the trip assignment presented within **Figure 3** to the to the volumes existing surveyed peak conditions provided within **Figure 2**. **Figure 4** overleaf provides an estimation of the future traffic volumes associated with and adjoining the subject site.

FIGURE 4
PROJECTED WEEKDAY PEAK HOUR TRAFFIC VOLUMES INCORPORATING SUBJECT DEVELOPMENT
7.00AM - 8.00AM & 4.00PM - 5.00PM



6.4 Projected Road Network Performance

6.4.1 Junction of Elizabeth Street/Davis Road and Intersection of Victoria Street/Elizabeth Street

Utilising the projected traffic generation characteristics of the proposed development and the abovementioned assumed trip assignment, a number of significant junctions have been modelled in order to estimate that likely impact on traffic safety and efficiency. A summary of the most pertinent results are indicated within **Table 6** overleaf whilst full output details are provided within **Appendix 3**.

TABLE 6 SIDRA OUTPUT – WEEKDAY PEAK HOUR PERFORMANCE JUNCTION OF DAVIS ROAD AND ELIZABETH STREET				
Junction of Elizabeth Street and Davis Road	**Existing Conditions**		**Projected Conditions**	
	AM	**PM**	**AM**	**PM**
Elizabeth Street South				
Delay	7.0	7.5	7.4	7.9
Degree of Saturation	0.42	0.37	0.43	0.38
Level of Service	A	A	A	A
Davis Road East				
Delay	5.5	5.7	5.2	5.4
Degree of Saturation	0.10	0.13	0.10	0.13
Level of Service	A	A	A	A
Davis Road West				
Delay	3.2	1.6	2.5	1.9
Degree of Saturation	0.00	0.02	0.01	0.02
Level of Service	A	A	A	A
Total Intersection				
Delay	6.5	6.5	6.6	6.6
Degree of Saturation	0.42	0.37	0.43	0.38
Level of Service	A	A	A	A
Junction of Victoria Street and Elizabeth Street	**AM**	**PM**	**AM**	**PM**
Elizabeth Street South				
Delay	46.8	39.9	47.0	39.9
Degree of Saturation	0.88	0.76	0.88	0.76
Level of Service	D	C	D	C
Victoria Street East				
Delay	23.2	30.1	23.3	30.1
Degree of Saturation	0.58	0.80	0.59	0.80
Level of Service	B	C	B	C
Elizabeth Street North				
Delay	44.2	41.8	44.7	42.1
Degree of Saturation	0.83	0.79	0.85	0.80
Level of Service	D	C	D	C
Victoria Street West				
Delay	33.0	26.8	33.1	26.9
Degree of Saturation	0.85	0.77	0.85	0.77
Level of Service	C	C	C	C
Total Intersection				
Delay	32.7	31.2	32.9	31.3
Degree of Saturation	0.88	0.80	0.88	0.80
Level of Service	C	C	C	C

Table 6 indicates that the traffic projected to be generated by the subject proposal is expected to result in some minor increase to the average vehicular delay, number of stops and degree of saturation at modelled intersections. However, the existing intersection level of service is projected to remain unaltered at all modelled intersections.

6.4.2 Site Access

The low traffic demands within Davis Road provide regular and extended gaps within directional traffic flows thereby providing good conditions with which to undertake turning movements to and from the site access driveways. Impedance associated with

such movements are therefore projected to be minimum thereby resulting in efficient site access conditions.

Section 4.1 of this report presented that the site has been designed so as to provide the maximum possible sight distance between the access driveway and the adjoining public road traffic movements. In consideration of this and the above discussion, the projected additional traffic movements generated by the proposed use are envisaged to be provided safe and efficient conditions within which to access and exit the site.

6.4.3 Operational Impacts

It is noted that **Table 2** has previously indicated that whilst the projected AM peak traffic generation of the proposed development coincides with the morning peak hour surveyed by staff of this Practice, the PM peak traffic demand of the proposed development (comprising 40 passenger and heavy vehicle movements to and from the site) is anticipated to occur outside of the afternoon peak period surveyed.

In any case, it has been previously noted that our observations of the traffic conditions within the surrounding roads during non-commuter peak periods and on weekends were quieter, with less traffic demands on the surrounding roads. As such, the additional traffic envisaged to be generated by the recycling facility during these times is not expected to have any adverse impacts on existing road network servicing the site. In this regard, a SIDRA analysis of these conditions incorporating the cumulative impacts of the recycling facility during these times are not expected to yield different results concerning the Level of Service, presented in **Table 6**.

7. CONCLUSION

This traffic impact assessment details our assessment of the traffic generation, access and safety considerations associated with a proposal for the establishment of a Resource Recovery & Waste Recycling Facility at 24 Davis Road, Wetherill Park. Having regard to the contents of this report the following conclusions are made:

- The on-site parking provisions are adequate to accommodate for projected demand given the likely number of employees and visitors on-site at any one time provided by the applicant;

- The proposed site access arrangements provide for the safe and efficient conditions with which to access and vacate the site;

- The internal circulation arrangements are projected to provide for safe and efficient internal movements and are capable of accommodating the peak operation demands of the use, wholly within the site;

- The surrounding road network in particular the junction of Elizabeth Street/Davis Road and the intersection of Victoria Street/Elizabeth Street operates with a good level of service during peak and non-peak periods (including weekends);

- The proposed use is projected to generate up to 30 peak hour trips (comprising both passenger and heavy vehicles) to and from the site corresponding to peak commuter periods and a maximum of 40 vehicle trips to and from the site during other times; and

- The surrounding road network is capable of accommodating the vehicular traffic generated by the proposal at all times.

Having regard to the conclusions abovementioned, this Practice is satisfied that the proposed development is worthy of support in relation to the traffic issues discussed.

APPENDIX 1

CONSTRUCTION VEHICLE TRANSPORT ROUTES

It is unclear at this stage what the exact routes construction vehicles are to undertake, as this information is usually contained within a Construction Traffic Management Plan prepared at the Construction Certificate stage following the commissioning of a builder thereby allowing a greater appreciation of the likely construction methodology and therefore the required traffic management measures to be implemented. Under these circumstances, only a preliminary indication of the potential transport routes to be utilised by construction vehicles to and from the site can be provided.

Due to the location of the site to the surrounding road network, it is likely that construction vehicles are to utilise similar routes to that of heavy vehicles frequenting the site, when the recycling facility is fully operational. In this regard, construction vehicle access movements to / from the site is likely to be right in / left out via Davis Road, originating and departing from / to the Davis Road in the east and Elizabeth Street in the west, as the western end of Davis Road terminates in a cul-de-sac. Davis Road/Elizabeth Street provides good connectivity to surrounding regional and arterial routes servicing the Sydney metropolitan area thereby indicating that construction vehicles are able to access and depart the site creating very little disturbance to surrounding local road traffic flow.

TRAFFIC IMPACT DURING CONSTRUCTION

The recent traffic investigations of the adjoining road network and the analysis contained within previous sections of this report have indicated that motorists are provided with a reasonable level of service within the immediately adjoining public road network. The traffic generation associated with construction activities are anticipated to be considerably less than the development at full operation. As such, the limited traffic can be accommodated without any unreasonable impacts on adjoining road network. Notwithstanding this, it has accordingly been recommended that construction vehicle movements to and from the site be minimised and eliminated where possible during road network peak periods (7.00am – 9.30am and 2.30pm – 6.00pm).

APPENDIX 2

MOVEMENT SUMMARY

Site: Davis Road and Elizabeth Street (EXISTING AM PEAK)

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	123	30.0	0.106	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
3	R2	338	30.0	0.415	7.4	LOS A	2.3	20.4	0.38	0.58	51.5
Approach		461	30.0	0.415	7.0	LOS A	2.3	20.4	0.28	0.58	51.7
East: Davis Road											
4	L2	156	30.0	0.104	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
5	T1	11	30.0	0.007	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		167	30.0	0.104	5.5	NA	0.0	0.0	0.00	0.53	52.8
West: Davis Road											
11	T1	4	30.0	0.004	0.4	LOS A	0.0	0.2	0.16	0.17	57.7
12	R2	3	30.0	0.004	6.8	LOS A	0.0	0.2	0.29	0.31	53.5
Approach		7	30.0	0.004	3.2	NA	0.0	0.2	0.21	0.23	55.8
All Vehicles		635	30.0	0.415	6.5	NA	2.3	20.4	0.20	0.56	52.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 [Victoria Street and Elizabeth Street (EXISTING AM PEAK)]

New Site
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	37	30.0	0.881	49.6	LOS D	6.7	59.0	1.00	1.06	33.5
2	T1	159	30.0	0.881	43.8	LOS D	6.7	59.0	1.00	1.06	34.3
3	R2	122	30.0	0.881	49.9	LOS D	6.5	57.2	1.00	1.06	32.6
Approach		318	30.0	0.881	46.8	LOS D	6.7	59.0	1.00	1.06	33.6
East: Victoria Street											
4	L2	201	30.0	0.563	25.1	LOS B	9.1	80.1	0.85	0.78	42.1
5	T1	468	30.0	0.563	19.2	LOS B	9.5	83.3	0.85	0.74	45.1
6	R2	76	30.0	0.580	42.7	LOS D	2.8	24.4	1.00	0.80	34.3
Approach		745	30.0	0.580	23.2	LOS B	9.5	83.3	0.86	0.76	42.9
North: Elizabeth Street											
7	L2	35	30.0	0.632	43.1	LOS D	3.2	27.9	1.00	0.82	35.3
8	T1	51	30.0	0.632	37.3	LOS C	3.2	27.9	1.00	0.82	36.4
9	R2	109	30.0	0.831	47.8	LOS D	4.4	38.3	1.00	0.97	32.9
Approach		195	30.0	0.831	44.2	LOS D	4.4	38.3	1.00	0.91	34.2
West: Victoria Street											
10	L2	258	30.0	0.851	36.6	LOS C	19.2	168.9	0.98	1.03	37.4
11	T1	756	30.0	0.851	30.5	LOS C	19.7	173.8	0.98	1.04	39.6
12	R2	86	30.0	0.656	43.6	LOS D	3.2	28.2	1.00	0.84	34.0
Approach		1100	30.0	0.851	33.0	LOS C	19.7	173.8	0.99	1.02	38.6
All Vehicles		2358	30.0	0.881	32.7	LOS C	19.7	173.8	0.95	0.93	38.6

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 per ped
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.74	0.74
P2	East Full Crossing	53	28.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.74	0.74
P4	West Full Crossing	53	27.5	LOS C	0.1	0.1	0.89	0.89
All Pedestrians		211	23.7	LOS C			0.82	0.82

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: Davis Road and Elizabeth Street (EXISTING PM PEAK)

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	56	30.0	0.048	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
3	R2	281	30.0	0.365	7.8	LOS A	1.9	16.5	0.41	0.62	51.4
Approach		337	30.0	0.365	7.5	LOS A	1.9	16.5	0.35	0.61	51.5
East: Davis Road											
4	L2	192	30.0	0.127	5.9	LOS A	0.0	0.0	0.00	0.57	52.3
5	T1	8	30.0	0.005	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		200	30.0	0.127	5.7	NA	0.0	0.0	0.00	0.55	52.6
West: Davis Road											
11	T1	22	30.0	0.015	0.3	LOS A	0.0	0.4	0.13	0.10	58.5
12	R2	5	30.0	0.015	7.1	LOS A	0.0	0.4	0.19	0.14	55.4
Approach		27	30.0	0.015	1.6	NA	0.0	0.4	0.14	0.10	57.9
All Vehicles		564	30.0	0.365	6.5	NA	1.9	16.5	0.21	0.56	52.2

Level of Service (LOS) Method: Delay (RTA NSW).
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 [Victoria Street and Elizabeth Street (EXISTING PM PEAK)]

New Site
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	22	30.0	0.756	42.4	LOS C	5.9	51.5	1.00	0.92	36.1
2	T1	138	30.0	0.756	36.5	LOS C	5.9	51.5	1.00	0.92	37.2
3	R2	146	30.0	0.756	42.6	LOS D	5.6	49.0	1.00	0.92	34.5
Approach		306	30.0	0.756	39.9	LOS C	5.9	51.5	1.00	0.92	35.8
East: Victoria Street											
4	L2	237	30.0	0.803	33.8	LOS C	15.5	136.1	0.97	0.96	38.4
5	T1	646	30.0	0.803	27.7	LOS B	16.0	140.4	0.97	0.96	40.8
6	R2	58	30.0	0.442	41.8	LOS C	2.1	18.2	0.99	0.75	34.6
Approach		941	30.0	0.803	30.1	LOS C	16.0	140.4	0.97	0.95	39.8
North: Elizabeth Street											
7	L2	23	30.0	0.567	41.3	LOS C	3.2	28.6	1.00	0.80	36.2
8	T1	68	30.0	0.567	35.4	LOS C	3.2	28.6	1.00	0.80	37.4
9	R2	121	30.0	0.791	45.4	LOS D	4.7	41.3	1.00	0.94	33.6
Approach		212	30.0	0.791	41.8	LOS C	4.7	41.3	1.00	0.88	35.0
West: Victoria Street											
10	L2	194	30.0	0.696	28.8	LOS C	11.7	103.3	0.92	0.85	40.6
11	T1	572	30.0	0.696	22.8	LOS B	12.1	106.5	0.92	0.83	43.2
12	R2	101	30.0	0.770	45.7	LOS D	3.9	34.4	1.00	0.91	33.3
Approach		867	30.0	0.770	26.8	LOS B	12.1	106.5	0.93	0.85	41.2
All Vehicles		2326	30.0	0.803	31.2	LOS C	16.0	140.4	0.96	0.90	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 per ped
P1	South Full Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77
P2	East Full Crossing	53	26.6	LOS C	0.1	0.1	0.87	0.87
P3	North Full Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77
P4	West Full Crossing	53	25.8	LOS C	0.1	0.1	0.86	0.86
All Pedestrians		211	23.5	LOS C			0.82	0.82

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

APPENDIX 3

MOVEMENT SUMMARY

Site: Davis Road and Elizabeth Street (PROJECTED AM PEAK)

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	127	30.0	0.110	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
3	R2	338	30.0	0.433	7.9	LOS A	2.6	22.7	0.43	0.62	51.2
Approach		465	30.0	0.433	7.4	LOS A	2.6	22.7	0.31	0.61	51.5
East: Davis Road											
4	L2	156	30.0	0.104	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
5	T1	22	30.0	0.014	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		178	30.0	0.104	5.2	NA	0.0	0.0	0.00	0.50	53.2
West: Davis Road											
11	T1	15	30.0	0.013	0.4	LOS A	0.1	0.5	0.17	0.15	57.9
12	R2	7	30.0	0.013	6.9	LOS A	0.1	0.5	0.26	0.24	54.3
Approach		22	30.0	0.013	2.5	NA	0.1	0.5	0.20	0.18	56.7
All Vehicles		665	30.0	0.433	6.6	NA	2.6	22.7	0.23	0.56	52.1

Level of Service (LOS) Method: Delay (RTA NSW).
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 [Victoria Street and Elizabeth Street (PROJECTED AM PEAK)]

New Site
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	37	30.0	0.884	49.9	LOS D	6.8	59.4	1.00	1.07	33.4
2	T1	160	30.0	0.884	44.0	LOS D	6.8	59.4	1.00	1.07	34.3
3	R2	122	30.0	0.884	50.1	LOS D	6.5	57.6	1.00	1.07	32.6
Approach		319	30.0	0.884	47.0	LOS D	6.8	59.4	1.00	1.07	33.5
East: Victoria Street											
4	L2	201	30.0	0.563	25.1	LOS B	9.1	80.1	0.85	0.78	42.1
5	T1	468	30.0	0.563	19.2	LOS B	9.5	83.3	0.85	0.74	45.1
6	R2	77	30.0	0.587	42.8	LOS D	2.8	24.8	1.00	0.80	34.2
Approach		746	30.0	0.587	23.3	LOS B	9.5	83.3	0.86	0.76	42.9
North: Elizabeth Street											
7	L2	36	30.0	0.646	43.3	LOS D	3.3	28.6	1.00	0.83	35.2
8	T1	52	30.0	0.646	37.4	LOS C	3.3	28.6	1.00	0.83	36.4
9	R2	111	30.0	0.846	48.6	LOS D	4.5	39.5	1.00	0.99	32.6
Approach		199	30.0	0.846	44.7	LOS D	4.5	39.5	1.00	0.92	34.0
West: Victoria Street											
10	L2	260	30.0	0.852	36.8	LOS C	19.3	169.8	0.99	1.03	37.3
11	T1	756	30.0	0.852	30.7	LOS C	19.9	174.8	0.99	1.04	39.5
12	R2	86	30.0	0.656	43.6	LOS D	3.2	28.2	1.00	0.84	34.0
Approach		1102	30.0	0.852	33.1	LOS C	19.9	174.8	0.99	1.02	38.5
All Vehicles		2366	30.0	0.884	32.9	LOS C	19.9	174.8	0.95	0.94	38.5

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 per ped
P1	South Full Crossing	53	19.4	LOS B	0.1	0.1	0.74	0.74
P2	East Full Crossing	53	28.4	LOS C	0.1	0.1	0.90	0.90
P3	North Full Crossing	53	19.4	LOS B	0.1	0.1	0.74	0.74
P4	West Full Crossing	53	27.5	LOS C	0.1	0.1	0.89	0.89
All Pedestrians		211	23.7	LOS C			0.82	0.82

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: Davis Road and Elizabeth Street (PROJECTED PM PEAK)

New Site
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	60	30.0	0.052	5.9	LOS A	0.0	0.0	0.00	0.57	52.4
3	R2	281	30.0	0.381	8.3	LOS A	2.1	18.2	0.46	0.65	51.0
Approach		341	30.0	0.381	7.9	LOS A	2.1	18.2	0.38	0.64	51.2
East: Davis Road											
4	L2	192	30.0	0.127	5.9	LOS A	0.0	0.0	0.00	0.57	52.3
5	T1	19	30.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		211	30.0	0.127	5.4	NA	0.0	0.0	0.00	0.52	53.0
West: Davis Road											
11	T1	33	30.0	0.024	0.4	LOS A	0.1	0.7	0.15	0.11	58.3
12	R2	9	30.0	0.024	7.2	LOS A	0.1	0.7	0.22	0.16	55.1
Approach		42	30.0	0.024	1.9	NA	0.1	0.7	0.17	0.12	57.6
All Vehicles		594	30.0	0.381	6.6	NA	2.1	18.2	0.23	0.56	52.2

Level of Service (LOS) Method: Delay (RTA NSW).
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 [Victoria Street and Elizabeth Street (PROJECTED PM PEAK)]

New Site
Signals - Fixed Time Isolated Cycle Time = 70 seconds (Practical Cycle Time)
Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles

Mov ID	OD Mov	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 per veh	Average Speed km/h
South: Elizabeth Street											
1	L2	22	30.0	0.758	42.5	LOS C	5.9	51.7	1.00	0.92	36.0
2	T1	139	30.0	0.758	36.6	LOS C	5.9	51.7	1.00	0.92	37.2
3	R2	146	30.0	0.758	42.7	LOS D	5.6	49.3	1.00	0.92	34.5
Approach		307	30.0	0.758	39.9	LOS C	5.9	51.7	1.00	0.92	35.8
East: Victoria Street											
4	L2	237	30.0	0.803	33.8	LOS C	15.5	136.1	0.97	0.96	38.4
5	T1	646	30.0	0.803	27.7	LOS B	16.0	140.4	0.97	0.96	40.8
6	R2	59	30.0	0.450	41.8	LOS C	2.1	18.5	0.99	0.75	34.6
Approach		942	30.0	0.803	30.1	LOS C	16.0	140.4	0.97	0.95	39.7
North: Elizabeth Street											
7	L2	24	30.0	0.580	41.4	LOS C	3.3	29.3	1.00	0.80	36.2
8	T1	69	30.0	0.580	35.5	LOS C	3.3	29.3	1.00	0.80	37.4
9	R2	123	30.0	0.804	45.9	LOS D	4.8	42.3	1.00	0.95	33.4
Approach		216	30.0	0.804	42.1	LOS C	4.8	42.3	1.00	0.89	34.9
West: Victoria Street											
10	L2	196	30.0	0.698	28.9	LOS C	11.8	103.8	0.92	0.85	40.6
11	T1	572	30.0	0.698	22.9	LOS B	12.2	107.0	0.92	0.84	43.2
12	R2	101	30.0	0.770	45.7	LOS D	3.9	34.4	1.00	0.91	33.3
Approach		869	30.0	0.770	26.9	LOS B	12.2	107.0	0.93	0.85	41.2
All Vehicles		2334	30.0	0.804	31.3	LOS C	16.0	140.4	0.96	0.90	39.2

Site Level of Service (LOS) Method: Delay (RTA NSW). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
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 per ped
P1	South Full Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77
P2	East Full Crossing	53	26.6	LOS C	0.1	0.1	0.87	0.87
P3	North Full Crossing	53	20.9	LOS C	0.1	0.1	0.77	0.77
P4	West Full Crossing	53	25.8	LOS C	0.1	0.1	0.86	0.86
All Pedestrians		211	23.5	LOS C			0.82	0.82

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.