

13 Pembury Road, Minto Transport Impact Assessment

Prepared for:
Skylife Properties Pty Ltd
1/05/2017

The Transport Planning Partnership
ACN: 607 079 005

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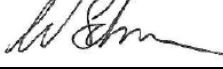
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- C. Swept Path Analysis and Vehicle Stacking Plan
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1 INTRODUCTION

1.1 Background

The Transport Planning Partnership (TPPP) has been engaged by Skylife Properties Pty Ltd to undertake a Transport Impact Assessment (TIA) for the proposed expansion of the waste transfer facility located at 13 Pembury Road, Minto. A State Significant Development (SSD) Application is to be lodged with the Department of Planning for the expansion of the facility.

The TIA for the proposed development is to be included in the Environmental Impact Statement and in particular needs to address the Secretary's Environmental Assessment Requirements (SEARs) related to traffic and transport. Table 1 lists the SEARs requirements and the corresponding sections of the report where these are addressed.

Table 1: SEAR's and Relevant Report Sections

Traffic and Transport	Addressed in
Details of all traffic types and volumes likely to be generated during construction and operation, including a description of haul routes	Section 6
An assessment of the predicated 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 2.5 Section 2.6 Section 6.4 Section 6.5
Detailed plans of the proposed layout of the internal road network and parking onsite in accordance with the relevant Australian Standards	Section 3.2 Section 4
Plans of any proposed road upgrades, infrastructure works or new roads required for the development	Section 7

In addressing the Consultation requirements of the SEARs, Roads and Maritime Services (Roads and Maritime) were briefed on the proposal and traffic assessment methodology. Confirmation of no additional assessment requirements for inclusion in the TIA was communicated to TPPP by Roads and Maritime on 08/07/2016 via email correspondence.

The application seeks to increase the amount of waste throughput from 30,000 tonnes per annum (tpa) to 220,000 tpa and an extension to the hours of operation from 6:00am – 7:00pm to 6:00am – 10:00pm on Monday to Saturday.

1.2 Purpose of this Report

This report assesses the potential transport implications due to the proposed development with respect to parking and access arrangements, layout of internal roads, and traffic impacts on the surrounding road network.

1.3 References

In preparing this report, reference has been made to the following:

- an inspection of the site and its surrounds
- Campbelltown City Council Local Environmental Plan (LEP) 2015
- Campbelltown City Council Development Control Plan (DCP) 2015
- Plans for the proposed development as prepared by Dewcape
- Swept path assessments undertaken by TPPP
- other documents and data as referenced in this report.

2 EXISTING CONDITIONS

2.1 Site Location

The subject site is located at 13 Pembury Road, Minto within the industrial district of the Campbelltown local government area. The site and immediate surrounding area are zoned General Industrial Zone (IN1) under Campbelltown City Council Local Environmental Plan (LEP) 2015. The site is located on Lot 1 DP 1013852 which has a total area of approximately 8,957m². Development for the purpose of a 'resource recovery facility' is permissible with development consent under the State Environmental Planning Policy (Infrastructure) 2007, Clause 121.

The surrounding land uses to the subject site include light industrial, low and medium density residential and public recreational classifications.

The site is currently occupied by Minto Recycling Pty Ltd. There are three buildings on the site, namely, Shed A, Shed B and Shed C. Waste from inbound trucks is tipped into Shed B; waste sorting and processing is undertaken in Shed C; and waste is stockpiled in Shed A. The site office is located at the access driveway to the site.

The site is accessible via two driveways along its northern boundary that are 11.5m and 6m in width. The site is located within a cul-de-sac where on-street kerbside parking is permitted.

The location of the subject site and its surrounding environs is shown in Figure 1.

Figure 1: Site Location and Surrounding Locality



2.2 Road Network

A description of the local road network is detailed as follows.

Pembury Road is a local road which runs east-west along the northern boundary of the site. Opposite the site, the alignment of the road changes to a north-south direction. Pembury Road is a no-through road with an unmarked two-lane two-way carriageway. The width of the carriageway is 12m and there is unrestricted on-street parking permitted on both sides of the road. The sign posted speed limit along Pembury Road is 50km/h.

A cross-section of Pembury Road is shown in Figure 2 as observed during a site inspection carried out on Thursday 9th June 2016.

Figure 2: Pembury Road (looking east)



Source: The Transport Planning Partnership, 2016

Airds Road is a collector road located towards the east of the site. Airds Road has a north-south alignment and a 16m wide carriageway. The roadway is two-lane two-way with opposing traffic movements divided by a broken separation line. Unrestricted on-street parking is permitted on both sides of the road. The posted speed limit is 50km/h along Airds Road. Within the vicinity of the site, a pedestrian footpath is located along the south-eastern side of Airds Road.

Ben Lomond Road functions as a sub-arterial road and is located to the north of the site. It is 17m in width and is configured as a two-way four lane road. At its western end, Ben Lomond Road increases to five lanes. Opposing movements are separated by a median which varies in width between 0.4 and 6m, with a section of road separated by double barrier line marking. Stopping and parking is not permitted on both kerbsides of Ben Lomond Road and the posted speed limit along the road is 60km/h.

Rose Payten Drive functions as a sub-arterial road and is located south of the site. Rose Payten Drive is generally east-west aligned and changes to Leumeah Road towards its south-eastern end. It is a two-way road configured with four lanes. The carriageway is 17m in width and has a raised median of 0.5m wide separating opposing traffic movements. Stopping and parking is not permitted on both kerbsides of Rose Payten Drive and the posted speed along the road is 60km/h.

A notable State Road within the vicinity of the site is Campbelltown Road. Campbelltown Road is a two-lane two-way road which runs in a north-south direction. The carriageway is 11m in width with double barrier line marking separating opposing traffic movements. The verge width on the east and west sides of the road are a minimum of 10m and 12m, respectively, in which vehicle stopping and parking is unrestricted. The sign posted speed limit in the area is 70km/h.

2.3 Surrounding Intersections

The following major intersections currently exist in the vicinity of the site:

- Airds Road/ Pembury Road/ Huntsmore Road (priority intersection)
- Airds Road/ Ben Lomond Road (priority intersection)
- Airds Road/ Culverston Road (roundabout intersection)
- Airds Road/ Rose Payten Drive (roundabout intersection)
- Campbelltown Road/ Ben Lomond Road (signalised intersection)
- Campbelltown Road/ Rose Payten Road (signalised intersection).

2.4 Vehicle Access and Circulation

The site has two driveway accesses off Pembury Road; the eastern and western driveways have respective widths of 11.5m and 6m. The eastern driveway is the main access to the site as it provides entry and exit to the site while the western driveway is currently unused.

A site office is located at the site entry where there are two separate in-ground weighbridges for inbound and outbound vehicles. Each weighbridge can accommodate one vehicle at a time and has dimensions 18.1m long by 2.8m wide.

The main access driveway is configured as two-way while the internal road layout is configured as one-way. Vehicles are required to perform a U-turn in the open area bounded by the site sheds to exit the site. All vehicle movements to/from and within the site are in a forward direction.

Currently, there are no restrictions around the site vicinity for the existing fleet of heavy vehicles accessing and leaving the site. The largest vehicle accessing the site is a 25m B-double. Trucks currently access Pembury Road via Airds Road which intersects with Ben Lomond Road to the north and Rose Payten Road to the south. The initial intersection is a give-way priority control while the two latter intersections are roundabouts.

The majority of vehicles accessing the site travel via the Hume Highway, approximately 4km east of the site.

Site operations permit vehicle movements to/from the site via Pembury Road Monday to Saturday between 6:00am – 7:00pm.

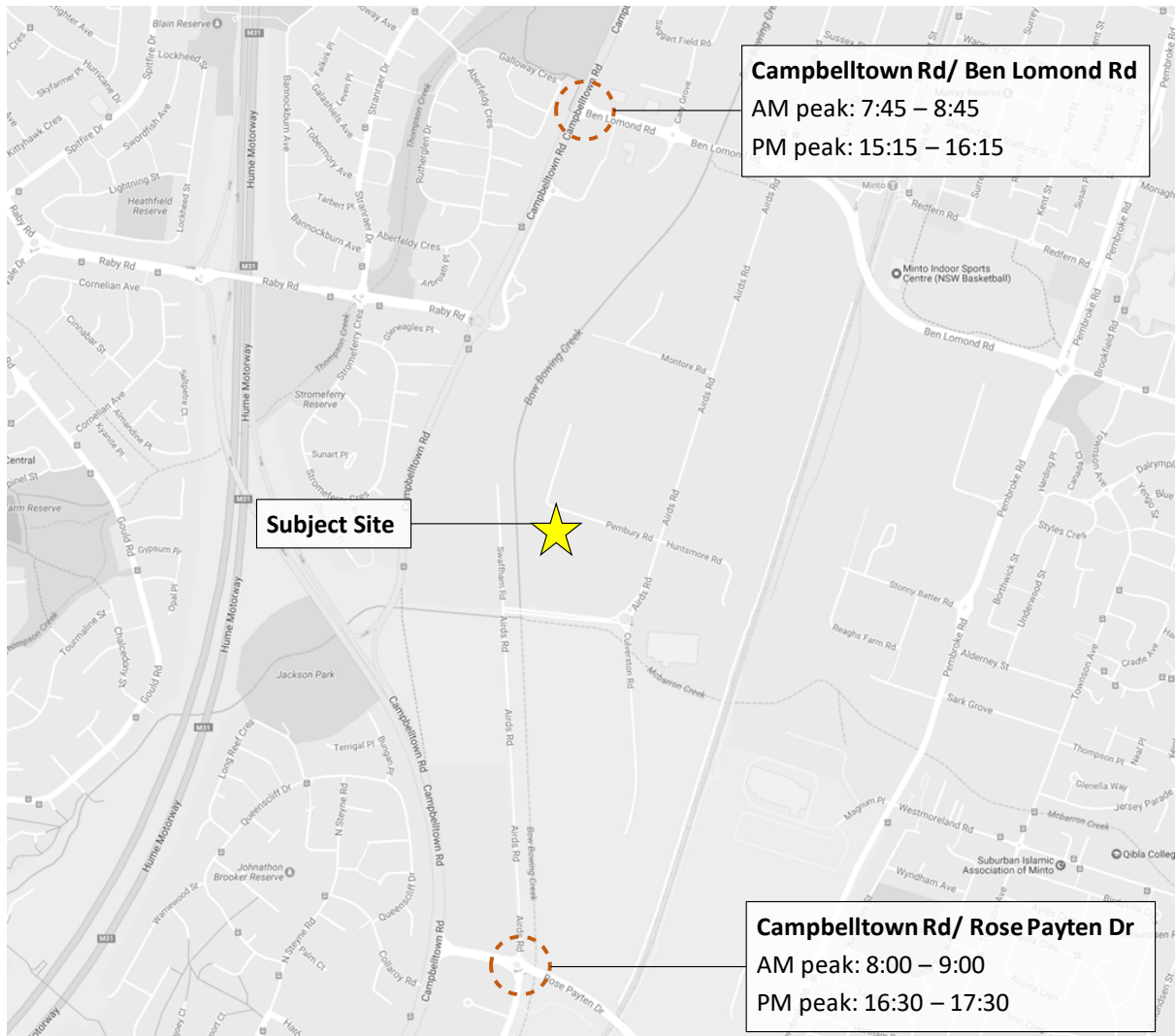
2.5 Traffic Volumes

Intersection turning movement counts were conducted on Thursday 26 March 2016 at two nearby key intersections, namely, Campbelltown Road/ Ben Lomond Road and Campbelltown Road/ Rose Payten Drive during the following periods:

- AM peak period: 7:00am – 11:00am
- PM peak period: 3:00pm – 6:00pm.

The location of these intersections with regard to the subject site is shown in Figure 3. Figure 4 to Figure 7 present the peak hour flows derived from the traffic counts while the full traffic survey data are contained in Appendix A.

Figure 3: Surveyed Intersections



Basemap source: Google Maps 2017

Figure 4: Campbelltown Rd/Ben Lomond Rd Existing Traffic Flows – AM Peak Hour

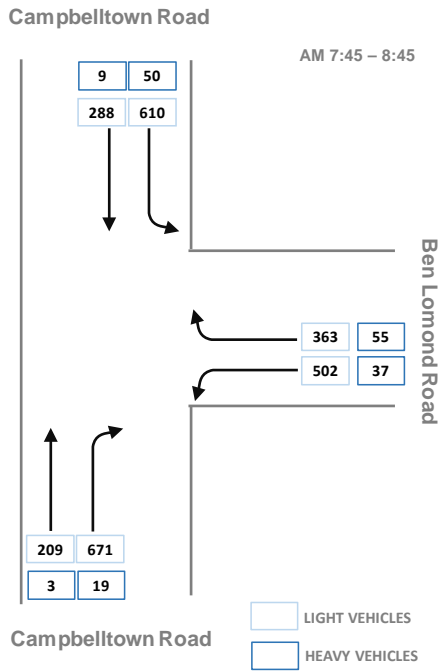


Figure 5: Campbelltown Rd/Ben Lomond Rd Existing Traffic Flows – PM Peak Hour

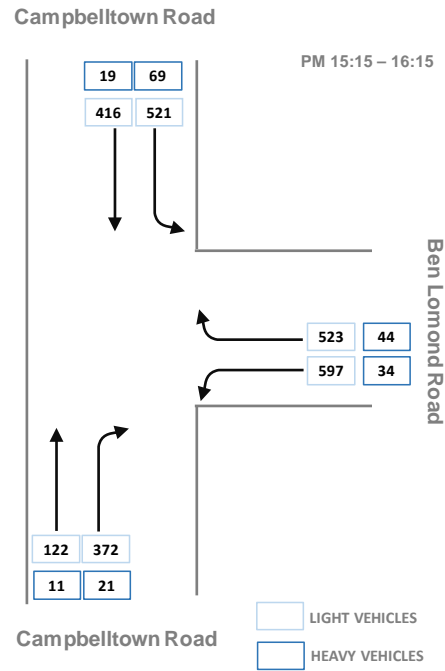


Figure 6: Campbelltown Rd/Rose Payten Dr Existing Traffic Flows – AM Peak Hour

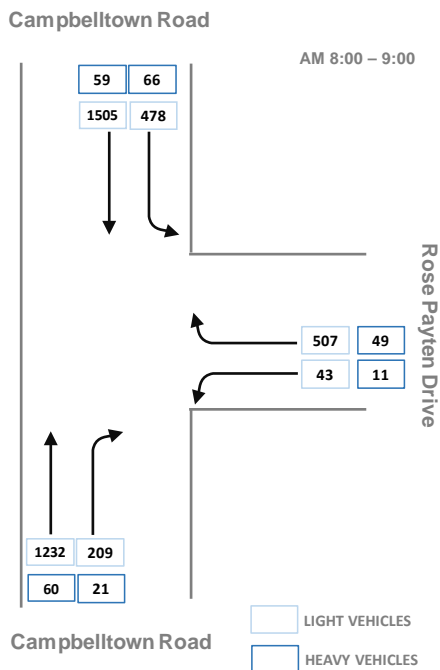
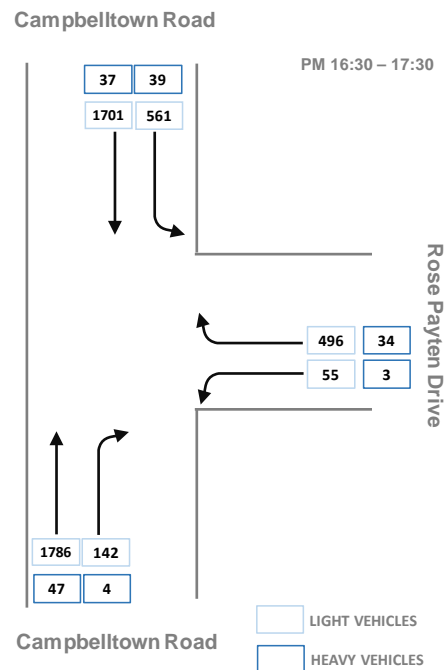
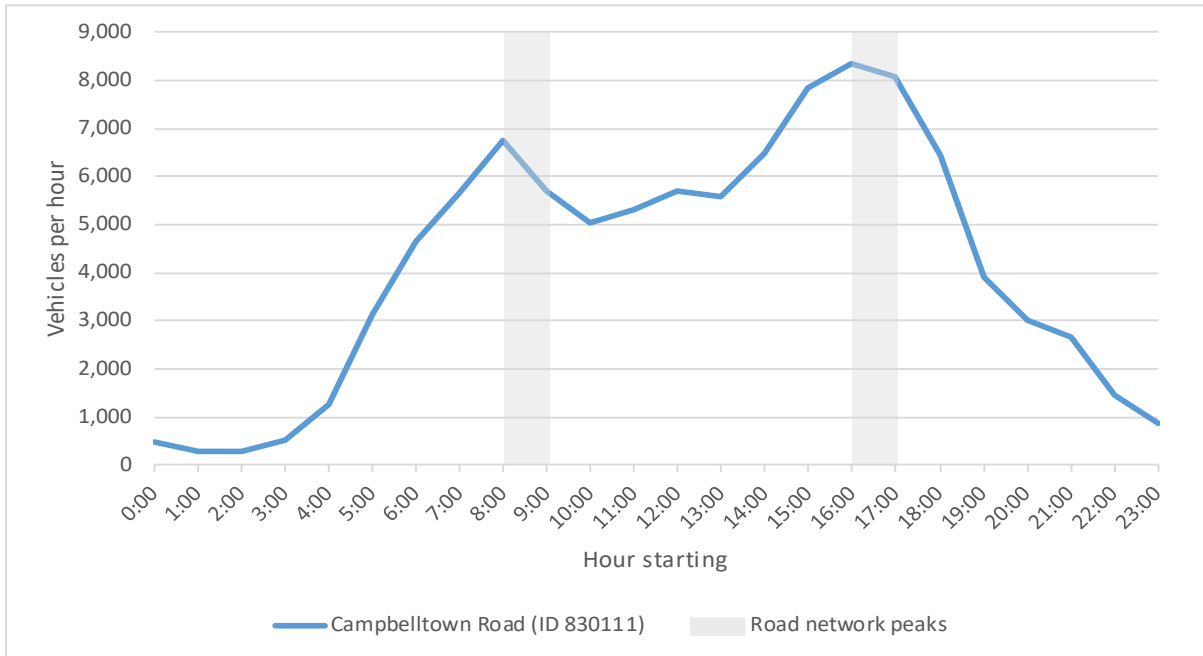


Figure 7: Campbelltown Rd/Rose Payten Dr Existing Traffic Flows – PM Peak Hour



Average annual daily traffic (AADT) data, from Roads and Maritime, on Campbelltown Road confirms the road network peaks within the site vicinity. AADT data for Thursday 26 May 2016 identifies the AM and PM road peaks as 8:00am – 9:00am and 4:00pm – 5:00pm, respectively, as shown in Figure 8.

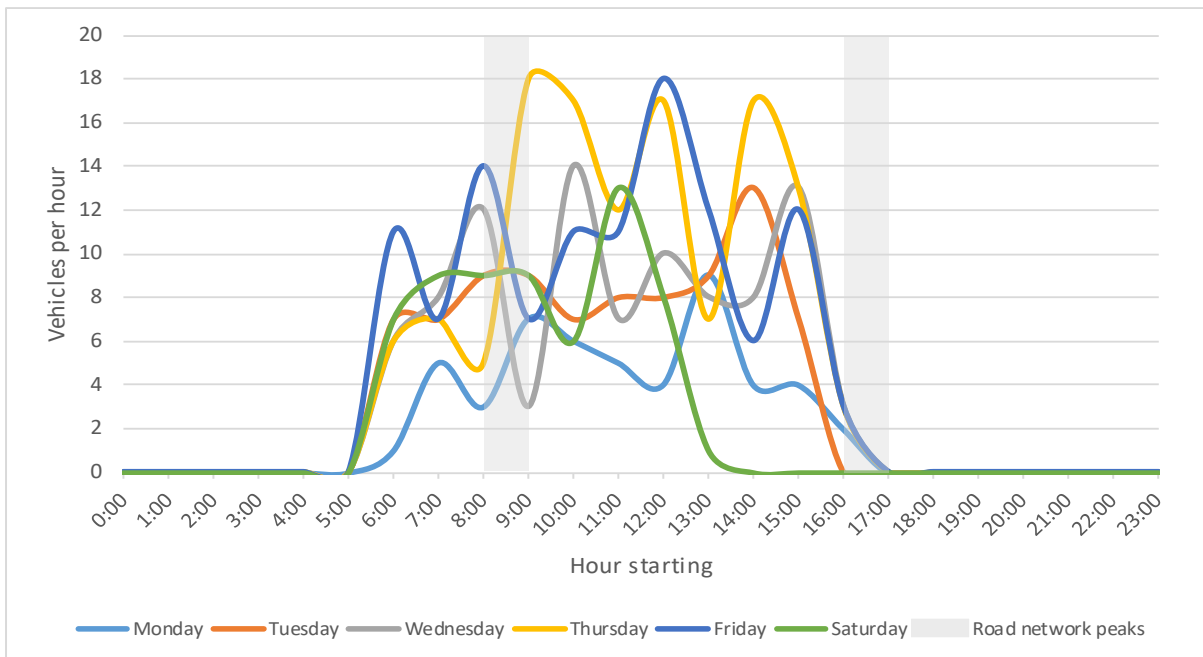
Figure 8: AADT on Campbelltown Road (Station Counter ID: 83011)



Data source: Roads and Maritime AADT

Two-way traffic movements over a typical week have been recorded by the inbound and outbound weighbridge operator. In and out traffic movements over a typical week of site operations, between Monday 20 June and Sunday 26 June 2016, are illustrated in Figure 9.

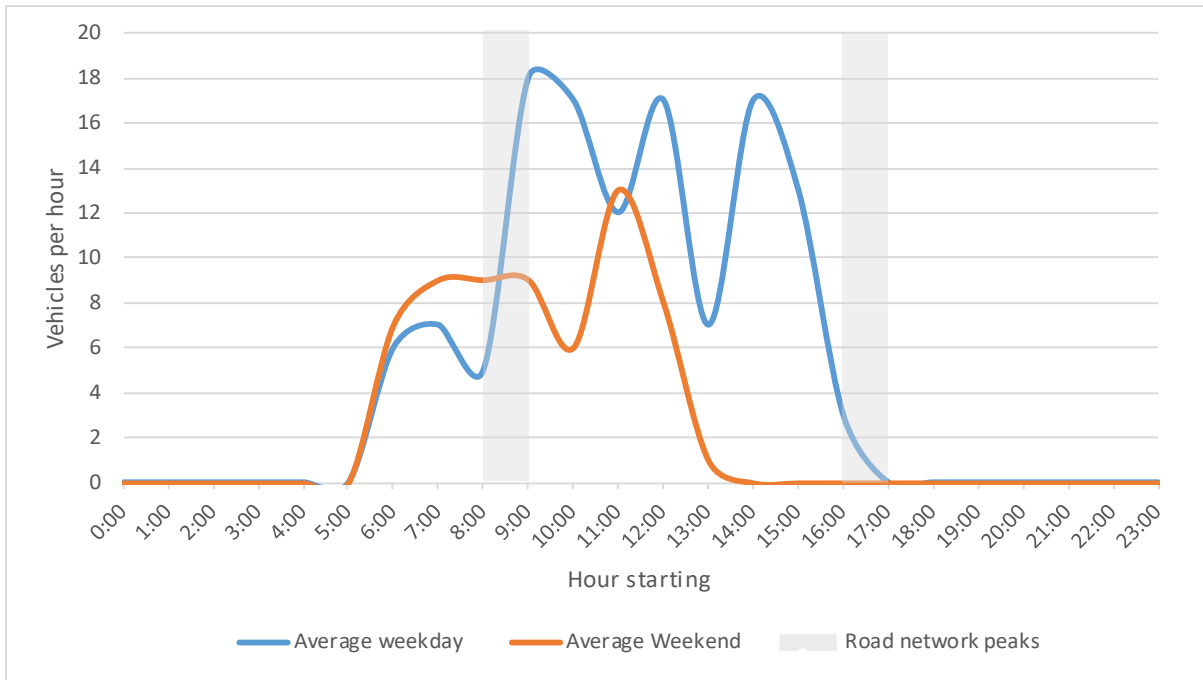
Figure 9: Two-Way Traffic Volumes at Minto Waste Transfer Facility



Data source: Minto Recycling Pty Ltd

Figure 9 indicates that the peak traffic volumes generated by the existing facility at Minto occur between 9:00am – 10:00am and 12:00pm – 1:00pm, which fall outside of the surrounding road network peak periods. Traffic movements on the busiest weekday and weekend, of the same week, have been analysed as a means to validate the seven-day traffic data and are shown in Figure 10.

Figure 10: Average Two-Way Traffic Volumes at Minto Waste Transfer Facility



Data source: Minto Recycling Pty Ltd

As shown in Figure 10, the weekday and weekend peak traffic movements generated by the existing site take place outside of the road network peaks. The peak periods of the existing traffic volumes at the Minto facility, as described above, are confirmed by Figure 10.

Classified two-way traffic generated by the site is summarised in Table 2.

Table 2: Summary of Existing Vehicle Classifications (Seven-Day Data)

Vehicle Type Based on Tare Weight	Daily Number of Vehicles	Proportion (%)
Inbound waste		
< 5 tonnes	8	21%
5 tonnes – 12.5 tonnes	18	47%
12.5 tonnes – 15 tonnes	7	18%
> 15 tonnes	6	14%
Sub-total (one-way traffic movements)	39	100%
Sub-total (two-way traffic movements)	78	-
Outbound waste		
< 5 tonnes	0	0%
5 tonnes – 12.5 tonnes	0	0%
12.5 tonnes – 15 tonnes	0	0%
> 15 tonnes	5	100%
Sub-total (one-way traffic movements)	5	100%
Sub-total (two-way traffic movements)	10	-
Inbound and Outbound Waste		
Total one-way traffic movements	44	-
Total two-way traffic movements	88	-

2.6 Roadway Capacity for Two-way Urban Road

An assessment of traffic flow along Pembury Road and its impact on roadway capacity has been carried out with reference to Roads and Maritime's *Guide to Traffic Generating Developments* (the "Guide"). The Guide prescribes an operational capacity threshold for different configurations of an urban road. Pembury Road is a two-way undivided road with one lane per direction; for this road classification, the Guide stipulates a threshold of 900 passenger car units (pcu) per hour per lane as shown in Figure 11.

Figure 11: Operational Capacity for Urban Roads

Table 4.3
Typical mid-block capacities for urban roads with interrupted flow

Type of Road	One-Way Mid-block Lane Capacity (pcu/hr)	
Median or inner lane:	Divided Road	1,000
	Undivided Road	900
Outer or kerb lane:	With Adjacent Parking Lane	900
	Clearway Conditions	900
	Occasional Parked Cars	600
4 lane undivided:	Occasional Parked Cars	1,500
	Clearway Conditions	1,800
4 lane divided:	Clearway Conditions	1,900

Source: Roads and Maritime's *Guide to Traffic Generating Developments* (dated 2002)

Pembury Road is a no-through road, hence, it does not carry through-traffic. The road function of Pembury Road is primarily to provide access to adjacent properties which mostly comprise industrial and light industrial land uses. The composition of traffic on Pembury Road generally consists of delivery trucks and cars driven by employees at these sites.

A tube counter was located on Pembury Road to capture the existing traffic volumes over a 24-hour period for one week in September 2016. Analysis of the roadway capacity considers the busiest hours in terms of traffic and transport activity, namely:

- The road network peaks specifically on Pembury Road as determined by the 24-hour tube counts (8:00am-9:00am and 1:00pm – 2:00pm).
- The hour of peak activity at the site (9:00am – 10:00am and 12:00pm – 1:00pm).

Traffic flows during each of these key peak periods are summarised in Table 3.

Table 3: Existing Traffic Flows on Pembury Road

Period		Traffic Flows on Pembury Road	
		Eastbound (veh/hr)	Westbound (veh/hr)
Pembury Road network peaks	8:00am-9:00am	75	98
	1:00pm-2:00pm	87	105
Minto site operation peaks	9:00am-10:00am	66	78
	12:00pm-1:00pm	87	83

Source: Matrix

Having regard to the traffic volumes as contained in Table 3, the road currently operates with traffic volumes well within its operational capacity threshold set within Roads and Maritime's Guidelines.

The tube count data along Pembury Road has been included in Appendix B.

2.7 Intersection Operation

In order to qualitatively assess the quantitative effect of traffic flow, traffic modelling is undertaken using SIDRA Intersection software, version 6.1. Level of Service (LoS) is the performance standard used to determine the operational efficiency of an intersection. There are six levels of service which range from LoS A to LoS F (best to worst operating conditions).

Traffic conditions that are characteristic of LoS A operations are free-flow traffic and no delays while LoS F operations are flow break-down, queuing and delays. Key nearby intersections that have been assessed in this study include the signalised intersections of Campbelltown Road/ Ben Lomond Road and Campbelltown Road/ Rose Payten Drive. A summary of the existing operation at these intersections is given in Table 4.

Table 4: Existing Conditions Intersection Analysis Results

Intersection	Intersection type	AM peak period		PM peak period	
		Average delay (s)	Level of Service (LoS)	Average delay (s)	Level of Service (LoS)
Campbelltown Road/ Ben Lomond Road	Signals	51	D	38	C
Campbelltown Road/ Rose Payten Drive	Signals	25	B	24	B

Note: Roads and Maritime uses level of service as a performance measure to indicate the operating efficiency of a given intersection. The level of service ranges from A to F. Levels of service between A and D indicate the intersection is operating within capacity with LoS A providing exceptionally good performance to LoS D indicating satisfactory performance. LoS E and F indicate the intersection is operating at or near capacity and would require intersection improvement works to maintain reasonable performance.

Based on Roads and Maritime's performance measure for LoS, the analysis indicates that the two nearby intersections operate satisfactorily at a LoS D or better under existing conditions.

2.8 Car Parking

Currently, the site offers three off-street car parking spaces for six staff. The suitability of the proposed parking provision and layout is discussed in Sections 3.3 and 4 of this report.

2.9 Public Transport

The subject site is located 1.6km (20 minute walk) south of Minto Railway Station and 2.5km (30 minute walk) north of Leumeah Railway Station. Both stations are serviced by the T2 Airport, Inner West and South Line and T5 Cumberland Line.

Two bus stops are located approximately 1.4km (17 minute walk) north of the site. Interline Bus Services provides routes to the site from surrounding areas; Catherine Field, Oran Park, Gregory Hills, Narellan, Raby, St Andrews, Bow Bowling, Eagle Vale and Kearns.

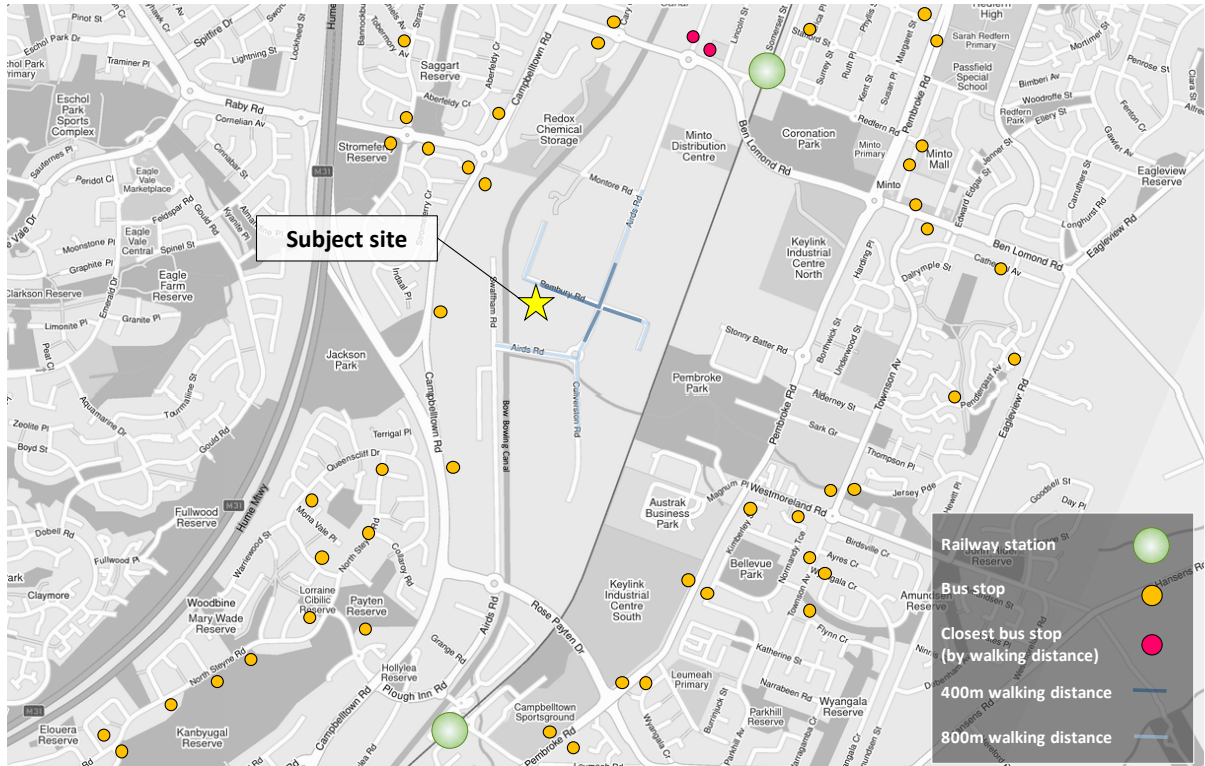
A summary of public transport available within the vicinity of the site is provided in Table 5.

Table 5: Public Transport Provision

Stop/ ID No.	Route	Direction	Frequency	
			AM peak, 6-9am	PM peak, 3-6pm
Train services				
Minto Railway Station	T2 Airport Line	To Minto (from City)	Every 15mins	
		From Minto (to City)	Every 15mins	
	T5 Cumberland Line	To Minto (from Parramatta)	Every 30mins	
		From Minto (to Parramatta)	Every 30mins	
Bus services				
256627	850	Narellan Town Centre to Minto	Every 30mins	No services
	874	Minto to Raby	Every 30mins	No services
	875	Minto to St Andrews	Every 30mins	One service
	880	Campbelltown to Minto	Every 30mins	Every 30mins
256630	875	Minto to St Andrews	Two services	No services
	880	Minto to Campbelltown	Every 30mins	Every 30mins

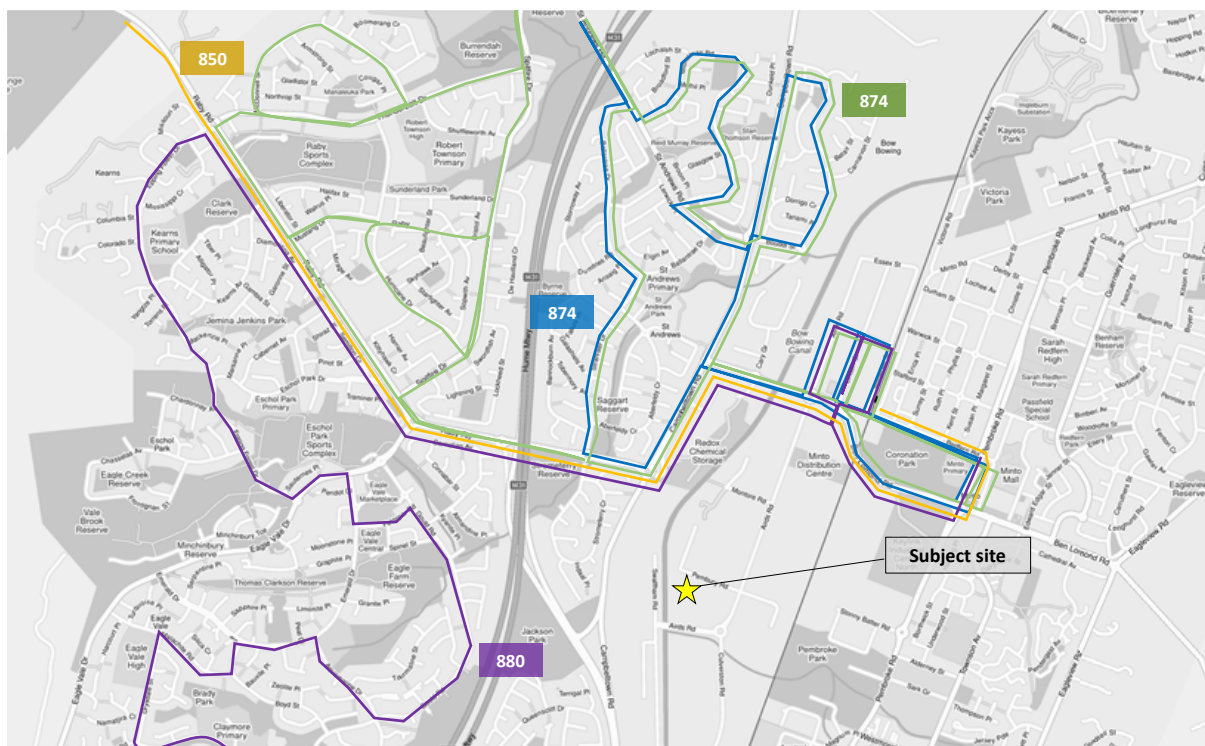
The proximity of public transport services to the subject site are shown in Figure 12 while bus routes within the region are indicated in Figure 13.

Figure 12: Surrounding Public Transport



Basemap source: Transport for NSW

Figure 13: Surrounding Bus Network



Basemap source: Transport for NSW

2.10 Pedestrian and Cyclist Facilities

Currently, there are scarce pedestrian and cyclist facilities surrounding the subject site. A footpath and kerb ramps are located along the east side of Airds Road while there are no facilities provided along Pembury Road.

According to Campbelltown City Council and Sydney Cycleways sources, there are no designated bicycle routes on the surrounding local roads. Dedicated cycle lanes are located along Campbelltown Road and Rose Payten Drive.

3 DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 Development Description

The proposal intends to raise the allowable waste volume carried through the site from 30,000 tpa to 220,000 tpa. In order to accommodate the proposed waste volume, alterations and additions to the existing site would include:

- Construction of a new in-ground weighbridge on the western side of Shed A with dimensions 20m long by 3.5m wide; and
- New substation, site office and amenities block.

An additional amendment is the extension of operating hours across Monday to Saturday as follows:

- Current operating hours: 6:00am – 7:00pm
- Proposed operating hours: 6:00am – 10:00pm.

It is proposed to provide a total of 10 onsite car parking spaces, which are to be located towards the northern boundary of the site. Of the 10 parking spaces, three parking spaces would be located near the eastern driveway while the remaining seven spaces would be located near the western egress.

The yields of the proposed site layout are summarised in Table 6 while the proposed site plan, access and car parking arrangements are shown in Figure 14.

Table 6: Development Schedule

Use (light industry)	Description	Size (m ²)
Office	Site office	16.76
	Lunch room	36.82
	Amenities	23.62
Warehouse	Waste storage (Shed A)	929.71
	Waste processing (Shed B)	961.79
	Waste tipping (Shed C)	1,149.91
Remainder of site	Including internal roads, weighbridges, car parking	5,838.39
Total site area		8,957.00

Figure 14: Proposed Site Layout



Source: Dewcape, dated 04/11/2016

3.2 Vehicle Access and Circulation

Site access for the future development would remain as current, that is, via Pembury Road. All vehicles would enter the site through the driveway nearest to the eastern boundary. The internal arrangements of the heavy vehicle manoeuvring within the site would be restricted to one-way movements.

A Traffic Controller would be located at the site access driveway to manage in and out movements of all vehicles at the eastern access. Waste-carrying vehicles would be weighed on the inbound weighbridge and waste is visually inspected by the Weighbridge Operator or Traffic Controller before unloading or immediately following unloading.

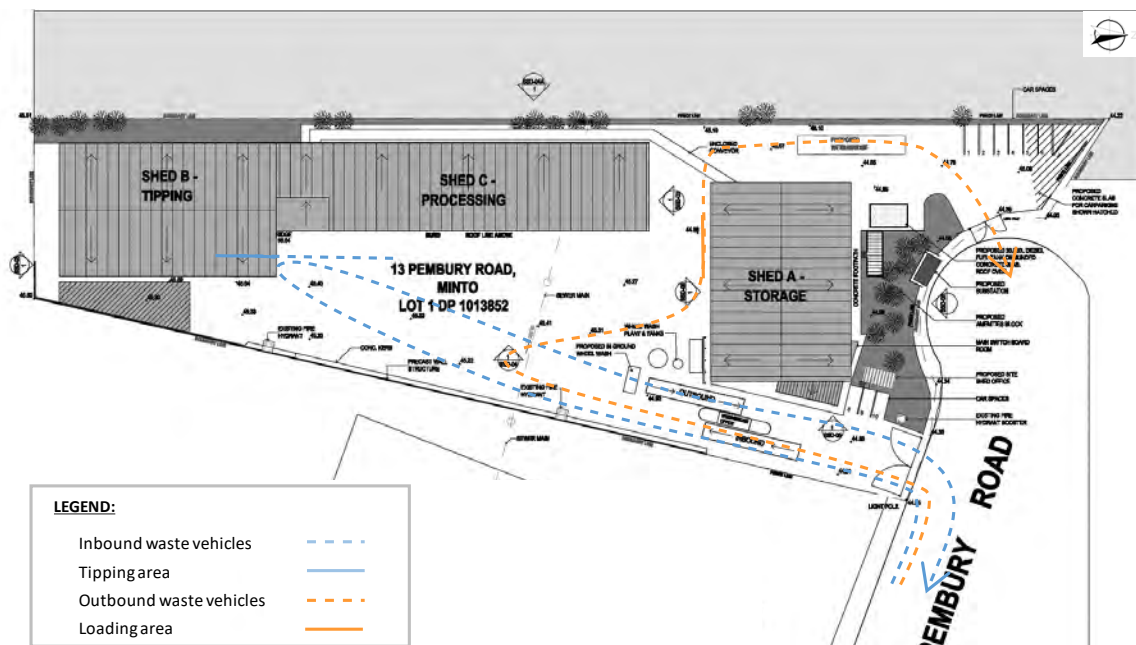
Loaded vehicles would enter Shed B by undertaking a U-turn and reversing to the tip floor. Following unloading, vehicles would proceed to one of two exit points; light vehicles via the eastern exit driveway while heavy and light vehicles would use the western exit driveway.

Non-recyclable waste (to be sent to landfill) and recovered waste (to be sent to material-specific recovery facilities) would be transported away from the site by large trucks. These trucks would arrive at the site empty and loaded up with waste in Shed A. Loaded trucks are to be weighed at the outbound weighbridges before departing the site.

The largest vehicle accessing the site would be a 25m B-double truck, which would travel via Campbelltown Road, Plough Inn Road and north up Airds Road. All other vehicles travelling to/ from the site would do so along the existing travel routes, namely, Ben Lomond Road and Rose Payten Drive. The vast majority of vehicles would utilise the latter routes whereas only a limited number of trucks are to travel via Plough Inn Road.

The access layout and vehicle circulation routes of the proposed site are shown in Figure 15. An analysis of the vehicle swept paths for internal circulation is detailed in Section 5.1.

Figure 15: Site Access Arrangements



Base plan source: Dewcape, dated 04/11/2016

3.3 Car Parking

A total of 10 car parking spaces would be provided onsite for 13 full time staff employed at the facility. The suitability of the parking provision and layout is discussed in Section 4 of this report.

4 CAR PARKING

4.1 Car Parking Requirements

The State Environmental Planning Policy (State and Regional Development) 2011, Part 2, Clause 11 stipulates that Council development control plans do not apply to state significant developments. However, having due regard to the objectives and guidelines as set by Council for industrial developments, the provision for car parking of the proposed development has been assessed in accordance with the Campbelltown (Sustainable City) Development Control Plan (DCP) 2015 as well as undertaking an assessment of the actual operation of the proposal.

Campbelltown Council's DCP sets out a number of objectives to ensure the operational safety and amenity of parking and accessibility for industrial developments, which include:

- o ensuring that all required car parking and related vehicle manoeuvring is accommodated onsite;
- o maintaining the free flow and safe movement of traffic into and out of the site, and
- o ensuring that onsite car parking does not detract from the visual character of the streetscape.

Typically, these objectives are satisfied through the application of Council's DCP parking provisions. The DCP stipulates parking rates for industrial developments based on the designation of areas. Table 7 summarises the minimum car parking requirements as per the DCP.

Table 7: Campbelltown Council Development Control Plan Parking Rates

Development Type	Designated Area	Rate	Proposed Area	Minimum Required Parking
Industrial	Office, lunch rooms, office storage areas	1 space per 35m ²	77.20m ²	3
	Areas other than office, lunch rooms and office storage areas	2 spaces per unit	3 units	6
	Buildings up to 2,000m ²	1 space per 100m ²	3,041.41m ²	31
Total spaces				40

Based on the above, the minimum required onsite car parking spaces would be 40 spaces. For the proposed 13 full time employees at the site, 40 parking spaces is considered to be excessive, particularly since the maximum number of staff onsite at any one time is 13 people. In this instance, determination of the required parking is considered more appropriately measured based on the number of employees at the site.

The future development would have 13 full time employees who would be engaged in work on Monday to Saturday between the hours of 6:00am – 10:00pm. The total number of off-street parking spaces would be 10, all of which would be used for staff parking. Opportunities for car-pooling amongst staff members as well as the use of public transport when travelling to/from work would mean that the 10 car parking spaces would adequately cater for the 13 employees at the facility.

As the nature of the future facility would predominately comprise automated processes and waste sorting activities, it would be expected that visitation patterns to the facility would be infrequent. Therefore, there would not be a requirement to provide visitor parking as part of

the proposal. It is noted that Council's DCP does not stipulate a requirement for visitor parking for industrial developments, such as the proposed development.

Based on this, a total of 10 car parking spaces would sufficiently accommodate the parking demand at the future facility while also fulfilling the objectives as set out in the DCP. Hence, the proposed 10 car parking spaces are considered to be adequate for the future facility.

The DCP specifies that industrial developments are to comply with the Building Code of Australia (BCA), Clause D3.5, the proposed development is classified as a Class 5, 6, 7b, 8 and 9a (ie. factory) building and has a disabled car parking provision of one spaces for every 100 car parking spaces or part thereof. Applying the accessible parking rate as per the BCA it is required to provide 0.13 accessible parking spaces for the proposed development. This generates a miniscule accessible parking provision for a site which is considered to have infrequent disabled persons who require to park and leave their vehicle. As detailed in Section 3.2, a Traffic Controller would be present at all times at the site entry who would manage and direct all traffic and any pedestrians. Based on the site operation and functionality, accessible spaces would not be provided as part of the future development.

4.2 Parking Layout

Car parking spaces for the development are proposed to be located toward the northern boundary of the site. Seven parking spaces positioned at the north-western corner of the site while the remaining three parking spaces would be located adjacent to the proposed site office, near the main site access.

The Australian Standard for Off-street car parking (AS2890.1:2004) requires car parking spaces for employee parking to be provided as Class 1A parking spaces. Class 1A car parking spaces are to have the following minimum dimensions:

- Bay length of 5.4m
- Bay width of 2.4m.

The proposed car parking layout complies with the above minimum requirements. Hence, the proposed car parking layout is satisfactory.

4.3 Site Access

Campbelltown Council's DCP outlines the requirements for industrial developments and the design of the site access. It states that each site is to have a maximum of one ingress and one egress for heavy vehicles. Further to this, it is possible that each site have an additional ingress/ egress for cars and light vehicles.

The proposed development provides one ingress and one egress for heavy vehicles, namely, via the respective eastern and western driveways. An additional egress is provided for cars/ light vehicles via the eastern driveway, therefore, complying with the requirements as set out in the DCP.

5 SITE LAYOUT

5.1 Vehicle Swept Paths

5.1.1 Onsite Stacking and Internal Circulation

The internal road layout of the proposed development is designed to accommodate forward movements by larger vehicles accessing the site. In the context of this assessment, large vehicles include 19m semi-trailers, 19.6m truck-and-quad-dog combinations and 25m B-double trucks.

Onsite vehicle stacking spaces would be provided where trucks can queue without causing interruptions to site operations and the surrounding road network (discussion on vehicle stacking is provided in Section 6.7.3). From the stacking spaces, all inbound waste trucks are able to undertake a U-turn and reverse onto the tip floor in Shed B. From the tip floor, these trucks are able to proceed in a forward direction toward the eastern outbound weighbridge to exit the site. Vehicles carrying inbound waste range in size from vans/small trucks to 19m semi-trailers.

After sorting and processing, the product materials are stockpiled in Shed A and transported off-site for further processing at other facilities. Larger trucks would remove waste off-site and exit the site via the new western weighbridge. Where possible, waste removal by these large trucks would be scheduled to take place outside of peak site operations to minimise conflicts between stacked vehicles and larger trucks onsite.

Once light waste is separated in Shed C, a Liebherr Hydraulic Excavator transfers this waste from the waste storage bays onto waste collection trucks which transport waste off-site. A front-end loader will be used on-site to transfer all other processed waste from Shed C to Shed A as needed. The same loader will be used to load material out of Shed A onto trucks for removal.

With regard to operations, material will not be transferred between Shed C and Shed A while waste collection trucks are being loaded. Storage bays are to be emptied when the site is not busy, hence, eliminating interference with vehicle movements on-site. Soil is transferred by an enclosed conveyor from Shed C to Shed A which does not disrupt vehicle movements in any manner.

There would be no conflict between the loader and vehicles whilst on-site as a result of the above operations. Also, there would be no impediment to the loader operations since vehicles will not queue outside of stacking spaces and Traffic Controllers will be appropriately positioned throughout the site to supervise these movements.

5.1.2 Site Access

Access to the site is provided off Pembury Road via a single ingress and two separated egresses. Both accesses can cater for all vehicle manoeuvres into/ out of the site in a forward direction. From the eastern weighbridges, trucks would turn left-in to enter the site and right-out to exit the site. Vehicles on the western outbound weighbridge would make a slight right-turn when exiting the site, and proceed straight down Pembury Road.

The swept path analysis indicates that when turning in and out of the site, heavy vehicles would require the full width of the roadway (Pembury Road). As per AS2890.2 Parking facilities, it is considered acceptable for a heavy rigid vehicle or articulated vehicle to take up most of the public road width when turning left into/ out of a driveway.

Given the low traffic-volume and traffic-speed environment of the Pembury Road, trucks needing to temporarily use the full width of the road whilst turning into/out of the site

driveway is not considered to cause an adverse impact at the site's access and safety of road users on the adjacent roadway.

A Traffic Controller would be located at the site access to manage in and out movements at the eastern access. Since all large trucks would be booked-in ahead of time, the Traffic Controller would be aware of arrival times of all large vehicles which would further enhance the coordination of truck movements at this driveway. The scheduling of waste vehicles at the site is discussed in-depth in Section 6.7.1.

An assessment of vehicle movements at the site ingress and egress points, as well as the internal circulation have been undertaken using AutoTURN. The swept path assessment shows that all movements can be satisfactorily accommodated onsite. The full set of assessment results are contained in Appendix C of this report.

5.1.3 Traffic and Pedestrian Access

All vehicle and pedestrian routes within the site would be separated, and signposted and/ or delineated as such. Pedestrian access to the waste processing and sorting sheds would be prohibited, with permission granted only to the Traffic Controller on duty. Staff would access the sheds using the pedestrian paths provided.

Pedestrians must give-way to all vehicles onsite, including trucks and mobile plant. When moving around onsite, pedestrians must keep to the designated pathway. Where the pathway intersects with a traffic route, pedestrians are required to give-way to vehicles before crossing the traffic lane.

As a rule-of-thumb, Personal Protective Equipment (PPE) must be worn by all persons when onsite. All employees, visitors, contractors and truck drivers are required to wear high visibility clothing to enhance discernibility of pedestrians during day and night conditions.

The number of pedestrian movements throughout the site would be low and generally limited to the start/end of work shifts and at lunch time. Therefore, interaction between vehicles and pedestrians across the site would be infrequent.

Truck drivers would be permitted to exit their vehicle only when untarping the load in preparation to enter the tip floor. Such activity would be undertaken in the stacking area and under the supervision of the Traffic Controller in the designated area.

A traffic control plan showing control measures to manage traffic and the separation of vehicle-pedestrian movements throughout the site is contained in Appendix D.

6 TRAFFIC IMPACT ASSESSMENT

6.1 Design Rate

Roads and Maritime's *Guide to Traffic Generating Developments* is used as a tool in determining the future traffic generation rates for different development types and land uses. The guide states that "...peak traffic generation period for industrial land use is generally determined by three key factors: employee density, travel mode and peak period travel distribution." The guide also recognises that peak period traffic generation of industrial land uses differs depending on the specific industrial development type.

Roads and Maritime's Guide contains traffic generation rates for four industrial development types, namely, factories, warehouses, plant nurseries and business parks. Of these development types, factories and warehouses are most similar to that of the subject site at Minto. The traffic generation rates for factories and warehouses are summarised in Table 8.

Table 8: Roads and Maritime Traffic Distribution Rates – Factories and Warehouses

Development Type	Traffic Generation Rate	
	Peak Hour Vehicle Trips	Daily Vehicle Trips
Factories	1 per 100m ² of GFA	5 per 100m ² of GFA
Warehouses	0.5 per 100m ² of GFA	4 per 100m ² of GFA

The traffic generation rates as per the guide are based on the gross floor area (GFA) of the development. The increase in vehicle movements associated with the proposed development is not directly impacted by changes in the GFA. Hence, application of Roads and Maritime's traffic generation rates is not considered to be appropriate. Roads and Maritime's traffic generation rates are also considered to be out-dated since they present survey data from over 20 years ago. Section 3.10.1 of the guide refers to RTA surveys of average gross floor space per employee of factory developments undertaken in 1978.

Roads and Maritime is in the process of updating the guide and has recently undertaken detailed traffic generation studies of specific land uses. However, it is understood that surveys for industrial developments do not encapsulate waste recycling developments.

6.2 Traffic Generation

An estimate of traffic generation due to the proposed development, based on Roads and Maritime's trip generation rates for factories and warehouses, is summarised in Table 9.

Table 9: Traffic Generation Estimates (Roads and Maritime Rates)

Development Type	Proposed Development	Peak Hour Trips		Daily Trips	
		Traffic Generation Rate	Estimated Trips	Traffic Generation Rate	Estimated Trips
Warehouses	Shed A and B	0.5 per 100m ² of GFA	10	4 per 100m ² of GFA	49
Factories	Shed C	1 per 100m ² of GFA	11	5 per 100m ² of GFA	84
Total			21		133

Based on the above trip generation rates, the proposed development would generate 27 vehicle trips within a peak hour period and 144 vehicle movements over the entire day.

As the GFA of the proposed development remains unchanged from the current arrangement, the traffic generation for the proposed development is considered more

appropriately determined based on an empirical traffic generation assessment. This assessment considers the tonnage of waste to be transported through the site.

6.2.1 Site Traffic Generation Characteristics

The traffic generating characteristics of the proposed development are considered to be directly related to the following parameters:

- Number of onsite employees
- Handling/ processing capacity
- Extended operating hours.

Employees

Currently, there are six staff employed at the site. The proposed development would have a total of 13 staff onsite, which would also be the maximum number of staff onsite at any one time. Hence, there would be an increase of six employees at the site.

Processing Capacity

The development proposes to increase the processing capacity at the site from the current 30,000 tpa to 220,000 tpa. This represents an increase that is 7.3 times greater than that of the existing processing capacity of the site.

During future operations, 220,000 tpa of inbound waste would be transported into the site by vehicles ranging from vans/ utes to large trucks. These vehicles would enter the site loaded and exit the site empty. Non-recyclable waste and recovered waste are transported off-site by trucks to other facilities. Trucks would arrive at the site empty and loaded out with waste. In both cases, the same vehicle generates two movements (ie. in and out).

Vehicle movements pertaining to the movement of inbound and outbound waste for the future development is summarised in Table 10.

Table 10: Future Vehicle Movements

Period	Vehicle Movements (one-way)	Vehicle Movements (two-way)	Waste (tonnes)
Inbound waste			
Per year	63,960	127,920	220,000
Per week	1,230	2,460	4,231
Per day (six-day week)	205	410	705
Outbound waste			
Per year	8,424	16,848	209,410
Per week	162	324	4,027
Per day (six-day week)	27	54	671
Total Average (per day)	232	464	1,376

As given in Table 2, the existing waste transfer facility generates an average of 88 two-way vehicle movements per day. As outlined in Table 10, the proposed facility is estimated to generate an average of 464 two-way vehicle movements per day. Therefore, the future facility would generate an additional 376 daily two-way movements, on average, which equates to 188 vehicles.

Currently, weighbridge data is collated and categorised based on vehicle type by vehicle tare weight. This information informs the composition of inbound and outbound traffic to the site. Maintaining a similar proportion of vehicle types as per the current operation (Section 2.5), the breakdown of vehicle types accessing the future site would be as per Table 11.

Table 11: Future Vehicle Movement Breakdown Based on Vehicle Size

Vehicle Type Based on Weight	Proportion of Vehicles (%)	Proportion of Waste (%)	Waste Per Annum (Tonnes)	One-Way Movements Per Annum
Inbound waste				
< 5 tonnes	21.0%	3.0%	6,598	13,466
5 tonnes – 12.5 tonnes	46.4%	45.7%	100,616	29,680
12.5 tonnes – 15 tonnes	18.9%	25.3%	55,624	12,092
> 15 tonnes	13.7%	26.0%	57,162	8,794
Sub-total	100%	100%	220,000	64,033
Outbound waste				
< 5 tonnes	0%	0%	0	0
5 tonnes – 12.5 tonnes	0%	0%	0	0
12.5 tonnes – 15 tonnes	3.3%	0.5%	1,030	278
> 15 tonnes	96.7%	99.5%	208,380	8,064
Sub-total	100%	100%	209,410	8,342
Total (one-way movements)			72,375	
Total (two-way movements)			144,750	

Table 11 summarises the future development's vehicle movements and the composition of these vehicles classified by the amount of waste carried by each vehicle type.

Based on a six-day working week, the daily vehicle movements (two-way) generated by the existing site is 88 trips, equating to 27,456 trips per annum. The proposed waste throughput (220,000 tpa) is around 7.3 times greater than the current allowable throughput (30,000 tpa). Applying this ratio to the annual vehicle trips would result in 200,429 vehicle movements per year which is greater than the estimated number of trips (ie. 144,750) as shown in Table 11. This demonstrates that the traffic generated by the future development is not directly proportional to the increase in waste throughput; rather, it correlates to the proportion of vehicle types which are transporting the waste.

6.3 Traffic Distribution

The directional split of traffic generated by the existing and proposed site is in such a manner that all waste is transported into the site by inbound vehicles. The same vehicle exits the site empty, in-turn generating two movements (ie. in and out).

Similarly, non-recyclable waste and recovered waste are transported away from the site by trucks to another facility. These trucks would arrive at the site empty and loaded out with waste, in-turn, each generating two movements.

With consideration for the above, a two-way vehicle movement relates to a single vehicle.

The distribution of the generated traffic would be that 50% of trips are to be directed to the north and the remaining 50% toward the south. It is presumed that the direction that traffic

approaches the site would be the direction taken when leaving the site. Hence, vehicle trips away from the site would reflect a similar number of trips toward the site.

The main haul routes to/from the site would be via Hume Highway and Campbelltown Road. These routes are illustrated in Figure 16 and Figure 17, respectively.

Figure 16: Inbound Haul Routes and Traffic Distribution

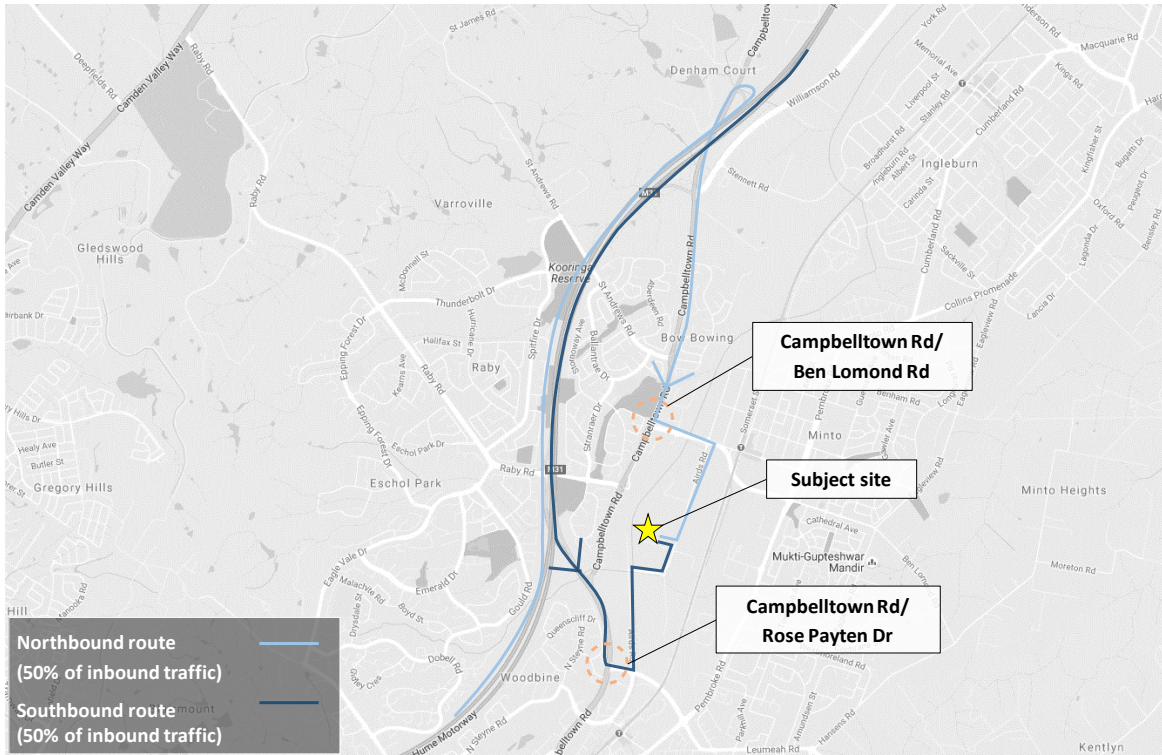
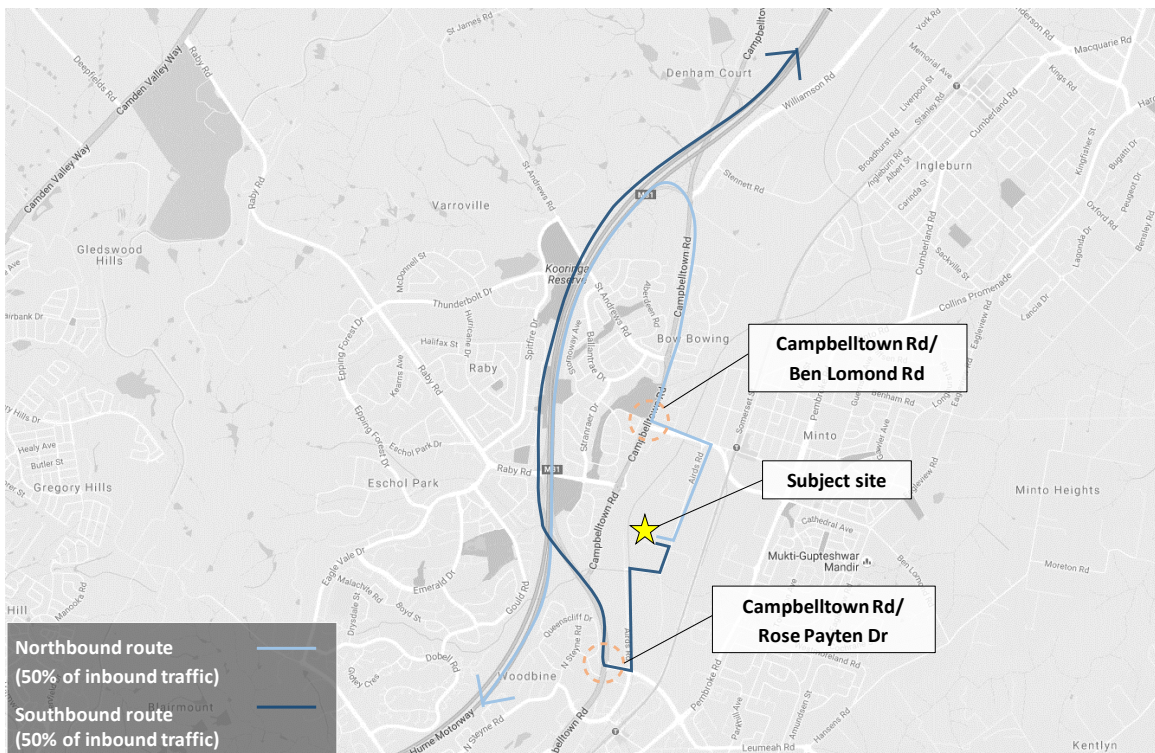


Figure 17: Outbound Haul Routes and Traffic Distribution



Recent bridge load limits have been imposed by Campbelltown Council at two locations along the haul routes identified in Figure 16 and Figure 17. Campbelltown Council has jurisdiction over the use of local roads, including Pembroke Road. The load limits restrict the movement of trucks greater than 40 tonnes on the Ben Lomond Road bridge and trucks greater than 32 tonnes on the Airds Road bridge over the Bow Bowling Channel.

When loaded with material, waste collection trucks departing the site can be in excess of 60 tonnes (gross weight). These trucks would be diverted via Pembroke Road to avoid the bridges on Ben Lomond Road and Airds Road. These trucks would travel to the site via the regular haul routes (as shown in Figure 16 and Figure 17) and travel away from the site using the Pembroke Road alternate haul route which is shown in Figure 18.

Figure 18: Alternate Outbound Haul Route for Trucks



Basemap source: Roads and Maritime Services NSW Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) Interactive Map (site accessed 18/04/2017)

The alternate route comprises sections of Airds Road, Pembroke Road and Ben Lomond Road. According to Roads and Maritime Services' (Roads and Maritime) NSW Combined Higher Mass Limits (HML) and Restricted Access Vehicle (RAV) interactive map, 25m B-double trucks and 19m B-double trucks are permitted to travel along these roads. This route is also approved for use by trucks as per the National Heavy Vehicles Regulator (NHVR) online interactive map. The alternate outbound haul route links trucks from the site to Campbelltown Road, whereby drivers would be able to access Hume Highway.

Roads and Maritime and NHVR have jurisdiction over state roads. In the area surrounding the site, these roads include Airds Road, Pembroke Road and Campbelltown Road.

Applying a similar composition of waste delivery and collection trucks, the amount of trucks expected to have a gross weight in excess of 60 tonnes is less than 1% of all trucks. In the future scenario, this equates to around three trucks per week which is considered to be a low volume of trucks utilising the alternate route.

Overall, the designated alternate route is in line with heavy vehicle access permission granted by Roads and Maritime, NHVR, and Campbelltown Council. Therefore, this route is deemed acceptable for haulage of waste collection trucks travelling away from the site.

6.4 Operational Traffic Impact

Given that the proposal is for an increase in waste throughput and an extension of operating hours, there is an anticipated increase in site generated traffic as a result.

Furthermore, the proposal would facilitate a spread of the future traffic volumes over a larger period and, as such, would slightly ameliorate traffic activity in and somewhat mitigate impacts on the surrounding road network. Notwithstanding this, a robust assessment has been completed to confirm that existing traffic volumes in the vicinity are appropriate having regard to the function of the surrounding road network.

A conservative assessment of the traffic impacts during the operational phase of the site has been undertaken using data representative of the busiest day. Inbound and outbound traffic movement data for the existing site indicates that Thursday is typically the busiest day of the six-day working week, as shown in Figure 9. Therefore, a worst-case scenario for a single day has been analysed and reported herein.

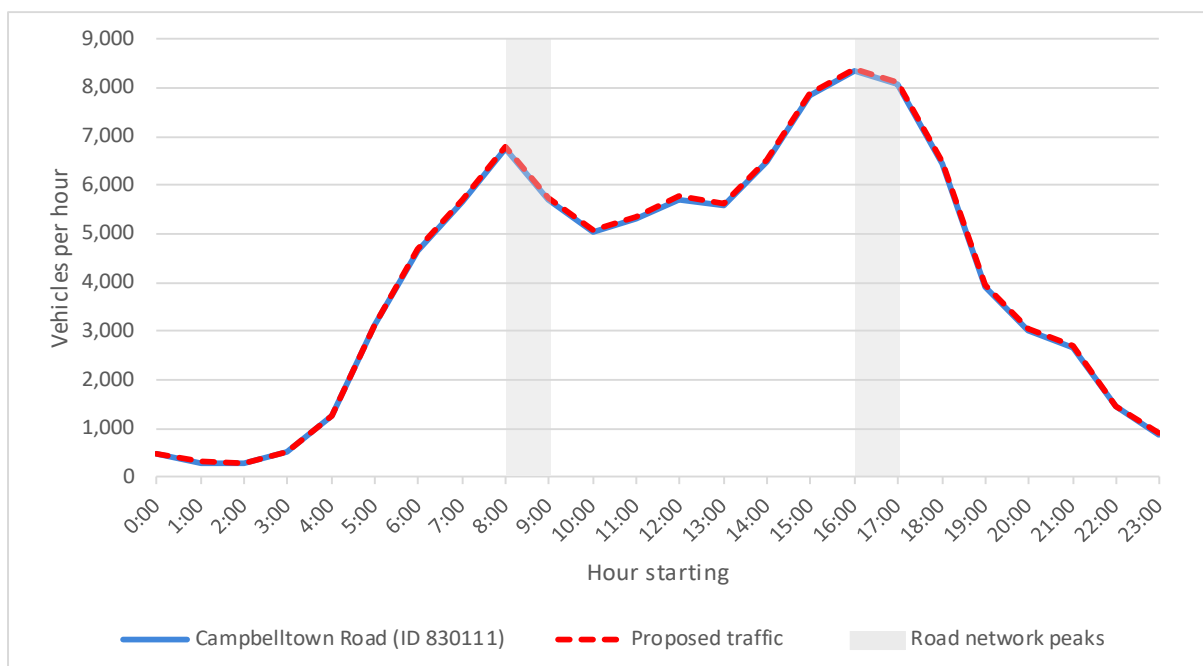
6.4.1 Arrival and Departure Characteristics of Site-Generated Traffic

As assessed in Section 2.5, morning and afternoon peak periods on the surrounding road network occur between 8:00am – 9:00am and 4:00 pm – 5:00pm. Peak traffic movements at the site take place between 9:00am – 10:00am and 12:00pm – 1:00pm, which occur outside of the local road network peak periods.

It is anticipated that the future traffic generation would have similar trends in arrival and departure times to as current. Therefore, the anticipated peak traffic generated by the proposal would remain outside of the surrounding road network peaks and would not have an adverse impact on the safety and operation of the road network surrounding the site.

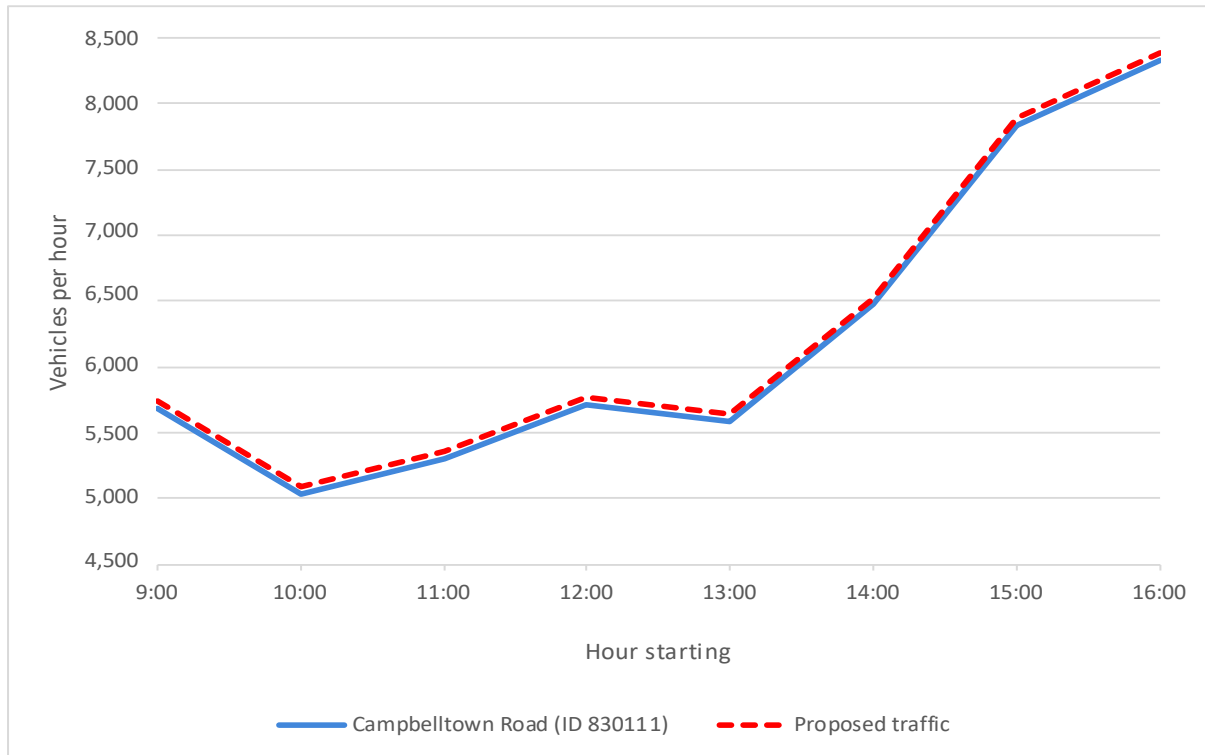
To support this, Figure 19 illustrates the existing average annual daily traffic on Campbelltown Road superimposed with the cumulated traffic in the future scenario. Figure 19 shows the traffic flows over the course of a 24-hour period while Figure 20 draws emphasis on the period during the middle of the day. These figures confirm that the greatest variance in vehicle trips occurs during the period outside of the road network peaks (ie. the largest change between the AADT traffic flows and proposed traffic flows occurs between 9:00am – 4:00pm).

Figure 19: Campbelltown Road Traffic Movements – AADT and Future Traffic



Source: Roads and Maritime Traffic Volume Viewer

Figure 20: Campbelltown Road Traffic Movements Between Road Network Peak Periods – AADT and Future Traffic



6.4.2 Projected 24-Hour Traffic Profile

A significant aspect of the proposal is that it aims to extend the end time of operation from 7:00pm to 10:00pm. The traffic projection during evening and night periods is determined based on the site operator’s project pipeline. Notable projects that have been secured in the site operator’s 10-year project pipeline include, but are not limited to:

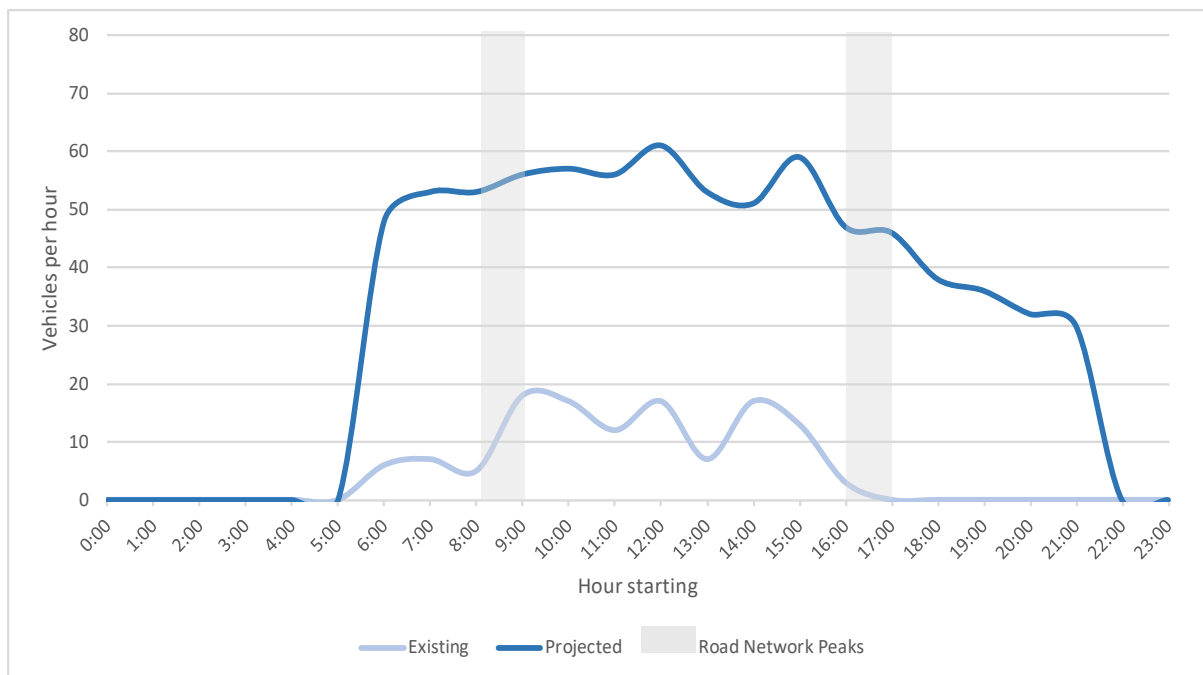
Project	Estimated Completion Date
NorthConnex	2019
Sydney CBD and SE Light Rail	2019
Revitalise Newcastle	2019
WestConnex	2023
Parramatta Light Rail	2023
Sydney Metro	2024
Western Sydney Infrastructure Plan	2025
Future Focused Schools	2025
Gateway to the South	2025
Inland Rail – Melbourne to Brisbane	2026

Major infrastructure projects, including the above, would account for the majority of evening and night-time deliveries. Many of these project construction sites are currently operating over a 24-hour six-day period and the site operator has secured a significant volume of material from these and similar projects. As such, to be able to provide its clients with the

waste services they require, the SSD application seeks to match the night-time hours of operation until 10:00pm. To a lesser extent, the facility would also receive household clean-up waste from local residents which would be expected to occur during typical business hours.

The extended night-time operation would allow the majority of waste to be delivered at a pre-arranged and convenient time to the facility. This operation is expected to be strictly controlled by the Operator to ensure minimal impact on the local amenity. The existing and projected daily traffic profiles based on the busiest day (ie. Thursday) is illustrated in Figure 21. The data input used to generate Figure 21 is contained in Appendix E.

Figure 21: Daily Traffic Profiles for Site-Generated Traffic



Based on the directional distribution in Section 6.3 and project pipeline details in Section 6.4.1, the estimated vehicle turning movements at key intersections Campbelltown Road/ Ben Lomond Road and Campbelltown Road/ Rose Payten Drive are shown in Figure 22 to Figure 25. SIDRA has been used to assess the impact of the projected traffic flows on the performance of these intersections. The results of this analysis are summarised in Table 12.

Figure 22: Campbelltown Rd/Ben Lomond Rd Projected Traffic Flows – AM Peak Hour

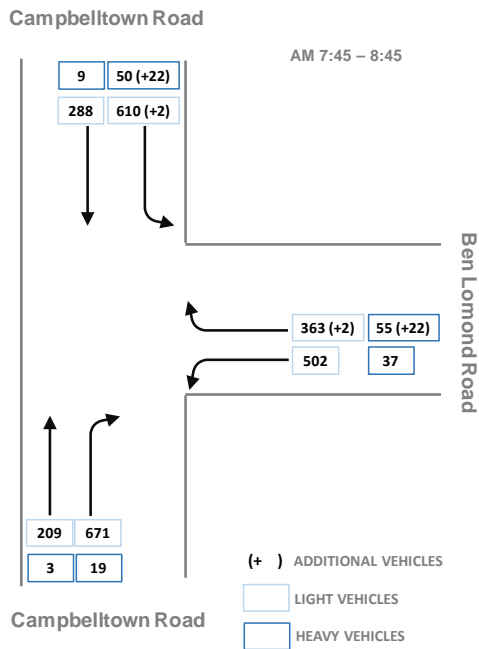


Figure 23: Campbelltown Rd/Ben Lomond Rd Projected Traffic Flows – PM Peak Hour

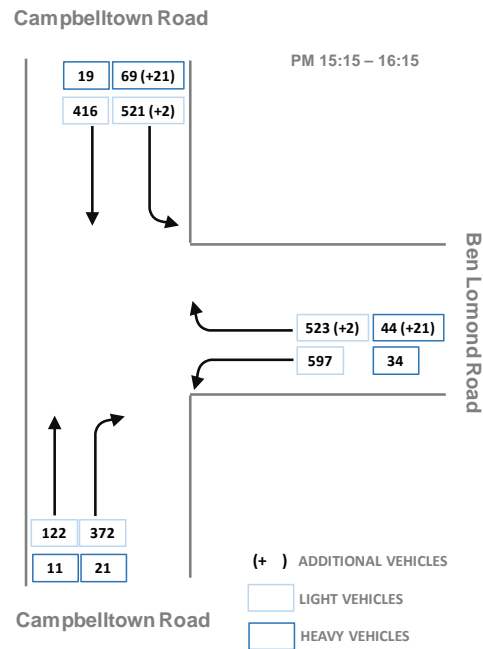


Figure 24: Campbelltown Road/Rose Payten Dr Projected Traffic Flows – AM Peak Hour

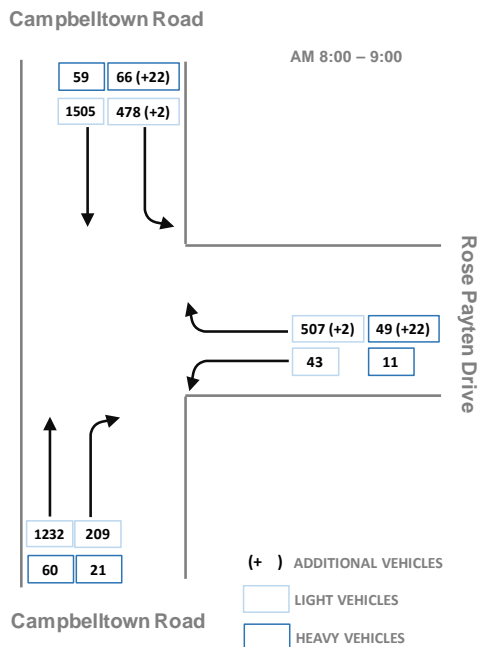


Figure 25: Campbelltown Road/Rose Payten Dr Projected Traffic Flows – PM Peak Hour

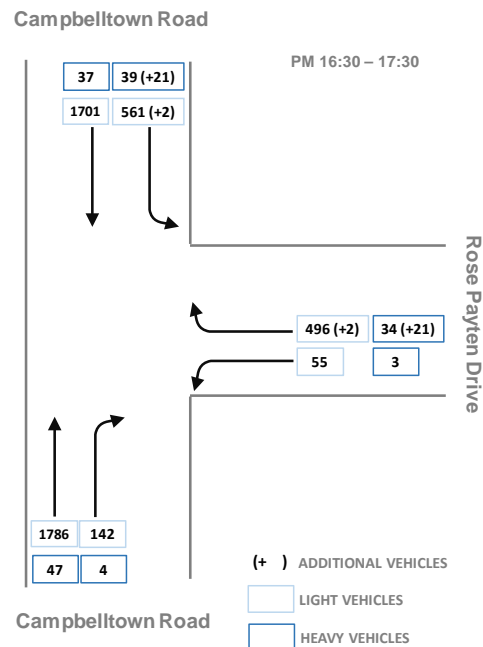


Table 12: Future Conditions Intersection Analysis Results

Intersection	Intersection type	AM peak period			PM peak period		
		Average delay (s)	LoS	Current LoS	Average delay (s)	LoS	Current LoS
Campbelltown Road/ Ben Lomond Road	Signals	54	D	D	39	C	C
Campbelltown Road/ Rose Payten Drive	Signals	26	B	B	24	B	B

Note: Roads and Maritime uses level of service as a performance measure to indicate the operating efficiency of a given intersection. The level of service ranges from A to F. Levels of service between A and D indicate the intersection is operating within capacity with LoS A providing exceptionally good performance to LoS D indicating satisfactory performance. LoS E and F indicate the intersection is operating at or near capacity and would require intersection improvement works to maintain reasonable performance.

The analysis indicates that the two major nearby intersections operate satisfactorily under future conditions and with similar performance levels to existing conditions. Hence, as a worst-case scenario, nearby intersections would operate at an acceptable level of service during both AM and PM peak periods. Detailed results of the SIDRA intersection performance assessment for existing and future operations are contained in Appendix F.

Given the extension of operating hours and increased tonnage transported, the proposal would allow for a greater distribution of traffic volumes over a longer period of time with the proposed additional three hours daily for waste processing. Extended operating hours causes a 'flattening out' of the peak activity and mitigating traffic volumes to further outside of the current road network peak periods.

On average, the additional daily traffic volumes generated by the proposal is 376 two-way vehicles movements or 188 trucks. The critical period for the proposed development and its maximum weekday traffic volume peak period occurs on Thursday between 12:00pm – 1:00pm and is estimated at approximately 61 two-way movements.

In comparison to existing traffic volumes in the vicinity of the site, the additional traffic generated by the proposal is not expected to compromise the safety or function of the surrounding road network. Overall, the existing operation of the surrounding road network, public transport services and pedestrian connections would largely remain unchanged as a result of the proposal.

6.5 Construction Traffic Impact

Construction works are expected to occur in a single stage over a duration of 4-6 weeks. The proposed works include:

- Excavation and construction of in-ground weighbridge
- Installation of amenities block, site office and substation
- Installation of inground wheelwash at existing outbound weighbridge
- Relocation of existing 30,000 litre fuel tank with roof
- Concrete slab for car parking to accommodate 10 parking spaces.

The commencement of these works is dependent on the SSD application approval.

The anticipated vehicle movements generated by the site across the construction phase are summarised in Table 13.

Table 13: Construction Traffic Movements

Construction Phase	Duration	Waste to be Removed Offsite	Construction Material to be Delivered to Site	Approx. Two-way Movements (In + Out)		Average Daily Two-way Movements
				Trucks	Cars	
Demolition and Construction	4-6 weeks	40 tonnes	100 tonnes	28	210	8

The approved hours of work during the construction phase are as follows:

- 7:00am-7:00pm on Monday to Friday
- 7:00am-1:00pm on Saturday
- No work on Sunday.

The key peak periods for construction related traffic would be as follows:

- Staff arrival at site: 6:30am-7:30am
- Truck movements: 7:30am-10:30am
- Staff departure from the site: 3:30pm-4:30pm.

The abovementioned activities would not hinder site operations as they mostly comprise works in the north-western quarter of the site, which is not in use under current operation. An exception to this is the installation of the wheelwash at the existing outbound weighbridge. Installation of the wheelwash would commence once the new western outbound weighbridge has been fully constructed. Installation of the wheelwash is anticipated to take between 1-2 weeks. During this time, all trucks would be redirected to exit the site via the new outbound weighbridge.

Demolition and construction works are to be scheduled during the morning period between 7:30am-10:30am. On average, there would be one truck accessing the site per day. Upon arrival to the site, the truck would be accommodated immediately onsite to ensure vehicles do not queue on Pembury Road.

Construction activities are anticipated to take place outside of the site's peak operational period (12:00pm – 1:00pm). Hence, the impact due to a single truck onsite during the nominated period would be minor. Similarly, the presence of an additional truck on the local road network during the AM road network peak (8:00am-9:00am) is considered to be negligible.

On average, there would be 3-4 cars accessing the site daily by construction staff. An additional 3-4 cars travelling to/ from the site during the off-peak periods would not be expected to have any adverse effects on the local road network and operations at the site. Therefore, the impact due to construction staff is considered to be minor.

Three car parking spaces would be provided onsite for construction staff. All personnel would be encouraged to car-pool or travel by public transport to manage the constraint of limited onsite parking during the construction phase.

As summarised in Table 13, traffic generation in the construction phase is considered to be minor with a total of eight two-way vehicle movements (ie. four vehicles) to/ from the site per day. The number of construction trucks and cars accessing the site is considered to be low, and thus, is not expected to compromise the safety and function of the surrounding road network.

It is anticipated that trucks associated with construction would be travelling from nearby town centres, either Liverpool toward the north or Campbelltown toward the south of the

site. Construction vehicles would therefore travel via the same routes as operational vehicles, namely, Campbelltown Road, Ben Lomond Road, Airds Road and Rose Payten Drive.

6.6 Roadway Capacity for Two-way Urban Road

As discussed in Section 2.6, Roads and Maritime's Guide alludes that the operational capacity of Pembury Road is around 900 pcu per hour per lane. Future traffic flows along Pembury Road have been estimated by summing the anticipated additional traffic and existing peak hour flows. To convert the volume of additional trucks into a passenger car unit of measure, a multiplication factor of two has been applied to the additional heavy vehicles. This factor is based on the average length of a truck being approximately double the length of a passenger car.

The estimated future volumes along Pembury Road for each of the key peak periods have been summarised in Table 14.

Table 14: Projected Traffic Flows on Pembury Road

Period		Traffic Flows on Pembury Road (Existing + Additional Site-Generated Traffic)	
		Eastbound (veh/hr)	Westbound (veh/hr)
Pembury Road network peaks	8:00am-9:00am	151	174
	1:00pm-2:00pm	175	193
Minto site operation peak periods	9:00am-10:00am	142	154
	12:00pm-1:00pm	175	171

The estimated future traffic flows along Pembury Road in each peak period remain below Roads and Maritime's threshold of 900 pcu per hour per lane. Therefore, the traffic flows along Pembury Road are considered acceptable with the future operations of the proposed site. Having regard to the traffic volumes as contained in Table 3, the road currently operates with traffic volumes well within its operational capacity threshold set within Roads and Maritime's Guide.

6.7 Onsite Traffic Management Measures

Measures to manage operation and safety of traffic within the site are proposed to include the following:

- Scheduling of waste deliveries to and from the site
- Training and enforcement of site safety protocols
- Provision for vehicle stacking within the site, and
- Supervision of all onsite operations.

6.7.1 Waste Delivery Schedule

Waste deliveries to the site undertaken by the site operator's fleet would be scheduled with the operator prior to the waste leaving its point of origin. Currently, the site operator utilises a live logging system which allows customers to log a request via telephone or via a mobile application (app) that is exclusive to the site operator. Although public deliveries (ie. non-site operator trucks) are not required to book-in ahead of time, they would be encouraged to do so.

All requests are centrally managed by the Customer Service and Allocations Team at the Head Office in Auburn. The role of the Allocations Team would be to determine a suitable vehicle to collect the waste and site operator facility that is best suited to accept the

delivery. The Allocations Team determines these details based on the information provided by the customer at the time of request.

The Allocations Team is also responsible for coordinating the timing of waste collection and delivery. The site operator's fleet are tracked via GPS through the operator's mobile app. Hence, trucks can be diverted to other nearby facilities by the site operator, if required.

After sorting and processing, the product materials are stockpiled within Shed A and transported off-site. All recovered materials are transported off-site for reuse, recycling or further recovery. Larger trucks, such as 19m semi-trailers and 25m B-doubles, would remove this waste off-site. Where possible, waste removal would be scheduled to take place outside of peak hours to minimise conflicts between inbound and outbound trucks

6.7.2 Safety Protocols Enforcement

All persons entering the site would be informed of the site-specific protocols and would be expected to follow all protocols. Site protocols would be distributed to all clients prior to entry at the site. An information sign would be located at the site entry which would provide general instructions to heavy vehicle drivers. Any person not having entered the site previously would be required to complete a site induction/ training upon arrival, and would be supervised by site personnel at all times. Staff would undertake necessary induction and training to adequately carry-out their job tasks.

Site protocols must be understood and followed by all personnel who enter the site to maintain the safe operating standards onsite. NSW Road Rules would apply on site in conjunction with the practices specific to the site.

6.7.3 Onsite Vehicle Stacking

Trucks would be able to stack (or queue) within the designated spaces onsite. Stacking would be managed by Traffic Controllers and Weighbridge Staff stationed at the inbound weighbridge, yard untarping area (vehicle stacking spaces) and Shed B.

A total of 17 stacking spaces would be provided along the eastern boundary of the site that can satisfactorily accommodate a mixture of vehicle types, ranging from vans/utes to 19m semi-trailers. As summarised in Appendix E, there are 61 two-way vehicle movements in/out of the site during peak operation at the facility. Therefore, there would be around 31 trucks expected to arrive at the site between 12:00pm – 1:00pm.

For the purpose of analysing the stacking capacity onsite a percentage split of vehicle types similar to that currently experienced in the peak hour has been applied to the 17 spaces such that, at any one time, the site can accommodate:

Number of Stacking Spaces	Approximate Split (%)
2 spaces for articulated trucks (ie. 19m semi-trailer)	12%
12 spaces for MRVs	71%
3 spaces for SRVs	17%

A breakdown of the time spent on each activity whilst onsite is summarised in Table 15. As a contingency, the 'Total Time Requires' has been rounded up to the nearest 10 minutes to factor in additional waiting time.

Table 15: Timing of Waste Disposal and Collection Activities

Activity	Waste Disposal		Waste Collection
	Car/ute/MR/HRV	Semi-trailer	25m B-double
Truck weigh-in	2 mins	2 mins	2 mins
Truck depositing waste on tip floor	10 mins	15 mins	<i>No waste deposited</i>
Truck collecting waste at stockpiles	<i>No waste collected</i>	<i>No waste collected</i>	15 mins
Truck weigh-out	2 mins	2 mins	2 min
Total Time Required	20 mins	20 mins	20 mins

Based on Table 15, a vehicle would spend an average of 20 minutes onsite between entry and exit. Applying this rate, each stacking space could accommodate 3 vehicles in one hour (60 minutes / 20 minutes). Therefore, during the site’s peak hour of operation, the proposed stacking arrangement could accommodate the turn-over of 51 vehicles (3 vehicles x 17 spaces).

As discussed above, future operations would generate 62 two-way vehicle movements during the site’s peak activity. Since a single vehicle generates one inbound movement and one outbound movement, the 62 two-way vehicle movements equate to 31 vehicles.

The availability of stacking space within the site would be able to adequately store the 31 vehicles expected to arrive during the site’s peak hour. Hence, queuing of vehicles would be entirely accommodated and managed within the site, and would not be expected to cause any impact on Pembury Road.

In theory, the 31 trucks expected to arrive in during the site’s peak hour could be easily accommodated across only 11 stacking spaces. This reinforces that the availability of 17 stacking spaces is not predicted to cause queueing onto the roadway.

In summary, the above calculation demonstrates that the 31 vehicles expected to arrive onsite during the busiest period of site operation could sufficiently be accommodated within the premises. Under the supervision and direction of Traffic Controllers and Weighbridge Operators, queuing of site-generated traffic would be managed completely within the site and would not be expected to queue back onto Pembury Road.

As a contingency, vehicles carrying loads which are not be ready to be received at the facility may stall temporarily in the kerbside lane on Airds Road. On approach to the site, unrestricted kerbside parking is permitted on the eastern side and western side of Airds Road, which could be utilised by trucks approaching from the north and south. Although the likelihood of this occurring is expected to be low, stalling of trucks along Airds Road is deemed acceptable as the roadway is large in width (16m), it is a low-speed road environment (50km/h) and kerbside parking would only be in use for short periods at a time.

The onsite vehicle stacking arrangement plan is contained in Attachment C of this report.

6.7.4 Supervision of Onsite Operations

Site personnel would be situated at various stations within the site to ensure the smooth operation of waste unloading/ loading at all times through the day and night. Site personnel are to be continually present onsite to provide direction to truck drivers and supervision of vehicle operations.

Upon entry to the site, truck drivers would be instructed by the Weighbridge Operator to complete a weigh-in. The Weighbridge Operator would visually inspect the waste then radio the Site Traffic Controller located at the tipping shed to advise them of the truck and material in load. The driver would then proceed to the front-most available space in the delineated vehicle stacking area along the eastern boundary of the site. This manoeuvre would be supervised by the Traffic Controller who would direct trucks to the tip floor for unloading. Unloaded trucks would then proceed to the outbound weighbridge where the Weighbridge Operator would collect final details and authorise the truck to exit the site.

Communication amongst Traffic Controllers and Weighbridge Operators would be via hand-held two-way radio. Whilst onsite, truck drivers would receive instructions from Traffic Controllers via the radio as well as by hand-signals from Traffic Controllers. Drivers would be required to tune-in to the site's radio channel upon entry. Signage at the site entry would inform drivers of the site's radio channel. As a precaution, the Weighbridge Operator would confirm that each driver has successfully tuned-in to the radio channel before proceeding to the stacking area.

Cooperation and clear communication between site personnel and drivers would be key in managing the internal site circulation, and therefore, the overall efficiency of the site. It would also ensure the safety of drivers and pedestrians within the site as well as the surrounding road network.

7 CONCLUSION

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

- The proposal seeks to amend the handling and processing capacity from 30,000 tpa to 220,000 tpa.
- As stated in the State Environmental Planning Policy (State and Regional Development) 2011, Part 2, Clause 11, Council development control plans do not apply to state significant developments. However, having regard to the DCP the proposed development generates a DCP parking requirement of 40 car parking spaces.
- Based on first principles, the proposed supply of 10 parking spaces would adequately accommodate the proposed 13 full time employees. The proposed parking provision considers car-pooling amongst staff and the use of public transport. Due to the infrequent number of visitors expected at the site, visitor parking spaces would not be provided as part of the proposal.
- The proposed parking layout is consistent with the dimensional requirements as set out in the Campbelltown City Council's DCP and Australian Standard for Off Street Car Parking (AS2890.1:2004 and AS2890.6:2009).
- The proposed site ingress and egress points are consistent with the requirements as set out in the Council's DCP.
- On the basis of weighbridge traffic data at the existing site (June 2016), the site currently generates 18 two-way vehicle movements during its peak hour between 9:00am – 10:00am. These trips are distributed as eight inbound movements and 10 outbound movements.
- Based on the 220,000 tpa sought for the site, the site is expected to generate, on average, an additional 376 two-way vehicles trips per day or 188 vehicles on the road network. During the busiest day of operation (Thursday), there would be an estimated 61 two-way vehicle movements during peak operation (12:00pm – 1:00pm). This equates to 31 vehicles, which are expected to be sufficiently accommodated within the 17 stacking spaces available onsite.
- A comparison of the existing and future intersection operating conditions shows that the impact of traffic generated by the development would not result in a significant change to the existing intersection Level of Service for the intersections of Campbelltown Road with Ben Lomond Road and Rose Payten Drive.
- Construction works mostly comprise the delivery and installation of new amenity and site office buildings, sub-station and in-ground weighbridge. The works are to generate a total of three trucks for a duration not in excess of eight hours each. Construction traffic is considered to be minimal and have a negligible impact on site operations as well as on the surrounding road network.
- The proposed development would not warrant any upgrades to existing road infrastructure within the vicinity of the site.
- There is adequate capacity in the surrounding road network to cater for the traffic generated by the proposed development.
- In comparison with existing traffic volumes within the vicinity of the site, the additional traffic generated by the proposed development is negligible and is not expected to compromise the safety and function of the surrounding road network.

APPENDIX A

Traffic Surveys

APPENDIX B

Pembury Road Tube Count Data

Job No N2679
Client TTPP
Site Pembury Rd - west of Airds Rd
Location Minto
Site No 2
Start Date 19-Sep-16
Description Volume Summary
Direction EB



Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep		
AM Peak	74	77	77	74	84	37	6		
PM Peak	89	102	79	107	104	36	11	927	711
0:00	3	4	5	7	11	6	0	6	5
1:00	3	1	8	1	3	0	1	3	2
2:00	3	5	5	1	1	1	1	3	2
3:00	4	4	4	4	8	0	0	5	3
4:00	6	11	13	15	10	3	0	11	8
5:00	13	11	13	15	20	6	1	14	11
6:00	47	48	48	48	42	13	0	47	35
7:00	32	30	31	55	38	13	3	37	29
8:00	56	58	53	41	75	20	4	57	44
9:00	55	46	52	63	66	29	4	56	45
10:00	74	77	77	60	84	35	3	74	59
11:00	58	69	66	74	73	37	6	68	55
12:00	87	70	67	80	74	36	5	76	60
13:00	87	71	74	64	51	30	3	69	54
14:00	70	102	55	107	104	16	2	88	65
15:00	75	80	47	74	53	9	11	66	50
16:00	89	78	73	65	87	5	8	78	58
17:00	76	93	79	81	76	7	6	81	60
18:00	38	36	35	39	25	7	1	35	26
19:00	9	28	11	20	20	1	1	18	13
20:00	10	12	6	19	19	2	3	13	10
21:00	5	9	4	6	12	0	5	7	6
22:00	15	16	12	13	2	2	0	12	9
23:00	0	3	1	6	5	1	0	3	2
Total	915	962	839	958	959	279	68	927	711

7-19	797	810	709	803	806	244	56	785	604
6-22	868	907	778	896	899	260	65	870	668
6-24	883	926	791	915	906	263	65	884	678
0-24	915	962	839	958	959	279	68	927	711

Job No	N2679
Client	TTPP
Site	Pembury Rd - west of Airids Rd
Location	Minto
Site No	2
Start Date	19-Sep-16
Description	Volume Summary
Direction	WB

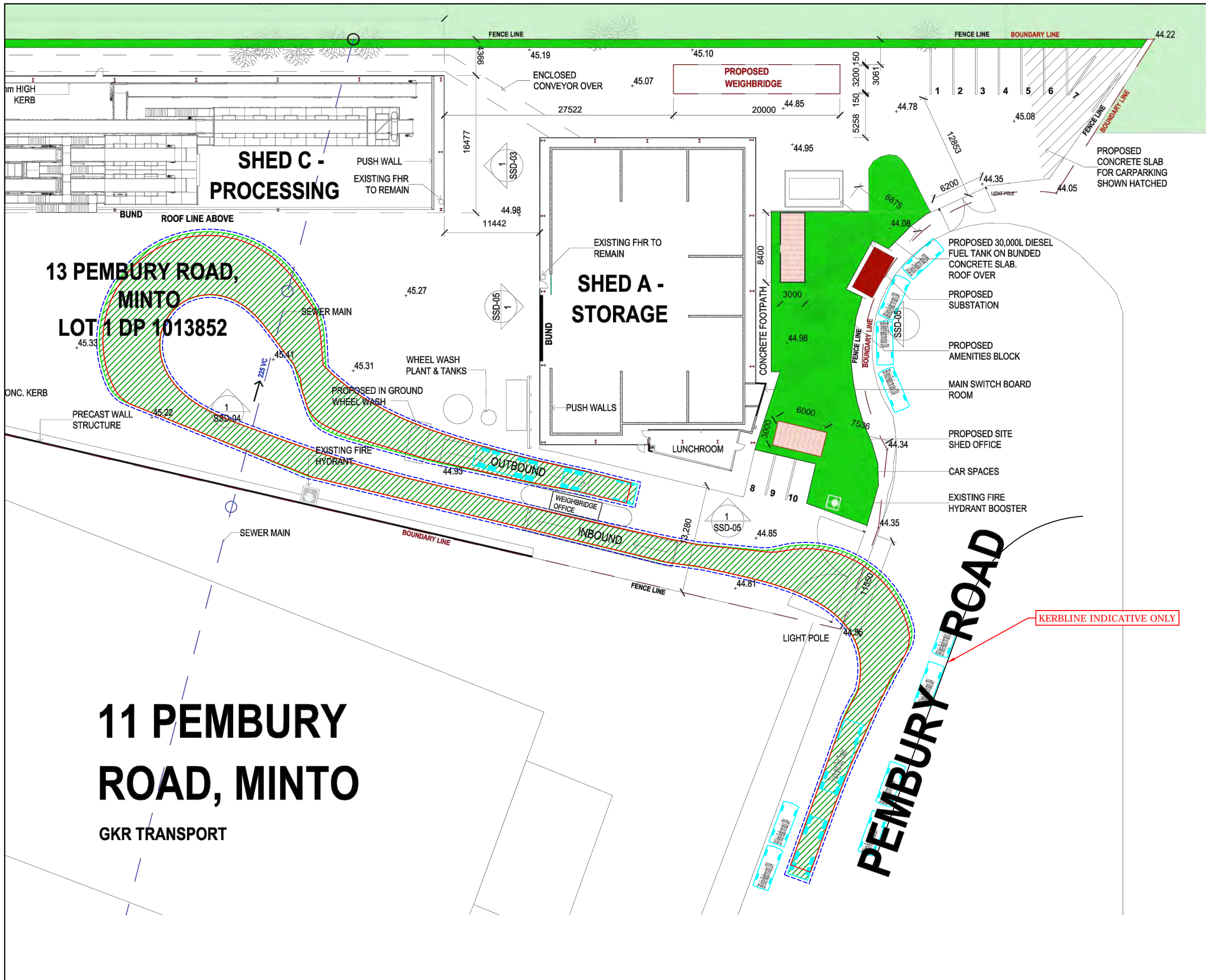


Hour Starting	Day of Week							W'Day Ave	7 Day Ave
	Mon	Tue	Wed	Thu	Fri	Sat	Sun		
	19-Sep	20-Sep	21-Sep	22-Sep	23-Sep	24-Sep	25-Sep		
AM Peak	89	86	93	97	99	45	9		
PM Peak	105	86	91	84	68	22	12	941	722
0:00	4	1	4	2	6	4	0	3	3
1:00	4	3	11	0	4	0	1	4	3
2:00	3	6	4	1	1	1	1	3	2
3:00	3	5	3	4	5	0	0	4	3
4:00	17	20	26	28	23	9	1	23	18
5:00	88	85	93	97	99	30	2	92	71
6:00	51	43	59	70	43	21	1	53	41
7:00	72	78	68	83	76	20	1	75	57
8:00	89	84	89	70	98	25	2	86	65
9:00	77	61	64	78	78	31	9	72	57
10:00	53	86	86	57	78	45	5	72	59
11:00	65	68	67	67	71	30	2	68	53
12:00	83	71	61	77	67	22	3	72	55
13:00	105	69	91	84	64	11	4	83	61
14:00	53	69	22	69	68	8	3	56	42
15:00	54	86	47	64	42	6	12	59	44
16:00	51	62	45	41	55	3	4	51	37
17:00	18	30	25	28	26	3	8	25	20
18:00	7	15	13	14	10	3	3	12	9
19:00	4	10	6	16	7	1	1	9	6
20:00	5	8	3	16	10	2	3	8	7
21:00	4	2	2	4	3	1	4	3	3
22:00	4	5	5	9	4	1	0	5	4
23:00	0	1	4	2	4	1	2	2	2
Total	914	968	898	981	942	278	72	941	722

7-19	727	779	678	732	733	207	56	730	559
6-22	791	842	748	838	796	232	65	803	616
6-24	795	848	757	849	804	234	67	811	622
0-24	914	968	898	981	942	278	72	941	722

APPENDIX C

Swept Path Analysis and Vehicle Stacking Plan



LEGEND:

- LANDSCAPED AREA
- PROPOSED SUBSTATION
- PROPOSED BUILDINGS

SITE AREA:	8957 m2
SHED - A:	929.71 m2
SHED - B:	1,149.91 m2
SHED - C:	961.79 m2
SITE OFFICE:	16.76 m2
LUNCH ROOM:	36.82 m2
AMENITIES:	23.62 m2



General Notes
 The builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Drawings shall not be used for construction purposes until issued for construction. Do not scale drawings. All boundaries and contours subject to survey.

Client
 Skylife Properties Pty Ltd.

Project Name
 MINTO SSD

Drawing Title:
 GROUND FLOOR PLAN

Scale: 1:200@A0 **Date:** 04/11/2016
Status: SSD **Drawn By:** BC

**13 PEMBURY ROAD,
 MINTO
 LOT 1 DP 1013852**

**11 PEMBURY
 ROAD, MINTO**
 GKR TRANSPORT

PEMBURY ROAD

KERBLINE INDICATIVE ONLY

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	WJ	WJ	16/03/17

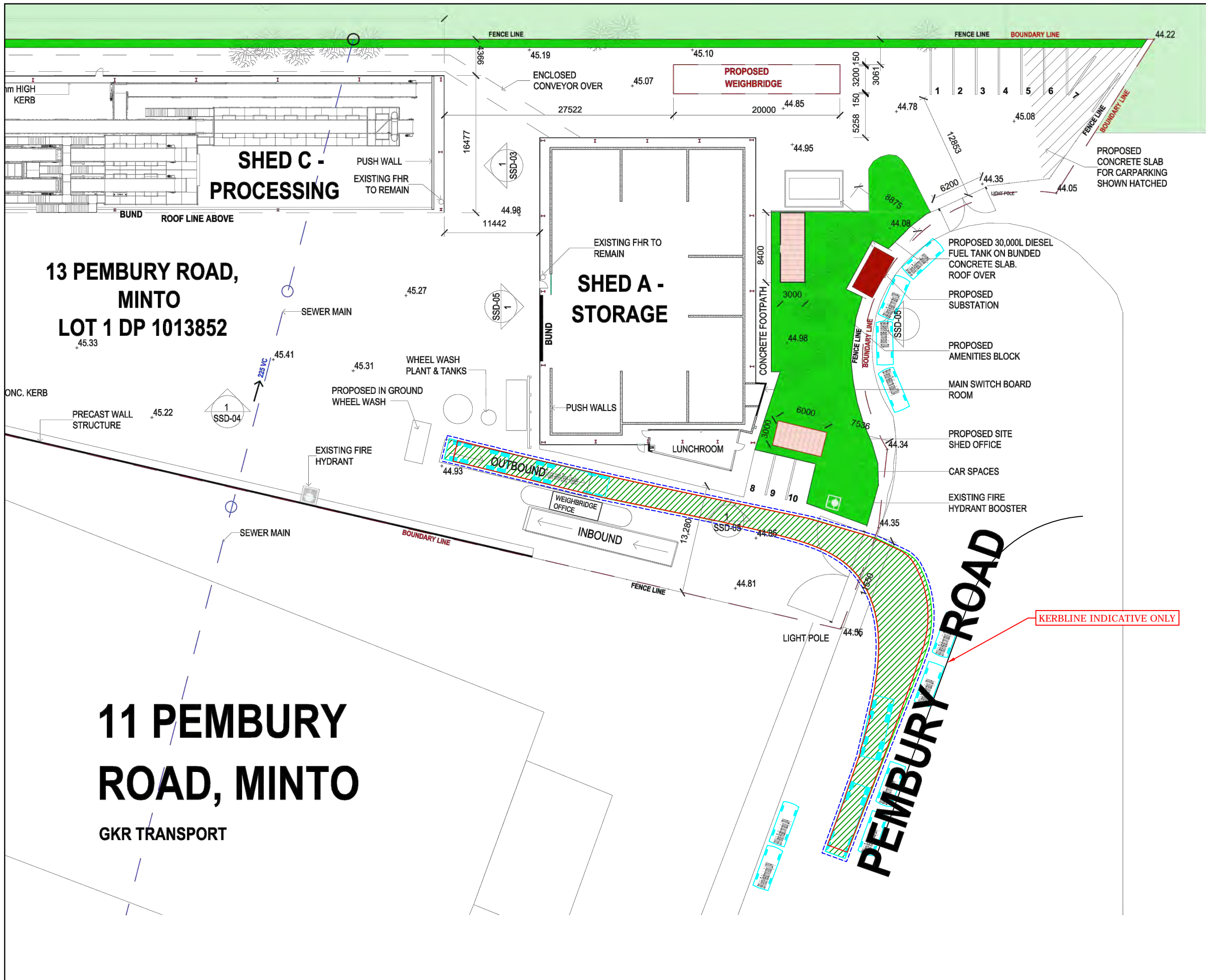
**The Transport
 Planning Partnership**

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 St. Leonards NSW 2045
 Tel: 02 8437 7800
 Email: info@tpp.net.au

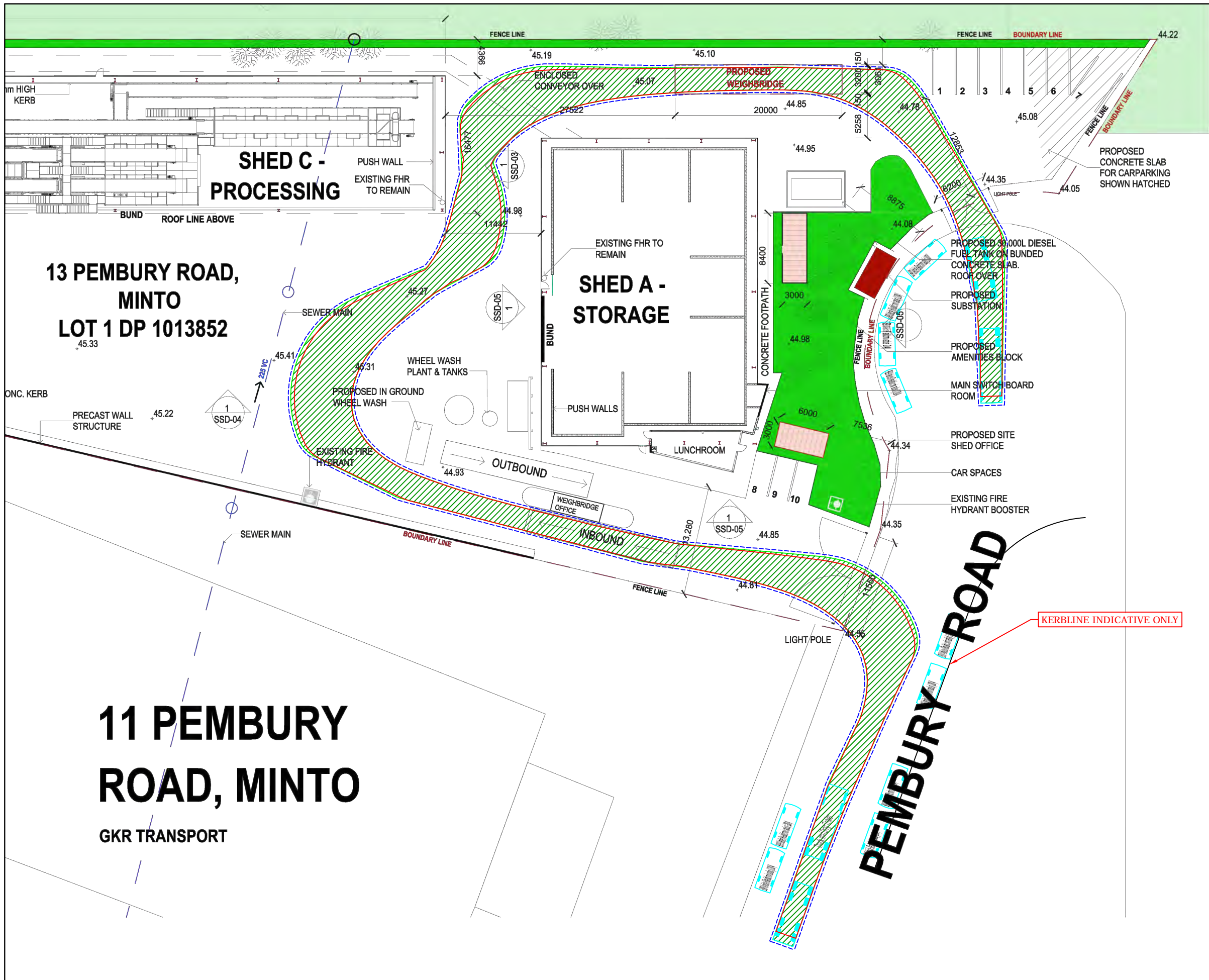
PROJECT
 13 PEMBURY ROAD, MINTO

TITLE
 19.6m TRUCK AND DOG IN - SWEEP PATH
 EXISTING WEIGHBRIDGE

DWG No.	FIGURE 1		
DATE STAMP	16 MARCH 2017		
PROJECT No.	SCALE	REV.	
15016	N.T.S	A	



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REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE																															
A	ISSUE FOR DISCUSSION	HC	WJ	WJ	16/03/17																															
PROJECT No. 15016	SCALE N.T.S	REV. A																																		



13 PEMBURY ROAD,
MINTO
LOT 1 DP 1013852

11 PEMBURY
ROAD, MINTO
GKR TRANSPORT

LEGEND:

LANDSCAPED AREA

PROPOSED SUBSTATION

PROPOSED BUILDINGS

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 GROUND FLOOR PLAN

Scale: 1:200@A0 **Date:** 04/11/2016

Status: SSD **Drawn By:** BC

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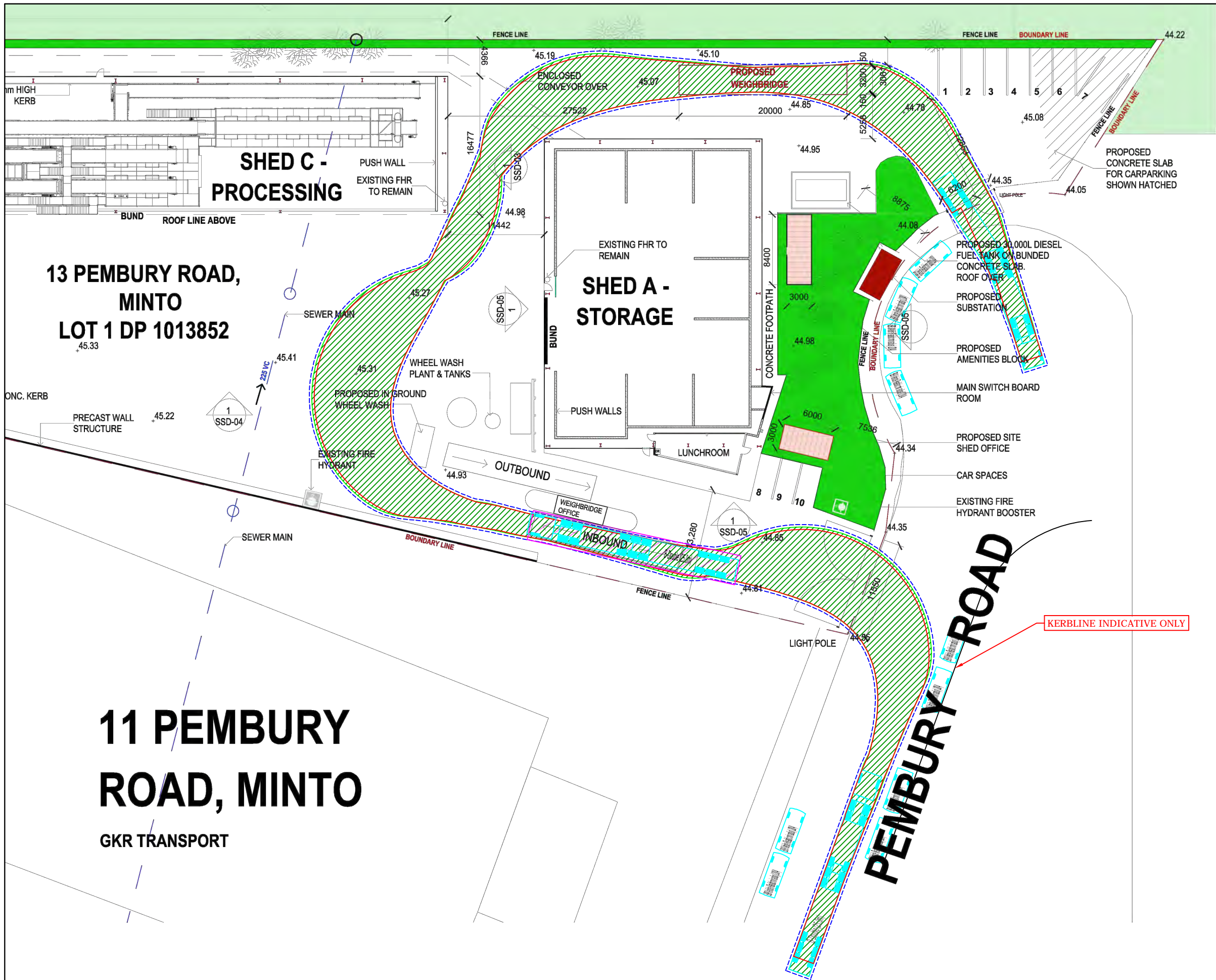
PROJECT
 13 PEMBURY ROAD, MINTO

TITLE
 19.6m TRUCK AND DOG - SWEEP PATH
 EXISTING WEIGHBRIDGE

DWG No.
 FIGURE 3

DATE STAMP
 16 MARCH 2017

PROJECT No. 15016	SCALE N.T.S	REV. A
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13 PEMBURY ROAD,
MINTO
LOT 1 DP 1013852

11 PEMBURY
ROAD, MINTO
GKR TRANSPORT

LEGEND:

LANDSCAPED AREA

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Project Name
MINTO SSD

Drawing Title:
GROUND FLOOR PLAN

Scale: 1:200@A0 **Date:** 04/11/2016

Status: SSD **Drawn By:** BC

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	WJ	WJ	16/03/17

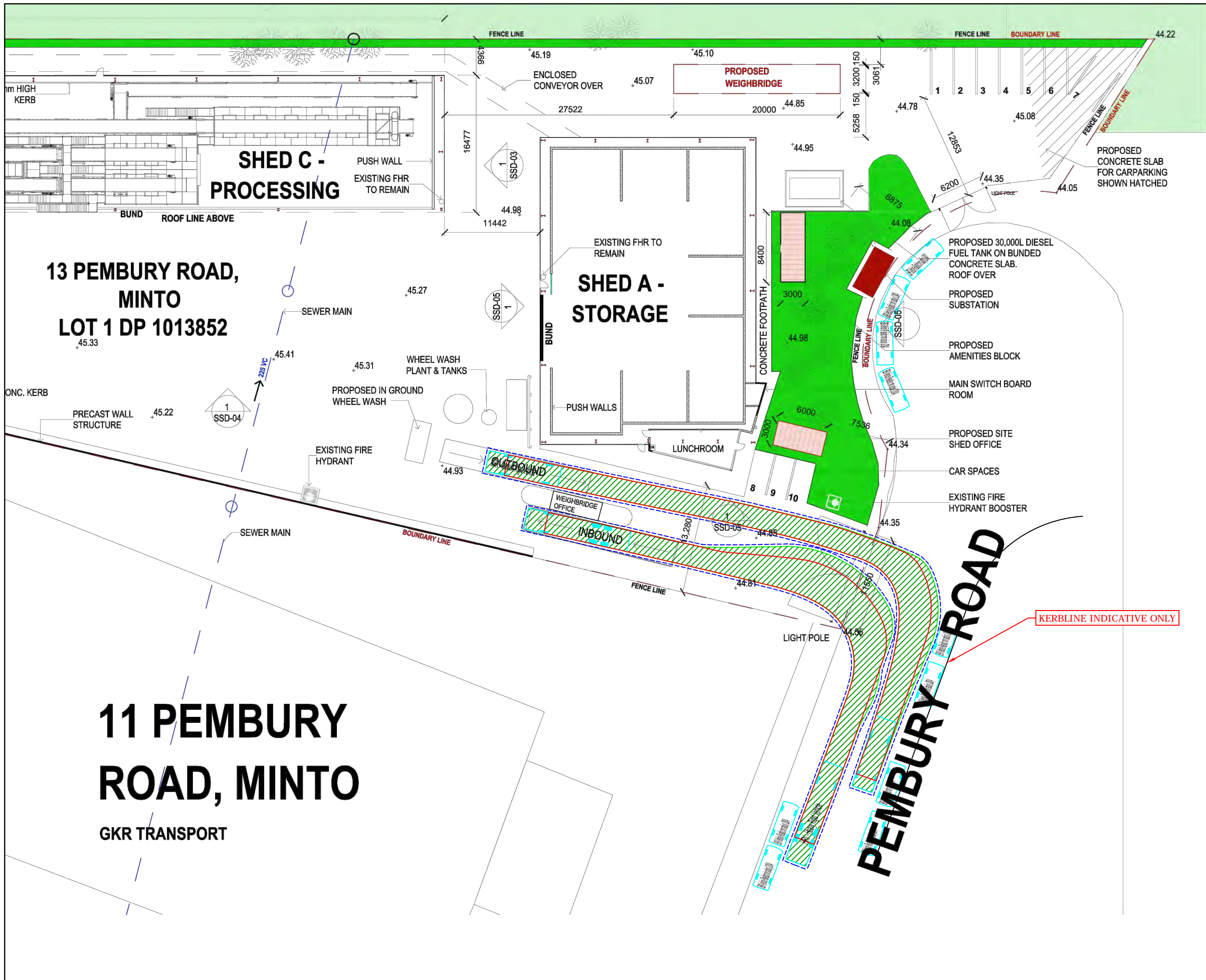
The Transport Planning Partnership

Suite 402, 22 Alchison Street
St. Leonards NSW 2045
Tel: 02 8437 7800
Email: info@tpp.net.au

PROJECT
13 PEMBURY ROAD, MINTO

TITLE
25.0m B-DOUBLE - SWEEP PATH

DWG No. FIGURE 4	
DATE STAMP 16 MARCH 2017	
PROJECT No. 15016	SCALE N.T.S
REV. A	



**13 PEMBURY ROAD,
MINTO
LOT 1 DP 1013852**

**11 PEMBURY
ROAD, MINTO**
GKR TRANSPORT

- LEGEND:**
- LANDSCAPED AREA
 - PROPOSED SUBSTATION
 - PROPOSED BUILDINGS

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Project Name
 MINTO SSD

Drawing Title:
 GROUND FLOOR PLAN

Scale: 1:200@A0 **Date:** 04/11/2016
Status: SSD **Drawn By:** BC

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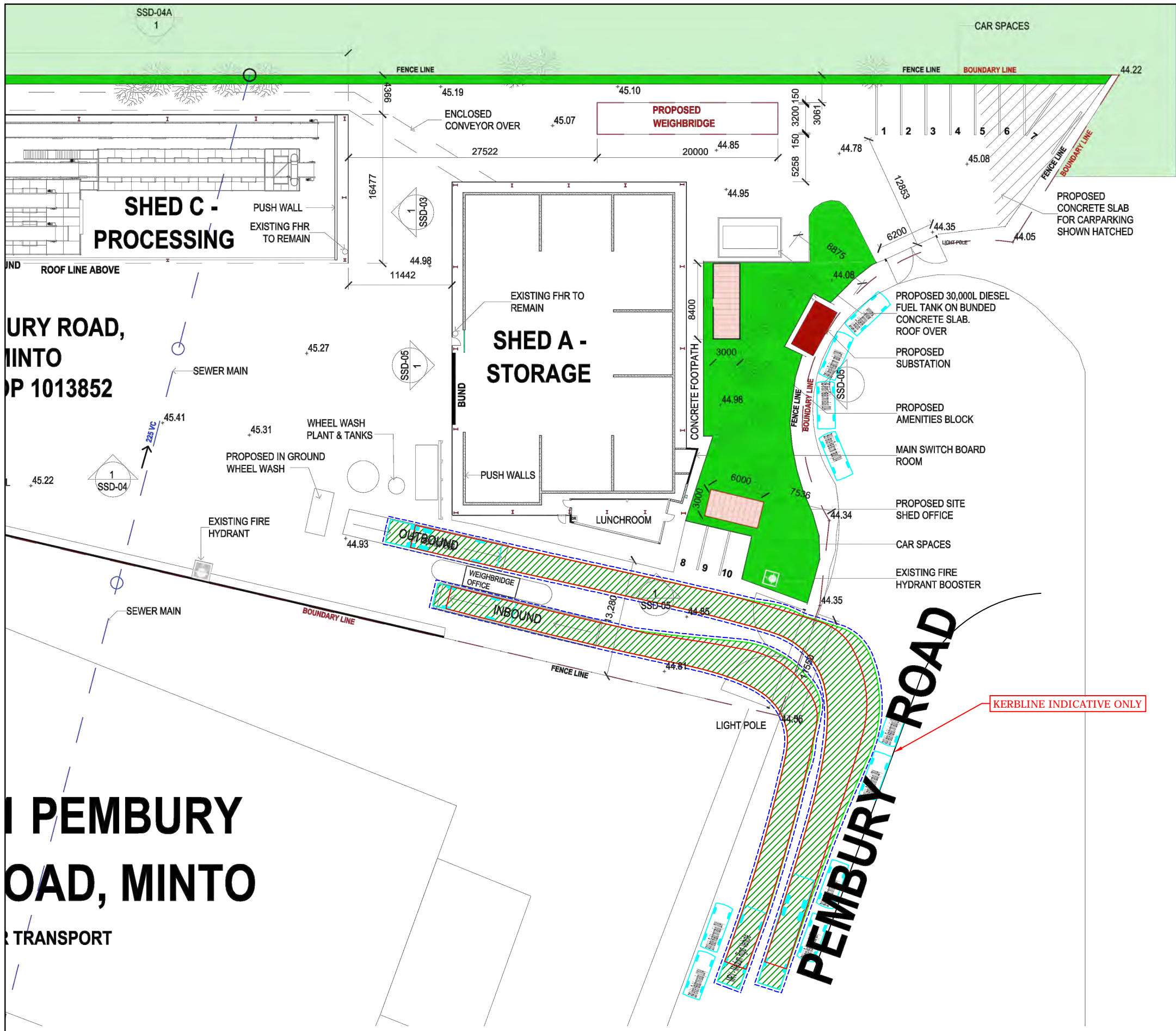
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A	ISSUE FOR DISCUSSION	HC	WJ	WJ	16/03/17

**The Transport
Planning Partnership**

Suite 402, 22 Alchison Street
St. Leonards NSW 2045
Tel: 02 8437 7800
Email: info@tpp.net.au

PROJECT	13 PEMBURY ROAD, MINTO
TITLE	12.5m HRV IN WITH 8.8m MRV OUT

DWG No.	FIGURE 1
DATE STAMP	16 MARCH 2017
PROJECT No.	15016
SCALE	N.T.S
REV.	A



LEGEND:

- LANDSCAPED AREA**
- PROPOSED SUBSTATION**
- PROPOSED BUILDINGS**

SITE AREA:	8957 m ²
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Client

Skylife Properties Pty Ltd.

Project Name

MINTO SSD

Drawing Title:

GROUND FLOOR PLAN

Scale: 1:200@A0 Date: 04/11/2016

PEMBURY ROAD,
MINTO
POSTCODE 1013852

13 PEMBURY ROAD, MINTO

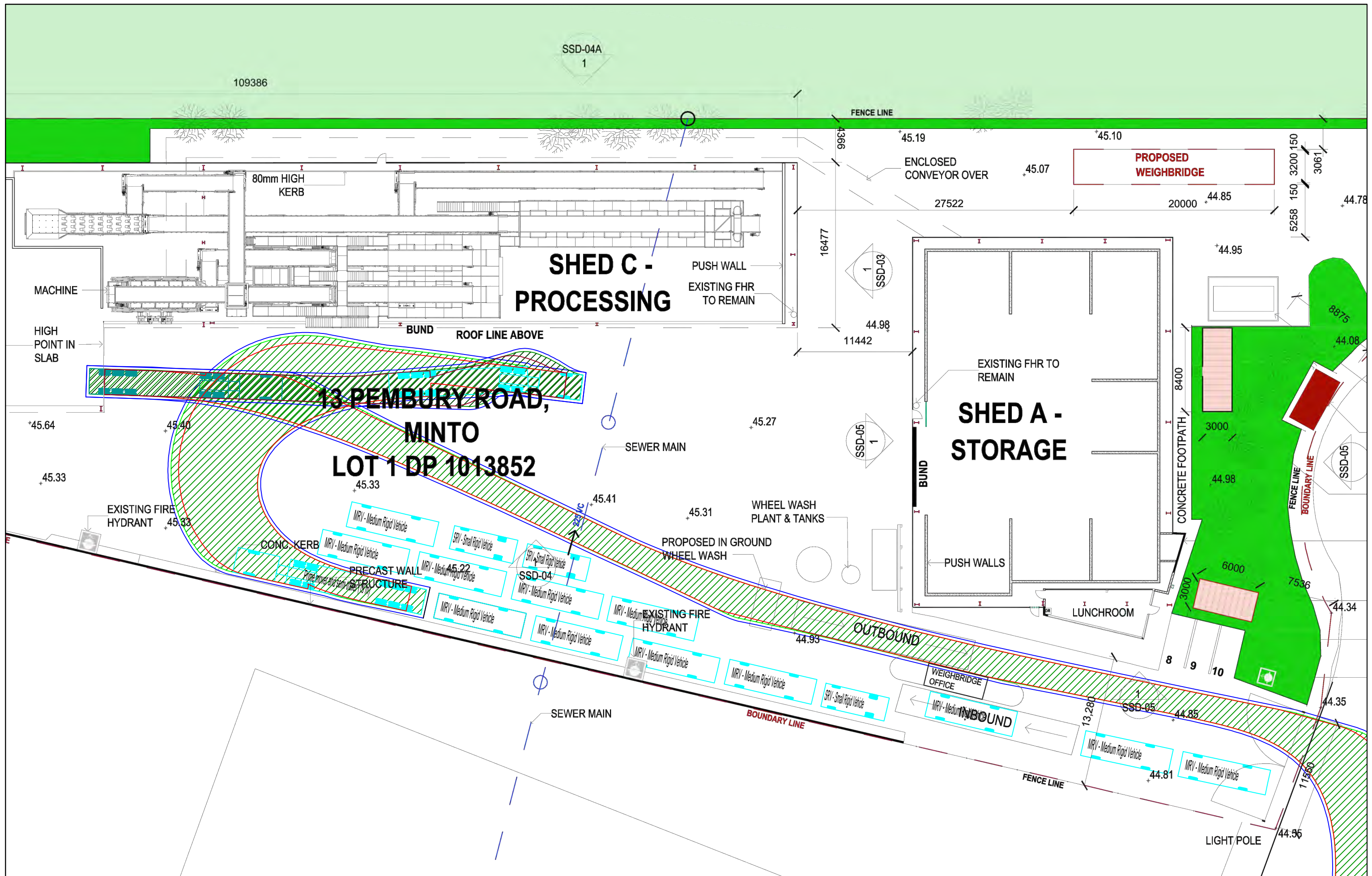
TRANSPORT

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	WJ	WJ	16/03/17

The Transport Planning Partnership

Suite 402, 22 Alchison Street
St. Leonards NSW 2045
Tel: 02 8437 7800
Email: info@tpp.net.au

PROJECT	13 PEMBURY ROAD, MINTO		
TITLE	8.8m MRV IN WITH 12.5m HRV OUT		
DWG No.	FIGURE 2		
DATE STAMP	16 MARCH 2017		
PROJECT No.	SCALE	REV.	
15016	N.T.S	A	



REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	SB	SB	16/03/17

The Transport Planning Partnership

Suite 402, 22 Alchison Street
 St. Leonards NSW 2045
 Tel: 02 8437 7800
 Email: info@tpp.net.au

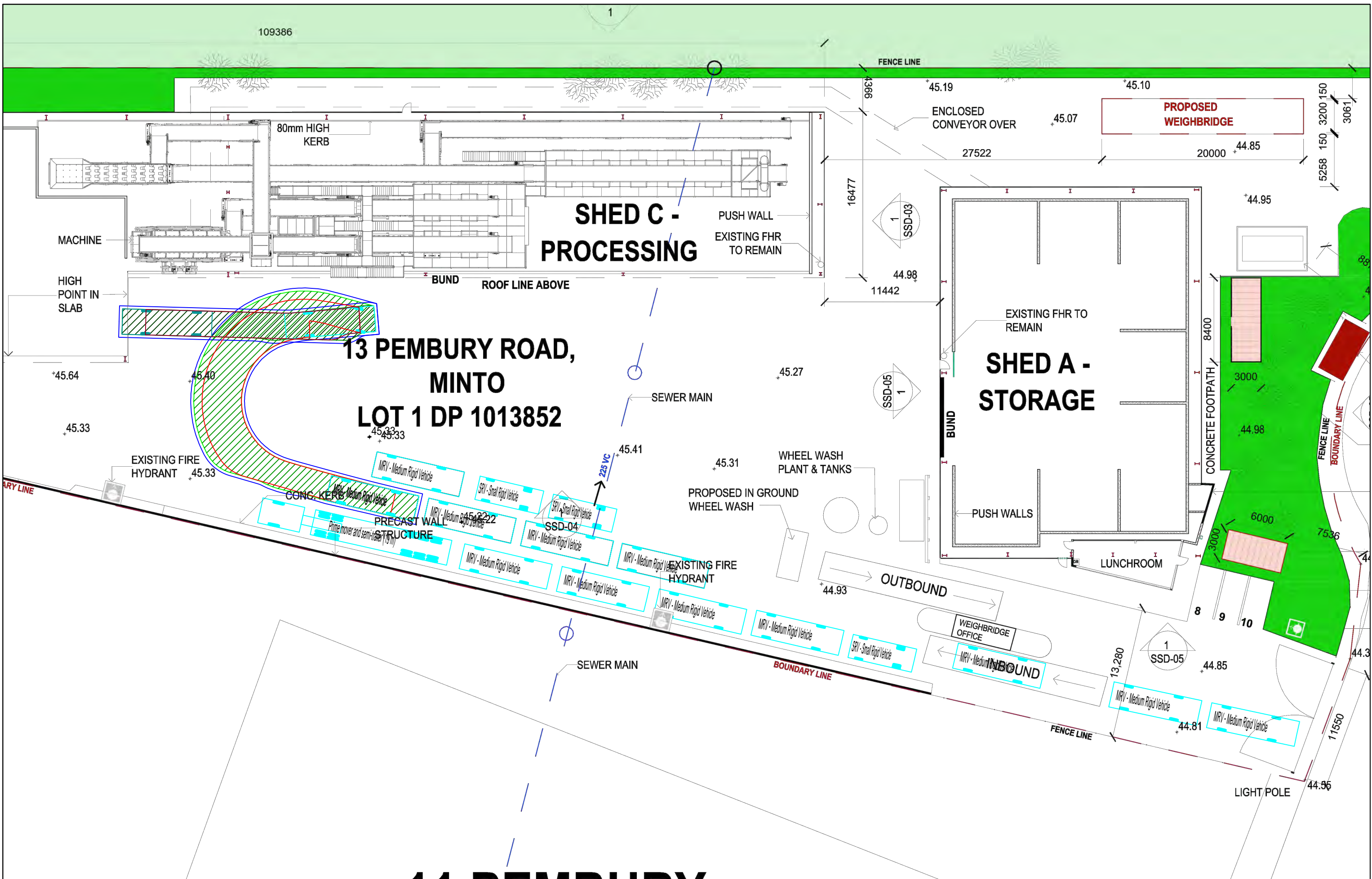
PROJECT
13 PEMBURY ROAD, MINTO

TITLE
19.0 SEMI-TRAILER - SWEPT PATH

DWG No. **FIGURE 2**

DATE STAMP **16 MARCH 2017**

PROJECT No. 15016	SCALE N.T.S	REV. A
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REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	SB	SB	16/03/17

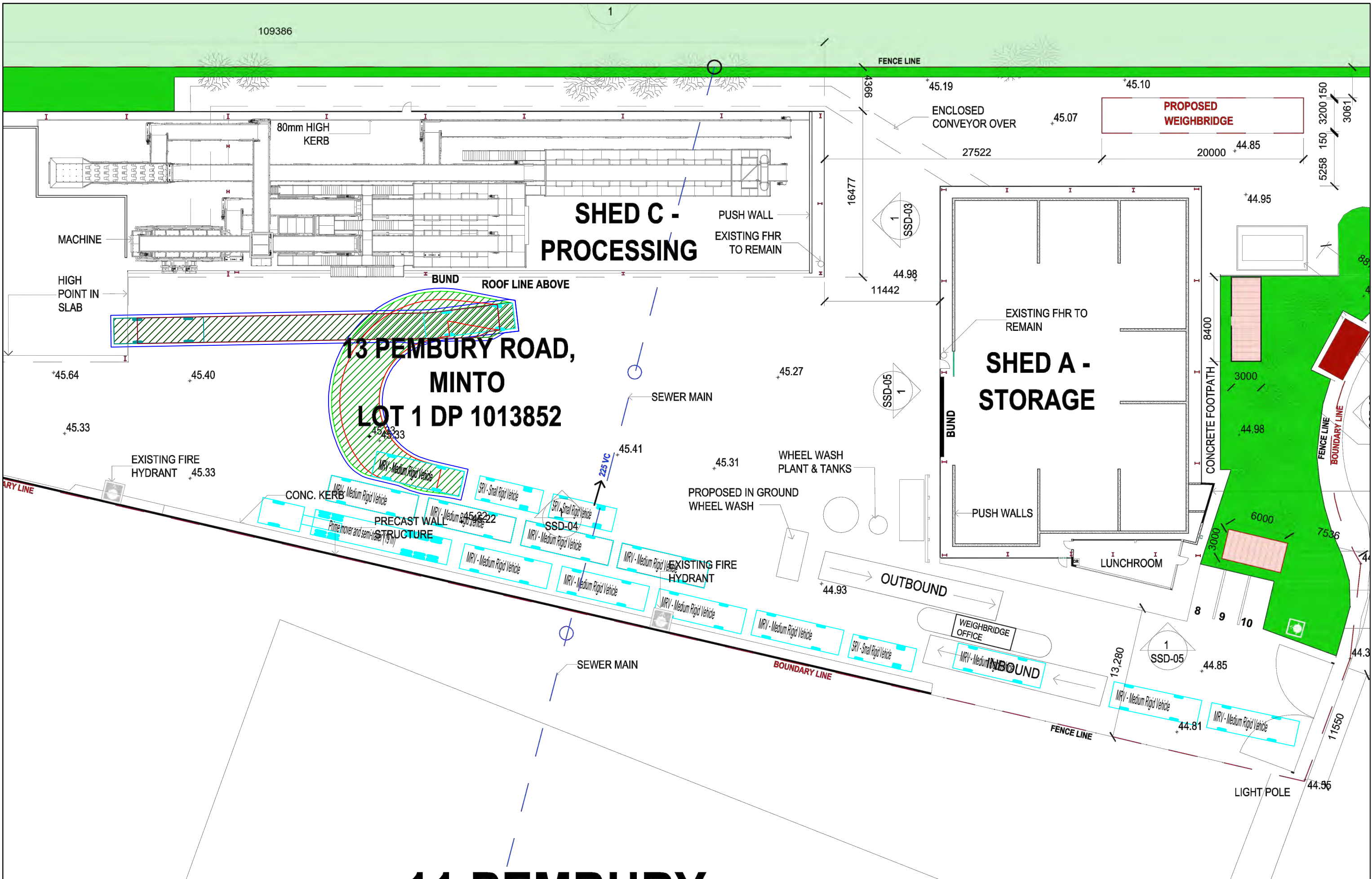
**The Transport
Planning Partnership**

Suite 402, 22 Alchison Street
St. Leonards NSW 2045
Tel: 02 8437 7800
Email: info@tpp.net.au

PROJECT
13 PEMBURY ROAD, MINTO

TITLE
8.8m MRV - SWEEP PATH

DWG No. FIGURE 3	
DATE STAMP 16 MARCH 2017	
PROJECT No. 15016	SCALE N.T.S
REV. A	



REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	SB	SB	16/03/17

**The Transport
Planning Partnership**

Suite 402, 22 Alchison Street
St. Leonards NSW 2045
Tel: 02 8437 7800
Email: info@tpp.net.au

PROJECT: 13 PEMBURY ROAD, MINTO

TITLE: 8.8m MRV - SWEPT PATH

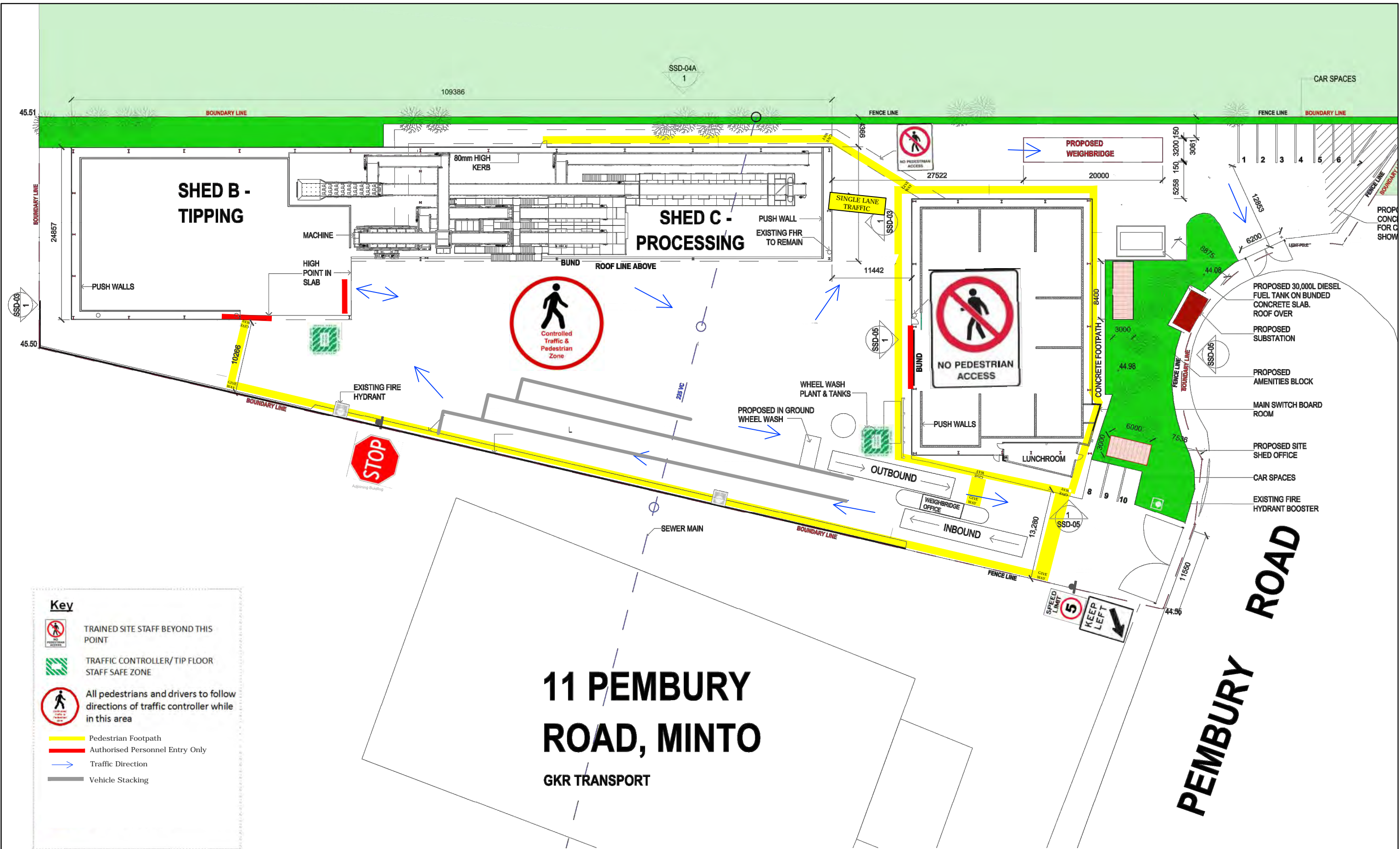
DWG No. FIGURE 4

DATE STAMP 16 MARCH 2017








PROJECT No. 15016	SCALE N.T.S	REV. A
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APPENDIX D

Traffic Control Plan



Key

-  TRAINED SITE STAFF BEYOND THIS POINT
-  TRAFFIC CONTROLLER/TIP FLOOR STAFF SAFE ZONE
-  All pedestrians and drivers to follow directions of traffic controller while in this area
-  Pedestrian Footpath
-  Authorised Personnel Entry Only
-  Traffic Direction
-  Vehicle Stacking

SCALE BAR (METRES)

REV.	DESCRIPTION	DRAWN	CHECK	APP'D	DATE
A	ISSUE FOR DISCUSSION	HC	SB	SB	17/03/17
B	ISSUE FOR SUBMISSION	LN	SB	SB	18/04/17

The Transport Planning Partnership

Suite 402, 22 Alchison Street
St. Leonards NSW 2065
Tel: 02 9437 7800
Email: info@tpp.net.au

PROJECT	13 PEMBURY ROAD, MINTO
TITLE	TRAFFIC PLAN

DWG No.	FIGURE 1	
DATE STAMP	18 APRIL 2017	
PROJECT No.	SCALE	REV.
15016	N.T.S	A

APPENDIX E

Site-Generated Traffic Flows

13 Pembury Road, Minto Facility 24-hour Traffic Profile

Starting Hour	Busiest Day at Minto Facility (ie. Thursday)		
	Existing Two-Way Movements	Additional Site-Generated Two-Way Movements	Projected Two-Way Movements (Existing + Additional)
00:00	0	0	0
01:00	0	0	0
02:00	0	0	0
03:00	0	0	0
04:00	0	0	0
05:00	0	0	0
06:00	6	42	48
07:00	7	46	53
08:00	5	48	53
09:00	18	38	56
10:00	17	40	57
11:00	12	44	56
12:00	17	44	61
13:00	7	46	53
14:00	17	34	51
15:00	13	46	59
16:00	3	44	47
17:00	0	46	46
18:00	0	38	38
19:00	0	36	36
20:00	0	32	32
21:00	0	30	30
22:00	0	0	0
23:00	0	0	0
Total	122	654	776

APPENDIX F

SIDRA Intersection Analysis Results

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Ben Lomond Rd AM peak (Existing)]

Campbelltown Rd - Ben Lomond Rd

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Campbelltown Rd											
2	T1	223	1.4	0.160	6.9	LOS A	5.0	35.4	0.34	0.29	61.8
3	R2	726	2.8	0.818	24.7	LOS B	24.6	176.4	0.92	0.88	44.3
Approach		949	2.4	0.818	20.5	LOS B	24.6	176.4	0.79	0.74	47.5
East: Ben Lomond Rd											
4	L2	567	6.9	0.435	11.0	LOS A	13.2	97.6	0.40	0.68	51.2
6	R2	440	13.2	0.824	69.9	LOS E	21.2	165.0	0.98	0.87	27.5
Approach		1007	9.6	0.824	36.7	LOS C	21.2	165.0	0.65	0.76	37.3
North: Campbelltown Rd											
7	L2	695	7.6	0.477	102.0	LOS F	63.7	471.6	1.00	0.94	23.4
8	T1	313	3.0	0.477	79.5	LOS F	63.7	471.6	0.98	0.86	27.3
Approach		1007	6.2	0.477	95.0	LOS F	63.7	471.6	0.99	0.91	24.5
All Vehicles		2964	6.1	0.824	51.4	LOS D	63.7	471.6	0.81	0.81	33.6

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 Pedestrian	Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	10	57.2	LOS E	0.0	0.0	0.87	0.87	
All Pedestrians		10	57.2	LOS E			0.87	0.87	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Ben Lomond Rd PM peak (Existing)]

Campbelltown Rd - Ben Lomond Rd

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	m		per veh	km/h
South: Campbelltown Rd											
2	T1	140	8.3	0.125	9.1	LOS A	2.9	21.7	0.46	0.38	59.6
3	R2	414	5.3	0.759	42.9	LOS D	19.2	140.4	0.97	0.88	36.3
Approach		554	6.1	0.759	34.4	LOS C	19.2	140.4	0.84	0.76	40.3
East: Ben Lomond Rd											
4	L2	664	5.4	0.613	14.0	LOS A	16.7	122.0	0.65	0.77	49.4
6	R2	597	7.8	0.770	41.9	LOS C	18.2	135.6	0.94	0.86	35.4
Approach		1261	6.5	0.770	27.2	LOS B	18.2	135.6	0.79	0.81	41.6
North: Campbelltown Rd											
7	L2	621	11.7	0.487	59.2	LOS E	42.4	321.6	1.00	0.93	32.2
8	T1	458	4.4	0.487	44.1	LOS D	42.4	321.6	0.96	0.85	37.2
Approach		1079	8.6	0.487	52.8	LOS D	42.4	321.6	0.98	0.90	34.1
All Vehicles		2894	7.2	0.770	38.1	LOS C	42.4	321.6	0.87	0.83	38.3

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	Average Delay	Level of Service	Average Back of Queue	Distance	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	m		per ped	
P1	South Full Crossing	10	35.3	LOS D	0.0	0.0	0.84	0.84	
All Pedestrians		10	35.3	LOS D			0.84	0.84	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Rose Payten Dr AM peak (Existing)]

Campbelltown Rd - Rose Payten Dr
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows 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: Campbelltown Rd											
2	T1	1360	4.6	0.524	9.9	LOS A	19.3	140.2	0.53	0.49	58.0
3	R2	242	9.1	0.746	67.9	LOS E	7.7	58.0	1.00	0.86	28.1
Approach		1602	5.3	0.746	18.7	LOS B	19.3	140.2	0.60	0.54	50.0
East: Rose Payten Drive											
4	L2	57	20.4	0.090	16.9	LOS B	1.4	11.8	0.50	0.67	46.0
6	R2	585	8.8	0.773	56.8	LOS E	17.1	128.6	1.00	0.89	31.7
Approach		642	9.8	0.773	53.3	LOS D	17.1	128.6	0.96	0.87	32.6
North: Campbelltown Rd											
7	L2	573	12.1	0.413	9.0	LOS A	6.0	46.7	0.27	0.68	57.6
8	T1	1646	3.8	0.790	25.6	LOS B	38.1	275.5	0.87	0.84	46.5
Approach		2219	5.9	0.790	21.3	LOS B	38.1	275.5	0.71	0.80	48.9
All Vehicles		4463	6.3	0.790	25.0	LOS B	38.1	275.5	0.71	0.72	46.0

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	10	51.4	LOS E	0.0	0.0	0.93	0.93	
P2	East Full Crossing	10	19.3	LOS B	0.0	0.0	0.57	0.57	
All Pedestrians		20	35.3	LOS D			0.75	0.75	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Rose Payten Dr PM peak (Existing)]

Campbelltown Rd - Rose Payten Dr
 Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Campbelltown Rd											
2	T1	1929	2.6	0.731	12.7	LOS A	40.2	287.3	0.64	0.60	55.6
3	R2	154	2.7	0.727	81.5	LOS F	5.7	41.1	1.00	0.84	25.5
Approach		2083	2.6	0.731	17.8	LOS B	40.2	287.3	0.67	0.62	51.1
East: Rose Payten Drive											
4	L2	61	5.2	0.101	18.6	LOS B	1.8	13.4	0.50	0.68	45.4
6	R2	558	6.4	0.758	64.4	LOS E	18.6	137.4	1.00	0.88	29.9
Approach		619	6.3	0.758	59.9	LOS E	18.6	137.4	0.95	0.86	31.0
North: Campbelltown Rd											
7	L2	632	6.5	0.417	8.4	LOS A	5.8	43.2	0.22	0.67	58.3
8	T1	1829	2.1	0.808	23.8	LOS B	49.2	350.5	0.81	0.81	47.6
Approach		2461	3.3	0.808	19.8	LOS B	49.2	350.5	0.66	0.77	50.0
All Vehicles		5163	3.3	0.808	23.8	LOS B	49.2	350.5	0.70	0.72	46.9

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	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	10	58.5	LOS E	0.0	0.0	0.91	0.91	
P2	East Full Crossing	10	16.5	LOS B	0.0	0.0	0.49	0.49	
All Pedestrians		20	37.5	LOS D			0.70	0.70	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Ben Lomond Rd AM peak (Future)]

Campbelltown Rd - Ben Lomond Rd

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Campbelltown Rd											
2	T1	223	1.4	0.163	7.6	LOS A	5.2	37.1	0.35	0.30	61.1
3	R2	726	2.8	0.841	30.0	LOS C	26.3	188.1	0.95	0.91	41.7
Approach		949	2.4	0.841	24.7	LOS B	26.3	188.1	0.81	0.76	45.1
East: Ben Lomond Rd											
4	L2	567	6.9	0.444	11.0	LOS A	13.2	97.7	0.40	0.69	51.2
6	R2	465	17.4	0.839	69.6	LOS E	22.7	182.6	0.97	0.88	27.3
Approach		1033	11.6	0.839	37.4	LOS C	22.7	182.6	0.66	0.77	36.8
North: Campbelltown Rd											
7	L2	720	10.5	0.497	104.2	LOS F	65.1	491.6	1.00	0.94	23.1
8	T1	313	3.0	0.497	80.0	LOS F	65.1	491.6	0.98	0.86	27.2
Approach		1033	8.3	0.497	96.9	LOS F	65.1	491.6	0.99	0.92	24.2
All Vehicles		3015	7.6	0.841	53.8	LOS D	65.1	491.6	0.82	0.82	32.8

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.

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 Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	10	56.4	LOS E	0.0	0.0	0.87	0.87	
All Pedestrians		10	56.4	LOS E			0.87	0.87	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Ben Lomond Rd PM peak (Future)]

Campbelltown Rd - Ben Lomond Rd

Signals - Fixed Time Isolated Cycle Time = 100 seconds (User-Given Cycle Time)

Variable Sequence Analysis applied. The results are given for the selected output sequence.

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		Total veh/h	HV %	v/c	sec		Vehicles veh	m		per veh	km/h
South: Campbelltown Rd											
2	T1	140	8.3	0.128	9.6	LOS A	3.0	22.3	0.47	0.39	59.2
3	R2	414	5.3	0.785	45.1	LOS D	19.8	145.3	0.98	0.90	35.6
Approach		554	6.1	0.785	36.1	LOS C	19.8	145.3	0.85	0.77	39.6
East: Ben Lomond Rd											
4	L2	664	5.4	0.611	14.0	LOS A	16.7	122.0	0.65	0.77	49.4
6	R2	621	11.0	0.791	42.1	LOS C	19.3	147.6	0.94	0.87	35.0
Approach		1285	8.1	0.791	27.6	LOS B	19.3	147.6	0.79	0.82	41.2
North: Campbelltown Rd											
7	L2	645	14.7	0.506	59.7	LOS E	43.2	333.4	1.00	0.93	32.0
8	T1	458	4.4	0.506	44.1	LOS D	43.2	333.4	0.96	0.85	37.2
Approach		1103	10.4	0.506	53.2	LOS D	43.2	333.4	0.98	0.90	34.0
All Vehicles		2942	8.6	0.791	38.8	LOS C	43.2	333.4	0.87	0.84	37.9

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	Average Delay	Level of Service	Average Back of Queue	Distance	Prop. Queued	Effective Stop Rate	
		ped/h	sec		Pedestrian ped	m		per ped	
P1	South Full Crossing	10	34.5	LOS D	0.0	0.0	0.83	0.83	
All Pedestrians		10	34.5	LOS D			0.83	0.83	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Rose Payten Dr AM peak (Future)]

Campbelltown Rd - Rose Payten Dr
 Signals - Fixed Time Isolated Cycle Time = 120 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Campbelltown Rd											
2	T1	1360	4.6	0.531	10.4	LOS A	19.8	143.9	0.55	0.50	57.5
3	R2	242	9.1	0.746	67.9	LOS E	7.7	58.0	1.00	0.86	28.1
Approach		1602	5.3	0.746	19.1	LOS B	19.8	143.9	0.62	0.56	49.6
East: Rose Payten Drive											
4	L2	57	20.4	0.089	16.9	LOS B	1.4	11.8	0.50	0.67	46.0
6	R2	611	12.2	0.794	57.5	LOS E	18.1	140.1	1.00	0.90	31.2
Approach		667	12.9	0.794	54.1	LOS D	18.1	140.1	0.96	0.88	32.1
North: Campbelltown Rd											
7	L2	598	15.5	0.440	9.1	LOS A	6.6	52.0	0.28	0.69	57.4
8	T1	1646	3.8	0.803	26.5	LOS B	38.8	280.6	0.88	0.85	46.0
Approach		2244	6.9	0.803	21.9	LOS B	38.8	280.6	0.72	0.80	48.6
All Vehicles		4514	7.2	0.803	25.6	LOS B	38.8	280.6	0.72	0.73	45.5

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	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	10	50.4	LOS E	0.0	0.0	0.92	0.92	
P2	East Full Crossing	10	19.8	LOS B	0.0	0.0	0.58	0.58	
All Pedestrians		20	35.1	LOS D			0.75	0.75	

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 1 [Campbelltown Rd - Rose Payten Dr PM peak (Future)]

Campbelltown Rd - Rose Payten Dr
 Signals - Fixed Time Isolated Cycle Time = 140 seconds (User-Given Cycle Time)

Movement Performance - Vehicles											
Mov ID	OD Mov	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Campbelltown Rd											
2	T1	1929	2.6	0.731	12.7	LOS A	40.2	287.3	0.64	0.60	55.6
3	R2	154	2.7	0.727	81.5	LOS F	5.7	41.1	1.00	0.84	25.5
Approach		2083	2.6	0.731	17.8	LOS B	40.2	287.3	0.67	0.62	51.1
East: Rose Payten Drive											
4	L2	61	5.2	0.102	20.9	LOS B	2.0	14.5	0.53	0.69	44.2
6	R2	582	9.9	0.815	68.2	LOS E	20.4	155.3	1.00	0.91	28.8
Approach		643	9.5	0.815	63.7	LOS E	20.4	155.3	0.96	0.89	29.8
North: Campbelltown Rd											
7	L2	656	9.6	0.441	8.5	LOS A	6.3	47.9	0.22	0.67	58.2
8	T1	1829	2.1	0.775	23.7	LOS B	45.4	323.9	0.81	0.81	47.6
Approach		2485	4.1	0.775	19.7	LOS B	45.4	323.9	0.65	0.77	50.0
All Vehicles		5212	4.2	0.815	24.4	LOS B	45.4	323.9	0.70	0.72	46.5

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	Queue Distance m	Prop. Queued	Effective Stop Rate per ped	
P1	South Full Crossing	10	58.5	LOS E	0.0	0.0	0.91	0.91	
P2	East Full Crossing	10	16.5	LOS B	0.0	0.0	0.49	0.49	
All Pedestrians		20	37.5	LOS D			0.70	0.70	

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.