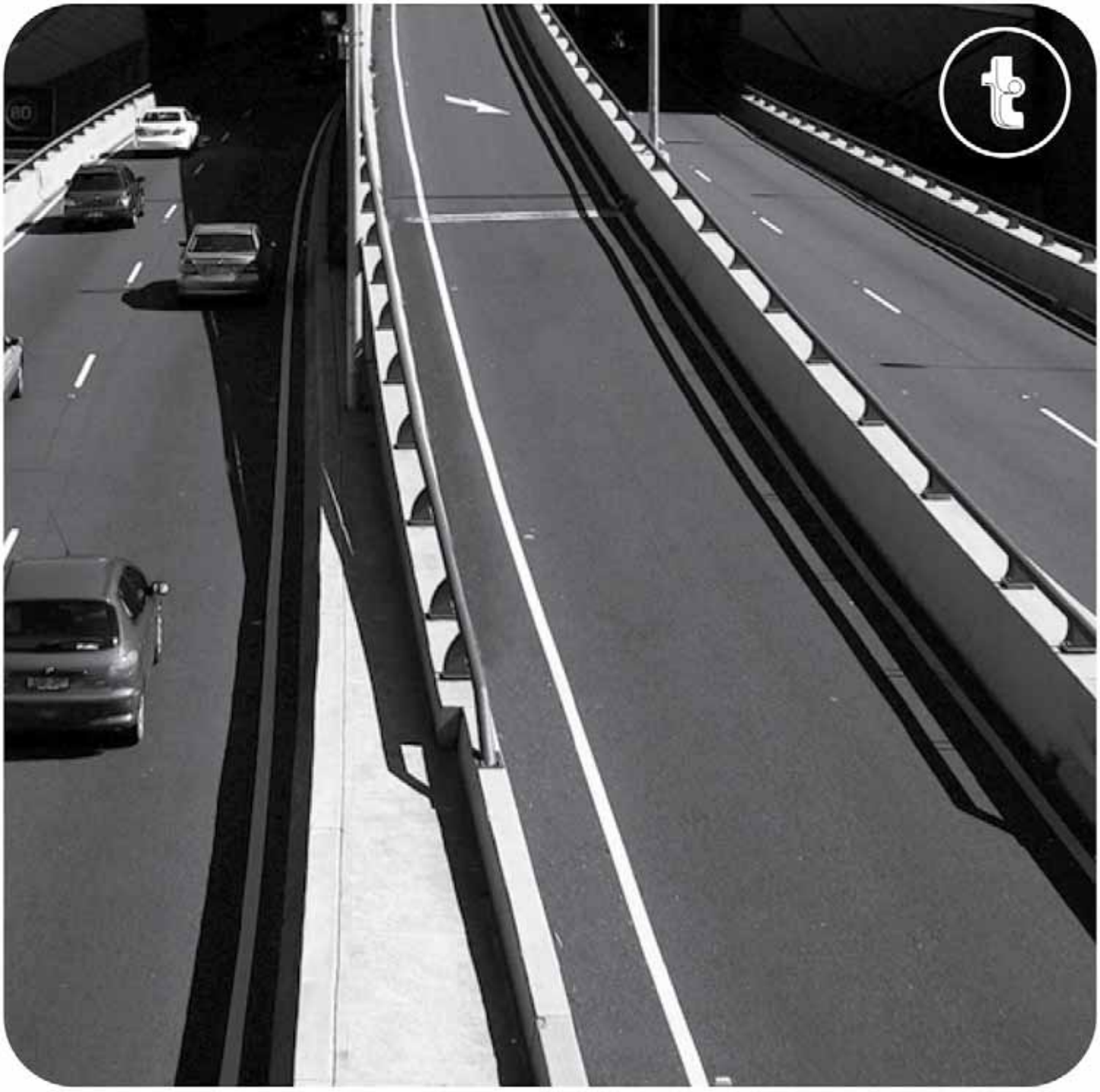
TECHNICAL REPORT NO 6

TRAFFIC IMPACT ASSESSMENT

TRAFFIX



traffic impact assessment

proposed integrated recycling park, grand avenue, camellia

prepared on behalf of REMONDIS Pty Ltd by **TRAFFIX** traffic & transport planners
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1. introduction

TRAFFIX has been commissioned by REMONDIS Pty Ltd to undertake a traffic impact assessment in relation to the proposed development of an Integrated Recycling Park at Grand Avenue, Camellia. The development is located within the Parramatta City Council LGA, however it is to be assessed by the NSW Department of Planning (DoP) as a Part 3A application.

This report documents the findings of our investigations and should be read in the context of the Environmental Assessment, prepared separately by National Environmental Consulting Services (NECS). The development has been formally referred to the RTA in accordance with the provisions of SEPP (Infrastructure) 2007. The RTA subsequently recommended that, although not technically included as part of the Director General's Requirements, the original traffic report should include detailed modelling of the intersection of Grand Avenue and Grand Avenue North and undertaking a Road Safety Audit. This additional modelling has now been included as part of this assessment, however a Road Safety Audit is not considered necessary at this stage as discussed in Section 6.

A review of RTA accident data has also been included in this assessment, in addition to the *Remondis Risk Assessment - Impact of Recycling Operations at Grand Avenue on Camellia Level Crossing and Environs*, dated 25 November 2010. In summary, the moderate traffic volumes associated with the development are not expected to exacerbate any existing accident trends. A detailed Road Safety Audit can be undertaken prior to construction / occupation that can identify any low cost measures to assist in reducing existing accident trends in the locality, namely at the intersection of James Ruse Drive and Grand Avenue. In any event, the Department may impose a condition of consent prior to construction or occupation requiring this safety audit to be undertaken, the event that it is still considered necessary.

The report is structured as follows:

- Section 2: Describes the site and its location
- Section 3: Documents existing traffic conditions
- Section 4: Describes the proposed development
- Section 5: Assesses the parking requirements
- Section 6: Assesses traffic impacts
- Section 7: Discusses access and internal design aspects
- Section 8: Presents the overall study conclusions.

2. location and site

The site is located at 1 Grand Avenue, Camellia which is situated to the east of the Camellia railway station. Rosehill Racecourse is located to the south of the site, on the southern side of Grand Avenue.

The overall site is bounded by the Clyde-Carlingford railway line to the west, industrial spur rail line to the south, a neighbouring industrial premise to the east and the Parramatta River to the north. The overall site occupies an area of some 7.39 hectares, however the subject application relates to a smaller section of the site with an area of some 4.5 hectares.

It is generally a cleared site, with remnant concrete and bitumen hardstand areas, and is currently used for container storage.

All access to the site is currently provided from Grand Avenue, via a short length of the Grand Avenue North, to the east of the Camellia railway station and car park. Access to/from Grand Avenue requires the crossing of an at-grade level crossing of the industrial spur rail line immediately to the southeast of the access.

A Location Plan is presented in **figure 1**, with a Site Plan presented in **figure 2**. Reference should also be made to the Photographic Record presented in **appendix a**, which provides an appreciation of the general character of roads and other key attributes in proximity to the site.

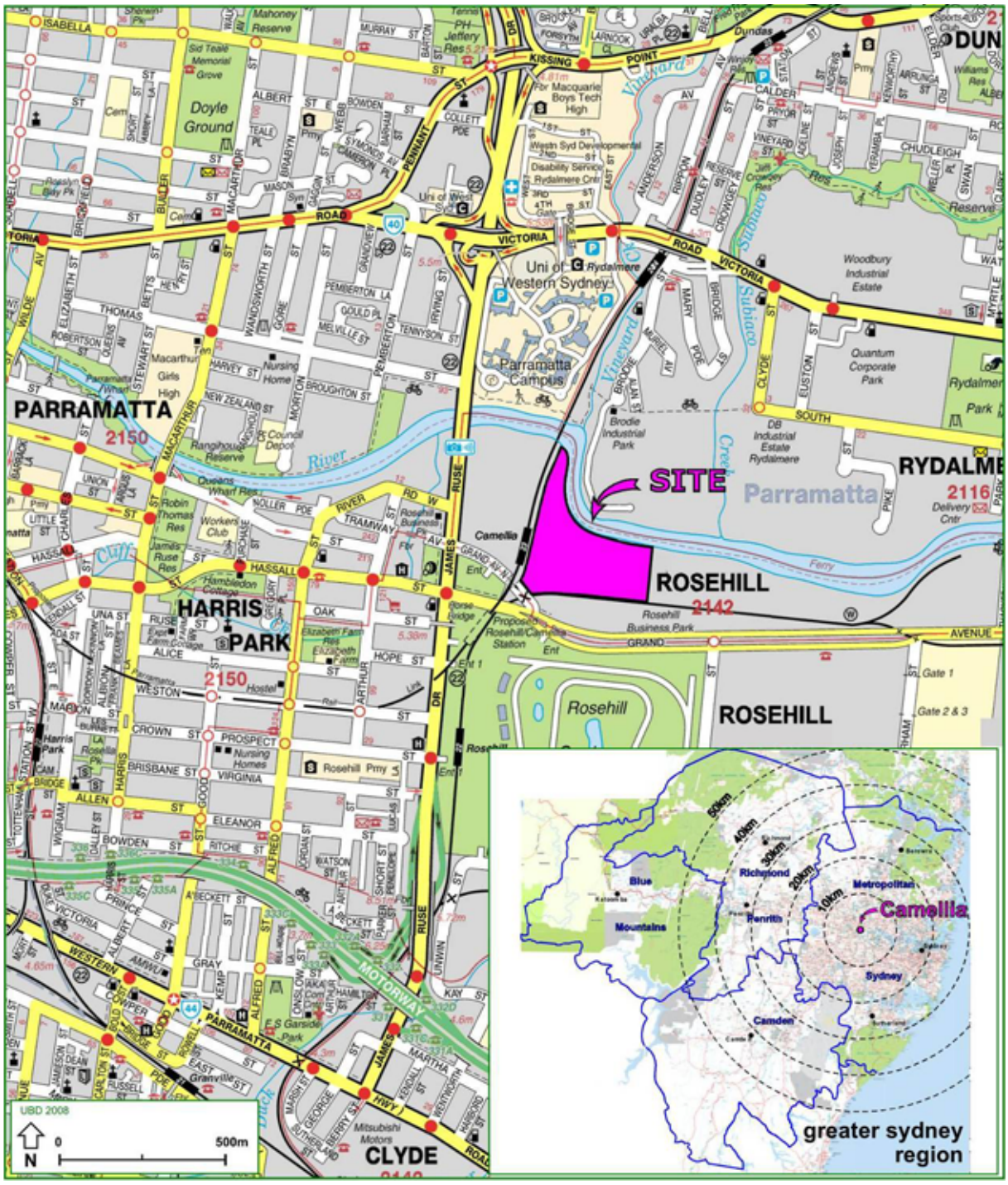


Figure 1: Location

Figure 2: Site

3. existing traffic conditions

3.1 road hierarchy

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

- M4 Motorway: a major arterial road (MR 6004) that forms Sydney's major east-west transport corridor, to the south of the site. It carries in excess of 81,500 vehicles per day to the east of the site;
- James Ruse Drive: an RTA classified road (MR 309) that runs in a north-south direction to the west of the site. It carries in the order of 63,000 vehicles per day;
- Victoria Road: a classified road (MR 165) that runs in an east-west direction, to the north of the site. It carries approximately 62,500vpd;
- Grand Avenue: a local industrial road that runs in an east-west direction to the south of the site and provides access from James Ruse Drive to the Rosehill Business Park;
- Grand Avenue North: a local road that runs in a northwest-southeast direction and provides the current and future access to the site. Camellia railway station effectively splits Grand Avenue North into two sections, the southern of which provides access to the site via Grand Avenue;

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

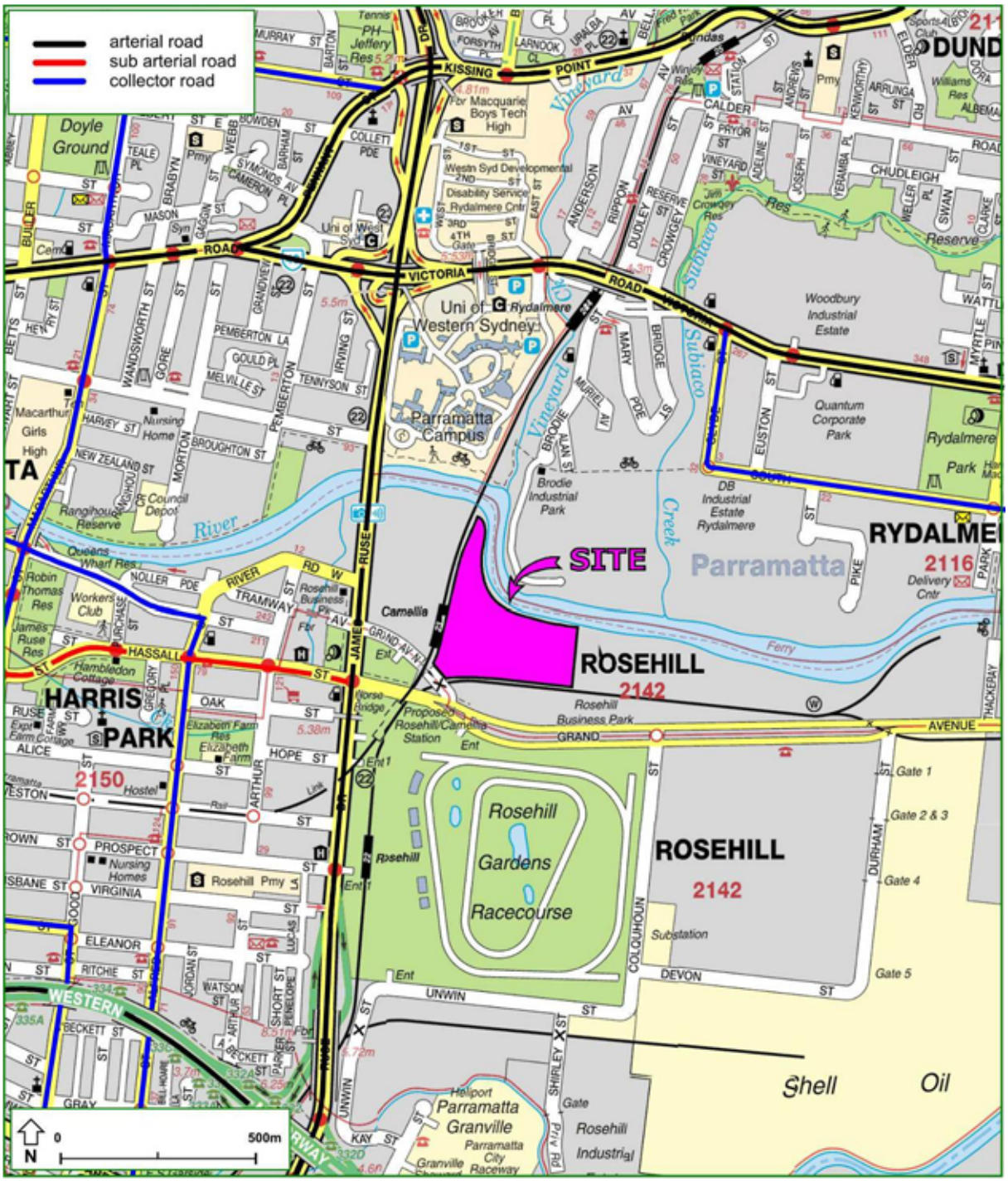


Figure 3: Surrounding Road Hierarchy

3.2 general description of road environment

James Ruse Drive is constructed with a 24.5 metre carriageway and generally carries three lanes of traffic in either direction. It forms a signalised intersection with Grand Avenue and Hassall Street, to the west of the site. This includes a left turn slip lane for eastbound traffic turning north onto James Ruse Drive. Reference should also be made to the SIDRA intersection layouts in **appendix d** which provides a diagrammatic representation of this intersection in terms of lane configurations and lengths.

Hassall Street is generally constructed with a 12 metre carriageway and carries two lanes of traffic in either direction. Localised widening in the vicinity of James Ruse Drive permit additional turning lanes to be provided at this intersection.

Grand Avenue generally carries a single lane of traffic in either direction with localised widening in the vicinity of James Ruse Drive to provide sufficient turning lanes at this intersection. The width narrows to approximately 7 metres on the overpass of the Clyde-Carlingford railway line, to the west of the site. Further to the east, Grand Avenue is constructed with a divided carriageway and includes a number of at-grade railway crossings of industrial spur lines along its length. A short left turn deceleration lane and 35 metre right turn storage lane are provide on Grand Avenue at its intersection with Grand Avenue North.

Grand Avenue North is divided by the Clyde-Carlingford railway line. Access to the site is provide via the southern section of Grand Avenue North, which is accessed via Grand Avenue. Vehicle access to the site requires traversing the at-grade rail spur line crossing, immediately to the southeast of the site access.

3.3 public transport

The existing bus services that operate in the locality are shown in **figure 4**. It is evident that the site benefits from good access to the public transport system with Camellia railway station adjacent to the site access and buses travelling along James Ruse Drive.

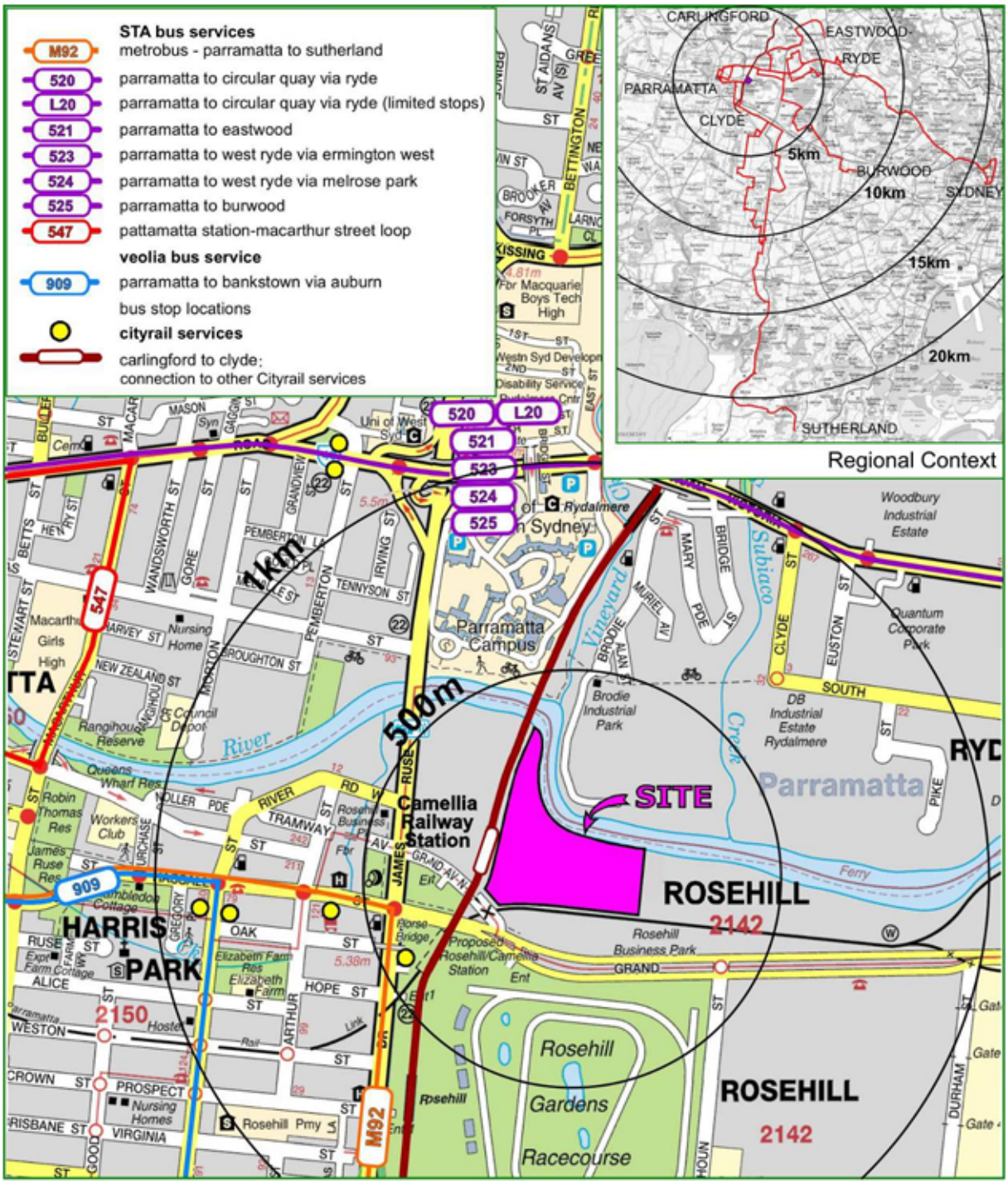


Figure 4: Public Transport Service

Due to the hours and nature of the proposed operations discussed in the following sections, the above services are expected to be used only a minimal extent by staff. Train service frequencies from Camellia railway station vary between 30-60 minutes depending on the time of day which is likely to be used by some staff. However, as the number of staff is small, for the purpose of this assessment and to assess a worst case scenario, reliance on private cars has been assumed for 90% of all staff relating to their journey-to-work travel, as discussed in Section 6.

3.4 surrounding cycle network

Copies of the Parramatta Council and RTA Cycleway maps are provided in **appendix b**. It can be seen that Grand Avenue forms a local on-road route of moderate difficulty which is assumed to be a consequence of the relatively high proportion of heavy vehicles using this route to access surrounding industrial developments.

3.5 existing site generation

Recently the site has been used for container storage purposes on a short term basis. The traffic report included in the development application submission states that the traffic associated with the use of the site would generate in the order of 212 trips per day, comprised of 200 truck movements plus 12 staff passenger vehicle movements.

3.6 existing intersection performances

For the purposes of the assessment of traffic impacts of this development, surveys were undertaken of the most critical intersection immediate adjacent to the site, being the intersection of James Ruse Drive with Grand Avenue, to the west of the site. These were undertaken between the morning (7-9am) and afternoon (4-6pm) on-street peak periods. Surveys were also undertaken between 1.30-2.30pm as this period reflects the peak site related traffic generation, as raised by the RTA and as discussed further in Section 6.

The results of these surveys, included in **appendix c**, were analysed using the SIDRA computer program to determine the intersections performance characteristics under existing traffic conditions. The SIDRA model produces a range of outputs, the most useful of which are the Degree of Saturation (DOS) and Average Vehicle Delay per vehicle (AVD). The AVD is in turn related to a level of service (LOS) criteria. These performance measures can be interpreted using the following explanations:

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

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

LOS – this is a comparative measure which provides an indication of the operating performance of an intersection as shown below:

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

A summary of the modelled results are provided below. Reference should also be made to the SIDRA outputs provided in **appendix d** which provide detailed results for individual lanes and approaches.

Table 1: existing intersection performance: am and pm on-street peak hour

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
James Ruse Dr / Grand Ave / Hassall St	AM	signals	1.221	201.2	F
	PM		1.347	288.3	F
Grand Avenue / Grand Avenue North	PM	priority	0.362	30.5	C

It is noted that queues on Grand Avenue (east) on approach James Ruse Drive extend up to its intersection with Grand Avenue North. However, it has been observed that vehicles generally do not obstruct the intersection itself such that there is the ability for vehicles exiting Grand Aveneu North to join the queue. Conditions between 1.30-3.30pm are improved as shown in table 2, below.

Table 2: existing intersection performance: 1.30-2.30pm

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
James Ruse Dr / Grand Ave / Hassall St	1.30-2.30pm	signals	1.0	75.8	F
Grand Avenue / Grand Avenue North	1.30-2.30pm	priority	0.105	20.7	B

It can be seen from Table 1 that this intersection James Ruse Drive and Grand Avenue fails under the existing ‘base case’ scenario, with a level of service F during both on-street peak periods and with significant delays. Nevertheless, it is stressed that the most relevant use of this analysis is to compare the relative change in the performance parameters as a result of the proposed development. This is discussed further in Section 6.

4. description of proposed development

A detailed description of the proposed development is provided in the Environmental Assessment, prepared separately by NECS. In summary, the development for which approval is now sought comprises the following components:

- Construction of the REMONDIS Integrated Recycling Plan (RIRP) which incorporates two waste treatment facilities:
  - Commercial & Industrial Resource Recovery Facility (CIRRF) with a total processing capacity of up to 100,000 tonnes per annum; and
  - Source Separated Organic Resource Recovery Facility (SSORRF) with a processing capacity of up to 50,000 tonnes per annum;
- Operation of the facility will be 24 hours per day, 7 days a week;
- Employment of between 15-20 operational staff plus some additional casual staff which will be divided into three (3) shifts such that the maximum on-site per shift will be 40 persons (19 for CIRRF plus 10 for SSORRF plus 10 additional admin and miscellaneous staff);
- Shift times are expected to occur:
  - Shift 1 6am – 2pm;
  - Shift 2 2pm – 10pm; and
  - Night Shift 10pm - 6am;
- Construction of a site office building for administration and staff amenities;
- Provision of 12 car parking spaces in the vicinity of the office building;

The parking and traffic impacts arising from the development are discussed in Sections 5 and 6, respectively. Reference should be made to the plans submitted separately to Council which are presented at reduced scale in **appendix e**. Schedules of expected staffing numbers and delivery numbers are also included in appendix e which form the basis of this assessment.

5. parking requirements

5.1 parking requirements

The Parramatta DCP 2005 requires that industrial uses provide parking at the following rates:

- 1 car space per 70m^2 GFA; plus
- 1 loading space per 800m^2;

The development schedule of areas shows a total area of 16,101.5m^2 which includes approximately 240m^2 of car parking which should be excluded. Application of the above rates to the balance of area results in a requirement for 227 parking spaces.

However, the proposed development is a highly specialised development that is purpose-built and involves sophisticated automated systems. Therefore the number of people on-site will be minimal when compared to typical industrial uses. Specifically, the facility will require a total of 40 staff during the first shift with a reduced 20 staff required during the second shift. Changeover with the night shift (5 staff) will be less critical.

It is assumed that up to 80% of staff will drive to the site (i.e. as a car driver), which results in a peak shift parking demand for 32 spaces associated with Shift 1. An allowance of say 130% of this parking demand is expected to be sufficient to cater for any overlap of parking demands associated with shift changeover periods on the assumption that these will be managed/staggered so that the parking demands of all staff (both shifts) do not need to be fully accommodated at any one time. This also provides an increased allowance for visitor parking outside of shift changeover periods.

Having regard for the above, it is considered that an on-site parking provision of 44 car spaces will be sufficient to accommodate the parking demands associated with the site and this is in accordance with the operator's expectations based on extensive experience.

The proposed development includes a number of waste delivery bays for each separate facility which are considered sufficient to meet the specific requirements of this specialised development.

5.2 disabled parking

Assuming the facility is a Class 8 building under the BCA classification system, then this results in a requirement to provide a single disabled car space per 100 spaces provided (or part thereof). This results in a requirement to provide a single accessible parking space.

Two spaces have been provided with a width of 3.8 metres in accordance with Council's DCP.

5.3 bicycle facilities

Council's DCP 2005 – Section 4.5.1 requires that bicycle parking be provided at a rate of 1 space per 20 car spaces. This results in a requirement to provide 2 spaces based on the parking demand stated above. These spaces are to be provided as Class 2 compounds as specified in AS 2890.3. Again, this can be dealt with under a suitable condition of consent.

6. traffic impacts

6.1 trip generation

6.1.1 employee trips

Having regard for existing bus and rail services and the need to promote alternate transport modes as far as practicable, 80% of employees have been assumed to drive to the site with an average car occupancy of 1.0 persons per vehicle. This represents a worst case scenario given the potential for some ride sharing. This results in a peak traffic generation of 48 vehicles per hour (with a 2:1 split in the direction of the main shift). This peak staff generation is expected to occur between 1.30-2.30pm, due to the shift changeover period, which occurs outside the on-street peak periods.

Staff traffic volumes are reduced during other periods with a total of about 104 movements per day associated with staff arrivals and departures.

The 2006 journey-to-work data indicates the following distribution of employees to/from the surrounding area:

- North 11% 2in, 4out
- East 66% 11in, 22out
- South 23% 4in, 8out
- West 0% nil

A similar trip distribution has been assumed for employees of the proposed development.

- North 2in, 4out
- East 11in, 22out
- South 6in, 12out
- West nil

Trips to both the south, east and west are expected to be distributed to the south along James Ruse Drive due to the nature of the surrounding road network.

6.1.2 deliveries and contractor movements

A total of up to 184 truck movements per day are associated with the subject development. These deliveries are relatively evenly distributed over the course of the day, with a maximum number of trucks per hour for each shift as follows:

- Shift 1 18 truck movements (9 in, 9 out);
- Shift 2 22 truck movements (11 in, 11 out);
- Night shift 6 truck movements (3 in, 3 out);

This assumes that separate trucks are required for inbound and outbound deliveries to various facilities which effectively doubles the number of truck deliveries indicated by the truck distribution table included in **appendix e**. The peak during Shift 2 occurs at 2.00pm with a reduced traffic generation of 12 truck movements per hour during the typical on-street PM peak.

6.1.3 combined trips

The peak traffic activity associated with the site will occur at approximately 2pm for both staff vehicles and peak truck arrivals and departures which results in a total of up to 70 vehicles per hour. As stated previously, this will occur outside the normal on-street peak periods.

Total daily traffic volumes will be in the order of 288 movements per day, the majority (184) of these being associated with truck deliveries.

6.2 peak period Intersection performances

The peak site related traffic is expected to occur outside of on-street peak periods when additional capacity is expected to be available compared to peak on-street periods.

Development related traffic during on-street peak periods will be associated with truck arrivals and departures with the following during both the morning and afternoon peak periods:

- AM peak 18 truck movements (14 in, 4 out);
- PM peak 12 truck movements (6 in, 6 out)

It is assumed that truck movements will be predominantly focused on the M4 Motorway to the south of the site which provides access to the wider Sydney region. This trend is evident from the existing truck movements at this intersection from Grand Avenue which demonstrate up to 75 percent of truck movements are directed to the south along James Ruse Drive.

These increases are very moderate (even assuming all trucks use this route) in the context of the high traffic volumes on surrounding roads. The performance of the critical intersection after the addition of the above trips is summarised in Table 3, below.

Table 3: existing + development intersection performances

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
James Ruse Dr / Grand Ave / Hassall St	AM	signals	1.222	203.4	F
	PM		1.348	295.4	F
	1.30-2.30pm		1.000	77.5	F
Grand Avenue / Grand Avenue North	PM	priority	0.489	41.3	C
	1.30-2.30pm		0.412	32.9	C

It is evident from the modelling that the development will result in minimal change to the performance of this intersection during the on-street morning peak and site related peak traffic periods. Increased delays during the PM peak as modelled are 'disproportionate' to the increase in traffic of only 5 vehicles per hour on any one approach and is considered to be a result of the existing saturated conditions experienced by this intersection. The increase in traffic during this period is expected to be within the daily fluctuations in traffic and is not considered to warrant any remedial works to any

surrounding intersections. The Level of Service at the intersection of Grand Avenue and Grand Avenue North is expected to reduced to LOS C (from B), however this still remains within acceptable performance parameters for an unsignalised intersection.

In summary, the proposed development generates only moderate traffic during on-street peak periods. Improvements to this intersection would be considered beneficial in terms of the performance of the surrounding road network, however any upgrading works are not considered warranted as a result of the subject development. In this regard, it is expected that any future works would be undertaken by the RTA and Council as a result of other considerations and these works are not relied upon by the subject development.

Furthermore, development traffic has the ability to use Colquhoun Street, Unwin Street and Wentworth Street to access Parramatta Road negating the need for traffic to use this intersection, if required. Table 4, below, demonstrates the relative intersection performances during the critical PM peak were this to be conditioned for heavy vehicles during the afternoon peak.

Table 4: intersection performance - alternative egress route

Intersection Description	Period	Control Type	Degree of Saturation	Intersection Delay	Level of Service
James Ruse Dr / Berry St / Parramatta Rd (existing)	PM	signals	0.880	34.6	C
James Ruse Dr / Berry St / Parramatta Rd (proposed if traffic is required to redistribute)	PM	signals	0.891	34.8	C
James Ruse Dr / Grand Ave / Hassal St (existing)	PM	signals	1.347	288.3	F
James Ruse Dr / Grand Ave / Hassal St (proposed if traffic is required to redistribute)	PM	signals	1.347	288.8	F

It can be seen that delays at the intersections of James Ruse Drive with both Parramatta Road and Grand Avenue will remain relatively unchanged from the existing scenario with redistribution of site related heavy vehicle movements. In this regard, the proposed alternate route seeks to reduce delays to existing traffic at the expense of additional travel time for site related traffic. This alternate route also permits vehicles to avoid potential queuing in Grand Avenue on approach to James Ruse Drive which can extend back to the intersection of Grand Avenue North.In summary, the impacts of the development can readily be accommodated through a suitable condition of consent requiring all truck egress movements to occur via this alternate route to Parramatta Road during the PM peak (4.00-6.00pm), in the event that Council and/or the DoP were to consider the additional delays at the intersection of James Ruse Drive unacceptable. Vehicle movements from the site can be accommodated with only moderate changes to existing delays at all other times. In this regard, whilst widening of the rail over bridge could potentially improve the performance and capacity of the critical intersection (James Ruse Drive, Hassal Street and Grand Avenue), however these works are considered extremely costly and not considered justified for the purposes of the subject application.

6.3 construction traffic

It is anticipated that construction of the development will involve the following number of vehicle movements and contractors during respective work stages:

- Stage 1 – Excavation for services
  - 6 to 8 weeks
  - 80 Trucks over 20 day period to remove contaminated soil
  - 4 -5 staff
- Stage 2 – Building platform
  - 2 to 3 months
  - 40 Truck movements on/off site per day
  - 20 staff

- Stage 3 – Construction of plant
    - 9 to 12 months
    - Up to 20 Truck movements per day
    - Up to 40 Staff (average 25-30)

The number of truck movements and staff numbers in all stages are less than is expected to occur when the development is operational. Therefore, any traffic impacts are also expected to be reduced and also acceptable. This can be confirmed by a construction traffic management plan report prior to the physical commencement of works, in the event that this is required by Council.

6.4 road safety impacts

The RTA has suggested a Road Safety Audit be undertaken as part of the assessment process. It is expected that a detailed Road Safety Audit can be undertaken prior to construction or occupation through a suitable condition of consent. Nevertheless, a preliminary review of road safety in the vicinity of the site has been undertaken to ensure that there are no significant issues that would affect the proposed development. In this regard, accident data has been obtained from the RTA for the latest reporting period between 2005 and 2009.

A summary of the accident locations is provided in **Figure 5** below, with Summary Crash Reports included in **Appendix E**. It should be noted that there is duplication within the summary crash report of accidents that are recorded along all routes.

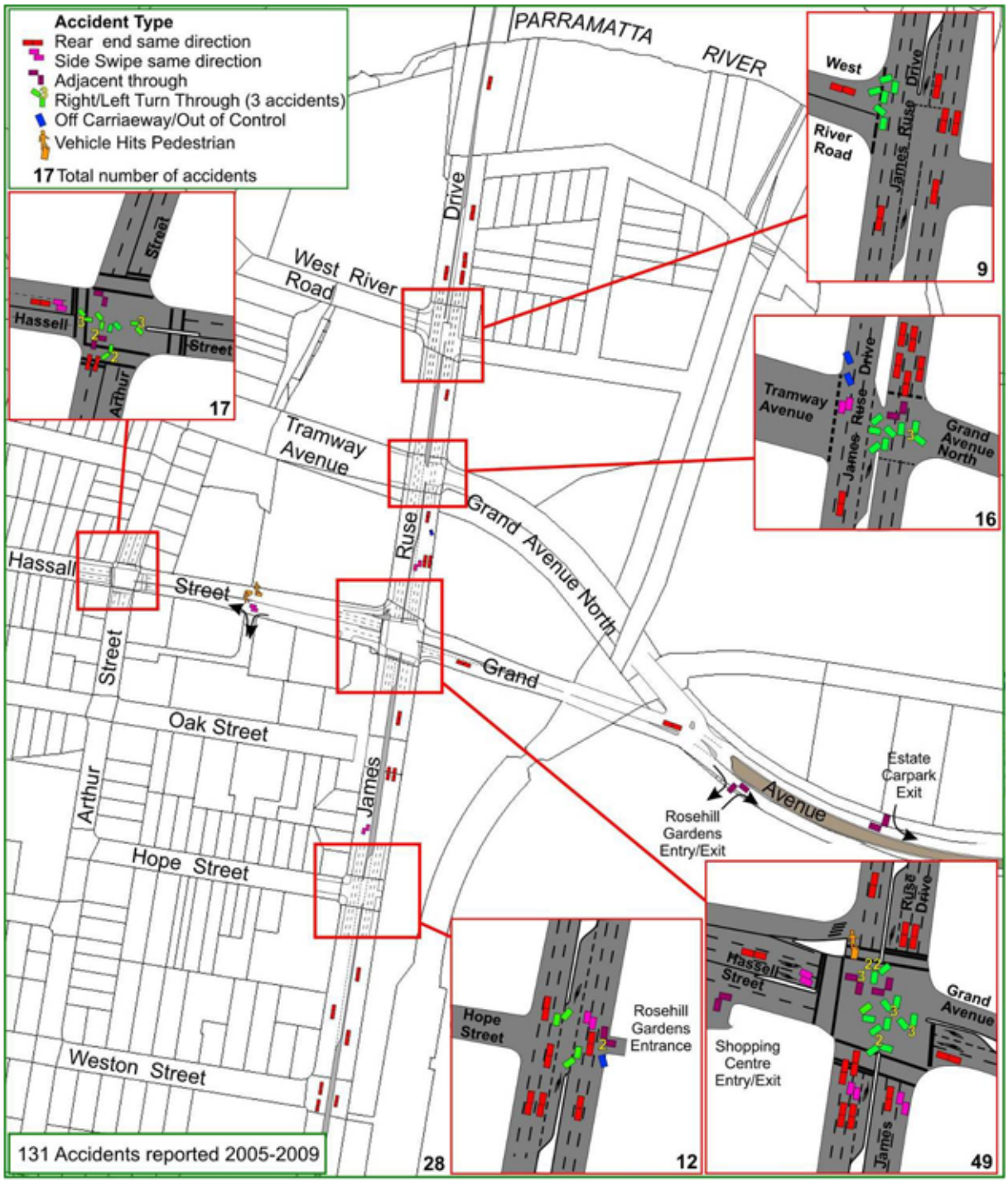


Figure 5: Accident Location & Type

It can be seen that there are a number of accidents at the major signalised intersection of James Ruse Drive with Grand Avenue. However, this should be viewed in the context of the high traffic volumes passing through this intersection which results in a reduced 'effective' crash rate when compared with other sites. The accident data demonstrates that a high proportion these accidents relate to rear end and turning movement accidents in the vicinity of the James Ruse Drive and Grand Avenue intersection. This is expected to be a result of queuing on approach to this intersection and driver frustration at delays associated with this intersection operation which encourage drivers to accept reduced gaps in opposing traffic. In this regard, additional signage warning of potential queuing may be beneficial at this intersection. Nevertheless, it should be emphasised that there were no fatality crashes during the reported period. In this regard, it is expected that the priority for any remedial works would be lower than a number of other locations throughout the State.

Only a single rear end accident occurred at the intersection of Grand Avenue and Grand Avenue North over the reported period, with no accidents at the at-grade rail crossing on Grand Avenue North. This is consistent with the findings of the *Remondis Risk Assessment - Impact of Recycling Operations at Grand Avenue on Camellia Level Crossing and Environs*, dated 25 November 2010, which concludes that the traffic associated with the site is acceptable, subject to some minor remedial measures.

In summary, the moderate traffic volumes associated with the development are not expected to exacerbate any existing accident trends. A detailed Road Safety Audit can be undertaken prior to construction / occupation that can identify any low cost measures to assist in reducing existing accident trends in the locality, namely at the intersection of James Ruse Drive and Grand Avenue.

7. access & internal design aspects

7.1 access

Access by an MRV can be achieved whilst passing a B85 vehicle, at the intersection of Grand Avenue with Grand Avenue North, which is considered acceptable. A HRV will require the full width of the road which is also considered acceptable having regard for the less frequent demand for vehicles of this size and the relatively low traffic volumes using Grand Avenue North and is also consistent with AS 2890.2. A single on-street parking space can be removed on the eastern side of Grand Avenue North in order to permit simultaneous passing of an HRV and B85 car as indicated by the swept paths in **Appendix G** in the event that Council were to consider this necessary.

Access to the site itself is proposed from Grand Avenue North, in the vicinity of the existing site access. This will provide access to a 14 metre wide internal road as discussed below. It is expected that access to the site will be required generally for 8.8 metre medium rigid vehicles, however occasional access by up to 12.5 metre rigid vehicles (HRV) and 'Truck and Dog' combination vehicles can be achieved as demonstrated by the swept paths.

Grand Avenue north traverses a rail level crossing to the south of the site. The *Remondis Risk Assessment - Impact of Recycling Operations at Grand Avenue on Camellia Level Crossing and Environs* concludes that the traffic associated with the development is acceptable, subject to some minor remedial measures.

7.2 internal design

The internal road system generally comprises a circulation loop road that runs in a clockwise direction around the centrally located facilities. Circulation within the site is shown in **appendix f** for a truck and dog combination, with access to loading facilities demonstrated by 12.5 metre rigid vehicles.

Substantial manoeuvring area is provided at adjacent to this circulation roadway to provide access to the recycling facilities and drop-off/pick-up locations.

Car parking areas are generally designed with a minimum space width of 2.5 metres. Spaces 5 and 10 currently do not provide sufficient width.

Finally it is expected that the proposed access and internal design would be subject to design certification prior to construction. In this regard, a general condition of consent requiring compliance with AS2890.1 and AS2890.2 is considered sufficient to deal with any minor inconsistencies.

8. conclusions

In summary:

- The surrounding road network, particularly James Ruse Drive in the vicinity of the site, currently exceeds capacity resulting in significant delays for road users during peak periods. It should be noted that the proposed development is a highly specialised and automated operation which results in a comparatively low traffic generation when considering other potential (and historic) uses of the site;

- The development will generate in the order of 288 vehicle movements per day with a peak hourly traffic generation of up to 70 vehicles per hour which does not coincide with on-street peak periods. Peak site related traffic is a result of shift changeover times which generally occur prior to on-street peak periods;

- Delays at surrounding intersections will remain relatively unchanged by the proposed development during the peak site traffic and morning on-street periods. Increased delays at the intersection of James Ruse Drive and Grand Avenue are not considered to warrant works to this intersection on behalf of the applicant for the reasons outlined in Section 6, including the ability for site traffic to redistribute to less congested intersections during this time;

- Traffic generation during on-street peak periods will be significantly reduced compared to shift changeover times and be in the order of 18 vehicles per hour and 12 vehicles per hour during the morning and afternoon peak periods, respectively. These are moderate increases in traffic and are not considered to warrant improvements to the surrounding road deficiencies;

- A total of 44 parking spaces are provided on-site for use by staff and visitors. This provides an allowance for some spare capacity to accommodate overflow parking that may occur during shift changeover periods;

- The access and internal design are considered supportable subject to the comments in Section 7 and subsequent construction design development;

It is therefore concluded that the proposed development is supportable on traffic planning grounds and the proposed development will operate satisfactorily.

appendix a

photographic record

View east towards the site access on Grand Avenue.

View north towards the Grand Avenue railway crossing.

View west towards the intersection between Grand Avenue and Grand Avenue North.

View east towards the intersection between Grand Avenue and Grand Avenue North

View East along Hassall Street towards its intersection with James Ruse Drive and Grand Avenue.

View south west toward towards the intersection between Grand Avenue and Colquhoun Street.

appendix b

cycleway maps

Sydney and Parramatta

Your guide to cycling from Parramatta to Sydney's inner western and eastern suburbs and the lower north shore.

How to use this map

This map has been produced to let cyclists know about the cycling facilities and to choose routes. The map shows the location of existing on-road and off-road cycling routes and facilities. The map also offers you a general guide to the likely difficulty you should expect to experience on particular routes in the region.

The cycleways map is like a street directory for cyclists. It helps you discover a suitable route for bicycle trips on streets or suburbs that always or that you have never been before. Sydney stations are also known to links you plan longer trips without the need for a car!

Keep in mind your safety and obey all road rules. Remember, riding defensively and keeping alert at all times will help to make your cycling safer and more enjoyable.

Main features of the cycleways map

SHARED PATH

These are paths built specifically to be shared with other cyclists and pedestrians. Shared paths are signposted and marked accordingly so that you can tell. If unsure, remain to share the path with pedestrians.

Keep in mind that any cyclist the law requires you to ride to the left of the path and give pedestrians priority. Take care when you are crossing roads and watch out for motor vehicles.

ON-ROAD FACILITIES

On-road bicycle facilities include bike lanes, wider shoulders or simply adequate road space to share with other traffic. These facilities have been marked with bicycle signs and/or bicycle logos to show the route.

On-road difficulty ratings

The map gives you a guide to the level of difficulty you are normally likely to find when cycling along these routes. Of course, traffic and weather conditions can make your ride more difficult.

GREEN: LOW DIFFICULTY ON-ROAD ROUTES

Green routes are generally low difficulty rides. These routes are suitable for young and inexperienced riders. They are generally road connected with other streets and cycle routes. Lots of intersections also mean lots of alternatives to take next.

PURPLE: MODERATE DIFFICULTY ON-ROAD ROUTES

Purple or moderate difficulty routes see more traffic than low difficulty routes and you will find fast riding them is more challenging. Purple routes mostly have one lane of traffic in each direction with a parking lane as well.

RED/PINK: HIGH DIFFICULTY ON-ROAD ROUTES

Brown or high difficulty routes are for more challenging and should only be used by experienced cyclists. When you see these routes you will often be sharing the road with a high volume of motor vehicles. Brown routes generally have more than one lane of traffic in each direction.

Remember you are the best judge of the most suitable cycle route for your needs based on your skill and fitness level and on your comfort in different traffic situations.

INTERSECTIONS

You should be extremely careful at intersections. Make sure that drivers and other road users see you have noticed. Use clear hand signals when you are turning or changing lanes so other road users know what you are doing.

STEEP GRADIENTS

These include railway crossings, bridges and locations where the road suddenly narrows and the cyclist is forced into a narrow position. Keep alert at these points.

HILLS

Where you see the symbol ▲▲▲▲ on the map (green) and an arrow the number of the symbol will vary with the route difficulty rating.

BIKE PARKING

Locations where there are secure bicycle parking facilities provided are shown by ⊡.

For details on how to hire a bike locker at a railway station, phone Bicycle NSW on (02) 9281 5181.

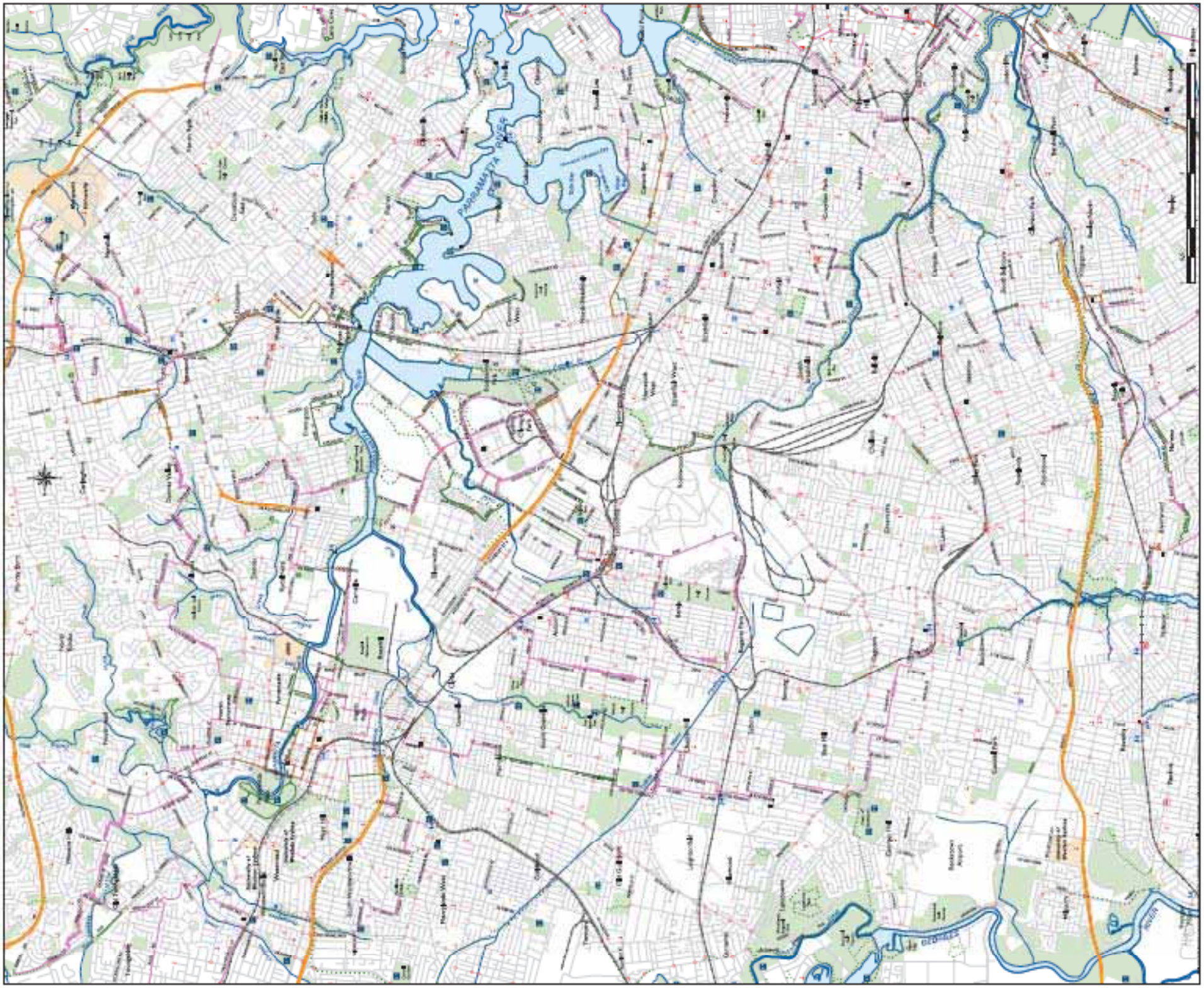
PLANNING A JOURNEY

It is useful to check the start and end of your trip on the maps and choose a bike route linking the two. Keep in mind that the route chosen should reflect your riding capability and preference.

CYCLING ETIQUETTE AND LAWS

The RTA produces 'Cyclewise' Maps for the Newcastle, Central Coast, Illawarra and Sydney regions.

To obtain free copies phone 1800 06 0137.



appendix c

survey results

Curtis Traffic Surveys

Turning movement count

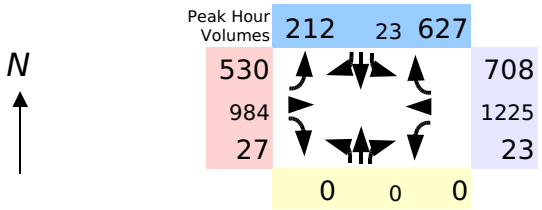
Job: 100302tx

Day, date: Thu 4 Mar 10

Location: James Ruse Dr, Berry St & Parramatta Rd

Weather: Fine

Client: Traffix



Time Period	From James Ruse Dr						From Parramatta Rd west						From Berry St (one way southbound)						From Parramatta Rd east						Total vehicle movements	
	Left		Through		Right		Left		Through		Right		Left		Through		Right		Left		Through		Right			
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles		
16:00 to 16:15	84	2	13	0	47	4	89	7	141	6	10	4	0	0	0	0	0	0	7	1	247	7	127	0	796	
16:15 to 16:30	129	9	20	0	30	4	125	9	230	13	6	0	0	0	0	0	0	0	10	0	228	17	118	3	951	
16:30 to 16:45	114	4	5	1	56	12	115	3	210	7	6	0	0	0	0	0	0	0	7	0	265	12	167	5	989	
16:45 to 17:00	15	2	14	3	47	7	100	6	197	6	5	1	0	0	0	0	0	0	9	0	240	19	102	5	778	
17:00 to 17:15	168	1	14	0	57	4	162	7	254	15	13	1	0	0	0	0	0	0	10	0	251	6	163	2	1128	Peak
17:15 to 17:30	138	2	4	0	27	3	133	5	241	8	3	2	0	0	0	0	0	0	8	1	325	14	196	1	1111	
17:30 to 17:45	174	3	2	0	62	5	90	3	188	12	2	1	0	0	0	0	0	0	2	0	285	6	156	6	997	
17:45 to 18:00	133	8	3	0	54	0	126	4	259	7	3	2	0	0	0	0	0	0	2	0	326	12	184	0	1123	
Hourly Summary	955	31	75	4	380	39	940	44	1720	74	48	11	0	0	0	0	0	0	55	2	2167	93	1213	22		
16:00 to 17:00	342	17	52	4	180	27	429	25	778	32	27	5	0	0	0	0	0	0	33	1	980	55	514	13	3514	
16:15 to 17:15	426	16	53	4	190	27	502	25	891	41	30	2	0	0	0	0	0	0	36	0	984	54	550	15	3846	
16:30 to 17:30	435	9	37	4	187	26	510	21	902	36	27	4	0	0	0	0	0	0	34	1	1081	51	628	13	4006	
16:45 to 17:45	495	8	34	3	193	19	485	21	880	41	23	5	0	0	0	0	0	0	29	1	1101	45	617	14	4014	
17:00 to 18:00	613	14	23	0	200	12	511	19	942	42	21	6	0	0	0	0	0	0	22	1	1187	38	699	9	4359	Peak Hour

Curtis Traffic Surveys

Turning movement count

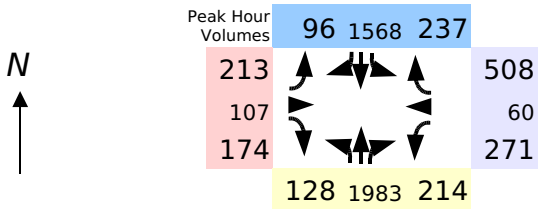
Job: 100806tx

Day, date: Thu 19 Aug 10

Location: James Ruse Dr, Grand Av & Hassall St

Weather: Fine

Client: Traffix

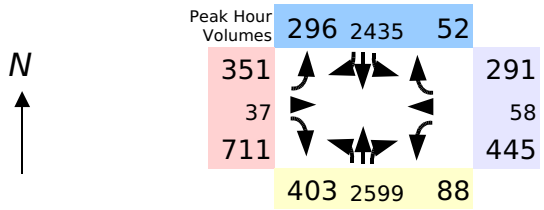


Time Period	From James Ruse Dr north						From Hassall St						From James Ruse Dr south						From Grand Av						Total vehicle movements
	Left		Through		Right		Left		Through		Right		Left		Through		Right		Left		Through		Right		
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	
13:30 to 13:45	94	7	380	32	30	26	29	13	33	4	23	11	10	10	235	33	33	6	42	0	20	2	88	2	1163
13:45 to 14:00	53	3	273	34	23	15	41	14	22	4	43	5	21	13	288	25	56	0	63	3	18	1	84	5	1107
14:00 to 14:15	47	3	282	14	24	22	38	8	28	3	31	3	23	5	261	31	41	2	58	4	16	1	78	1	1024
14:15 to 14:30	55	7	402	8	20	21	45	22	21	1	32	10	14	17	367	36	61	4	77	5	14	1	103	5	1348
14:30 to 14:45	65	4	437	23	15	11	47	20	28	7	46	7	16	13	478	38	49	4	72	0	22	1	94	4	1501 Peak
14:45 to 15:00	104	0	373	9	14	12	26	16	32	5	41	5	24	11	404	27	53	1	106	1	13	0	142	5	1424
15:00 to 15:15	27	1	319	11	17	12	35	18	21	1	36	5	18	12	400	41	53	0	80	1	13	0	151	8	1280
15:15 to 15:30	31	5	378	18	11	4	35	16	13	0	28	6	25	9	548	47	53	1	10	1	11	0	103	1	1354
Hourly Summary	476	30	2844	149	154	123	296	127	198	25	280	52	151	90	2981	278	399	18	508	15	127	6	843	31	
13:30 to 14:30	249	20	1337	88	97	84	153	57	104	12	129	29	68	45	1151	125	191	12	240	12	68	5	353	13	4642
13:45 to 14:45	220	17	1394	79	82	69	171	64	99	15	152	25	74	48	1394	130	207	10	270	12	70	4	359	15	4980
14:00 to 15:00	271	14	1494	54	73	66	156	66	109	16	150	25	77	46	1510	132	204	11	313	10	65	3	417	15	5297
14:15 to 15:15	251	12	1531	51	66	56	153	76	102	14	155	27	72	53	1649	142	216	9	335	7	62	2	490	22	5553
14:30 to 15:30	227	10	1507	61	57	39	143	70	94	13	151	23	83	45	1830	153	208	6	268	3	59	1	490	18	5559 Peak Hour

Curtis Traffic Surveys

Turning movement count

Job: 100302tx
Day, date: Thu 4 Mar 10
Location: James Ruse Dr, Grand Av & Hassall St
Weather: Fine
Client: Traffic Solutions

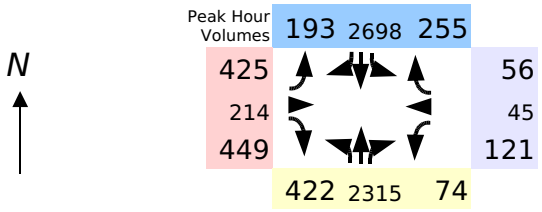


Time Period	From James Ruse Dr north						From Hassall St						From James Ruse Dr south						From Grand Av						Total vehicle movements	
	Left		Through		Right		Left		Through		Right		Left		Through		Right		Left		Through		Right			
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles		
16:00 to 16:15	12	5	512	19	39	6	65	4	15	1	142	5	66	5	632	14	14	21	77	23	17	5	39	6	1744	
16:15 to 16:30	17	7	507	24	46	5	74	3	13	0	150	4	74	4	623	11	12	18	68	15	14	2	41	5	1737	
16:30 to 16:45	12	6	556	22	56	6	87	2	15	1	168	5	85	3	595	12	11	12	73	19	13	0	42	3	1804	
16:45 to 17:00	7	4	604	23	79	4	103	3	10	1	188	0	95	2	651	13	9	14	87	16	12	3	65	6	1999	
17:00 to 17:15	6	5	612	16	68	3	82	2	6	0	175	2	105	1	678	11	8	18	128	15	15	1	91	5	2053	Peak
17:15 to 17:30	8	4	585	17	79	1	71	1	4	0	172	1	110	2	630	9	7	9	95	12	13	1	75	4	1910	
17:30 to 17:45	7	3	567	15	89	1	67	2	8	0	159	1	64	3	617	16	8	5	68	10	12	2	62	5	1791	
17:45 to 18:00	12	2	545	11	105	0	71	0	15	2	117	3	72	2	568	14	5	5	72	7	10	0	52	3	1693	
Hourly Summary	81	36	4488	147	561	26	620	17	86	5	1271	21	671	22	4994	100	74	102	668	117	106	14	467	37		
16:00 to 17:00	48	22	2179	88	220	21	329	12	53	3	648	14	320	14	2501	50	46	65	305	73	56	10	187	20	7284	
16:15 to 17:15	42	22	2279	85	249	18	346	10	44	2	681	11	359	10	2547	47	40	62	356	65	54	6	239	19	7593	
16:30 to 17:30	33	19	2357	78	282	14	343	8	35	2	703	8	395	8	2554	45	35	53	383	62	53	5	273	18	7766	Peak Hour
16:45 to 17:45	28	16	2368	71	315	9	323	8	28	1	694	4	374	8	2576	49	32	46	378	53	52	7	293	20	7753	
17:00 to 18:00	33	14	2309	59	341	5	291	5	33	2	623	7	351	8	2493	50	28	37	363	44	50	4	280	17	7447	

Curtis Traffic Surveys

Turning movement count

Job: 100302tx
Day, date: Thu 4 Mar 10
Location: James Ruse Dr, Grand Av & Hassall St
Weather: Fine
Client: Traffic Solutions



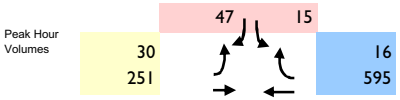
Time Period	From James Ruse Dr north						From Hassall St						From James Ruse Dr south						From Grand Av						Total vehicle movements	
	Left		Through		Right		Left		Through		Right		Left		Through		Right		Left		Through		Right			
	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles	Light Vehicles	Heavy Vehicles		
07:00 to 07:15	47	5	624	19	40	2	95	3	29	4	85	3	89	1	489	15	8	11	3	19	6	2	2	7	1608	
07:15 to 07:30	51	6	670	21	36	1	101	5	37	5	99	5	92	2	567	19	6	12	6	23	8	0	6	8	1786	
07:30 to 07:45	61	5	652	25	42	1	110	4	45	4	115	4	108	1	595	21	10	10	5	24	12	3	4	11	1872	
07:45 to 08:00	73	3	690	33	51	0	102	5	61	5	125	3	110	2	549	20	9	9	8	20	9	1	5	6	1899	Peak
08:00 to 08:15	52	4	585	22	62	0	92	6	51	6	95	3	104	3	522	22	10	8	13	22	10	2	11	5	1710	
08:15 to 08:30	40	8	451	18	86	1	72	5	46	4	88	4	108	2	522	24	11	10	9	18	11	3	7	8	1556	
08:30 to 08:45	41	6	439	17	59	2	67	4	42	3	75	3	122	1	553	27	14	7	10	22	9	1	5	10	1539	
08:45 to 09:00	47	10	423	23	63	0	75	4	41	7	86	5	102	5	495	26	10	14	10	29	4	5	11	8	1503	
Hourly Summary	412	47	4534	178	439	7	714	36	352	38	768	30	835	17	4292	174	78	81	64	177	69	17	51	63		
07:00 to 08:00	232	19	2636	98	169	4	408	17	172	18	424	15	399	6	2200	75	33	42	22	86	35	6	17	32	7165	
07:15 to 08:15	237	18	2597	101	191	2	405	20	194	20	434	15	414	8	2233	82	35	39	32	89	39	6	26	30	7267	Peak Hour
07:30 to 08:30	226	20	2378	98	241	2	376	20	203	19	423	14	430	8	2188	87	40	37	35	84	42	9	27	30	7037	
07:45 to 08:45	206	21	2165	90	258	3	333	20	200	18	383	13	444	8	2146	93	44	34	40	82	39	7	28	29	6704	
08:00 to 09:00	180	28	1898	80	270	3	306	19	180	20	344	15	436	11	2092	99	45	39	42	91	34	11	34	31	6308	

Curtis Traffic Surveys

Turning movement count

Job: 110403tx
Day, date: Thu 14 Apr 11
Location: Grand Av & Grand Av Nth
Weather: Fine
Client: Traffix

Peak Hour Volumes



Time Period	From Grand Av east: Through Light vehicles	Through Heavy vehicles	Right Light vehicles	Right Heavy vehicles	From Grand Av Nth: Left Light vehicles	Left Heavy vehicles	Right Light vehicles	Right Heavy vehicles	From Grand Av west: Left Light vehicles	Left Heavy vehicles	Through Light vehicles	Through Heavy vehicles	Total	
16:00 to 16:15	115	16	2	0	3	1	5	0	2	4	39	11	198	
16:15 to 16:30	130	17	5	0	5	1	1	1	5	0	46	22	233	
16:30 to 16:45	135	17	4	1	5	1	10	1	5	4	43	16	242	
16:45 to 17:00	117	20	1	1	1	1	13	0	6	0	51	12	223	
17:00 to 17:15	142	17	4	0	1	0	20	1	9	1	46	15	256	peak
17:15 to 17:30	99	10	0	1	1	0	13	2	7	0	34	11	178	
17:30 to 17:45	131	15	0	0	3	0	14	0	4	0	48	6	221	
17:45 to 18:00	85	10	2	0	2	0	11	0	6	0	41	5	162	
Total	954	122	18	3	21	4	87	5	44	9	348	98		
Hourly summary														
16:00 to 17:00	497	70	12	2	14	4	29	2	18	8	179	61	896	
16:15 to 17:15	524	71	14	2	12	3	44	3	25	5	186	65	954	peak hour
16:30 to 17:30	493	64	9	3	8	2	56	4	27	5	174	54	899	
16:45 to 17:45	489	62	5	2	6	1	60	3	26	1	179	44	878	
17:00 to 18:00	457	52	6	1	7	0	58	3	26	1	169	37	817	

Previous Survey Results
Grand Avenue Volumes

Time Period	westbound LV	westbound HV	westbound Total	eastbound LV	eastbound HV	eastbound Total	TOTAL	Difference
16:00 to 16:15	133	34	*167*	41	27	*68*	235	119%
16:15 to 16:30	123	22	*145*	42	25	*67*	212	91%
16:30 to 16:45	128	22	*150*	38	19	*57*	207	86%
16:45 to 17:00	164	25	*189*	26	19	*45*	234	105%
17:00 to 17:15	234	21	*255*	20	23	*43*	298	116%
17:15 to 17:30	183	17	*200*	19	13	*32*	232	130%
17:30 to 17:45	142	17	*159*	23	8	*31*	190	86%
17:45 to 18:00	134	10	*144*	32	9	*41*	185	114%
Hourly summary								
16:00 to 17:00	548	103	*651*	147	90	*237*	888	99%
16:15 to 17:15	649	90	*739*	126	86	*212*	951	100%
16:30 to 17:30	709	85	*794*	103	74	*177*	971	108%
16:45 to 17:45	723	80	*803*	88	63	*151*	954	109%
17:00 to 18:00	693	65	*758*	94	53	*147*	905	111%

FACTORED VOLUMES

Time Period	From Grand Av east: Through Light vehicles	Through Heavy vehicles	Right Light vehicles	Right Heavy vehicles	From Grand Av Nth: Left Light vehicles	Left Heavy vehicles	Right Light vehicles	Right Heavy vehicles	From Grand Av west: Left Light vehicles	Left Heavy vehicles	Through Light vehicles	Through Heavy vehicles	Total	% Increase
16:00 to 16:15	147	20	3	0	4	1	6	0	3	5	53	15	256	129%
16:15 to 16:30	128	17	5	0	5	1	1	1	5	0	45	22	229	98%
16:30 to 16:45	133	17	4	1	4	1	9	1	5	4	42	15	235	97%
16:45 to 17:00	161	28	1	1	1	1	14	0	4	0	36	9	257	115%
17:00 to 17:15	228	27	6	0	1	0	23	1	6	1	32	11	337	132%
17:15 to 17:30	182	18	0	2	1	0	17	3	5	0	24	8	260	146%
17:30 to 17:45	143	16	0	0	3	0	12	0	2	0	28	3	207	94%
17:45 to 18:00	129	15	3	0	2	0	13	0	5	0	37	4	208	129%
Total	1250.36	158.639	22.2552	4.20127	20.7667	4.00144	93.8622	5.53605	35.7289	10.0093	297.038	86.9625		
Hourly summary														
16:00 to 17:00	569	82	13	2	13	4	29	2	17	9	176	61	977	109%
16:15 to 17:15	651	88	17	2	11	3	46	3	20	5	156	56	1058	111%
16:30 to 17:30	704	90	12	4	8	2	62	5	20	5	135	42	1089	121%
16:45 to 17:45	713	90	8	3	6	1	66	4	18	1	121	30	1060.4	121%
17:00 to 18:00	681	77	9	2	7	0	65	4	19	1	121	26	1011.9	124%

TRAFFIX

TRAFFIX SURVEYS		
Location:		Grand Ave / Grand Ave North
Date:		9-May-11
Time:		1:45pm - 2:45pm
Weather:		Overcast
Surveyor(s):		PC

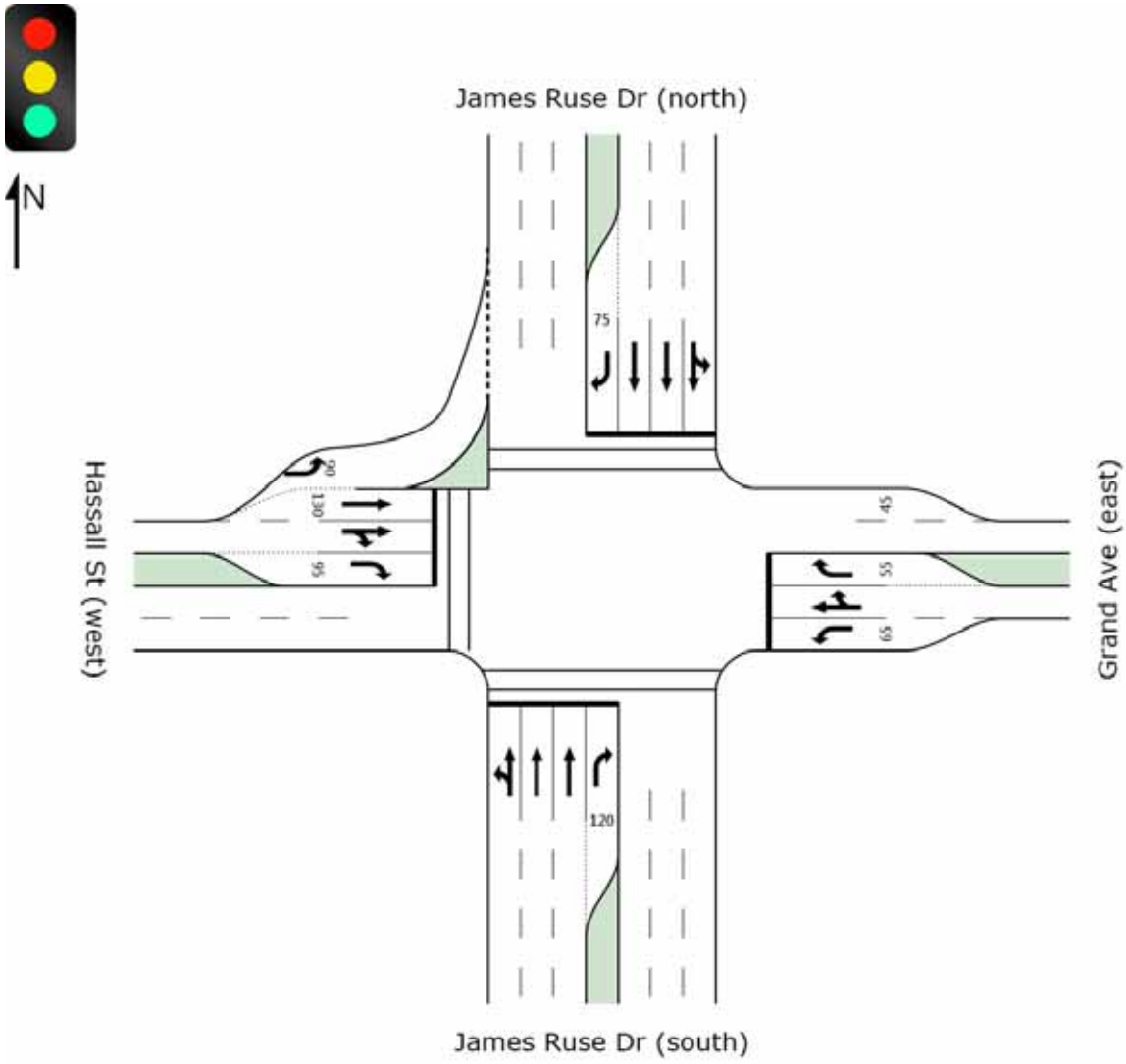
	Movement						
	Grand Avenue - East			Grand Avenue - West		Grand Avenue North	
	Through	Right	U-Turn	Left	Through	Left	Right
Time Period							
1:45-2:00pm	101	0	0	6	99	1	5
2:00-2:15pm	114	4	1	8	90	4	3
2:15-2:30pm	127	1	2	6	99	5	9
2:30-2:45pm	150	1	3	6	77	7	8
Total Hour							
Total Hour	**492**	**6**	**6**	**26**	**365**	**17**	**25**

appendix d

sidra results

appendix d1

existing scenario


N
James Ruse Dr (north)
75
90
130
95
45
55
65
Hassall St (west)
Grand Ave (east)
120
James Ruse Dr (south)

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX-AM

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing
Period: AM (7.15-8.15am)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	444	1.9	1.102	178.6	LOS F	124.6	892.7	1.00	1.40	10.5
2	T	2437	3.5	1.102	169.0	LOS F	126.7	913.8	1.00	1.52	11.2
3	R	78	52.7	0.962	117.5	LOS F	8.9	90.2	1.00	1.04	14.9
Approach		2959	4.6	1.102	169.1	LOS F	126.7	913.8	1.00	1.49	11.2
East: Grand Ave (east)											
4	L	127	73.6	0.855	79.0	LOS F	11.0	125.2	0.87	0.93	19.4
5	T	47	13.3	0.276	60.3	LOS E	6.2	53.1	0.92	0.72	21.6
6	R	59	53.6	0.276	69.9	LOS E	6.2	53.1	0.91	0.76	21.2
Approach		234	56.3	0.855	72.9	LOS F	11.0	125.2	0.89	0.84	20.3
North: James Ruse Dr (north)											
7	L	268	7.1	1.221	281.4	LOS F	171.7	1249.5	1.00	1.80	7.1
8	T	2916	3.7	1.221	271.7	LOS F	174.9	1263.7	1.00	1.88	7.5
9	R	127	1.0	1.147	235.4	LOS F	18.4	130.1	1.00	1.26	8.2
Approach		3312	3.8	1.221	271.1	LOS F	174.9	1263.7	1.00	1.85	7.5
West: Hassall St (west)											
10	L	415	4.7	1.000 [3]	34.7	LOS C	21.1	153.5	0.77	0.81	30.9
11	T	257	9.3	1.159	165.8	LOS F	48.2	355.3	0.97	1.23	10.5
12	R	473	3.3	1.158	140.8	LOS F	48.2	355.3	1.00	1.12	12.4
Approach		1145	5.1	1.159	107.9	LOS F	48.2	355.3	0.91	1.03	15.1
All Vehicles		7649	5.9	1.221	201.2	LOS F	174.9	1263.7	0.98	1.56	9.6

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	29.5	LOS C	0.1	0.1	0.63	0.63
All Pedestrians		159	55.9				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX-PM

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing
Period: PM (4.30-5.30pm)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	424	2.0	1.331	381.6	LOS F	196.2	1395.2	1.00	1.96	5.3
2	T	2736	1.7	1.331	372.2	LOS F	200.3	1423.0	1.00	2.17	5.7
3	R	93	60.2	1.188	278.5	LOS F	15.3	162.8	1.00	1.34	7.1
Approach		3253	3.4	1.331	370.8	LOS F	200.3	1423.0	1.00	2.12	5.7
East: Grand Ave (east)											
4	L	225	13.9	1.000 [3]	62.3	LOS E	14.9	117.1	0.99	0.83	22.2
5	T	304	8.6	1.322	376.5	LOS F	78.6	601.8	1.00	1.67	5.2
6	R	306	6.2	1.322	197.2	LOS F	78.6	601.8	0.98	1.16	9.4
Approach		836	10.7	1.322	226.1	LOS F	78.6	601.8	0.99	1.26	8.2
North: James Ruse Dr (north)											
7	L	55	36.5	1.193	264.1	LOS F	145.6	1064.4	1.00	1.83	7.5
8	T	2751	3.2	1.197	253.1	LOS F	148.0	1064.5	1.00	1.82	8.0
9	R	123	4.7	1.144	233.9	LOS F	17.9	130.6	1.00	1.26	8.3
Approach		2929	4.0	1.197	252.5	LOS F	148.0	1064.5	1.00	1.79	8.0
West: Hassall St (west)											
10	L	369	2.3	0.912	45.3	LOS D	21.4	153.0	0.77	0.85	27.0
11	T	39	5.4	0.115	55.2	LOS D	3.4	25.1	0.87	0.66	23.1
12	R	748	1.1	1.346	272.0	LOS F	84.1	594.6	1.00	1.33	7.1
Approach		1157	1.6	1.347	192.3	LOS F	84.1	594.6	0.92	1.15	9.6
All Vehicles		8175	4.1	1.347	288.3	LOS F	200.3	1423.0	0.99	1.78	7.0

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	65.3	LOS F	0.2	0.2	0.93	0.93
P5	Across N approach	53	66.3	LOS F	0.2	0.2	0.94	0.94
P7	Across W approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
All Pedestrians		159	55.2				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX-(1.30pm)

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing
Period: (1.30-2.30pm)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	119	39.8	0.831	65.8	LOS E	33.6	270.3	0.99	0.94	23.8
2	T	1343	9.8	0.831	54.2	LOS D	35.5	270.3	0.99	0.93	25.3
3	R	214	5.9	0.620	69.4	LOS E	15.8	116.1	0.97	0.83	21.6
Approach		1676	11.4	0.832	57.0	LOS E	35.5	270.3	0.99	0.92	24.7
East: Grand Ave (east)											
4	L	265	4.8	0.945	56.7	LOS E	15.9	115.7	0.94	0.86	23.4
5	T	77	6.8	0.978	104.9	LOS F	27.7	201.2	1.00	1.12	14.8
6	R	385	3.6	0.979	95.7	LOS F	27.7	201.2	0.99	0.99	16.7
Approach		727	4.3	0.979	82.4	LOS F	27.7	201.2	0.97	0.95	18.3
North: James Ruse Dr (north)											
7	L	283	7.4	0.987	107.2	LOS F	58.0	429.5	1.00	1.13	16.0
8	T	1510	6.2	0.987	97.3	LOS F	59.5	438.8	1.00	1.19	17.2
9	R	181	46.4	1.000 [3]	72.2	LOS F	14.0	136.9	0.98	0.83	21.4
Approach		1974	10.2	1.000	96.4	LOS F	59.5	438.8	1.00	1.15	17.3
West: Hassall St (west)											
10	L	221	27.1	0.546	24.1	LOS B	9.5	81.6	0.56	0.74	36.8
11	T	122	10.3	0.448	60.8	LOS E	10.1	78.9	0.93	0.74	21.5
12	R	166	18.4	0.448	70.9	LOS F	10.1	78.9	0.95	0.80	20.6
Approach		509	20.2	0.547	48.2	LOS D	10.1	81.6	0.78	0.76	25.8
All Vehicles		4886	10.8	1.000	75.8	LOS F	59.5	438.8	0.97	1.00	20.3

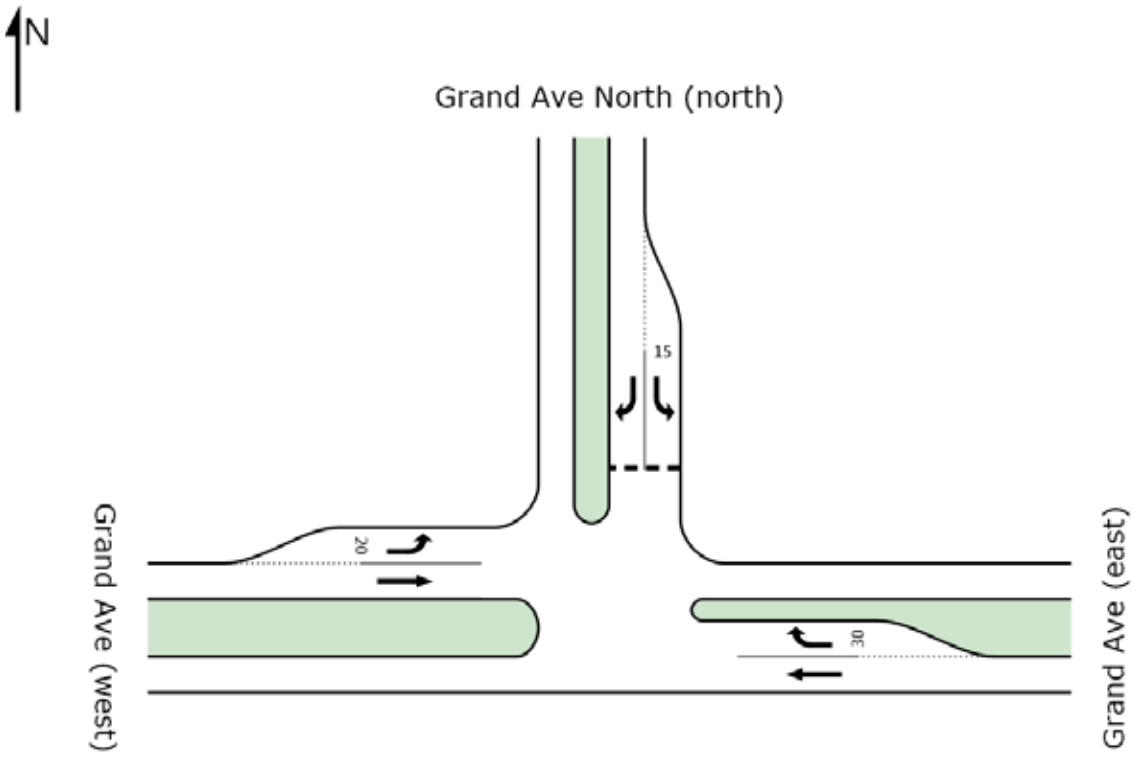
Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	43.3	LOS E	0.2	0.2	0.76	0.76
All Pedestrians		159	60.5				0.89	0.89

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).


N
Grand Ave North (north)
15
20
30
Grand Ave (west)
Grand Ave (east)

MOVEMENT SUMMARY

Site: Grand Ave / Grand Avenue North_PM_EX

Grand Avenue / Grand Avenue North
Period: PM
Scenario: Existing (Factored Volumes)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Grand Ave (east)											
5	T	836	11.3	0.460	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R	17	25.0	0.022	8.0	LOS A	0.1	0.8	0.35	0.58	42.1
Approach		853	11.6	0.460	0.2	LOS A	0.1	0.8	0.01	0.01	49.8
North: Grand Ave North (north)											
7	L	11	20.0	0.018	7.9	LOS A	0.1	0.4	0.31	0.58	28.6
9	R	71	7.5	0.362	30.5	LOS C	1.8	13.4	0.88	1.02	12.7
Approach		81	9.1	0.362	27.6	LOS C	1.8	13.4	0.81	0.96	13.7
West: Grand Ave (west)											
10	L	26	20.0	0.016	6.8	LOS A	0.0	0.0	0.00	0.61	38.9
11	T	186	23.7	0.110	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		213	23.3	0.110	0.8	LOS A	0.0	0.0	0.00	0.08	48.3
All Vehicles		1146	13.6	0.460	2.2	NA	1.8	13.4	0.06	0.09	47.1

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

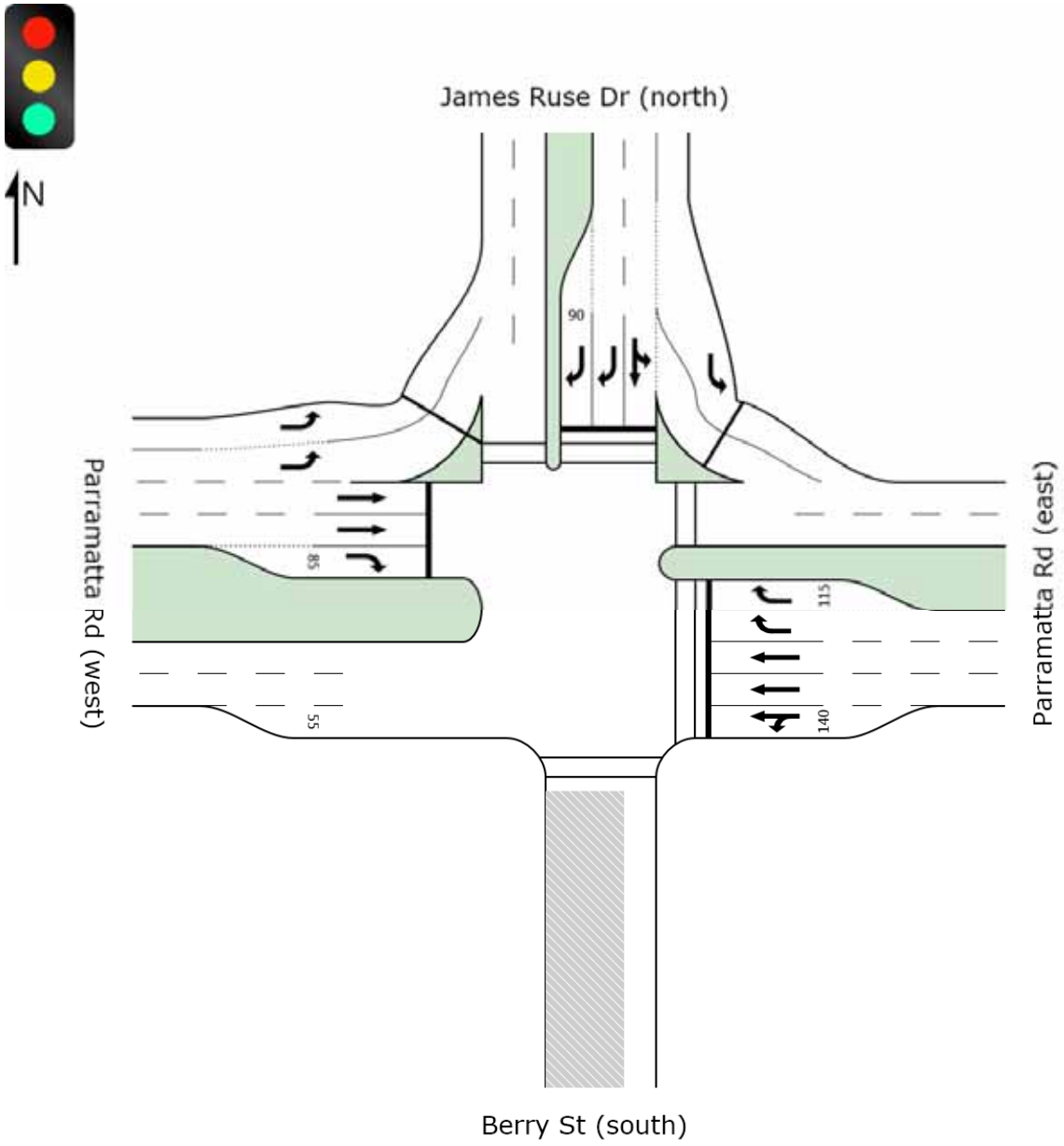
Site: Grand Ave / Grand Avenue North_PM (site peak)_EX

Grand Avenue / Grand Avenue North
Period: PM (1.30-2.30pm)
Scenario: Existing
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Grand Ave (east)											
5	T	518	11.3	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R	13	25.0	0.018	9.6	LOS A	0.1	0.7	0.49	0.65	41.0
Approach		531	11.7	0.285	0.2	LOS A	0.1	0.7	0.01	0.02	49.7
North: Grand Ave North (north)											
7	L	26	20.0	0.051	9.4	LOS A	0.2	1.4	0.46	0.67	26.7
9	R	26	7.5	0.105	20.7	LOS B	0.5	3.5	0.79	0.92	16.7
Approach		53	13.7	0.105	15.0	LOS B	0.5	3.5	0.62	0.79	20.5
West: Grand Ave (west)											
10	L	27	20.0	0.017	6.8	LOS A	0.0	0.0	0.00	0.61	38.9
11	T	384	23.7	0.227	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		412	23.5	0.227	0.5	LOS A	0.0	0.0	0.00	0.04	49.1
All Vehicles		995	16.7	0.285	1.1	NA	0.5	3.5	0.04	0.07	48.4

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS B. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.


James Ruse Dr (north)
N
90
85
55
115
140
Parramatta Rd (west)
Parramatta Rd (east)
Berry St (south)

MOVEMENT SUMMARY

Site: James Ruse Dr_Parramatta Rd-EX_PM

James Ruse Dr / Parramatta Rd / Berry St
Scenario: Existing
Period: PM (5.00-6.00pm)
Signals - Fixed Time Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Parramatta Rd (east)											
4	L	24	4.3	0.232	23.6	LOS B	6.4	46.0	0.60	0.90	28.2
5	T	1289	3.1	0.606	19.2	LOS B	20.9	149.9	0.76	0.67	27.8
6	R	745	1.3	0.880	59.9	LOS E	21.5	152.5	1.00	0.99	15.9
Approach		2059	2.5	0.880	34.0	LOS C	21.5	152.5	0.84	0.79	21.6
North: James Ruse Dr (north)											
7	L	660	2.2	0.337	20.6	LOS B	10.7	76.4	0.59	0.76	38.6
8	T	24	0.0	0.337	13.2	LOS A	10.7	76.4	0.59	0.51	40.7
9	R	223	5.7	0.246	38.6	LOS C	6.1	44.6	0.82	0.77	19.8
Approach		907	3.0	0.337	24.8	LOS B	10.7	76.4	0.64	0.76	34.0
West: Parramatta Rd (west)											
10	L	558	3.6	0.481	38.1	LOS C	12.6	90.8	0.85	0.82	19.6
11	T	1036	4.3	0.853	41.7	LOS C	27.3	197.8	1.00	1.00	15.2
12	R	28	22.2	0.295	61.1	LOS E	2.2	18.0	0.99	0.72	12.1
Approach		1622	4.3	0.853	40.8	LOS C	27.3	197.8	0.95	0.94	16.6
All Vehicles		4588	3.2	0.880	34.6	LOS C	27.3	197.8	0.84	0.84	22.2

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	11	31.2	LOS D	0.0	0.0	0.79	0.79
P3	Across E approach	26	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	11	44.2	LOS E	0.0	0.0	0.94	0.94
All Pedestrians		48	41.2				0.91	0.91

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

appendix d2

existing plus development scenario

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX+Dev-AM

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing + Development
Period: AM (7.15-8.15am)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	444	1.9	1.102	178.6	LOS F	124.6	892.7	1.00	1.40	10.5
2	T	2437	3.5	1.102	169.0	LOS F	126.7	913.8	1.00	1.52	11.2
3	R	92	59.8	1.173	264.4	LOS F	14.8	156.9	1.00	1.32	7.4
Approach		2973	5.0	1.173	173.4	LOS F	126.7	913.8	1.00	1.49	11.0
East: Grand Ave (east)											
4	L	133	74.6	0.895	74.8	LOS F	10.9	125.3	0.88	0.88	20.2
5	T	47	13.3	0.280	60.4	LOS E	6.2	53.8	0.92	0.72	21.5
6	R	60	54.4	0.280	69.9	LOS E	6.2	53.8	0.91	0.76	21.2
Approach		240	57.5	0.895	70.7	LOS F	10.9	125.3	0.89	0.82	20.7
North: James Ruse Dr (north)											
7	L	271	7.8	1.223	282.7	LOS F	172.1	1253.9	1.00	1.80	7.0
8	T	2916	3.7	1.223	273.0	LOS F	175.5	1267.9	1.00	1.89	7.5
9	R	127	1.0	1.147	235.4	LOS F	18.4	130.1	1.00	1.26	8.2
Approach		3314	3.9	1.222	272.3	LOS F	175.5	1267.9	1.00	1.86	7.5
West: Hassall St (west)											
10	L	415	4.7	1.000 [3]	34.7	LOS C	21.1	153.5	0.77	0.81	30.9
11	T	258	9.8	1.164	169.5	LOS F	49.0	361.5	0.97	1.24	10.3
12	R	473	3.3	1.165	142.8	LOS F	49.0	361.5	1.00	1.13	12.3
Approach		1146	5.1	1.165	109.7	LOS F	49.0	361.5	0.91	1.04	14.9
All Vehicles		7673	6.2	1.222	203.4	LOS F	175.5	1267.9	0.98	1.56	9.5

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue		Prop. Queued	Effective Stop Rate
					Pedestrian	Distance		
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	29.5	LOS C	0.1	0.1	0.63	0.63
All Pedestrians		159	55.9				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX+Dev-PM

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing+Development
Period: PM (4.30-5.30pm)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	424	2.0	1.331	381.6	LOS F	196.2	1395.2	1.00	1.96	5.3
2	T	2736	1.7	1.331	372.2	LOS F	200.3	1423.0	1.00	2.17	5.7
3	R	98	62.4	1.143	239.2	LOS F	14.9	160.5	1.00	1.28	8.1
Approach		3258	3.6	1.331	369.4	LOS F	200.3	1423.0	1.00	2.12	5.7
East: Grand Ave (east)											
4	L	226	14.9	1.000 [3]	61.9	LOS E	14.8	117.2	0.99	0.83	22.3
5	T	309	8.6	1.348	399.7	LOS F	82.3	633.0	1.00	1.71	4.9
6	R	307	6.5	1.349	207.8	LOS F	82.3	633.0	0.98	1.18	9.0
Approach		842	11.4	1.348	239.1	LOS F	82.3	633.0	0.99	1.28	7.9
North: James Ruse Dr (north)											
7	L	56	37.7	1.214	282.4	LOS F	150.4	1100.3	1.00	1.89	7.1
8	T	2751	3.2	1.217	271.4	LOS F	153.0	1100.3	1.00	1.88	7.5
9	R	123	4.7	1.144	233.9	LOS F	17.9	130.6	1.00	1.26	8.3
Approach		2931	4.0	1.217	270.0	LOS F	153.0	1100.3	1.00	1.85	7.5
West: Hassall St (west)											
10	L	369	2.3	0.912	45.3	LOS D	21.4	153.0	0.77	0.85	27.0
11	T	39	5.4	0.115	55.2	LOS D	3.4	25.1	0.87	0.66	23.1
12	R	748	1.1	1.346	271.9	LOS F	84.1	594.6	1.00	1.33	7.1
Approach		1157	1.6	1.347	192.2	LOS F	84.1	594.6	0.92	1.15	9.6
All Vehicles		8187	4.3	1.348	295.4	LOS F	200.3	1423.0	0.99	1.80	6.9

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	65.3	LOS F	0.2	0.2	0.93	0.93
P5	Across N approach	53	66.3	LOS F	0.2	0.2	0.94	0.94
P7	Across W approach	53	34.7	LOS D	0.2	0.2	0.68	0.68
All Pedestrians		159	55.4				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX+Dev-(1.30pm)

James Ruse Drive / Grand Avenue / Hassall Street, CamelliaScenario: Existing+DevelopmentPeriod: (1.30-2.30pm)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	119	39.8	0.831	65.8	LOS E	33.6	270.3	0.99	0.94	23.8
2	T	1343	9.8	0.831	54.2	LOS D	35.5	270.3	0.99	0.93	25.3
3	R	238	8.8	0.786	77.4	LOS F	18.6	140.4	1.00	0.88	20.1
Approach		1700	11.8	0.832	58.3	LOS E	35.5	270.3	0.99	0.92	24.3
East: Grand Ave (east)											
4	L	276	6.9	1.000 [3]	54.0	LOS D	15.6	116.0	1.00	0.85	24.2
5	T	107	8.1	0.978	103.4	LOS F	30.8	225.2	1.00	1.11	14.9
6	R	392	4.0	0.978	93.4	LOS F	30.8	225.2	0.98	0.98	16.9
Approach		775	5.6	1.000	80.8	LOS F	30.8	225.2	0.99	0.95	18.6
North: James Ruse Dr (north)											
7	L	287	8.1	0.994	111.0	LOS F	59.3	440.3	1.00	1.15	15.6
8	T	1514	6.2	0.994	101.0	LOS F	61.0	449.8	1.00	1.21	16.7
9	R	176	46.4	1.000 [3]	75.4	LOS F	14.0	136.9	1.00	0.83	20.8
Approach		1978	10.3	1.000	100.2	LOS F	61.0	449.8	1.00	1.16	16.8
West: Hassall St (west)											
10	L	221	27.1	0.553	24.2	LOS B	9.5	82.1	0.57	0.74	36.7
11	T	123	11.1	0.450	60.8	LOS E	10.1	79.4	0.93	0.74	21.5
12	R	166	18.4	0.450	71.0	LOS F	10.1	79.4	0.95	0.80	20.6
Approach		511	20.4	0.553	48.3	LOS D	10.1	82.1	0.78	0.76	25.8
All Vehicles		4963	11.1	1.000	77.5	LOS F	61.0	449.8	0.97	1.01	19.9

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue		Prop. Queued	Effective Stop Rate
					Pedestrian	Distance		
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	66.3	LOS F	0.2	0.2	0.94	0.94
P5	Across N approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P7	Across W approach	53	43.3	LOS E	0.2	0.2	0.76	0.76
All Pedestrians		159	59.6				0.89	0.89

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: Grand Ave / Grand Avenue North_PM_EX + DEV (on-street peak flows)

Grand Avenue / Grand Avenue North
Period: PM
Scenario: Existing (Factored Volumes) + On-Street Peak Period Flows
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Grand Ave (east)											
5	T	836	11.3	0.460	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R	17	25.0	0.022	8.1	LOS A	0.1	0.8	0.36	0.58	42.1
Approach		853	11.6	0.460	0.2	LOS A	0.1	0.8	0.01	0.01	49.8
North: Grand Ave North (north)											
7	L	11	20.0	0.018	7.9	LOS A	0.1	0.4	0.32	0.58	28.5
9	R	77	15.1	0.489	41.3	LOS C	2.6	20.2	0.92	1.08	10.1
Approach		87	15.7	0.491	37.3	LOS C	2.6	20.2	0.84	1.02	10.9
West: Grand Ave (west)											
10	L	33	35.5	0.022	7.1	LOS A	0.0	0.0	0.00	0.60	38.9
11	T	186	23.7	0.110	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		219	25.5	0.110	1.1	LOS A	0.0	0.0	0.00	0.09	47.9
All Vehicles		1159	14.5	0.491	3.1	NA	2.6	20.2	0.07	0.10	46.0

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

MOVEMENT SUMMARY

Site: Grand Ave / Grand Avenue North_PM (site peak)_EX+DEV

Grand Avenue / Grand Avenue North
Period: PM (1.30-2.30pm)
Scenario: Existing + Development
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
							Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Grand Ave (east)											
5	T	518	11.3	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
6	R	13	25.0	0.019	10.0	LOS A	0.1	0.8	0.51	0.66	40.7
Approach		531	11.7	0.285	0.2	LOS A	0.1	0.8	0.01	0.02	49.7
North: Grand Ave North (north)											
7	L	26	20.0	0.052	9.5	LOS A	0.2	1.4	0.47	0.68	26.5
9	R	78	17.4	0.412	32.9	LOS C	2.2	17.4	0.88	1.04	12.1
Approach		104	18.0	0.412	27.0	LOS C	2.2	17.4	0.78	0.95	14.0
West: Grand Ave (west)											
10	L	59	28.9	0.038	7.0	LOS A	0.0	0.0	0.00	0.60	38.9
11	T	384	23.7	0.227	0.0	LOS A	0.0	0.0	0.00	0.00	50.0
Approach		443	24.4	0.227	0.9	LOS A	0.0	0.0	0.00	0.08	48.2
All Vehicles		1078	17.5	0.412	3.1	NA	2.2	17.4	0.08	0.13	45.5

LOS (Aver. Int. Delay): NA. The average intersection delay is not a good LOS measure for two-way sign control due to zero delays associated with major road movements.
Level of Service (Worst Movement): LOS C. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on the worst delay for any vehicle movement.

Project: T:\Traffix\2010\10034\Modelling\10 034_110511 Grand Ave North.sip
8000844, TRAFFIX, SINGLE

appendix d3

existing + development (with redistributed heavy vehicles)

MOVEMENT SUMMARY

Site: James Ruse Dr_Parramatta Rd-EX+Dev_PM

James Ruse Dr / Parramatta Rd / Berry St
Scenario: Existing+Development
Period: PM (5.00-6.00pm)
Signals - Fixed Time Cycle Time = 100 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
East: Parramatta Rd (east)											
4	L	24	4.3	0.232	23.6	LOS B	6.4	46.0	0.60	0.90	28.2
5	T	1289	3.1	0.606	19.2	LOS B	20.9	149.9	0.76	0.67	27.8
6	R	751	2.0	0.891	61.5	LOS E	22.1	157.0	1.00	1.01	15.6
Approach		2064	2.7	0.891	34.6	LOS C	22.1	157.0	0.84	0.80	21.3
North: James Ruse Dr (north)											
7	L	665	3.0	0.341	20.4	LOS B	10.8	77.5	0.58	0.76	38.7
8	T	24	0.0	0.341	12.7	LOS A	10.7	76.4	0.58	0.51	41.2
9	R	223	5.7	0.246	38.6	LOS C	6.1	44.6	0.82	0.77	19.8
Approach		913	3.6	0.341	24.6	LOS B	10.8	77.5	0.64	0.76	34.1
West: Parramatta Rd (west)											
10	L	558	3.6	0.481	38.1	LOS C	12.6	90.8	0.85	0.82	19.6
11	T	1036	4.3	0.853	41.7	LOS C	27.3	197.8	1.00	1.00	15.2
12	R	28	22.2	0.295	61.1	LOS E	2.2	18.0	0.99	0.72	12.1
Approach		1622	4.3	0.853	40.8	LOS C	27.3	197.8	0.95	0.94	16.6
All Vehicles		4599	3.5	0.891	34.8	LOS C	27.3	197.8	0.84	0.84	22.1

Level of Service (Aver. Int. Delay): LOS C. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS E. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	11	31.2	LOS D	0.0	0.0	0.79	0.79
P3	Across E approach	26	44.2	LOS E	0.1	0.1	0.94	0.94
P5	Across N approach	11	44.2	LOS E	0.0	0.0	0.94	0.94
All Pedestrians		48	41.2				0.91	0.91

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS E. LOS Method for individual pedestrian movements: Delay (HCM).

MOVEMENT SUMMARY

Site: James Ruse Dr_Grand Ave-EX+Dev (Redistributed)-PM

James Ruse Drive / Grand Avenue / Hassall Street, Camellia
Scenario: Existing+Development (HV Redistributed)
Period: PM (4.30-5.30pm)
Signals - Fixed Time Cycle Time = 150 seconds

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	95% Back of Queue Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: James Ruse Dr (south)											
1	L	424	2.0	1.331	381.6	LOS F	196.2	1395.2	1.00	1.96	5.3
2	T	2736	1.7	1.331	372.2	LOS F	200.3	1423.0	1.00	2.17	5.7
3	R	93	60.2	1.188	278.5	LOS F	15.3	162.8	1.00	1.34	7.1
Approach		3253	3.4	1.331	370.8	LOS F	200.3	1423.0	1.00	2.12	5.7
East: Grand Ave (east)											
4	L	225	13.9	1.000 [3]	62.3	LOS E	14.9	117.1	0.99	0.83	22.2
5	T	304	8.6	1.327	381.4	LOS F	79.4	608.3	1.00	1.68	5.1
6	R	307	6.5	1.328	200.3	LOS F	79.4	608.3	0.98	1.17	9.3
Approach		837	10.8	1.328	228.9	LOS F	79.4	608.3	0.99	1.27	8.2
North: James Ruse Dr (north)											
7	L	56	37.7	1.194	264.8	LOS F	145.8	1066.6	1.00	1.83	7.5
8	T	2751	3.2	1.197	253.8	LOS F	148.3	1066.6	1.00	1.82	8.0
9	R	123	4.7	1.144	233.9	LOS F	17.9	130.6	1.00	1.26	8.3
Approach		2931	4.0	1.197	253.2	LOS F	148.3	1066.6	1.00	1.80	8.0
West: Hassall St (west)											
10	L	369	2.3	0.912	45.3	LOS D	21.4	153.0	0.77	0.85	27.0
11	T	39	5.4	0.115	55.2	LOS D	3.4	25.1	0.87	0.66	23.1
12	R	748	1.1	1.346	272.0	LOS F	84.1	594.6	1.00	1.33	7.1
Approach		1157	1.6	1.347	192.2	LOS F	84.1	594.6	0.92	1.15	9.6
All Vehicles		8177	4.1	1.347	288.8	LOS F	200.3	1423.0	0.99	1.78	7.0

Level of Service (Aver. Int. Delay): LOS F. Based on average delay for all vehicle movements. LOS Method: Delay (RTA NSW).
Level of Service (Worst Movement): LOS F. LOS Method for individual vehicle movements: Delay (RTA NSW).
Approach LOS values are based on average delay for all vehicle movements.

3 x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

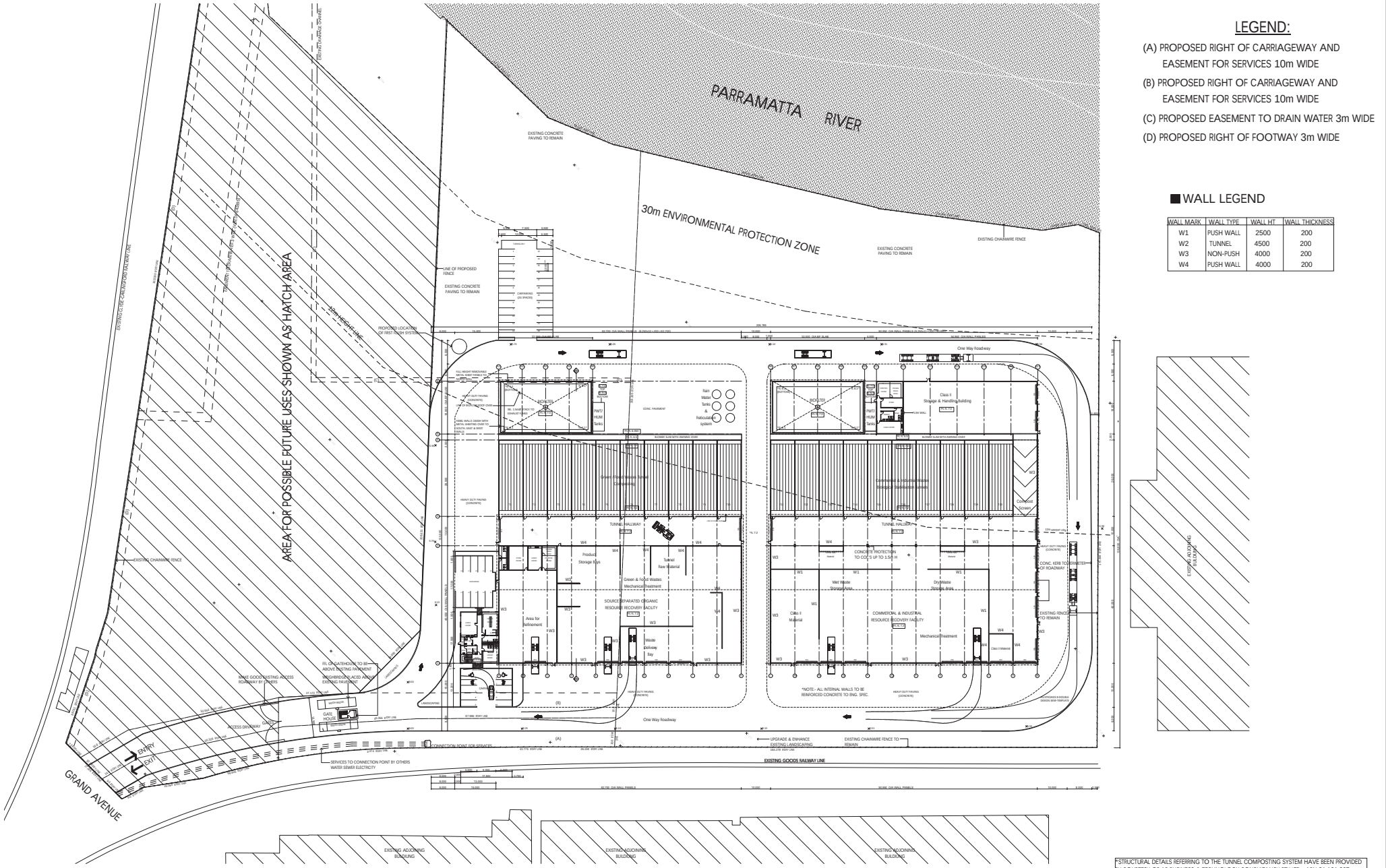
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow	Average Delay	Level of Service	Average Back of Queue Pedestrian	Average Back of Queue Distance	Prop. Queued	Effective Stop Rate
		ped/h	sec		ped	m		per ped
P1	Across S approach	53	65.3	LOS F	0.2	0.2	0.93	0.93
P5	Across N approach	53	66.3	LOS F	0.2	0.2	0.94	0.94
P7	Across W approach	53	34.0	LOS D	0.2	0.2	0.67	0.67
All Pedestrians		159	55.2				0.85	0.85

Level of Service (Aver. Int. Delay): LOS E. Based on average delay for all pedestrian movements. LOS Method: Delay (HCM).
Level of Service (Worst Movement): LOS F. LOS Method for individual pedestrian movements: Delay (HCM).

appendix e

reduced plans



LEGEND:

(A) PROPOSED RIGHT OF CARRIAGEWAY AND EASEMENT FOR SERVICES 10m WIDE

(B) PROPOSED RIGHT OF CARRIAGEWAY AND EASEMENT FOR SERVICES 10m WIDE

(C) PROPOSED EASEMENT TO DRAIN WATER 3m WIDE

(D) PROPOSED RIGHT OF FOOTWAY 3m WIDE

WALL LEGEND

WALL MARK	WALL TYPE	WALL HT	WALL THICKNESS
W1	PUSH WALL	2500	200
W2	TUNNEL	4500	200
W3	NON-PUSH	4000	200
W4	PUSH WALL	4000	200

SITE PLAN
SCALE 1:500

*STRUCTURAL DETAILS REFERRING TO THE TUNNEL COMPOSTING SYSTEM HAVE BEEN PROVIDED BY COURTESY OF AP BUSINESS & TECHNOLOGY CONSULTANCY PTY LTD - ABN 21 101 267 (APBTC). THESE DESIGN DETAILS ARE PROTECTED BY COPYRIGHT OF APBTC AND ARE NOT TO BE USED BY ANY THIRD PART OR ANY OTHER PURPOSE WITHOUT WRITTEN CONSENT OF APBTC

Issue	By	Description	Date
A	CZ	FOR DA CONSULTANTS REVIEW STAGE	30.04.10
B	CZ	AMENDED FOR DA CONSULTANTS REVIEW	20.05.10
C	CZ	AMENDED FOR DA CONSULTANTS REVIEW	24.08.10
D	CZ	AMENDED FOR DA CONSULTANTS REVIEW	27.08.10
E	CZ	AMENDED FOR CLIENT	10.11.10

General Notes:
1) All dimensions and floor areas are to be verified by the Builder prior to the commencement of any building work. Any discrepancies are to be brought to the attention of the designer.
2) Levels shown are approximate unless accompanied by reduced levels.
3) Figured dimensions must be taken in preference to scaling.
4) All boundary clearances must be verified by the surveyor prior to the commencement of
5) Where engineering drawings are required such must take preference to this drawing.
6) Stormwater to be discharged to Councils' requirements and AS 3500.3-1990.
7) All services to be located and verified by the Builder with relevant authorities before

PRELIMINARY
DATE: 30.11.10

AP Business & Technology Consultancy Pty Ltd
PO Box 78 Blackburn Victoria 3130

Date	MARCH 2010
Scale	AS NOTED
Drawn	S.PASSARELLI
Checked	C.ZAPPIA

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Project	REMONDIS INTEGARTED RECYCLING PLANT LOT 1B GRAND AVENUE CAMELLIA
Client	REMONDIS PTY LTD
Project No.	P3268
Title	SITE PLAN
Activity Type:	DA
Job No.:	1097-10
Sheet No.:	A01
Issue	E

appendix f

crash summary reports

Summary Crash Report

# Crash Type		
Car Crash	90	92.8%
Light Truck Crash	18	18.6%
Rigid Truck Crash	7	7.2%
Articulated Truck Crash	8	8.2%
'Heavy Truck Crash	(15)	(15.5%)
Bus Crash	2	2.1%
"Heavy Vehicle Crash	(17)	(17.5%)
Emergency Vehicle Crash	1	1.0%
Motorcycle Crash	2	2.1%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	1	1.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	70	72.2%
Non intersection	27	27.8%

* Up to 10 metres from an intersection

~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	5	5.2%
Multi Vehicle	92	94.8%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	97	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	2	2.1%
Fatigue	0	0.0%

Weather		
Fine	77	79.4%
Rain	9	9.3%
Overcast	11	11.3%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	13	13.4%
Dry	84	86.6%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	2.1%
Daylight	74	76.3%
Dusk	7	7.2%
Darkness	14	14.4%

Crash Movement		
Intersection, adjacent approaches	13	13.4%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	26	26.8%
U-turn	1	1.0%
Rear-end	34	35.1%
Lane change	12	12.4%
Parallel lanes; turning	2	2.1%
Vehicle leaving driveway	2	2.1%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	1	1.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	1	1.0%
Off road on straight, hit object	2	2.1%
Out of control on straight	1	1.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	2	2.1%

Speed Limit					
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	1	1.0%	90 km/h zone	1	1.0%
60 km/h zone	11	11.3%	100 km/h zone	0	0.0%
70 km/h zone	84	86.6%	110 km/h zone	0	0.0%
~ 40km/h or less	0	0.0%			

CRASHES	97	
Fatal crash	0	0.0%
Injury crash	29	29.9%
Non-casualty crash	68	70.1%

CASUALTIES	39	
Killed	0	0.0%
Injured	39	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group			% of Day
00:01 - 02:59	2	2.1%	12.5%
03:00 - 04:59	1	1.0%	8.3%
05:00 - 05:59	2	2.1%	4.2%
06:00 - 06:59	3	3.1%	4.2%
07:00 - 07:59	5	5.2%	4.2%
08:00 - 08:59	6	6.2%	4.2%
09:00 - 09:59	8	8.2%	4.2%
10:00 - 10:59	14	14.4%	4.2%
11:00 - 11:59	5	5.2%	4.2%
12:00 - 12:59	4	4.1%	4.2%
13:00 - 13:59	4	4.1%	4.2%
14:00 - 14:59	7	7.2%	4.2%
15:00 - 15:59	7	7.2%	4.2%
16:00 - 16:59	9	9.3%	4.2%
17:00 - 17:59	6	6.2%	4.2%
18:00 - 18:59	3	3.1%	4.2%
19:00 - 19:59	6	6.2%	4.2%
20:00 - 21:59	2	2.1%	8.3%
22:00 - 24:00	3	3.1%	8.3%

Street Lighting Off/Nil			% of Dark
0	of	14 in Dark	0.0%

Crashes		Casualties
15	2009	1
18	2008	8
19	2007	11
18	2006	5
27	2005	14

~ School Travel Time		
Involvement	21	21.6%

McLean Periods			% Week
A	15	15.5%	17.9%
B	2	2.1%	7.1%
C	28	28.9%	17.9%
D	5	5.2%	3.5%
E	9	9.3%	3.6%
F	14	14.4%	10.7%
G	11	11.3%	7.1%
H	8	8.2%	7.1%
I	2	2.1%	12.5%
J	3	3.1%	10.7%

Day of the Week								
Monday	16	16.5%	Thursday	14	14.4%	Sunday	12	12.4%
Tuesday	15	15.5%	Friday	17	17.5%	WEEKDAY	72	74.2%
Wednesday	10	10.3%	Saturday	13	13.4%	WEEKEND	25	25.8%

# Holiday Periods								
New Year	0	0.0%	Queen's BD	1	1.0%	Easter SH	8	8.2%
Aust. Day	1	1.0%	Labour Day	0	0.0%	June/July SH	5	5.2%
Easter	0	0.0%	Christmas	1	1.0%	Sept./Oct. SH	5	5.2%
Anzac Day	2	2.1%	January SH	6	6.2%	December SH	2	2.1%

Crashid dataset 4090 - Crashes along James Ruse Dr from Parramatta River bridge to Weston St intersection. Crashes reported 2005 - 2009

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	74	96.1%
Light Truck Crash	11	14.3%
Rigid Truck Crash	2	2.6%
Articulated Truck Crash	2	2.6%
'Heavy Truck Crash	(4)	(5.2%)
Bus Crash	2	2.6%
"Heavy Vehicle Crash	(6)	(7.8%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	3	3.9%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	67	87.0%
Non intersection	10	13.0%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	1	1.3%
Multi Vehicle	76	98.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	73	94.8%
Unclassified Road	4	5.2%

Contributing Factors		
Speeding	3	3.9%
Fatigue	0	0.0%

Weather		
Fine	62	80.5%
Rain	7	9.1%
Overcast	8	10.4%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	8	10.4%
Dry	69	89.6%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	55	71.4%
Dusk	3	3.9%
Darkness	19	24.7%

Crash Movement		
Intersection, adjacent approaches	17	22.1%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	31	40.3%
U-turn	1	1.3%
Rear-end	16	20.8%
Lane change	1	1.3%
Parallel lanes; turning	3	3.9%
Vehicle leaving driveway	2	2.6%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	3	3.9%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	0	0.0%
Off road on straight, hit object	2	2.6%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	1	1.3%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	15	19.5%	90 km/h zone	0	0.0%
60 km/h zone	26	33.8%	100 km/h zone	0	0.0%
70 km/h zone	36	46.8%	110 km/h zone	0	0.0%
~ 40km/h or less	0	0.0%			

CRASHES	77	
Fatal crash	0	0.0%
Injury crash	29	37.7%
Non-casualty crash	48	62.3%

CASUALTIES	38	
Killed	0	0.0%
Injured	38	100.0%
^ Unrestrained	0	0.0%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

Time Group		% of Day	
00:01 - 02:59	1	1.3%	12.5%
03:00 - 04:59	1	1.3%	8.3%
05:00 - 05:59	1	1.3%	4.2%
06:00 - 06:59	3	3.9%	4.2%
07:00 - 07:59	4	5.2%	4.2%
08:00 - 08:59	2	2.6%	4.2%
09:00 - 09:59	8	10.4%	4.2%
10:00 - 10:59	8	10.4%	4.2%
11:00 - 11:59	5	6.5%	4.2%
12:00 - 12:59	3	3.9%	4.2%
13:00 - 13:59	5	6.5%	4.2%
14:00 - 14:59	5	6.5%	4.2%
15:00 - 15:59	7	9.1%	4.2%
16:00 - 16:59	3	3.9%	4.2%
17:00 - 17:59	2	2.6%	4.2%
18:00 - 18:59	5	6.5%	4.2%
19:00 - 19:59	4	5.2%	4.2%
20:00 - 21:59	5	6.5%	8.3%
22:00 - 24:00	5	6.5%	8.3%

Street Lighting Off/Nil		% of Dark
0	of 19 in Dark	0.0%

Crashes		Casualties
10	2009	4
14	2008	9
19	2007	11
13	2006	5
21	2005	9

~ School Travel Time		
Involvement	16	20.8%

McLean Periods			% Week
A	10	13.0%	17.9%
B	1	1.3%	7.1%
C	27	35.1%	17.9%
D	4	5.2%	3.5%
E	3	3.9%	3.6%
F	11	14.3%	10.7%
G	8	10.4%	7.1%
H	5	6.5%	7.1%
I	5	6.5%	12.5%
J	3	3.9%	10.7%

Day of the Week						# Holiday Periods		
Monday	12	15.6%	Thursday	11	14.3%	Sunday	9	11.7%
Tuesday	13	16.9%	Friday	13	16.9%	WEEKDAY	61	79.2%
Wednesday	12	15.6%	Saturday	7	9.1%	WEEKEND	16	20.8%

New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	5	6.5%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	1	1.3%
Easter	0	0.0%	Christmas	4	5.2%	Sept./Oct. SH	4	5.2%
Anzac Day	1	1.3%	January SH	4	5.2%	December SH	5	6.5%

Crashid dataset 4090 - Crashes along Hassall St from the intersection of Arthur St to approx 250m west of the Colouhoun St intersection. Crashes reported 2005 - 2009

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

Summary Crash Report

# Crash Type		
Car Crash	6	100.0%
Light Truck Crash	1	16.7%
Rigid Truck Crash	0	0.0%
Articulated Truck Crash	1	16.7%
'Heavy Truck Crash	(1)	(16.7%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(1)	(16.7%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	0	0.0%
Pedal Cycle Crash	0	0.0%
Pedestrian Crash	0	0.0%

' Rigid or Artic. Truck " Heavy Truck or Heavy Bus
These categories are NOT mutually exclusive

Location Type		
*Intersection	6	100.0%
Non intersection	0	0.0%

* Up to 10 metres from an intersection
~ 07:30-09:30 or 14:30-17:00 on school days

Collision Type		
Single Vehicle	2	33.3%
Multi Vehicle	4	66.7%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	6	100.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	0	0.0%
Fatigue	0	0.0%

Weather		
Fine	6	100.0%
Rain	0	0.0%
Overcast	0	0.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	1	16.7%
Dry	5	83.3%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	0	0.0%
Daylight	4	66.7%
Dusk	1	16.7%
Darkness	1	16.7%

Crash Movement		
Intersection, adjacent approaches	2	33.3%
Head-on (not overtaking)	0	0.0%
Opposing vehicles; turning	1	16.7%
U-turn	0	0.0%
Rear-end	0	0.0%
Lane change	0	0.0%
Parallel lanes; turning	1	16.7%
Vehicle leaving driveway	0	0.0%
Overtaking; same direction	0	0.0%
Hit parked vehicle	0	0.0%
Hit railway train	0	0.0%
Hit pedestrian	0	0.0%
Permanent obstruction on road	0	0.0%
Hit animal	0	0.0%
Off road, on straight	1	16.7%
Off road on straight, hit object	1	16.7%
Out of control on straight	0	0.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	0	0.0%
Out of control on curve	0	0.0%
Other crash type	0	0.0%

CRASHES	6	
Fatal crash	0	0.0%
Injury crash	2	33.3%
Non-casualty crash	4	66.7%

^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn

CASUALTIES	2	
Killed	0	0.0%
Injured	2	100.0%
^ Unrestrained	0	0.0%

Time Group			% of Day
00:01 - 02:59	1	16.7%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	0	0.0%	4.2%
07:00 - 07:59	0	0.0%	4.2%
08:00 - 08:59	0	0.0%	4.2%
09:00 - 09:59	0	0.0%	4.2%
10:00 - 10:59	2	33.3%	4.2%
11:00 - 11:59	0	0.0%	4.2%
12:00 - 12:59	1	16.7%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	0	0.0%	4.2%
15:00 - 15:59	0	0.0%	4.2%
16:00 - 16:59	0	0.0%	4.2%
17:00 - 17:59	1	16.7%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	1	16.7%	4.2%
20:00 - 21:59	0	0.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Crashes		Casualties
2	2008	0
3	2006	1
1	2005	1

~ School Travel Time		
Involvement	0	0.0%

Street Lighting Off/Nil		% of Dark
0	of 1 in Dark	0.0%

Speed Limit				
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	0	0.0%	90 km/h zone	0	0.0%
60 km/h zone	0	0.0%	100 km/h zone	0	0.0%
70 km/h zone	6	100.0%	110 km/h zone	0	0.0%
~ 40km/h or less	0	0.0%			

McLean Periods			% Week
A	0	0.0%	17.9%
B	0	0.0%	7.1%
C	1	16.7%	17.9%
D	0	0.0%	3.5%
E	2	33.3%	3.6%
F	0	0.0%	10.7%
G	0	0.0%	7.1%
H	2	33.3%	7.1%
I	1	16.7%	12.5%
J	0	0.0%	10.7%

Day of the Week						# Holiday Periods		
Monday	0	0.0%	Thursday	1	16.7%	Sunday	2	33.3%
Tuesday	0	0.0%	Friday	0	0.0%	WEEKDAY	2	33.3%
Wednesday	1	16.7%	Saturday	2	33.3%	WEEKEND	4	66.7%

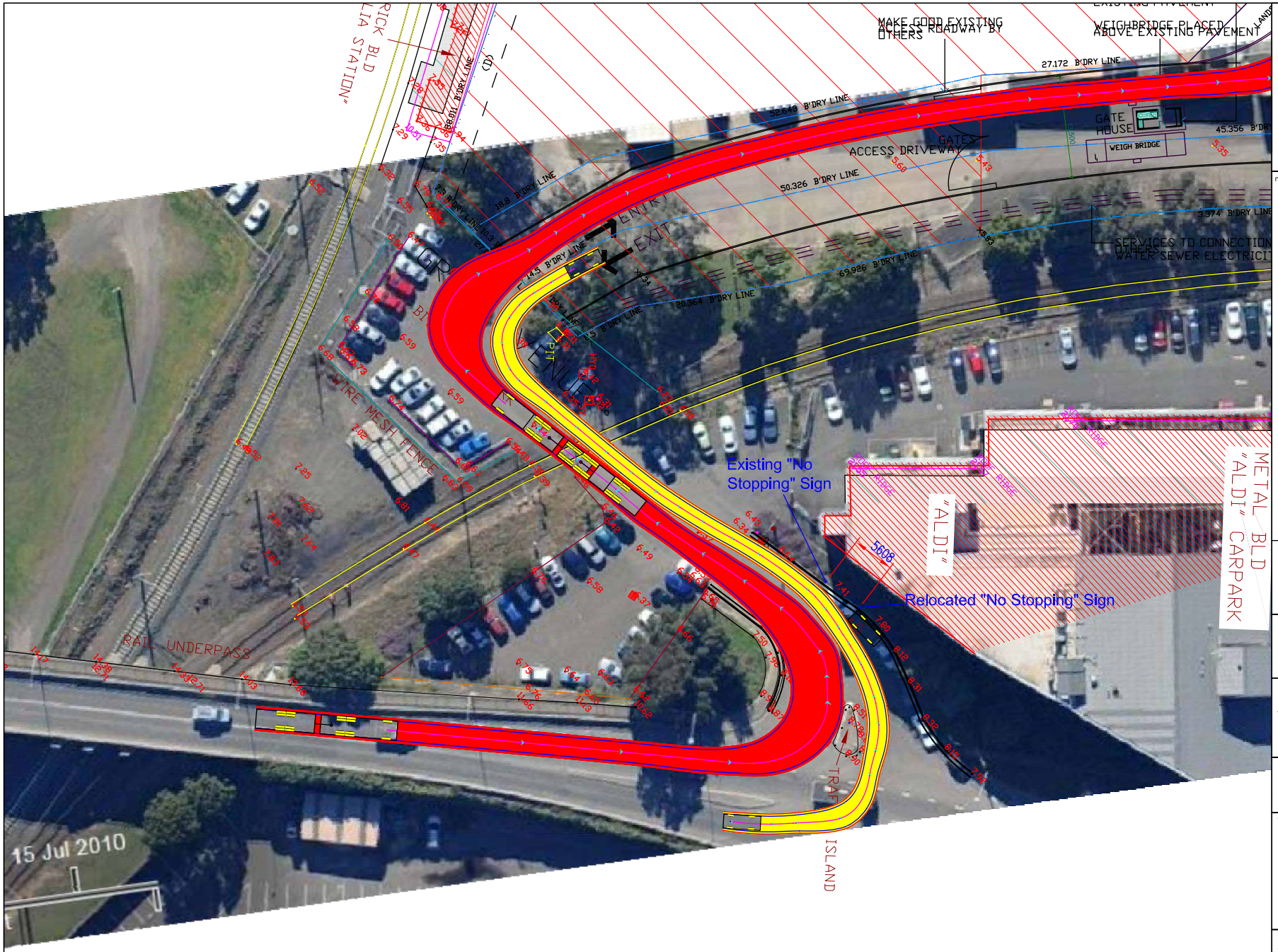
New Year	0	0.0%	Queen's BD	0	0.0%	Easter SH	0	0.0%
Aust. Day	0	0.0%	Labour Day	0	0.0%	June/July SH	0	0.0%
Easter	0	0.0%	Christmas	0	0.0%	Sept./Oct. SH	0	0.0%
Anzac Day	0	0.0%	January SH	0	0.0%	December SH	0	0.0%

Crashid dataset 4090 - Crashes along Grand Ave North between Grand Ave and Clyde-Carlingford Railway. Crashes reported 2005 - 2009

Percentages are percentages of all crashes. Unknown values for each category are not shown on this report.

appendix g

swept paths



no. revision note | by. date

client
Remondis

scale
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m 5 10 15 20
0

project
Materials Recycling Facility
Grand Avenue North
Camellia

drawing prepared by
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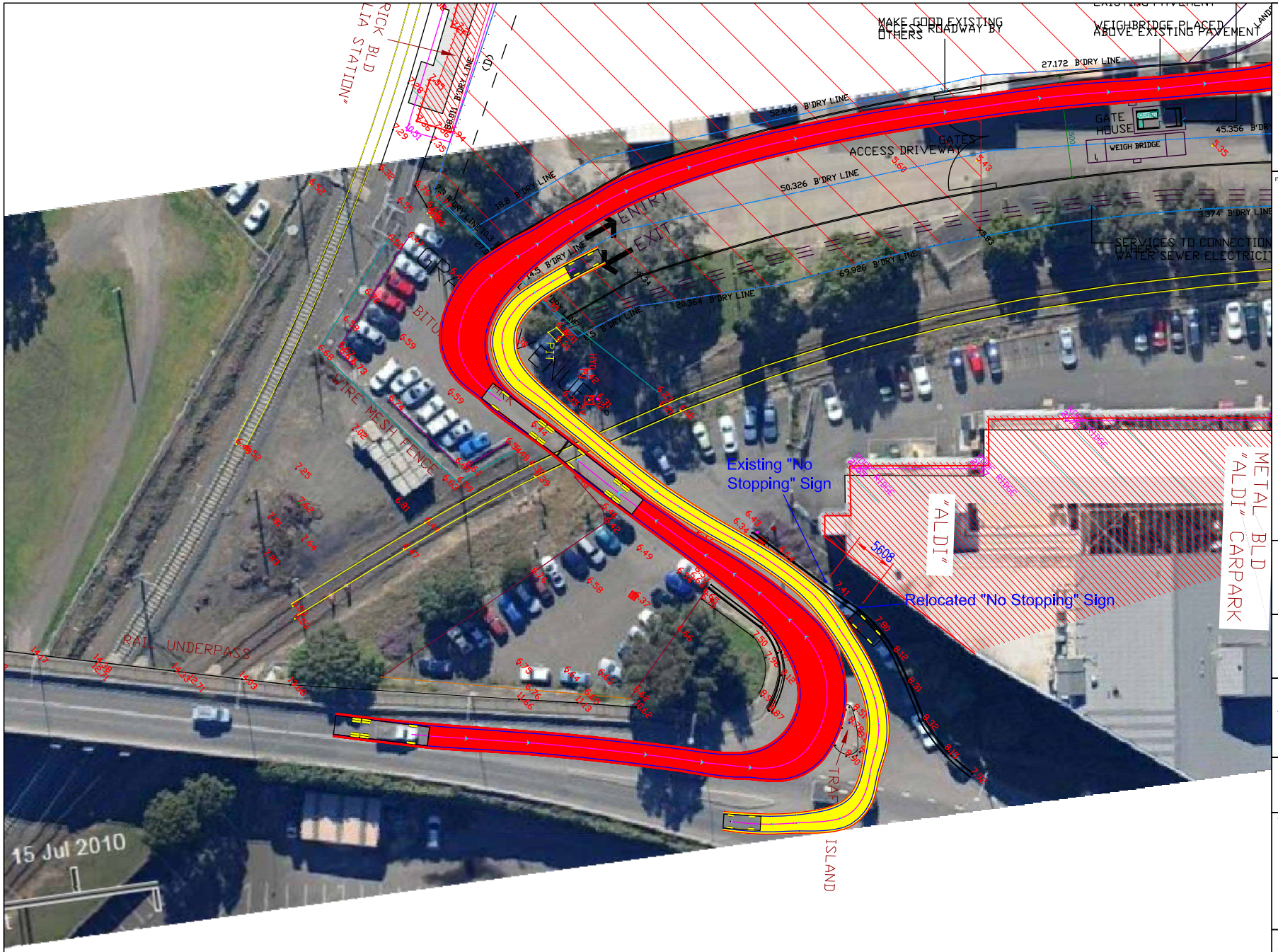
traffix
traffic & transport planners

drawing title
Swept Paths
Truck & Dog Passing a B85 Car

drawn:	checked:	date:
TL	-	30 Aug 2011

project no.	drawing phase.	drawing no.	rev
10.034	-	TX.01	-



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Remondis

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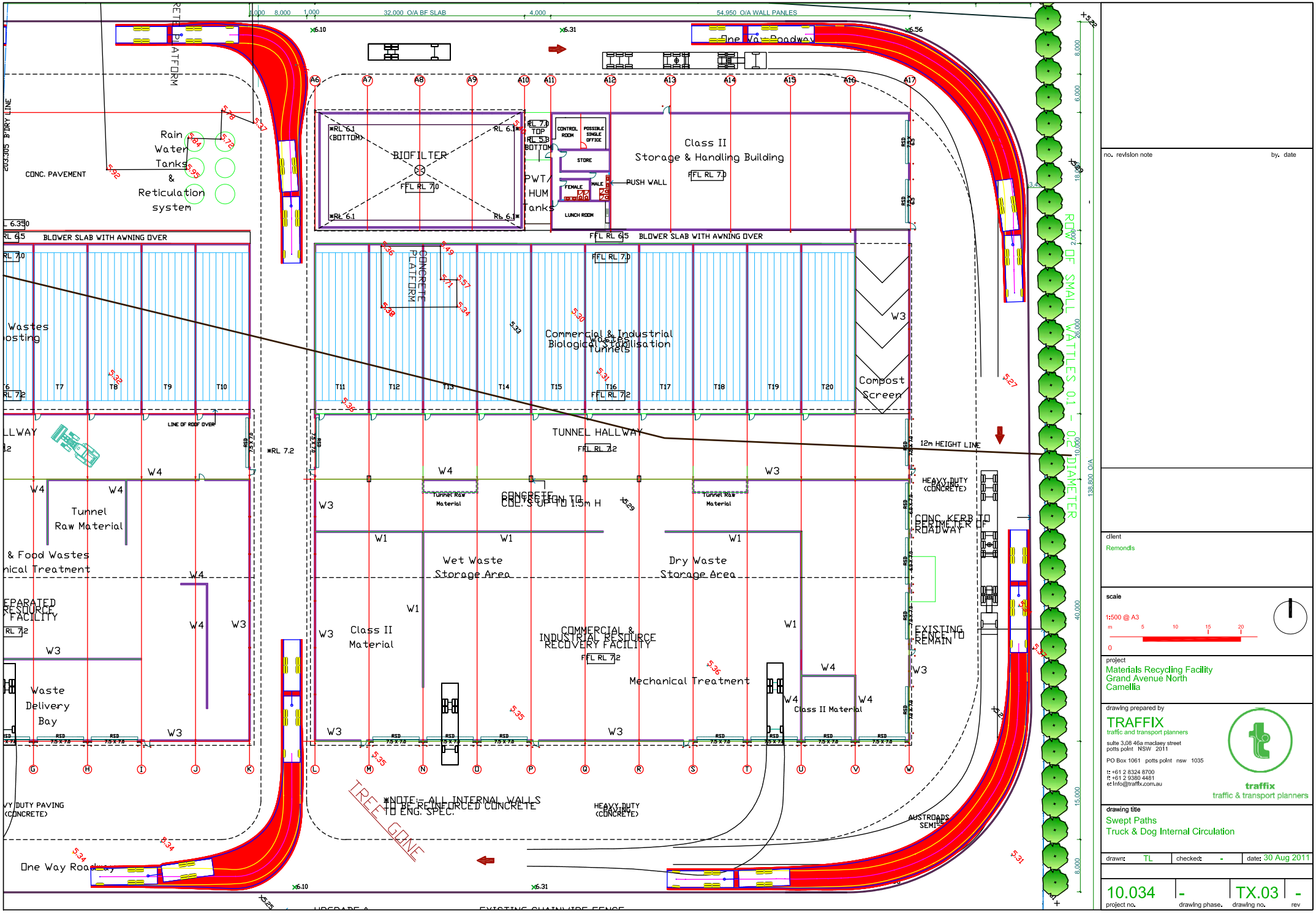
traffic & transport planners

drawing title
Swept Paths
12.5m HRV Passing a B85 Car

drawn:	checked:	date:
TL	-	30 Aug 2011

project no.	drawing phase.	drawing no.	rev
10.034	-	TX.02	-



no.	revision note	by.	date

client
Remondis

scale
1:500 @ A3
m 5 10 15 20
0

project
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Grand Avenue North
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drawing title
Swept Paths
Truck & Dog Internal Circulation

drawn:	checked:	date:
TL	-	30 Aug 2011

project no.	drawing phase.	drawing no.	rev
10.034	-	TX.03	-