Appendix 9

Traffic Impact Assessment

Glenfield Waste Services

State Significant Development

Traffic Impact Assessment

October 2014

prepared for

Glenfield Waste Services

prepared by

ARC Traffic + Transport

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Executive Summary

Glenfield Waste Services proposes a State Significant Development (the **Proposal**) of a Recycling Facility (the **Facility**) on certain land at Glenfield Waste Site, Cambridge Avenue Glenfield (the **Site**). The Proposal would increase capacity at the Site from the existing 100,000 tonnes per annum (**tpa**) to 450,000tpa, of which 385,000tpa would be processed through the Facility. The remainder would be provided for by existing landfill operations at the Site.

Further to a review of the Direct General's Requirements relating to the Proposal, ARC Traffic + Transport (**ARC**) has prepared a detailed Traffic Impact Assessment (**TIA**) to appropriately assess the potential traffic and transport impacts arising from the Proposal. A summary of the TIA findings is provided below.

i. Traffic Generation

The Proposal provides for a significant increase in the operational capacity of the Site, however the trip generation of the Site will not increase proportionally, as the majority of recyclable materials will be sourced from customers who utilise vehicles with higher average capacities than vehicles currently travelling to and from the Site. Further to consideration of vehicle capacities, as well as operating hours, service and staff vehicle demands, the trip generation of the Site further to the Proposal is estimated at 600 vehicle trips per day (**vpd**); this represents an increase of some 350vpd over existing Site generation.

In the **AM** [commuter peak hour 7:00am – 8:00am] the future Site trip generation is estimated at 50 vehicle trips per hour (**vph**). Further to consideration of the existing Site generation – including current RailCorp maintenance vehicle trip generation to the western portion of the Site - the additional AM trip generation of the Site would be less than 20vph, though with a significantly higher proportion of heavy vehicles.

In the **PM** [commuter peak hour 4:00pm – 5:00pm] the future Site trip generation is estimated at 20vph, approximately double the existing PM trip generation of the Site, and primarily consists of staff vehicles.

ii. Access

All inbound vehicle trips will utilise the existing access point (**GWS Road 1**, see **Figure 1.1.2**) from Cambridge Avenue. Vehicle trips from the existing landfill operations in the northern part of the Site will continue to depart via GWS Road 1, while vehicle trips from the Facility would depart via the existing access point (**GWS Road 2** see **Figure 1.1.2**) to Railway Avenue.

While a Restricted Access Vehicle (**RAV**) route is currently provided from Campbelltown Road via Glenfield Road and Cambridge Avenue to GWS Road 1, a RAV route is not provided in Railway Parade south from GWS Road 2 to the intersection of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade.

A RAV route assessment will be required to examine this small section of Railway Parade for RAV suitability; a viable alternative would require RAVs to return to GWS Road 1 and then Cambridge Avenue as currently occurs.

iii. 2024 Traffic Forecast Scenarios

The trip generation of the Proposal has been assessed against forecast traffic through the local road network for the year 2024. 2024 "base" traffic flows include the generation of the Glenfield Road Urban Release Area to the west of the Site; significant increases in Campbelltown Road through flows at the intersection with Glenfield Road; and [very] minor increases in flows further to background average annual growth.

Concurrent to the Proposal, GWS proposes the broader rezoning of the southern portion of the Site (in which the Facility lies) for industrial development. This is the subject of a detailed **Rezoning Proposal** TIA also prepared by ARC; the potential impacts of the Rezoning Proposal generating trips at the same time as the Facility has also been examined in this TIA.

Further to detailed discussions with Transport NSW (**TNSW**), the RMS, and the Department of Planning & Environment (**DP&E**), the trip generation of the planned Moorebank Avenue **Intermodal**(s) has not been included in the 2024 forecast year. Simply, the range of Intermodal trips that could potentially be generated to the local road network under investigation is so broad as to not allow an appropriate assignment as part of this TIA. As per our discussions with the DP&E, further detailed traffic studies in regard to the Intermodal – and particularly a review of trip distribution further to a future capacity Intermodal - will be essential prior to Intermodal operations commencing.

iv. Traffic Impacts

With reference to SIDRA intersection analysis, and a review of AustRoads, RMS and other design guidelines, ARC has determined that the Proposal would have no significant impact on the local road network through 2024. In summary: -

- No delay increases such as would reduce Level of Service (**LoS**) are reported in 2024 further to the implementation of the Proposal, nor are there reports of any significant capacity reductions or queue length increases attributable to the additional Proposal trips.

- The intersection of GWS Road 1 & Cambridge Avenue continues to report a poor LoS in both the AM and PM through 2024, being entirely attributable to the right turn GWS Road 1 to Cambridge Avenue. This delay relates to a handful of vehicles per hour, and has no impact on the broader operation of the intersection or on queue lengths in GWS Road 1 or Cambridge Avenue; moreover, these delays would be reduced under the Proposal, as the majority of the right turn demand to Cambridge Avenue would be redistributed to GWS Road 2.

- The roundabout of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade will continue to operate at a good LoS through 2024 in the AM and PM. In the AM, the potential exists for 95%ile queues to extend north in Railway Parade towards the intersection with GWS Road 2, but this is no different to any number of industrial access

points in proximity to intersections, and with no significant sight distance or other safety issues – and again only a minor flow from GWS Road 2 in the AM – this is an acceptable condition.

- Further to the above, the intersection of GWS Road 2 & Railway Parade will operate at a high LoS across the day.

- The roundabout of Glenfield Road & Hurlstone Agricultural College & [for the short term] a South West Railway Construction Access operates at a good LoS in the AM and PM through 2024, though the single lane capacity is reduced, and queue lengths increased. The Proposal in and of itself has little if any impact on capacity or queues at this intersection.

- The signalised intersection of Glenfield Road & Brampton Avenue & Old Glenfield Road will continue to operate at a good LoS with moderate delays, though queue lengths will be increased. The Proposal in and of itself has little if any impact on these queues.

- The intersection of Campbelltown Road & Glenfield Road will accommodate significantly increased traffic flows by 2024. While the intersection will continue to operate at a good LoS (specifically further to the RMS Campbelltown Road Upgrade Project) queue lengths in Campbelltown Road and in Glenfield Road in both the AM and PM will likely still be significant. Again though, these increases relate to broader sub-regional traffic flow increases, with the trip generation of the Proposal in and of itself having little if any impact on these queues.

  Further to discussions with the RMS Upgrade Project Team, final planning for the upgrade of this intersection has not been completed, and further assessments will review current [RMS] traffic flow forecasts, particularly given the significantly higher [than currently forecast] flows to/from Glenfield Road identified in this TIA.

- The intersection of Cambridge Avenue & Moorebank Avenue reports a similarly poor LoS in the PM to the intersection of Cambridge Avenue & GWS Road 1, but this delay also relates to a very small number of vehicles turning right from Cambridge Avenue to Moorebank Avenue. As for the intersection of Cambridge Avenue & GWS Road 1, this has no impact on the broader operation of the intersection, and again the Proposal in and of itself has little if any impact on these queues.

- The Cambridge Avenue **Causeway** is estimated to accommodate some 1,800vph in the AM and PM by 2024. While this flow is well within the theoretical capacity of a two lane road, consideration of the width of the Causeway, directional splits and the lack of an adjacent verge suggests a much lower capacity; conversely, the Causeway represents only a very small section of Cambridge Avenue which more generally provides the characteristics suitable to accommodate higher flows. As importantly, there is significant separation between the Causeway and the 'bookend' intersections to the east and west.

  While there is growing pressure to replace the Causeway (with a high level bridge) to ameliorate both traffic and [perhaps more importantly] flooding issues, the trips generated by the Proposal would in and of themselves have little if any impact on the operation of the Causeway, constituting less than 1% of two-way flows in 2024.

v. Design & Construction

The design of the Facility will necessarily be required to provide internal access roads which can accommodate the maximum vehicle requirements with reference to the appropriate Australian Standards; and loading/unloading areas and staff and visitor parking spaces also with reference to the appropriate Australian Standards.

The construction of the Facility would occur only further to the preparation and implementation of a detailed Construction Traffic Management Plan (**CTMP**), which would necessarily detail construction trip generation, vehicle routes, construction hours and Site access amongst other considerations. In regard to construction traffic impacts, construction trips are unlikely to exceed the trip generation potential of the Proposal, and as such would have a similarly negligible impact on the local road network. Notwithstanding, this preliminary conclusion would be further examined as part of the CTMP.

vi. Additional Sub-Regional Issues

While the local road network will operate at a generally good LoS through 2024, it is nonetheless the case that upgrade requirements are already being considered. The provision of a [four lane] bridge to replace the Causeway remains a subject of much debate, with the greatest potential for implementation linked very specifically to the Intermodal; however, with available Intermodal documentation (the **SIMTA TIA**) reporting only a very minor Intermodal generation via Cambridge Avenue, this link is somewhat tenuous.

The assessment of the Intermodal provided in this TIA suggests the potential for significant Intermodal trip generation through the local road network, particularly for trips to/from Campbelltown Road; and trips to the Hume Motorway via the Campbelltown Road on-ramp. If such potential is realised, it may be that the bridge [and potentially the Campbelltown City Council proposed "**Link Road**" to Campbelltown Road] may be required; this would certainly take pressure off Moorebank Avenue and the M5 Interchange, at which the SIMTA TIA reports all but unacceptable delays even further to recommended upgrade works.

Given that the SIMTA TIA considers only an Intermodal of 1M unit capacity – and that the final Intermodal will provide 1.7M unit capacity – a viable southern route appears essential to the sustainability of the broader sub-regional road network.

vii. Conclusion

Notwithstanding the broader sub-regional trip generation and infrastructure issues outlined above, **it is the conclusion of ARC that the Proposal is inherently supportable**, primarily as a result of very moderate trip generation during the peak periods to a local road network with the capacity to absorb those trips with negligible impact; and as a result of the GWS commitment to provide for construction and operational infrastructure that will conform to appropriate guidelines and standards.

Introduction

Glenfield Waste Services (**GWS**) proposes a State Significant Development (the **Proposal**) providing for a Recycling Facility (the **Facility**) to be located within the southern portion of Glenfield Waste Site, Cambridge Avenue, Glenfield (the **Site**). The Proposal would provide capacity for the recycling of up to 450,000 tonnes per annum (**tpa**) of materials, including [the potential for] up to 200,000tpa of sandstone sourced from major metropolitan projects.

ARC Traffic + Transport (**ARC**) has been commissioned to prepare a Traffic Impact Assessment (**TIA**) to appropriately and independently assess the potential traffic and transportation impacts of the Proposal. As part of this TIA, ARC has: -

- Referenced the specific assessment requirements provided by the Director-General in regard to the Proposal. In this regard, the Director General's Requirements (**DGRs**) Reference SSD 6429 require the following be addressed in regard to Traffic and Transport: -

  - *predictions of the traffic volumes likely to be generated during construction and operation;*
  - *an assessment of the impacts of this traffic on the safety, capacity and efficiency of the surrounding road network;*
  - *modelling of key intersections (including any nearby existing or proposed developments) and details of truck routes;*
  - *an assessment of the need for upgrading or road improvement works;*
  - *details of the availability of non-car travel modes and measures to encourage greater use of these travel modes; and*
  - *access and parking*.

- Referenced the specific traffic assessment requirements of the Roads & Maritime Service (**RMS**) in regard to the Proposal, as provided to the Director General, 4th December 2013, and state: -

  The RMS…would like the following issues to be included in the transport and traffic impact assessment of the proposed development:

  1. *Daily and peak traffic movements likely to be generated by the proposed development including the impact on nearby intersections, including peak traffic movements and the need/associated funding for upgrading or road network improvement works (if required).*
  2. *Trip assignments on the regional road network in the AM and PM peak periods.*
  3. *Details of the proposed accesses and the parking provisions associated with the proposed development including compliance with the requirements of the relevant Australian Standards (i.e. turn paths, sight distance requirements, aisle widths, etc).*
  4. *In due course, the provision of a Construction Traffic Management Plan (CTMP) will be required for all demolition/construction activities, detailing vehicle routes, number of trucks, hours of operation, access arrangements and traffic control measures.*

- Completed a detailed review and assessment of potential traffic and transport impacts associated with the Proposal. In this regard, this TIA provides an assessment of the existing operation of the road network which provides for the Site, and the manner in which that road network would operate further to an approval of the Proposal. This has included: -

    - On-site observations of the road network providing Site access to the sub-regional and regional road network, including general vehicle flows, types and speeds; sight distances at key locations; and general road and intersection operations;
    - A detailed review of available, and 2013 and 2014 commissioned, traffic survey data;
    - A detailed review of current GWS operations;
    - A detailed assessment of the traffic generation and distribution characteristics of the Proposal;
    - A detailed assessment of sub-regional projects that have the potential to impact traffic flows in the area of investigation in this TIA;
    - An assessment of future levels of service at key intersections; and
    - Reference to the appropriate traffic and transport guidelines and assessment criteria, including: -
        - RTA Road Design Guide (**RTA RDG**)
        - RTA Guide to Traffic Generating Developments (**RTA Guide**)
        - RMS Technical Direction 2013 04a – Guide to Traffic Generating Developments; Updated traffic surveys (**RMS Guide Update**)
        - AustRoads Guide to Road Design Part 4A Unsignalised and Signalised Intersections (**AustRoads GRD4A**)
        - Australian Standard 2890.1: Parking Facilities – Off Street Car Parking (**AS 2890.1**)
        - Australian Standard 2890.2: Parking Facilities – Off Street Commercial Vehicle Facilities (**AS 2890.2**)

Further to the Director General and RMS assessment requirements detailed above, ARC has also discussed the Proposal and the scope of work provided in this TIA in detail with the Department of Planning & Infrastructure (**DP&I**), RMS and Transport for NSW (**TNSW**); and with traffic and planning officers at Campbelltown City Council (**CC Council**) and Liverpool City Council (**LCC Council**).

ARC acknowledges the time and insight provided by these officers, specifically in regard to sub-regional projects having a bearing on the operation of the broader road network; traffic forecasting; and sensitivity testing of future traffic scenarios.

1 The Existing Site

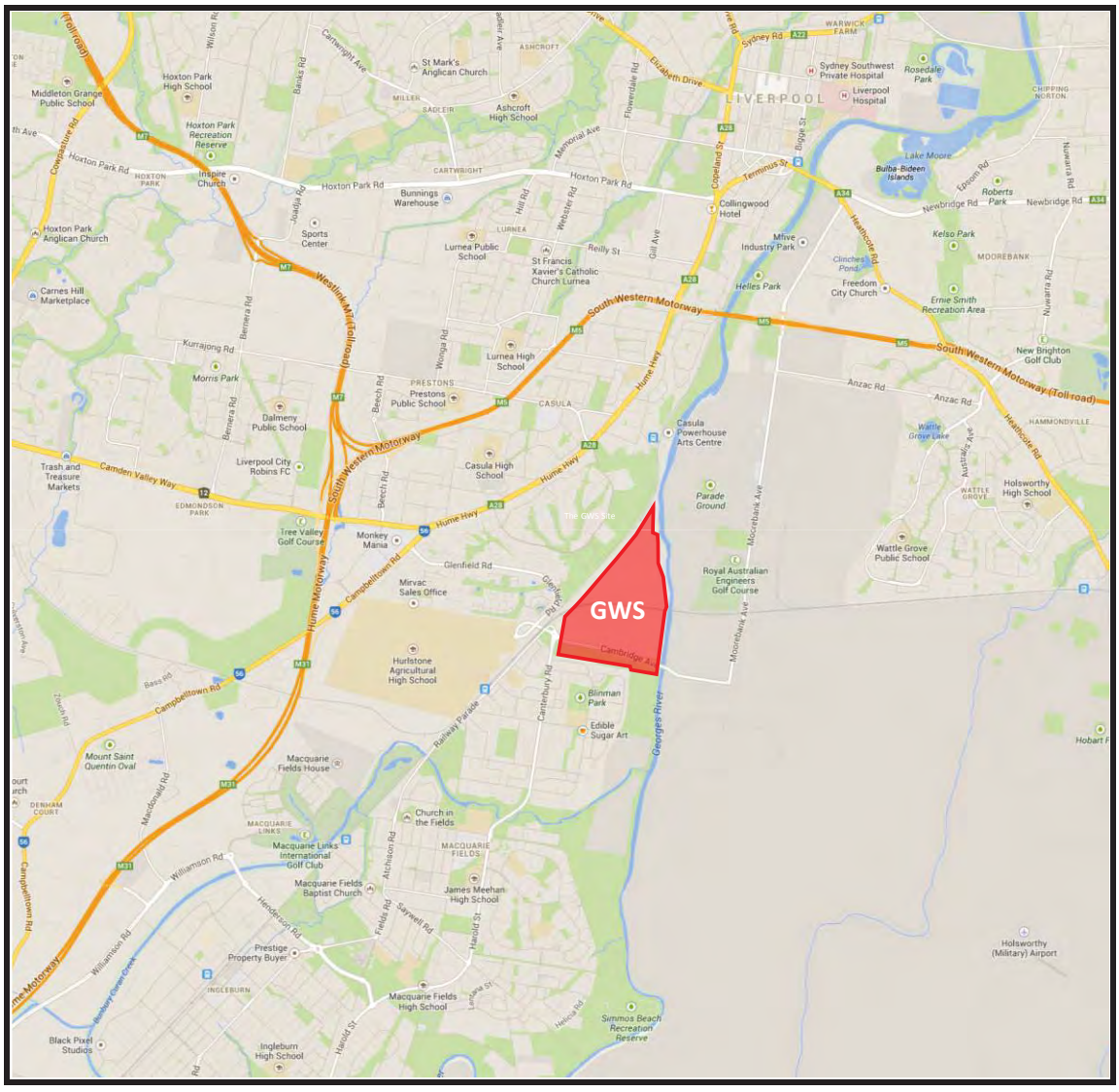
1.1 Location

The Glenfield Waste Site has an area of some 100 hectares (**ha**), and is generally bounded by: -

- Cambridge Avenue to the south
- The Georges River to the east and north-east
- The Southern Rail Line & Southern Sydney Freight Rail Line corridor to the west and north-west

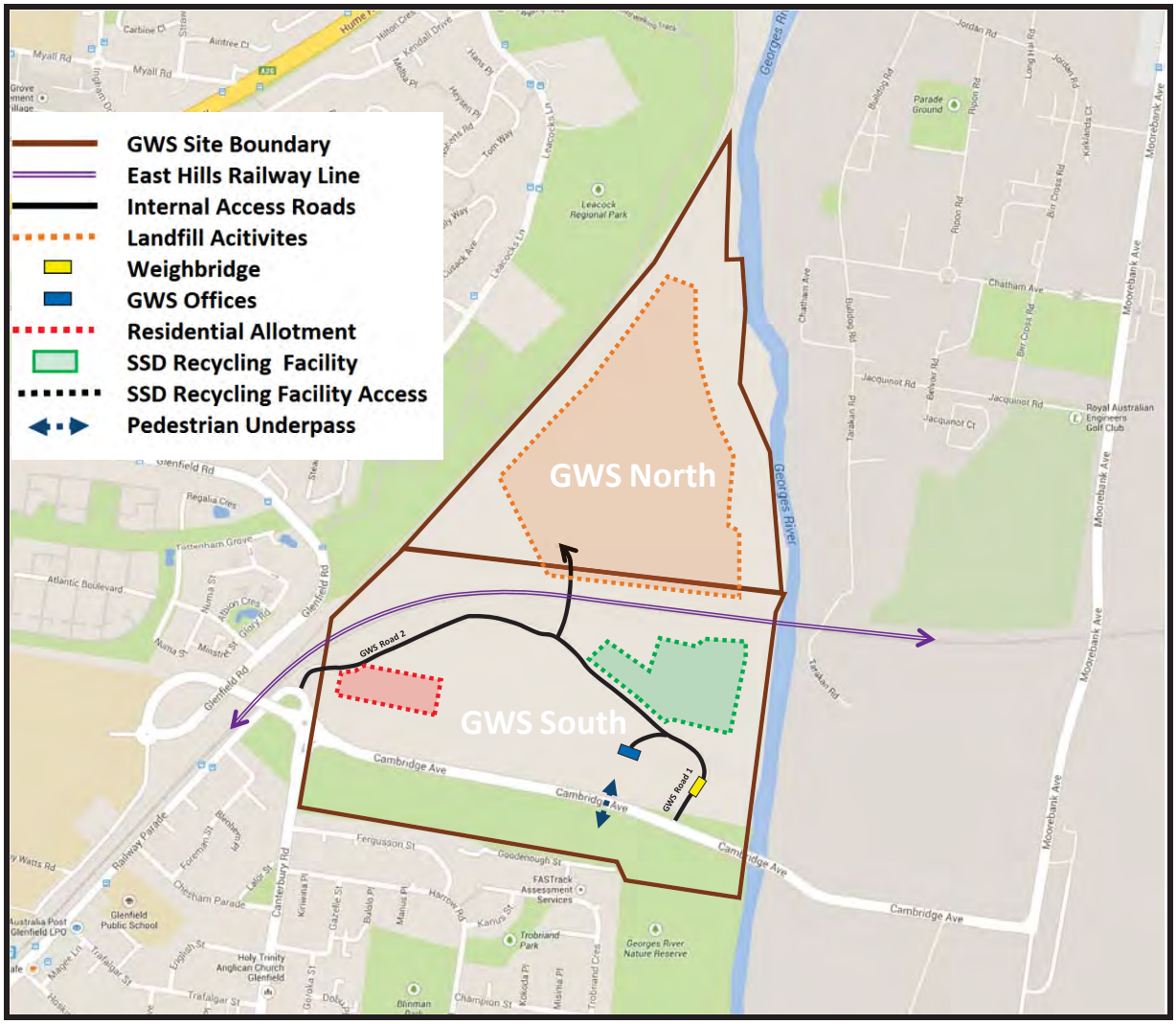
The Site in its sub-regional context is shown in **Figure 1.1.1**, while a more detailed Site plan is provided in **Figure 1.1.2**.

Figure 1.1.1 Site Location



Source: Google Maps

Figure 1.1.2 Glenfield Waste Site



Source: Google Maps & EPS

The East Hill Railway Line running east-west through the centre of the Site generally marks the boundary between LCC Council (north) and CC Council (south).

1.2 Existing Operations

The portion of the Site north of the East Hills Railway (approximately 40ha) accommodates a licenced non-putrescible waste facility which will be retained for the continuation of current [landfill] operations. The portion of the Site south of the East Hills Railway (approximately 60ha) accommodates existing recycling facilities as well as GWS offices and a weighbridge; this southern portion of the Site also includes substantial (unused) land on the southern side of Cambridge Avenue, and a [single dwelling] residential allotment.

Having operated as a waste management facility since 1979, GWS is open to the public between 6:00am and 4:00pm Monday to Friday, and from 6:00am to 1:00pm on Saturdays.

The area of the Site south of the East Hills Railway will accommodate the Proposal, and is the specific focus of this TIA; the current landfill operations in the northern portion of the Site would not be altered by the Proposal, with vehicle access and operational capacity (and therefore trip generation) to essentially continue unchanged.

1.3 Access

1.3.1 Site Access

Primary vehicle access for the Site is via an access road north from Cambridge Avenue (termed **GWS Road 1** for ease of reference, and shown in **Figure 1.1.2**) located approximately 900m east of Canterbury Road (and some 900m west of Moorebank Avenue). GWS Road 1 in turn provides access to all on-site areas associated with GWS operations.

A second access point (termed **GWS Road 2,** also shown in **Figure 1.1.2**) intersects Railway Parade; GWS Road 2 has in the past provided principle access to the Site (for GWS operations) but is not used at this time, specifically as a result of the need for both arriving and departing [material carrying] vehicles to pass over the weighbridge in GWS Road 1. Notwithstanding, GWS Road 2 does currently provide access for the residential dwelling within the Site; and for Railcorp maintenance vehicles accessing the adjacent rail lines.

1.3.2 Sub-Regional Access

The Site has good access to the broader sub-regional and regional road network. Campbelltown Road (and then Hume Highway, Hume Motorway and M7) are accessed by Cambridge Avenue and Glenfield Road, while Canterbury Road to the immediate west of the Site provides alternative access south to Campbelltown through residential suburbs and industrial precincts including Ingleburn and Minto. Cambridge Avenue also links east to Moorebank Avenue, which in turn runs north to an interchange with the M5 and then through to Liverpool.

These access paths are examined in more detailed in **Section 2**.

While these routes are open to all *General Access Vehicles* (**GAV**s), a *Restricted Access Vehicle* (**RAV**) route operates between 10:00am and 4:00pm along Glenfield Road and Cambridge Avenue between Campbelltown Road (which is RAV accessible) and GWS Road 1.

The RAV route specifically provides for the movement of vehicles (generally B-Doubles) of length greater than 19m, and/or weight greater than 42.5t, but all other vehicles (i.e. up to 19m in length and under 42.5t) can freely travel the length of Cambridge Avenue, including the **Causeway** over the Georges River immediately east of the Site.

The RMS RAV route is shown in **Figure 1.3.2**.

Figure 1.3.2 RMS Restricted Access Vehicle Route

Source: RMS

1.4 Traffic Generation

1.4.1 Traffic Surveys

In order to determine the current traffic generation of the Site, an intersection survey of GWS Road 1 & Cambridge Avenue was conducted in May 2014 by Skyhigh Traffic Surveys; earlier installations of Automatic Traffic Counters (**ATCs**), provided data inconsistent with observations, a result of the slow, stop-start nature of heavy vehicles moving between Cambridge Avenue and the weighbridge in GWS Road 1.

Importantly, while the traffic survey provides information in regard to general trip generation and distribution, this information has been specifically augmented with an assessment of GWS weighbridge data so as to provide a complete picture of current (and thence future) trip generation.

1.4.2 Key Traffic Volumes

Table 1.4.2 provides an hourly summary of daily traffic flows (6:00am - 6:00pm) surveyed on Wednesday 21st May 2014 to and from the Site via GWS Road 1; as noted above, GWS is open to the public until 4:00pm on weekdays, and as such there is a significant drop in Site trip generation after this time.

Table 1.4.2 Intersection Flows, GWS Road 1 & Cambridge Avenue

Approach			Cambridge Avenue Eastbound								GWS Road 1								Cambridge Avenue Westbound								GWS Road 1			
Direction			Direction 10 (Left Turn)				Direction 11 (Through)				Direction 7 (Left Turn)				Direction 9 (Right Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Two-Way			
Time Period			Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00	to	7:00	8	2	0	10	1,185	54	0	1,239	0	4	0	4	0	0	0	0	176	6	0	182	3	3	0	6	11	9	0	20
6:15	to	7:15	3	2	0	5	1,228	52	0	1,280	1	5	0	6	1	0	0	1	191	9	0	200	4	5	0	9	9	12	0	21
6:30	to	7:30	1	3	0	4	1,287	41	0	1,328	2	6	0	8	1	1	0	2	199	8	0	207	4	5	0	9	8	15	0	23
6:45	to	7:45	1	4	0	5	1,231	28	0	1,259	2	6	0	8	1	3	0	4	207	7	0	214	3	4	0	7	7	17	0	24
7:00	to	8:00	2	3	0	5	1,230	22	0	1,252	2	4	0	6	1	6	0	7	223	6	1	230	1	4	0	5	6	17	0	23
7:15	to	8:15	1	5	0	6	1,178	20	0	1,198	1	4	0	5	1	6	0	7	266	5	1	272	0	3	0	3	3	18	0	21
7:30	to	8:30	1	5	0	6	1,092	30	2	1,124	0	3	0	3	1	7	0	8	302	7	1	310	1	2	0	3	3	17	0	20
7:45	to	8:45	2	3	0	5	1,056	35	2	1,093	0	3	0	3	2	6	0	8	342	8	1	351	1	3	0	4	5	15	0	20
8:00	to	9:00	1	7	0	8	937	32	2	971	0	2	0	2	2	3	0	5	353	9	0	362	1	3	0	4	4	15	0	19
8:15	to	9:15	2	5	0	7	821	26	4	851	0	3	0	3	1	5	0	6	339	8	0	347	3	2	0	5	6	15	0	21
8:30	to	9:30	3	4	0	7	693	15	3	711	0	4	0	4	3	3	0	6	298	6	0	304	2	2	0	4	8	13	0	21
8:45	to	9:45	2	4	0	6	555	10	3	568	0	3	0	3	3	2	0	5	254	4	1	259	2	0	0	2	7	9	0	16
9:00	to	10:00	3	2	0	5	484	9	3	496	0	3	0	3	3	2	0	5	221	6	1	228	2	2	0	4	8	9	0	17
9:15	to	10:15	3	5	0	8	421	13	1	435	0	2	0	2	4	2	0	6	195	9	1	205	0	5	0	5	7	14	0	21
9:30	to	10:30	3	5	0	8	356	15	0	371	0	3	0	3	4	5	0	9	197	13	1	211	1	5	0	6	8	18	0	26
9:45	to	10:45	3	6	0	9	325	16	0	341	0	4	0	4	5	6	0	11	208	14	0	222	1	5	0	6	9	21	0	30
10:00	to	11:00	2	7	0	9	312	14	0	326	0	4	0	4	5	6	0	11	214	12	0	226	1	4	0	5	8	21	0	29
10:15	to	11:15	3	6	0	9	299	9	0	308	0	3	0	3	4	5	0	9	211	10	1	222	1	4	0	5	8	18	0	26
10:30	to	11:30	3	6	0	9	297	8	0	305	0	3	0	3	4	7	0	11	215	6	1	222	1	5	0	6	8	21	0	29
10:45	to	11:45	3	8	0	11	286	7	1	294	0	4	0	4	3	7	0	10	195	10	1	206	1	5	0	6	7	24	0	31
11:00	to	12:00	3	7	0	10	280	8	2	290	0	6	0	6	3	8	0	11	192	8	1	201	1	6	0	7	7	27	0	34
11:15	to	12:15	2	5	0	7	277	7	3	287	0	9	0	9	4	7	0	11	209	7	0	216	1	4	0	5	7	25	0	32
11:30	to	12:30	2	6	0	8	302	6	3	311	0	8	0	8	2	3	0	5	233	10	0	243	1	3	0	4	5	20	0	25
11:45	to	12:45	5	3	0	8	303	5	3	311	1	6	0	7	5	2	0	7	256	8	0	264	1	3	0	4	12	14	0	26
12:00	to	13:00	6	2	0	8	314	3	2	319	1	4	0	5	5	2	0	7	271	10	0	281	1	1	0	2	13	9	0	22
12:15	to	13:15	5	2	0	7	319	4	1	324	1	1	0	2	7	4	0	11	293	14	0	307	1	3	0	4	14	10	0	24
12:30	to	13:30	5	2	0	7	288	2	2	292	1	4	0	5	7	3	0	10	298	10	0	308	0	5	0	5	13	14	0	27
12:45	to	13:45	2	2	0	4	306	3	1	310	0	5	0	5	3	3	0	6	321	10	0	331	1	5	0	6	6	15	0	21
13:00	to	14:00	2	3	0	5	317	4	2	323	0	5	0	5	4	2	0	6	343	10	0	353	1	6	0	7	7	16	0	23
13:15	to	14:15	3	3	0	6	333	4	2	339	0	6	0	6	2	1	0	3	358	7	1	366	2	4	0	6	7	14	0	21
13:30	to	14:30	3	2	0	5	345	5	1	351	1	2	0	3	4	2	0	6	398	13	1	412	3	3	0	6	11	9	0	20
13:45	to	14:45	4	5	0	9	368	5	2	375	2	1	0	3	5	2	0	7	443	12	1	456	2	3	0	5	13	11	0	24
14:00	to	15:00	3	3	0	6	366	3	1	370	3	2	0	5	6	3	0	9	505	13	3	521	2	2	0	4	14	10	0	24
14:15	to	15:15	2	4	0	6	369	3	1	373	3	1	0	4	5	4	0	9	588	15	2	605	1	3	0	4	11	12	0	23
14:30	to	15:30	2	5	0	7	419	5	2	426	2	2	0	4	4	4	0	8	681	12	2	695	1	4	0	5	9	15	0	24
14:45	to	15:45	1	2	0	3	422	5	1	428	2	3	0	5	5	6	0	11	799	15	2	816	2	4	0	6	10	15	0	25
15:00	to	16:00	2	2	0	4	418	5	1	424	2	2	0	4	3	9	0	12	876	13	0	889	2	4	0	6	9	17	0	26
15:15	to	16:15	2	1	0	3	412	6	1	419	2	2	0	4	3	8	0	11	990	14	0	1,004	2	3	0	5	9	14	0	23
15:30	to	16:30	1	0	0	1	367	4	0	371	2	2	0	4	7	8	0	15	1,081	20	1	1,102	1	1	0	2	11	11	0	22
15:45	to	16:45	1	0	0	1	344	3	0	347	1	1	0	2	7	6	0	13	1,131	19	1	1,151	0	1	0	1	9	8	0	17
16:00	to	17:00	0	0	0	0	335	5	0	340	0	1	0	1	7	2	0	9	1,189	27	1	1,217	0	1	0	1	7	4	0	11
16:15	to	17:15	0	0	0	0	333	4	0	337	0	1	0	1	7	1	0	8	1,203	29	1	1,233	0	0	0	0	7	2	0	9
16:30	to	17:30	0	0	0	0	339	3	0	342	0	0	0	0	2	0	0	2	1,199	21	0	1,220	0	0	0	0	2	0	0	2
16:45	to	17:45	0	0	0	0	325	3	0	328	0	0	0	0	0	0	0	0	1,182	25	0	1,207	0	0	0	0	0	0	0	0
17:00	to	18:00	0	0	0	0	306	2	0	308	0	0	0	0	0	0	0	0	1,162	20	0	1,182	0	0	0	0	0	0	0	0

With reference to **Table 1.4.2**, the survey shows that the Site currently generates: -

- Approximately 250 vehicle trips per day (**vpd**), of which 38% are light vehicles and 62% are heavy vehicles
- A peak hourly flow of 34 vehicles per hour (**vph**) in the hour 11:00am – 12:00pm
- A flow of 23 vph in the Cambridge Avenue **AM** [commuter peak hour 7:00am – 8:00am – see also **Section 2.3**]
- A flow of 11 vph in the Cambridge Avenue **PM** [commuter peak hour 16:00pm – 17:00pm – see also **Section 2.3**]

1.5 Vehicle Capacities

The Proposal will increase the capacity of recycling operations at the Site, and further provide facilities for new recycling streams. In order to determine the future trip generation of the Proposal, 2013 GWS weighbridge data has been examined so as to determine the average [waste and recyclable material] capacity of vehicles arriving and departing the Site. This information is summarised in **Table 1.5** below.

Table 1.5 2013 GWS Incoming & Outgoing Materials

Materials In	Transactions	Weight (tonnes)	Average Tonnes per Vehicle
	27891	99399.7	3.56
Materials Out	**Transactions**	**Weight**	**Average Tonnes per Vehicle**
	1702	37877.7	22.25

Source: GWS

With reference to the table above: -

- The current average arriving load of inbound materials in 3.56 tonnes
- The current average departing load of [recycled] outbound materials is 22.25 tonnes
- The Site generated some 29,600 transactions in 2013
- The Site generates an average of some 105 waste/recycle material carrying vehicles per day, a figure which corresponds with the May 2014 surveyed trip generation of the Site further to consideration of staff and service vehicle demands.

1.6 Trip Distribution Characteristics

1.6.1 Hourly Trip Profile

A weighbridge data sample including each day of the first week of each month between July and December 2013 has been examined to determine the arrival trip distribution of vehicles using the weighbridge. Hourly weighbridge arrival data for each day of each of the sample weeks has been recorded, and then the percentage of the total daily flows to each hour through the day calculated. The results of this assessment are provided in **Table 1.6.1** below.

Table 1.6.1 GWS Weighbridge Arrival Trip Profile

GWS Weighbridge Arrival Profile	Jul-13		Aug-13		Sep-13		Oct-13		Nov-13		Dec-13		6 Month Average	
	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %	Arrivals per Hour	Hourly %
6:00am - 7:00am	7	6%	6	6%	7	6%	7	7%	7	6%	10	8%	8	6.5%
7:00am - 8:00am	8	6%	8	8%	9	8%	9	8%	9	7%	8	7%	8	7.3%
8:00am - 9:00am	10	8%	8	8%	12	11%	8	8%	9	7%	10	8%	9	8.2%
9:00am - 10:00am	13	11%	12	12%	13	12%	11	10%	12	9%	13	11%	12	10.6%
10:00am - 11:00am	16	13%	10	10%	12	11%	18	16%	16	12%	14	11%	14	12.4%
11:00am - 12:00pm	13	11%	10	10%	14	13%	13	12%	16	13%	16	13%	14	11.8%
12:00pm - 1:00pm	14	12%	15	16%	15	13%	11	10%	16	12%	15	12%	14	12.3%
1:00pm - 2:00pm	15	12%	13	13%	12	11%	11	10%	17	13%	13	10%	13	11.5%
2:00pm - 3:00pm	14	12%	9	9%	9	8%	13	12%	16	12%	15	12%	13	10.9%
3:00pm - 4:00pm	10	9%	7	7%	8	7%	10	9%	10	7%	9	7%	9	7.6%
4:00pm - 5:00pm	2	1%	1	1%	1	1%	1	1%	2	1%	1	1%	1	1.0%
Daily Arrivals	122		99		112		111		130		124		116	100%

This arrival profile also provides an appropriate indication of the departure profile for the Site, with the majority of unloading/loading occurring with a relatively short turnaround. The one exception to this profile is staff vehicle trips, the majority of which are generated before 7:00am (arrivals); and after 4:00pm (departures).

1.6.2 Origins & Destinations Profile

The traffic survey data shows that approximately 50% of daily arrival and departure trips are from/to the west, and 50% of trips are to/from the east; this distribution tallies with available GWS customer origins/destinations information, and with an earlier customer survey reported by AECOM as part of preliminary investigations into the Proposal.

A closer review of the survey data shows that while heavy vehicle trips are generally evenly split between the east and west, a slight majority of light vehicle trips – and particularly staff trips based on the higher generation of light vehicle trips at the start and end of the working day – are travelling to and from the west.

1.7 Parking

The very minimal parking demands of staff are fully contained on-site, with formal and informal parking areas around the Site providing significant spare capacity. The Site does not generate any off-site parking.

2 The Existing Road Network

The local road network which provides Site access to the sub-regional road network, and which in turn will provide for the Proposal, is shown in **Figure 2** and examined in further detail below.

Figure 2 Road Network

Source: Google Maps

2.1 Key Roads

2.1.1 Cambridge Avenue

As discussed, all GWS operational access is currently provided to/from Cambridge Avenue. Cambridge Avenue serves a significant trip demand generated between [primarily] the south and south-west (via Canterbury Road in particular) and the Holsworthy/Moorebank area and thence through to Liverpool. Cambridge Avenue provides two lanes for two-way traffic, and has a posted speed limit of 60km/h.

While generally providing [very] wide verges east from Canterbury Road and adjacent to the Site, immediately east of the Site Cambridge Avenue narrows to the Causeway over the Georges River (see **Section 2.5**) before widening again through to Moorebank Avenue.

2.1.2 Moorebank Avenue

Moorebank Avenue provides connectivity from Cambridge Avenue to Moorebank, the M5 Motorway and through to Liverpool. Moorebank Avenue generally provides two lanes for two-way traffic with minor additional capacity at local intersections, and has a posted speed limit of 60km/h.

2.1.3 Glenfield Road

Glenfield Road provides connectivity between the Hume Highway/Campbelltown Road and the Site [via Cambridge Avenue]. Glenfield Road generally provides two lanes for two-way traffic, with additional capacity at key intersections, and has a posted speed limit of 60km/h.

2.1.4 Railway Parade

Railway Parade provides local access to Glenfield railway station and the Glenfield "village" before continuing south into Macquarie Fields. Railway Parade provides two lanes for two way traffic, and has a posted speed limit of 50km/h.

2.1.5 Canterbury Road

Canterbury Road provides access between Glenfield and the southern suburbs (Macquarie Fields and through to Minto). Canterbury Road generally provides four traffic lanes (with localised parking and stopping restrictions) for two-way traffic, and has a posted speed limit of 60km/h.

2.1.6 Sub-Regional and Regional Road Network Connections

As stated, the Site has good connectivity to the sub-regional and then regional road network. Glenfield Road links to Campbelltown Road, which in turn provides access to the Hume Highway, Hume Motorway (outbound trips), M7 and Camden Valley Way; while from Moorebank Avenue, connections are available to the M5 which in turn links to the Sydney motorway network.

From the outset, it is important to state that the generation of the Proposal would in our opinion have no significant impact on the broader sub-regional road network simply as a result of the minor traffic generation potential of the Proposal, more details of which are provided in **Section 4**.

This is also the case in regard to Moorebank Avenue, though regardless a more detailed assessment of the future operation of Moorebank Avenue is not possible at this time further to the ongoing planning of the Moorebank Avenue **Intermodal**, which is estimated to have the potential to generate some 1,800vph upon reaching capacity; this compares to an estimated Proposal generation of some 25vph to Moorebank Avenue.

As discussed with TNSW, the RMS and the DP&E, it is simply not possible to estimate flows at the [numerous] Moorebank Avenue intersections with any degree of certainty prior to the finalisation of traffic studies of a capacity Intermodal, and moreover given the continuing uncertainty in regard to Intermodal trip distribution.

A detailed review of these issues is provided in **Section 5.6** and in **Appendix D.6**.

2.2 Key Intersections

2.2.1 Cambridge Avenue & GWS Road 1

As discussed, this priority intersection provides primary access for the Site, and includes: -

- A Channelised Left (**CHL**) deceleration lane Cambridge Avenue to GWS Road 1
- A short acceleration lane GWS Road 1 to Cambridge Avenue Road
- An Auxiliary Right (**AUR**) turn treatment Cambridge Avenue to GWS Road 1

2.2.2 Railway Parade & GWS Road 2

This priority intersection provides Basic Left and Right (**BAL** and **BAR**) treatments on all approaches. Sight distances are appropriate to the lower speed environment resulting from GWS Road 2 being situated on the 'outside' of the curve of Railway Parade, maximising sight distances to the south-east and south-west.

2.2.3 Cambridge Avenue & Glenfield Road & Railway Parade & Canterbury Road

This roundabout intersection provides dual approach and departure lanes on all legs, and minimum 8.5m circulating width (two lane). The dual approach lanes diverge from single lanes in Glenfield Road, Railway Parade and Cambridge Avenue; dual departure lanes also merge to single lanes in these same roads, and in Canterbury Road so as to provide for an additional [continuous] slip lane from Cambridge Avenue.

2.2.4 Glenfield Road & Brampton Avenue & Old Glenfield Road

This signalised intersection provides access to the Glenfield Residential Estate, and provides: -

- Channelised Right (**CHR**) lanes Glenfield Road to both Brampton Avenue and Old Glenfield Road
- Dual approach lanes in Glenfield Road both eastbound and westbound
- Dual approach lanes in both Brampton Avenue and Old Glenfield Road, each with a short dedicated right turn lane

2.2.5 Campbelltown Road & Glenfield Road

This signalised intersection provides: -

- A CHR lane Campbelltown Road to Glenfield Road
- A CHL lane Campbelltown Road to Glenfield Road
- Dual right turn lanes Glenfield Road to Campbelltown Road
- A short [unsignalised] left turn slip lane Glenfield Road to Campbelltown Road

This intersection is to be upgraded as part of the RMS Campbelltown Road Upgrade Project. More details in regard to this project are provided in **Section 5.2** and **Appendix D2**.

2.2.6 Cambridge Avenue & Moorebank Avenue

This priority intersection provides: -

- A CHR Moorebank Avenue to Cambridge Avenue
- A short left turn slip lane Cambridge Avenue to Moorebank Avenue
- A right turn lane Cambridge Avenue to Moorebank Avenue

2.2.7 Moorebank Avenue Intersections

A number of priority and signalised intersections are provided along Moorebank Avenue between Cambridge Avenue and the M5 interchange, and numerous intersection upgrades (and potentially new intersections) are proposed to provide for the Intermodal development. Key intersections include: -

- Signalised intersection of Moorebank Avenue & Chatham Avenue, which currently provides access to the Commonwealth School of Military Engineering Site
- Two signalised intersections of Moorebank Avenue & the Defence National Storage Distribution Centre
- Signalised intersection of Moorebank Avenue & Anzac Road, which provides access to industrial sites east of Moorebank Avenue, and thence through to Wattle Road and Heathcote Road

As discussed in **Section 2.1.6**, it is not possible at this time to gauge the exact level and distribution of additional future trips at these intersections, but it is nonetheless the opinion of ARC that the additional trip generation of the Proposal would in and of itself have little if any impact on delays at each of these intersections through to the M5 (see also **Section 4**, **Section 5** and **Appendix D6**).

2.3 Peak Period Traffic Flows

To provide an appropriate base for the traffic assessment of the Proposal, peak period traffic surveys were conducted at the key intersections outlined in **Section 2.2** above; the surveys were completed in December 2013 and May 2014.

In determining peak hours for assessment, ARC has specifically selected those periods where the generation of the Proposal, existing commuter peaks and sub-regional project peaks have the potential to coincide and therefore have the highest collective impact on the local road network.

In the **AM**, the hour 7:00am – 8:00am represents a significantly high commuter peak through the local road network as well as a higher generation of the Site than earlier periods (when Cambridge Avenue flows actually peak). Similarly, in the **PM**, the hour 4:00pm – 5:00pm reports a marginally lower flow in Cambridge Avenue and Glenfield Road than the reported commuter peak hour (5:00pm – 6:00pm) but the Site would generate little (if any) traffic in this later hour.

With reference to the traffic surveys, peak period traffic flows through the local road network are shown in the following figures: -

- **Figure 2.3.1 Existing AM Traffic Flows**
- **Figure 2.3.2 Existing PM Traffic Flows**

Figure 2.3.1 Existing AM 7:00am – 8:00am

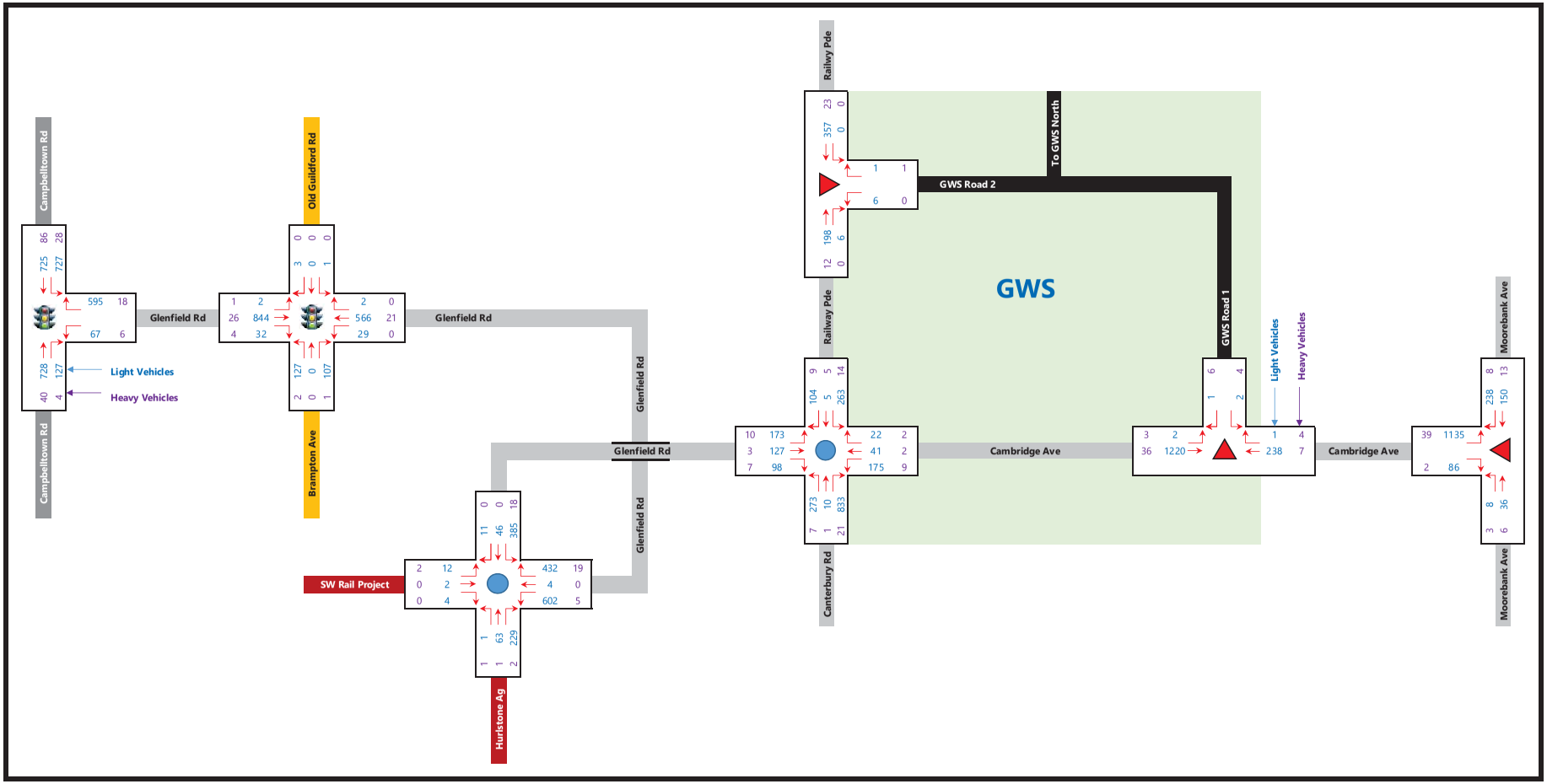
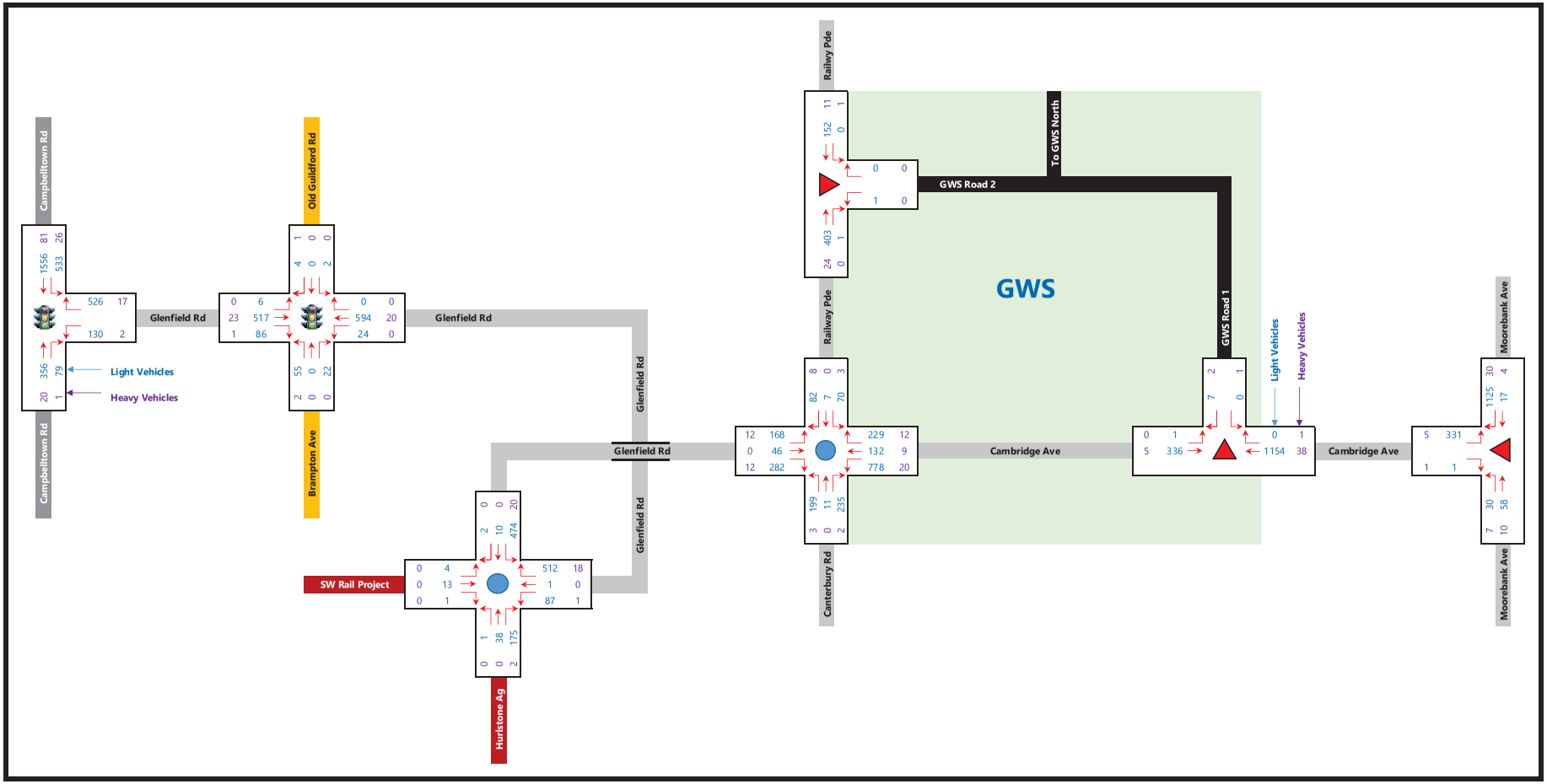


Figure 2.3.2 Existing PM 4:00pm – 5:00pm



2.4 Existing Intersection Operations

2.4.1 SIDRA Intersection Model

In order to determine the current levels of service provided at the key intersections through the local road network, the RMS approved SIDRA intersection model been utilised to determine current intersection operations. The SIDRA inputs includes peak hour traffic flows and speed profiles, intersection geometry and operational controls, and in turn SIDRA reports the following key performance measures: -

- **Level of Service**

  Level of Service (**LoS**) is a basic performance indicator assigned to an intersection based on average delay. For signalised and roundabout intersections, LoS is based on the average delay to all vehicles, while at priority controlled intersections LoS is based on the worst approach delay. The RMS LoS criteria, which have been used in the assessment, are provided below: -

Level of Service (RMS)	Control delay per vehicle in seconds (d) (including geometric delay)		
	Signals and Roundabouts	Rating	Stop and Give Way / Yield Signs
A	d < 14.5	Good	d < 14.5
B	14.5 < d < 28.5	Good with acceptable delay	14.5 < d < 28.5
C	28.5 < d < 42.5	Satisfactory	28.5 < d < 42.5
D	42.5 < d < 56.5	Near capacity	42.5 < d < 56.5
E	56.5 < d < 70.5	At capacity	56.5 < d < 70.5
F	70.5 < d	Over capacity	70.5 < d

- **Delay**

  Delay represents the difference between interrupted and uninterrupted travel times through an intersection, and is measured in seconds per vehicle in this assessment. Delays include queued vehicles accelerating and decelerating from/to the intersection stop, as well as general delays to all vehicles travelling through the intersection. With reference to the LoS criteria above, the average intersection delay for signals and roundabouts represents an average of delays to all vehicles on all approaches, while for priority intersections the average delay for the worst approach is used.

- **Degree of Saturation**

  Degree of Saturation (**DoS**) is defined as the ratio of demand (arrival) flow to capacity. DoS above 1.0 represent over-saturated conditions (demand flows exceed capacity) and degrees of saturation below 1.0 represent under-saturated conditions (demand flows are below capacity). The capacity of the movement with the highest DoS is reported.

The existing performance of key intersections is reported in **Table 2.4.1** below.

Table 2.4.1 Existing Intersection Performance

2014 Existing Conditions	Level of Service		Average Deelay (s)		Worst Delay (s)		Degree of Saturation		Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
GWS Road 1 & Cambridge Avenue	F [A]	C	0.7	0.3	77.4	31.7	0.66	0.62	5.0	1.9
GWS Road 2 & Railway Parade	A	A	0.5	0.4	6.9	6.1	0.10	0.19	4.4	8.1
Cambridge Avenue & Moorebank Avenue	A	E [A]	5.4	6.5	8.9	58.2	0.76	0.71	60.6	66.8
Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade	A	A	9.8	7.2	19.0	11.1	0.60	0.34	33.6	13.0
Glenfield Road & Hurlstone College & South West Rail Access	A	A	6.6	7.6	12.2	12.6	0.64	0.37	48.3	18.0
Glenfield Road & Brampton Avenue & Old Glenfield Road	B	B	24.8	26.2	37.6	35.2	0.71	0.56	157.2	110.5
Glenfield Road & Campbelltown Road	B	B	28.5	23.8	68.6	80.7	0.54	0.58	125.9	155.7

2.4.2 Intersection Performance Summary

- In general, the intersection analysis indicates that most of the local intersections operate at a good LoS, with low average delays and moderate spare capacity; this is particularly the case at the two roundabout intersections and – simply as a factor of low traffic flows – the intersection of GWS Road 2 & Railway Parade.

- The intersection of GWS Road 1 & Cambridge Avenue reports a poor LoS "F" in the AM. This LoS relates to the high delay experienced by a handful of heavy vehicles assigned to the right turn GWS Road 1 to Cambridge Road; with a high gap acceptance attributed to heavy vehicles, and the weight of the eastbound flow in Cambridge Avenue, these delays are quite significant, though the length of queue (95%ile length of 5.0m) more appropriately quantifies the actual "impacts" of this delay.

  The existing AUR turn treatment – though recently 'superseded' in the AustRoads standards by the **CHR (Short)** – remains in our opinion a more than appropriate turn treatment. The modelling indicates that the queue for the right turn to GWS Road 1 utilises a fraction of the available "turn" area provided by the AUR, such that through trips (westbound) are rarely inconvenienced (and certainly not delayed) by needing to use the passing lane.

- The intersection of Cambridge Avenue & Moorebank Avenue similarly reports LoS "E" in the PM, but this delay also relates to a very small number of vehicles turning right from Cambridge Avenue to Moorebank Avenue; as for the intersection of Cambridge Avenue & GWS Road 1, this has no impact on the broader operation of the intersection, nor generates a queue such as would impact the movement of the left turn Cambridge Avenue to Moorebank Avenue.

- The signalised intersections of Glenfield Road with Campbelltown Road, and with Brampton Avenue & Old Glenfield Road, both operate at a good LoS.

2.5 The Cambridge Avenue Causeway

While the performance of key intersections (as assessed in **Section 2.4** above) is generally the most significant consideration in determining the capacity of a road network, general lane capacity can also be important, particularly when there are constraints to the immediate or efficient provision of additional lane capacity. The Causeway represents such a constraint, though it must be noted that the impact of a closure of the Causeway due to flooding is perhaps a more significant driver for the Causeway to be replaced at this time.

2.5.1 Recent History

The "need" for an upgrade of the Causeway has long been a subject of debate, particularly as the route via Cambridge Avenue to Moorebank Avenue (and vice versa) has become such a significant sub-regional link between Campbelltown and Moorebank/Holsworthy/Liverpool. Moreover, when flooded and therefore closed to traffic, the +1,500vph currently using the Causeway in the AM and PM can have a significant impact on other diversionary routes.

To summarise all the proposals, reports, recommendations and responses in regard to the upgrade of the Causeway – even if taking only a snapshot of the past 5 years - would run to dozens of pages, but it remains the case that funding, or at least an appropriate funding mechanism, has yet to be found which would provide for an upgrade. CC Council (and LC Council) have long sought State Government assistance, but this has not been forthcoming to date; rather – and perhaps offering some shorter term potential – the provision of a high level bridge has more recently been specifically linked to the development of the Intermodal, i.e. as a piece of infrastructure required as part of the broader Intermodal operations.

Given that current Intermodal traffic assessments report virtually no Intermodal trip generation to the south (i.e. to the Causeway) this is far from assured (see **Section 5.6** and **Appendix D.6**).

CC Council has provided ARC with a copy of the Report for Cambridge Avenue High Level Bridge Strategic Concept Design and Cost Estimate (**Bridge Report**) prepared by GHD in 2009 for CC Council and the RMS. While earlier proposals referenced a two lane bridge, the Bridge Report examined a four lane bridge that could accommodate future traffic increases as well as a higher bridge to ensure separation from peak flood levels. It is noted that some of the proposals examined in Bridge Report restrict access to GWS Road 1; our more recent discussions with the authors of the Bridge Report further suggest that a more detailed [future] assessment may determine that the bridge be required to extend even further to the west (i.e. further across the GWS Road 1 intersection).

One of the four bridge options assessed in the Bridge Report is reproduced below.

Figure 2.5.1 Potential High Level Bridge (Option 2)

Source: Bridge Report

Contrary to these investigations, it has very recently been reported that the Department of Defence (**DoD**) has examined the closure of Cambridge Avenue west from Moorebank Avenue. While the DoD has publicly stated that the closure is only one option under investigation as it largely relocates from the Moorebank area, such a closure would have broad impacts throughout the sub-region, and would certainly require detailed review.

2.5.2 Recent Causeway Statements

Some of the most pertinent [recent] reports regarding the Causeway are provided for reference below.

- CC Council Civil Works Report April 2009

  Council continues to be involved in a number of areas to gain funding commitments from Government for the provision of a high level bridge and the safe operation of the existing causeway…correspondence has also been received from the Minister for Roads, Michael Daley MP, regarding the provision of a high level bridge to replace the present causeway crossing. The Minister states that advice provided by the Roads and Traffic Authority (RTA) is that upgrading of the causeway bridge requires serious consideration as part of the transport access options for the proposed Moorebank Inter-modal Terminal.

  The Minister has confirmed the Department of Defence has recently written to the RTA offering an easement on the east bank of the Georges River to construct the bridge and associated works…The RTA has informed the Minister that they will liaise further to progress this issue on behalf of all tiers of government when planning and funding for the Moorebank Inter-modal Terminal becomes more advanced and funding sources for the provision of the Cambridge Avenue high level bridge has been identified.

- CC Council Civil Works Report July 2010

  Council has been advised that to facilitate the planning process, a Moorebank Project Office is being established to manage the detailed planning and approvals for the intermodal terminal, in consultation with all levels of Government, as well as the local community. It is advised that the Project Office will also consider land transport issues such as the provision of a high level bridge at Cambridge Avenue in the detailed planning.

- Response in the NSW Parliament to Dr Andrew McDonald from the Minister for Roads 2009

  …any upgrade to Cambridge Avenue, including a possible high level bridge across the Georges River, must be considered in conjunction with the transport impacts of the proposed conversion of the Moorebank Defence Lands to civilian use, including the construction of a large intermodal terminal on part of the site…Under the Nation Building Program, the Federal Government has set aside $300 million for development of an intermodal freight terminal at Moorebank, including road and rail connections to the terminal. Pending completion of feasibility and scoping studies for the terminal, it is not possible to make any definitive statement on the future role and standard of Cambridge Avenue.

- Response in the NSW Parliament to Dr Andrew McDonald from the Minister for Roads 2010

  The Government has no current plans to construct a high level bridge to replace the causeway. However, pending completion of feasibility and scoping studies for the proposed intermodal terminals at Moorebank, it is not possible to make any definitive statement on the future role and standard of Cambridge Avenue.

- Amanda Partridge, Macarthur Chronicle Campbelltown, September 2013

  THE fate of Cambridge Ave, Glenfield, is still unclear as the Department of Defence confirms it is looking into options amid a planned move to Holsworthy and West Wattle Grove…A Defence Department spokesman told the Chronicle no decision had been made yet.

  "*There are a number of Commonwealth owned roads in the Moorebank area, including a portion of Cambridge Ave,*" *he said. "These roads were originally built for Defence purposes and are also open to the public… Defence is assessing its required [sic] use of these roads and will liaise with relevant stakeholders, prior to any decisions being made, including on whether it would be more appropriate for such roads to be transferred to the relevant state or local authority.*"

In summary, there is no question that the Causeway will need to be replaced by a bridge if a trafficable "all-weather" link is to remain via Cambridge Avenue to/from Moorebank Avenue. The dual issues of flooding and traffic appear to point inevitably to a four lane high level bridge as providing the only viable option to address both issues appropriately, as does the underlying impression (with reference to the quotes above) that the bridge would be required by the Intermodal.

2.5.3 Causeway Capacity

The operational capacity of a traffic lane in an urban environment varies significantly based on a number of factors, including terrain, vehicle types, intersection/turning demands and carriageway and verge width amongst others. While nominal lane capacity is therefore quantitative to a degree, it must also be partially subjective; traffic flows that breach a nominal capacity will not necessarily or automatically trigger the implementation of additional capacity when costs and other factors are considered – the Causeway is an excellent example of such.

The 2010 Highway Capacity Manual (**HCM**) states that the capacity of a two-lane road is 3,200vph, but only under what are very favourable conditions; wide lanes and verges, flat terrain, no heavy vehicles, and an even directional split. These are not characteristics of the Causeway – application of HCM (or the similar AustRoads Guide to Traffic Engineering Practice: Part 2 – Roadway Capacity) capacity equations suggests a substantially lower two-way capacity for a section of road such as the Causeway.

Conversely, Cambridge Avenue for all but the Causeway provides almost ideal conditions by which to achieve theoretical capacity – wide lanes, wide verges and [certainly west of the Causeway] flat terrain, and significant separation from intersections.

A good example of the actual [and indeed current] capacity of the Causeway - and no doubt there are many similar examples - is provided by [the albeit recently upgraded] Windsor Road between Pitt Town Road and Richmond Road. A study prepared for Hawkesbury Council showed that the [then] very narrow two lane bridge across the Hawkesbury River was in the peak hours carrying flows in excess of 1,650vph per lane (with a similar tidal demand to that evident at the Causeway).

The real issue for investigation in such circumstances generally remains the capacity of adjacent intersections where opposed flows fundamentally reduce capacity. As such, the provision of additional approach lane capacity at either end of the narrow Windsor Road section resulted in generally good levels of service at the bookend intersections in the peak hours, and as such consideration of the significant single lane traffic flows was largely immaterial. Observations and traffic surveys during the peak periods certainly confirm the high tidal flows across the Causeway, but nonetheless the distance available between the Causeway and the bookend intersections to the east and west, and the lack of delays to the primary tidal movements at those intersections, means that the high tidal lane flows across the Causeway generally…flow.

There is of course a further area which requires investigation in the case of the Causeway – whether the mix of high flows and tight geometry are contributing to proportionally higher accident rates. This issue is examined below.

2.6 Crash Data

The RMS has provided crash data to ARC for the period 2008 – 2013, and is presented in full in **Appendix B**. A summary of the data is provided below.

2.6.1 Cambridge Avenue

Cambridge Avenue reports 24 crashes for the period 2008 – 2013, with 16 injury crashes (reporting 20 injuries) but no fatalities. Importantly, only 4 crashes were attributed to speeding, which given the long and straight segment of Cambridge Avenue east from Canterbury Road is perhaps a lower proportion than anticipated. The most common incidents were rear-end crashes (9) primarily on the approaches to Canterbury Road and to Moorebank Avenue, followed by opposing vehicle (turning) crashes (4) and off-road crashes (4).

Additionally: -

- 6 crashes are reported between 200m and 500m east of Canterbury Road, i.e. immediately adjacent to the Site, with a further single crash (off-road) 25m west of the Causeway
- 4 crashes at the intersection of Cambridge Avenue & Canterbury Road & Railway Parade & Glenfield Road
- 8 crashes in Cambridge Avenue between the Causeway and Moorebank Avenue, primarily rear-end crashes on the approach to Moorebank Avenue
- 6 crashes at the intersection of Cambridge Avenue & Moorebank Avenue
- No crashes at the intersection of Cambridge Avenue & GWS Road 1
- No crashes on the Causeway

As reported above, the crash data reports a single accident in the immediate vicinity of the Causeway, while others are reported as being at such significant distance from the Causeway such that the Causeway is unlikely a factor. Notwithstanding, ARC notes that the Bridge Report specifically raises the issue of road safety at the Causeway: -

> *In addition, a number to serious crashes have been recorded at the approaches to the Causeway in recent years. As a result, the Causeway has developed a poor accident history.*

It is difficult to determine what may have changed in recent years to alter the prevalence of incidents at the Causeway, particularly given that all available traffic data suggests little change in traffic flows over the past 5 – 10 years; certainly there is a [pre-2008] record of numerous incidents, including a fatal accident involving an emergency services vehicle in 2006. It must therefore be acknowledged that the existing capacity and design conditions discussed in **Section 2.5.3** can only increase the potential for incidents compared to other locations with similar flows but wider lanes/verges, even if such incidents have not been specifically reported in recent years.

2.6.2 Glenfield Road

Glenfield Road reports 50 crashes for the period 2008 – 2013, the majority being at the intersection of Campbelltown Road. The 25 injury crashes resulted in 25 but no fatalities. 8 crashes were attributed to speeding, and a further 6 to fatigue. The most common incidents were rear-end crashes (16) primarily on the approaches to the Campbelltown Road & Glenfield Road intersection, as well as adjacent approach crashes (7) and a smaller number of opposing vehicle (turning) crashes (4).

Additionally: -

- 5 crashes are reported at the intersection of Glenfield Road & Brampton Avenue & Old Guildford Road, the majority of which relate to right turn conflicts
- 21 crashes are reported between Campbelltown Road and Canterbury Road, with a variety of crash types including off-road, rear-end, head-on and out of control on bend; many of the crashes are in close proximity to Campbelltown Road, Brampton Avenue, and the Glenfield Road overpass
- 20 crashes are reported at the intersection of Campbelltown Road & Glenfield Road
- 4 crashes at the intersection of Cambridge Avenue & Canterbury Road & Railway Parade & Glenfield Road

As for Cambridge Avenue, this is not an enviable crash record, though away from key intersections, and with only a small proportion of crashes attributable to speed, fatigue or road conditions, it is difficult to pinpoint why so many accidents have occurred in what is generally a well-defined moderate speed road.

3 Public Transport, Pedestrian & Cycle Access

3.1 Rail services

Glenfield Railway Station is located approximately 1km south-west of the Site (at Railway Avenue), though closer to 2km from the existing Site offices near GWS Road 1. Glenfield Station is located at the interchange of three railway lines, including:

- The South Line (Campbelltown to City Circle via Granville)
- The Cumberland Line (Campbelltown to Blacktown)
- The Airport and East Hills Line (Macarthur to City Circle via East Hills and Sydney Airport)

Glenfield Station provides medium – high frequency services across the day. Services on the South and Airport/East Hills lines operate with a 10 minute frequency in each direction, while services on the Cumberland line generally operate with a 30 minute frequency in each direction.

In 2009, the NSW Government announced the construction of a new 11 kilometre rail line – the South West Rail Link (**SWRL**) from Glenfield to Leppington in South West Sydney. The SWRL – currently nearing completion - included upgrades to Glenfield Rail Station and the line itself as it passes through the Site. Upon completion, the total number of services through Glenfield Station during the weekday peak hour is estimated to increase from 8 to 12; and by 2020, the number of services is forecast to rise to 20 during the weekday peak hour.

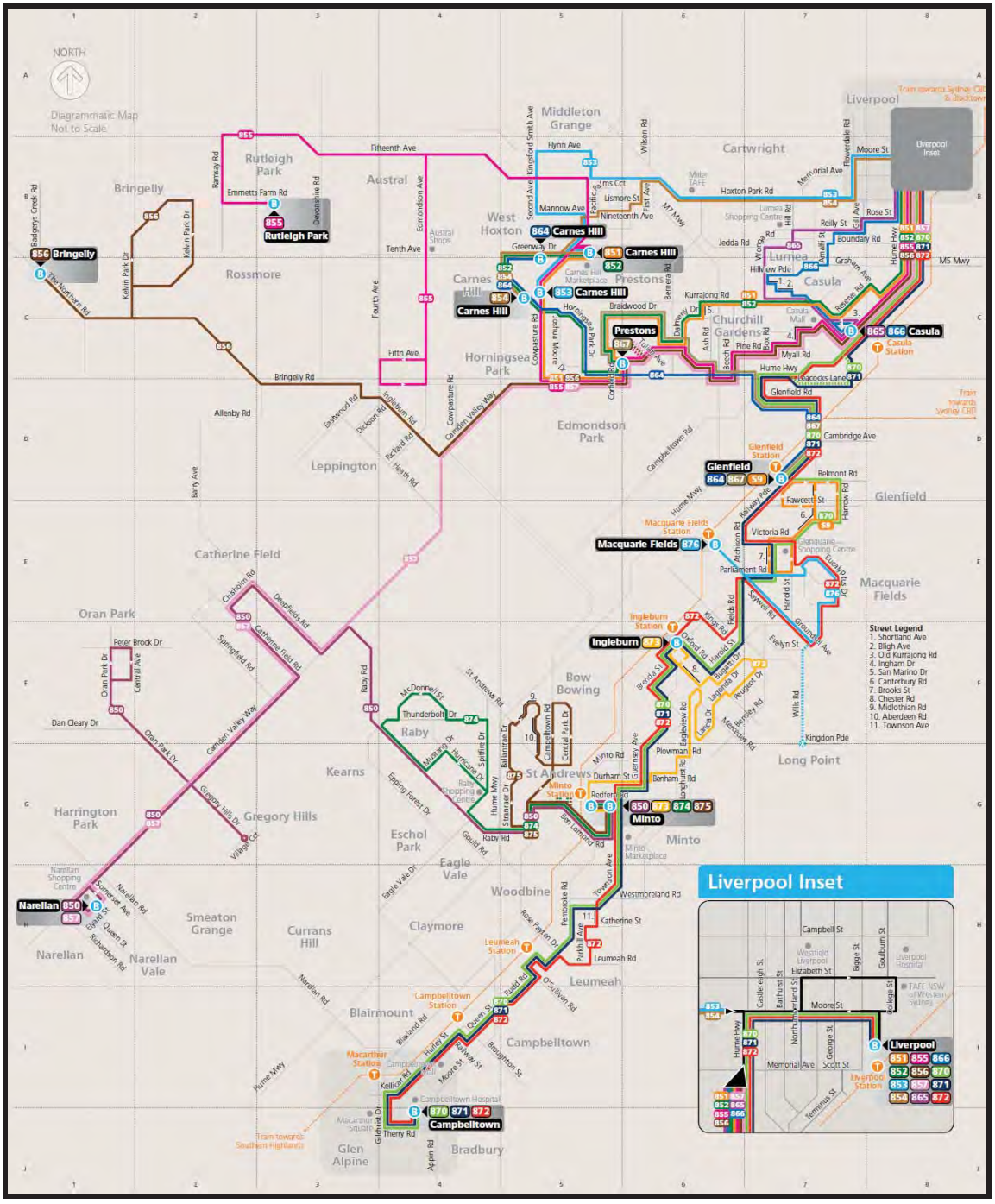
Complementing the increased services is the [largely completed] Glenfield Transport Interchange, which comprises an upgrade to Glenfield Station to accommodate the introduction of the SWRL, as well as the construction of a multi-storey commuter car park. The upgrade also includes changes to Railway Parade to specifically offer enhanced interchange opportunities through: -

- Enhanced bus facilities, including priority bus measures.
- Increased provision for kiss and ride.
- Improved pedestrian crossing opportunities.
- Widening of the Railway Parade cycle lanes to 1.5 metres.

3.2 Bus services

Bus services in the Glenfield area are provided by Interline, with routes operating past the intersection of Railway Parade & GWS Road 2, with bus stops located approximately 300m south in Railway Parade. These bus routes are shown **Figure 3.2** below.

Figure 3.2 Glenfield Bus Routes



Source: TNSW

With reference to **Figure 3.2**, available routes via Glenfield Station and Railway Parade include: -

- Route 864 Carnes Hill – Glenfield via Horningsea Park
- Route 867 Prestons – Glenfield via Prestons
- Route 870 Campbelltown – Ingleburn – Liverpool via Glenfield
- Route 871 Campbelltown – Ingleburn – Liverpool via Glenfield
- Route 872 Campbelltown – Ingleburn – Glenfield – Liverpool via Macquarie Fields

In general, these bus routes provide half hourly services to/from Glenfield during the peak periods. No bus services currently utilise Cambridge Avenue.

The *South West Sector Bus Servicing Plan* identifies a short term and long term bus route that will also travel in the vicinity of the Site. The short term proposed bus service would travel between Glenfield Station and Ingleburn via Canterbury Road and Glenfield Road, while the long term bus route would also travel along Canterbury Road and Glenfield Road between Glenfield Station and Leppington (every 15 minutes in the peak periods).

3.3 Pedestrian Access

Minimal pedestrian facilities are currently provided in the vicinity of the Site, being instead limited to the populous area to the west of the Site in Railway Parade and Canterbury Road, providing for pedestrians in more immediate proximity to Glenfield Station and the surrounding village centre and residential areas.

CC Council has a footpath improvement program in place to identify areas of path which need to be replaced, as well as determine where new footpaths could be provided to achieve maximum use. CC Council uses a weighting system to assess which areas of footpath to upgrade, as well as where new footpaths should be situated; it is unlikely that Cambridge Avenue would [under current or proposed usage] qualify for such paths.

3.4 Cycle Access

The Site is well located in terms of opportunities for cycling, being located in [relatively] close proximity to the Liverpool-Parramatta Rail Trail and the M7 Motorway Cycleway. Notwithstanding, there are limited cycle provisions in the local area, and no local designated on or off road cycle paths (though it is noted that the most recently available CC Council *Bike Plan* from 2010 suggests cycle paths are located in Cambridge Avenue, Canterbury Road and Glenfield Road). Certainly most local roads (other than the Causeway and the Glenfield Road over-bridge) are available to accommodate cyclist on-road.

The potential exists for more cycle paths to be defined in coming years, and to link to new sub-regional routes currently being planned, but based on our discussions with CC Council no new bike plan is currently available for review, and a detailed copy of the 2010 *Bike Plan* is not available due [per CC Council] to inconsistencies in the 2010 *Bike Plan*.

3.5 Summary

Notwithstanding the excellent public transport services available within 800m of Glenfield Station, it must be acknowledged that, excepting staff trips, the nature of the work undertaken at the Site (both currently and further to the Proposal) has little potential to create (or attract) a significant number of public transport, walk or cycle trips until such time as [likely bus] services are provided along Cambridge Avenue.

The only real potential for reduced vehicle usage in the short term would be in regard to staff trips, though earlier industrial work start times when many services (and specifically bus services) operate at a lower headway means that any real mode shift is unlikely in the short term.

This should change in the future. While regular bus routes are unlikely to utilise Cambridge Avenue given the [current] low patronage levels in Glenfield and Moorebank – and indeed due to the Causeway limitations - developments such as the Intermodal provide excellent opportunities for bus services to link between Glenfield Station and Moorebank Avenue and then Liverpool, and as such operate directly past the Site. Similarly, the Rezoning Proposal at the Site will also provide for significant on-site employment, further improving the viability of sub-regional routes via Cambridge Avenue linking major centres and major public transport hubs.

4 The Proposal

4.1 The Facility

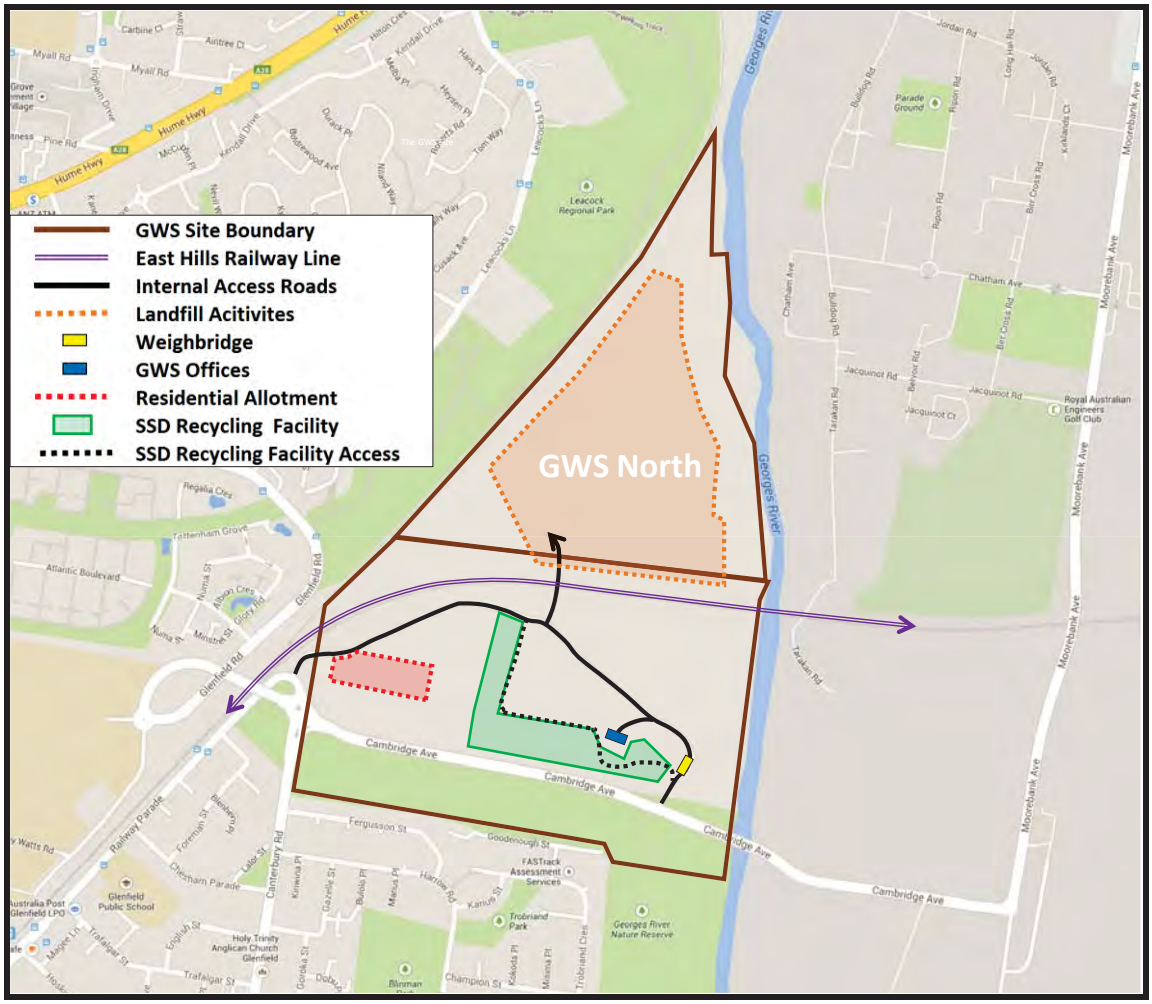
4.1.1 General Operations

GWS proposes the development of a Recycling Facility on land within the southern portion of the GWS Site. It is proposed that onsite recycling will be primarily sourced from commercial and industrial (**C&I**) and construction and demolition (**C&D**) waste. The C&I waste will be limited to natural and manufactured timbers, green waste, metals, plastics (hard and soft) and glass. The C&D waste will predominantly consist of concrete, brick, asphalt, terracotta etc. as well as virgin excavated natural material and excavated natural material.

The Facility will be constructed across approximately 5ha and positioned to avoid existing landfill cells within the southern portion of the Site. Each of the internal areas will facilitate recycling of different materials.

The Facility within the southern portion of the GWS Site is shown in **Figure 4.1.1** below, while more detailed plans of the Facility are provided in the broader Environmental Assessment which this TIA accompanies.

4.1.1 The SSD Recycling Facility



4.1.2 Capacity

The Facility would provide capacity for the recycling of up to 450,000tpa, including: -

- Up to 250,000 tpa of general recyclable materials
- Up to 200,000 tpa of sandstone from major projects

4.1.3 Customers

It is estimated the majority (at least 70%) of general recyclable materials will be sourced from wholesale customers (i.e. in quantities of 10 tonnes and above) – these materials would arrive from major development sites, commercial and industrial contract customers. Approximately 30% of general recyclable materials will be sourced from smaller customers (i.e. in quantities of 1 – 10 tonnes). Once recycled, approximately 80% of [sorted] materials would be sold to wholesale customers (in quantities of 20 tonnes or more), with 20% sold to smaller customers (again in quantities of 1 – 10 tonnes).

With regard to sandstone recycling, demand would be driven by major projects i.e. if there are no major projects then there will be no sandstone delivered to or (once recycled) taken from the Site. During periods of sandstone recycling, materials would both arrive and depart the Site in loads of more than 20 tonnes. Importantly, the 200,000tpa sandstone recycling capacity is based on annual operations, i.e. on a sandstone recycling demand being generated year round; the Facility would not provide for (say) 100,000t of sandstone to be recycled in 2 months, as this would simply exceed the [average] capacity of the sandstone recycling component of the Facility.

The Facility is expected to employ up to 20 staff, an increase of some 15 staff over existing recycling staff.

4.2 Access

4.2.1 Access Paths

All inbound access (to the existing landfill operations and proposed Facility in the northern and southern portions of the Site respectively) will remain via the existing intersection of GWS Road 1 & Cambridge Avenue

Once on-site, vehicles travelling to and from the landfill operations will utilise the existing weighbridge north of Cambridge Avenue, then existing internal access roads through the Site to the northern portion of the Site. These vehicles would then return via the same internal access roads, again utilise the weighbridge and depart the Site via the intersection of GWS Road 1 & Cambridge Avenue.

Once on-site, vehicles travelling to the Facility will turn west before the existing weighbridge, and then utilise new weighbridge facilities before proceeding through the Facility to the appropriate materials recovery area. Once unloaded (or loaded) vehicles use a second weighbridge, then depart the Site via the existing intersection of GWS Road 2 & Railway Parade; almost all departing vehicles are expected to turn left back to the roundabout intersection of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Avenue.

4.2.2 Access Design

All on-site roads will be designed with reference to AS 2890.1 and AS 2890.2, and specifically consider the turning paths of the maximum sized vehicles travelling through the Site. All loading and unloading areas will similarly be designed to account for the maximum sized vehicles.

Further to the identification of RAVs continuing to use the Site – and moreover the proposed internal route from GWS Road 1 through the Facility to depart to GWS Road 2 – it will be necessary to secure RMS approval for the classification of the short section of Railway Parade between GWS Road 2 and the intersection of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Avenue as an RAV route (with all vehicles then turning to the existing RAV approved Glenfield Road).

While our observations suggest that an approval should be possible, an alternatively route for RAVs is available internally back to GWS Road 1 for departure to Cambridge Avenue (to the approved RAV route as per current RAV movements from the Site).

4.3 Traffic Generation

The assessment of the trip generation of the Proposal is based on the following: -

- The sourcing of a majority of recyclable materials from wholesale customers utilising vehicles with higher weight capacity
- The outsourcing of the majority of recyclable materials to wholesale customers utilising vehicles with higher weight capacity)
- The sourcing of a minority of recyclable materials from smaller customers utilising vehicles with lower weight capacity
- The outsourcing of a minority of recyclable materials to smaller customers utilising vehicles with lower weight capacity
- The sourcing and outsourcing of sandstone to wholesale customers utilising vehicles with higher weight capacity

This analysis is summarised in the sections below.

4.3.1 Landfill Operations

Landfill operations within the northern portion of the Site will continue as per current operations. GWS waste stream data for 2013 shows the total GWS operations currently providing for some 62,000tpa of landfill materials and 38,000tpa of recyclable materials; this broad 60/40 waste/recycling split has been consistent over recent years. With the relocation of all recycling operations to the new Facility, it is estimated that the landfill operations would continue to provide capacity for approximately 65,000tpa.

It is estimated that landfill materials will continue to arrive in "average" size loads (per **Table 1.5.1**, some 3.56 tonnes per vehicle). Further to separating the landfill operations from the [future] recycling operations, the landfill operations would not generate outbound material trips. A summary of the estimated landfill operations trip generation is provided below.

Table 4.3.1 Landfill Operations

GWS Landfill Operations				
Inbound Materials		Outbound Materials		Total Daily Trips
65000	Annual Capacity	0	Annual Capacity	
3.56	Vehicle Capacity (t)	22	Vehicle Capacity (t)	
18258	Total Vehicles	0	Total Vehicles	
286	Working Days	286	Working Days	
64	Vehicles per Day	0	Vehicles per Day	
128	Vehicle Trips per Day	0	Vehicle Trips per Day	128

4.3.2 Recycling Facility – General Recyclables

The Facility will have capacity for some 185,000tpa of general recyclable materials, all of which would both arrive and depart the Site.

It is estimated that the majority of inbound materials (some 70%) will arrive from major contract customers, i.e. customers with a steady requirement to recycle materials, and those arriving with bulk materials rather than smaller loads. Major contract customers would also be responsible for the majority of outbound recycled materials (some 80%) though outbound loads are estimated to have a significantly higher average size than inbound loads. Minor contract customers would make up the remaining inbound and outbound capacity (i.e. some 30% of inbound materials, and 20% of outbound materials). These customers are estimated to carry much lower average loads (for both inbound and outbound materials).

A summary of the estimated general recycling operations trip generation is provided below.

Table 4.3.2.1 Recycling Facility Operations - Major Contract Customers

GWS Recycling Facility - Major Contracts 70% of Inbound, 80% of Outbound				
Inbound Recyclables		Outbound Recyclables		Daily Trips
129500	Annual Capacity	148000	Annual Capacity	
15	Vehicle Capacity (t)	22	Vehicle Capacity (t)	
8633	Total Vehicles	6727	Total Vehicles	
286	Working Days	286	Working Days	
30	Vehicles per Day	24	Vehicles per Day	
60	Vehicle Trips per Day	47	Vehicle Trips per Day	107

Table 4.3.2.2 Recycling Facility Operations - Minor Contract Customers

GWS Recycling Facility - Minor Contracts 30% of Inbound, 20% of Outbound				
Inbound Recyclables		Outbound Recyclables		Daily Trips
55500	Annual Capacity	37000	Annual Capacity	
3.56	Vehicle Capacity (t)	3.56	Vehicle Capacity (t)	
15590	Total Vehicles	10393	Total Vehicles	
286	Working Days	286	Working Days	
55	Vehicles per Day	36	Vehicles per Day	
109	Vehicle Trips per Day	73	Vehicle Trips per Day	182

4.3.3 Recycling Facility - Sandstone

As discussed previously, the Proposal provides for the recycling of up to 200,000tpa of sandstone, though this is a maximum level that the Facility could recycle per year, based on an average peak input over the course of the year (simply because there is fixed amount per day that it is actually possible to recycle).

The demand for and supply of sandstone recycling would be generated during period where major projects and construction works (within Sydney and environs) were underway; at other times, there would be little demand for sandstone recycling at the Site.

Both inbound and outbound sandstone arrives/departs almost exclusively in high capacity vehicles; reference to GWS sandstone data shows that inbound sandstone is transported in lots averaging 22 tones, while departing sandstone is transport in loads averaging over 26 tonnes; as a result, even during a period of sandstone recycling, the total trip generation of the sandstone recycling operations is relatively moderate, as shown in **Table 4.3.3** below.

Table 4.3.3 Recycling Facility Operations – Sandstone

GWS Recycling Facility - Sandstone				
Inbound Sandstone		Outbound Sandstone		Daily Trips
200000	Annual Capacity	200000	Annual Capacity	
23.5	Vehicle Capacity (t)	26.5	Vehicle Capacity (t)	
8511	Total Vehicles	7547	Total Vehicles	
286	Working Days	286	Working Days	
30	Vehicles per Day	26	Vehicles per Day	
60	Vehicle Trips per Day	53	Vehicle Trips per Day	112

4.3.4 Traffic Generation Summary

With reference to the sections above, in total it is estimated that the [existing] landfill and [proposed] recycling operations could at capacity generate some 530vpd. In addition, staff and service vehicle trips are estimated to add 60vpd - 70vpd**, bringing the total future generation of the GWS Site to approximately 600vpd**. In periods where sandstone was not being recycled, this generation would be reduced to approximately 490vpd.

With reference to the available weighbridge data and the average waste/recycling loads for the different landuses as detailed above – and for reference in the modelling of key intersections - it is estimated that approximately 70% of vehicles would be heavy vehicles, and 30% of vehicles would be light vehicles.

4.4 Trip Distribution

4.4.1 Hourly Trip Profiles

There is no information to suggest that the current distribution of trips to and from the Site would be significantly different further to the Proposal, and indeed it is reasonable to assume that major contractors would more likely generate trips outside of [commuter] peak periods in order to maximise the efficiency of travel times to and from the Site.

Notwithstanding, trips have been assigned across the day – and specifically to the peak hours - with reference to the arrival trip distribution outlined in **Table 1.6.1**.

4.4.2 Origin & Destination Profile

As discussed in **Section 1.6.2**, the current trip distribution of the Site is generally balanced between trips to the east and west. There is no information to suggest that this distribution profile would be significantly altered by the Proposal, though a majority of staff trips are again estimated to travel to/from the west.

4.5 Trip Assignment

With reference to the traffic flow forecasts in **Section 4.3**, the arrival profile in **Table 1.6.1** and the directional distribution profile outlined in **Section 1.6.2**, the distribution of future Site trips to the local road network is shown in the following figures: -

- **Figure 4.5.1** Future AM Site Generation
- **Figure 4.5.2** Future PM Site Generation

It should be noted that these flows would replace existing flows to and from GWS, not be additional to existing flows.

Figure 4.5.1 Future AM Site Trip Generation

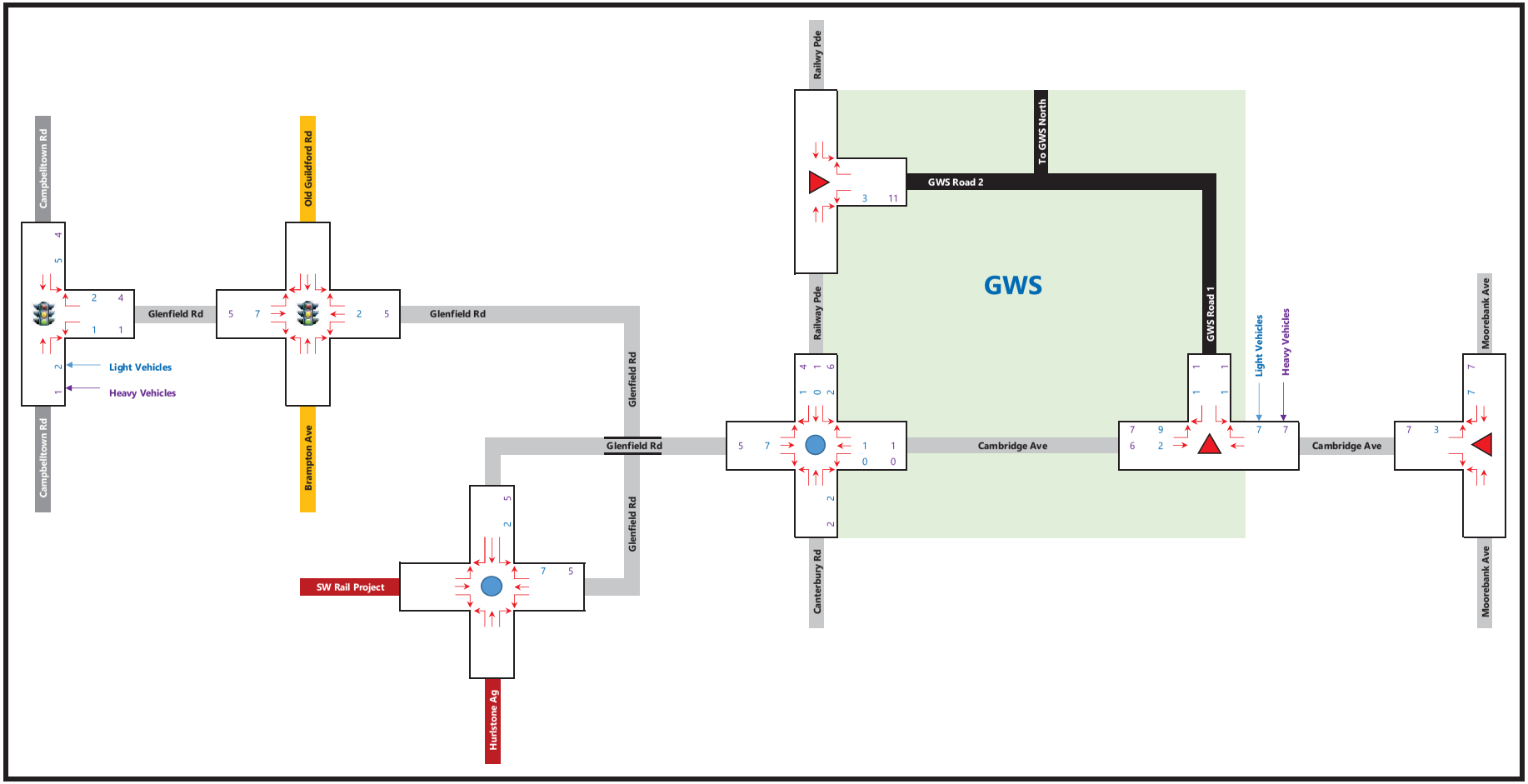
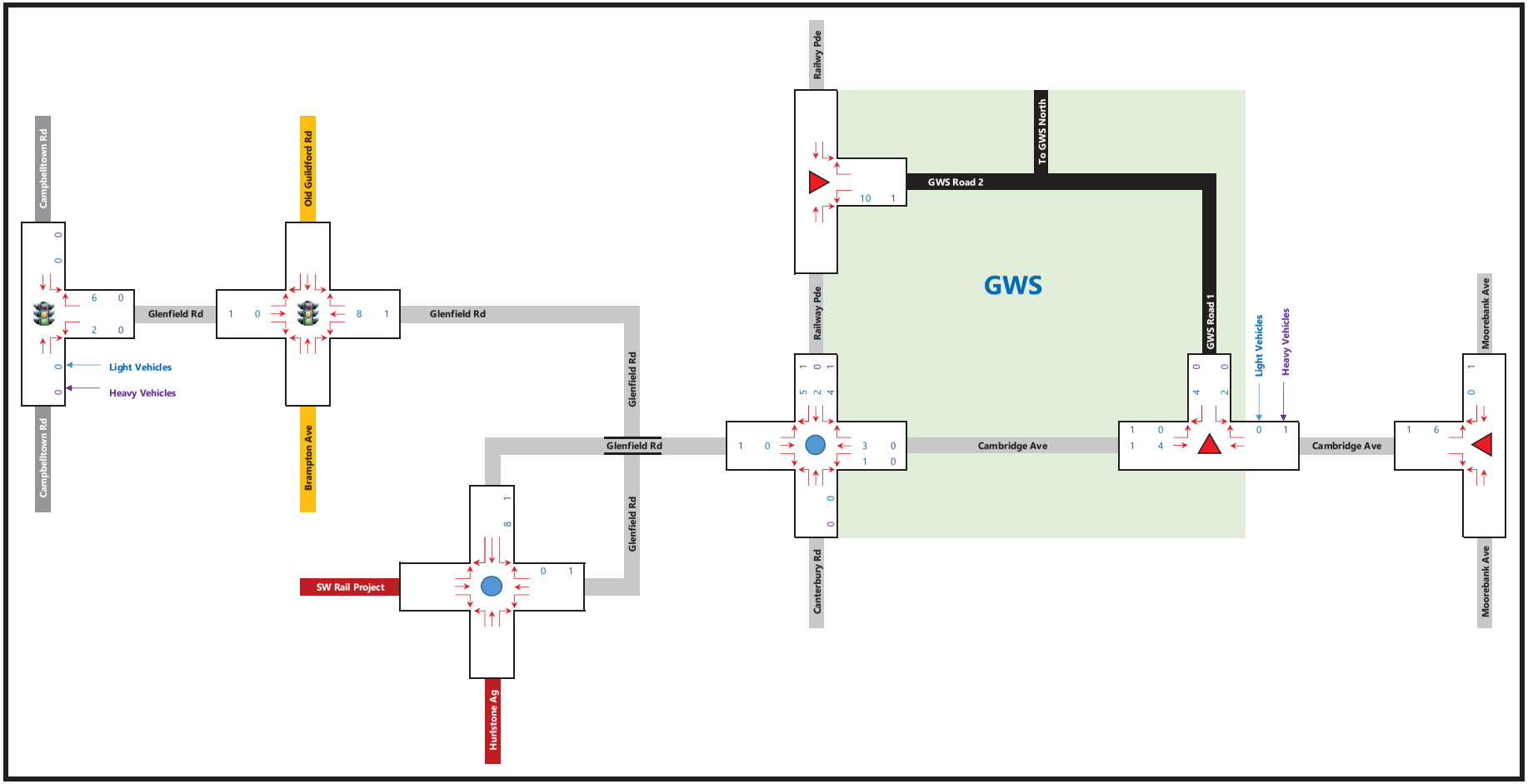


Figure 4.5.2 Future PM Site Trip Generation



4.6 Parking

As well as appropriate loading and unloading facilities/areas through the various sections of the Facility, staff parking would also be provided in a central location. With an estimated peak of 20 staff working at the Facility – and given that the nature of the Site does not neatly conform to the parking rates provided in the CC Council Campbelltown (Sustainable City) Development Control Plan 2012 - it is recommended that a minimum of 20 staff spaces plus a minimum of 5 visitor spaces be provided.

All parking spaces will be designed with reference to AS 2890.1:2004.

5 Sub-Regional Projects

Appendix D provides a detailed assessment of the numerous sub-regional developments/projects which have the potential to impact the road network to which the Proposal will generate additional trips. These are summarised below.

5.1 Glenfield Road Urban Release Area

The Glenfield Road Urban Release Area (**GRURA**) provides for the development of 1,100 residential dwellings, including 980 separate dwellings and 120 townhouse dwellings. All access from the GRURA is to Glenfield Road, with signalised intersections at Brampton Avenue & Old Glenfield Road; and at Atlantic Boulevard. A left in/left out intersection to Glenfield Road is also proposed (understood to be near Britannia Drive).

It is estimated that the fully occupied GRURA will generate some 820vph to/from Glenfield Road, of which approximately 50% would travel to the east and 50% to the west. Approximately 60% of trips are estimated to use the intersection of Glenfield Road & Brampton Avenue & Old Glenfield Road, and 40% the intersection of Glenfield Road & Atlantic Boulevard once Atlantic Boulevard is connected through to the main part of the estate.

The resulting AM and PM trips generated by the GRURA are detailed in **Appendix D.1**.

5.2 Campbelltown Road Upgrade

The RMS is currently finalising plans for the Campbelltown Road **Upgrade**, which includes the intersection of Campbelltown Road & Glenfield Road. While the upgrade of this intersection would occur towards the end of the broader Upgrade, it is expected to be completed by 2024.

Future traffic flow estimates at the intersection are provided in the Campbelltown Road Upgrade Review of Environmental Factors: Traffic and Transport Modelling Assessment (**CR TTMA**); provided for a year 2026, these increases are estimated to be largely evident by this TIA forecast year of 2024 (and have therefore been assessed in their entirety in this TIA).

Significant increases are forecast in the CR TTMA to through flows in Campbelltown Road generated by new residential activation precincts to the south of Glenfield Road. Conversely – and as discussed with the RMS **Upgrade Project Team** – the assessment provided in this TIA (based on recent traffic surveys, and the assessment of the additional GRURA trip generation potential as per **Section 5.1** above) indicates turning flows to/from Glenfield Road that are much higher than forecast in the CR TTMA (see **Appendix D.2**).

As a worst case, the forecast Campbelltown Road through flows provided in the CR TTMA have been paired with the higher Glenfield Road turning flows determined as part of this TIA. The resulting AM and PM trips generated at the intersection of Campbelltown Road & Glenfield Road are detailed in **Appendix D.2**.

5.3 Average Annual Growth

The developments described above, and specifically GRURA and residential activation precincts off Campbelltown Road south of Glenfield Road, are essentially "certain", and as such the trips generated by each will be evident in the forecast year 2024.

Conversely, average annual growth in and of itself through the local road network is expected to be very minor. Average Annual Daily Traffic (**AADT**) and Average Daily Traffic (**ADT**) data indicates almost no growth in flows through the local road network over the past +10 years; rather, growth is generated by targeted projects within the sub-regional such as those described above. As a result, only a minor (0.5% per annum) average annual growth factor has been applied through the forecast year 2024 (see also **Appendix D.3**).

5.4 Glenfield Link Road

CC Council has identified the potential for a new sub-arterial **Link Road** between Glenfield Road (in the vicinity of the railway overpass) to Campbelltown Road (likely to an intersection with Beech Road). CC Council has specifically linked the Link Road proposal with the development of the Intermodal; Link Road would may then also form part of broader works in the area including the bridge to replace the Causeway; and potentially a [major or minor] upgrade of Cambridge Avenue.

However, at this time there is no information to suggest the potential for Link Road to be developed within the 10 year TIA forecast period. Available Intermodal traffic assessments refute the potential for any significant flow to use the local road network and - as affirmed by CC Council and our discussions with the RMS Upgrade Project Team - there is no independent proposal to design or fund the Link Road in the near future.

It is also worth noting that an addendum to the CR TTMA includes a new eastern approach to the Campbelltown Road & Beech Road intersection, which is where the Link Road is envisaged to meet Campbelltown Road, but information provided by the Upgrade Project Team has specifically stated that this is not representative of the Link Road, but rather a new access for the Hurlstone Agricultural College (**HAC**) as stated in RMS Campbelltown Upgrade Supplementary Land Use and Socio-Economic Impact Assessment (Appendix E of the Upgrade documentation available on the RMS website): -

> *There is currently no access to the school from Campbelltown Road. The proposal would create a southern approach to the Beech Road intersection, which would facilitate improved access to Roy Watts Road in the future, thereby improving accessibility of the Hurlstone Agricultural High School.*

This new access road has the potential to significantly reduce trips to the HAC via the roundabout off Glenfield Road, but the Upgrade documentation does not provide any sub-regional modelling in regard to such reductions.

Notwithstanding, the proposal to provide access to the HAC via a new approach to Campbelltown Road at Beech Road would appear to rule out the Link Road at this time (see also **Appendix D.4**)

5.5 GWS Rezoning Proposal

Concurrent with the Proposal, GWS proposes a rezoning of the southern portion of the Site (including the area to be occupied by the Facility) for future industrial (warehousing) development (the **Rezoning Proposal**). Some 28 hectares would be available for industrial development further to consideration of easements, environmental boundaries etc, and a total floor area of 198,000m^2 GFA is estimated.

ARC has prepared a TIA on behalf of GWS in regard to the Rezoning Proposal (the **Rezoning TIA**), a detailed summary of which is provided in **Appendix D.5**, and further summarised below.

5.5.1 Access

Access to the rezoned industrial land within the Site would be provided by a new intersection to Cambridge Avenue, likely to be situated midway between the intersection of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade, and GWS Road 1. It is expected that a roundabout intersection will be provided.

5.5.2 Trip Generation

With reference to the RMS Guide Update, and to recent industrial traffic assessments (including assessment prepared for the RMS) it is estimated that the Rezoning Proposal could be developed to provide warehousing facilities similar to those provided within the Erskine Park Industrial Estate. Applying the RMS surveyed trip generation rates to the Rezoning Proposal provides an estimate of some 260vph – 270vph in the AM and PM; ARC notes that the trip generation of 5ha of industrial warehouse development is almost identical to the trip generation of the Proposal [also occupying some 5ha) in the critical AM, though higher than the Proposal in the PM.

5.5.3 Trip Distribution

With reference to the Journey to Work data, it is estimated that a majority (approximately 65%) of staff trips would be generated to and from the west, with the remainder generated to and from the east. With reference to the location of the Site within the south-west region, and in line with the heavy vehicle distribution profile provided in the Intermodal traffic assessments, an even higher majority (some 80%) of heavy vehicle trips would be generated to and from the west.

5.5.4 Trip Assignment

With reference to vehicle access, trip generation and trip distribution, the assignment of Rezoning Proposal trips is detailed in **Appendix D.5**.

5.6 The Moorebank Avenue Intermodal

The final – and certainly most significant – sub-regional development proposal is the Intermodal, which is estimated to provide capacity of 1.7m containers per year, and be developed as either a joint enterprise or as separate operations. From a traffic and transport perspective, the distinction is not significant – all Intermodal vehicle trips would be generated to Moorebank Avenue, and then necessarily travel to/from the north or south.

This future trip distribution – to the north or to the south - is a key issue for discussion.

The 2013 SIMTA Transport and Accessibility Impact Assessment (**SIMTA TIA**) identifies the potential for some 50vph to be generated to/from Moorebank Avenue south of the 1M [container] Intermodal. Based on the fact that the SIMTA TIA assessed a 1M Intermodal, this generation might therefore proportionally increase to some 85vph based on a 1.7M Intermodal.

Based on sensitivity testing by ARC, 85vph would have little impact on the local road network through 2024 even further to the Proposal (and indeed further to the Rezoning Proposal also).

However, available information suggests that the 1.7M Intermodal could generate a significantly higher percentage of the estimated total peak hour generation of up to 1,800vph to the road network south and west of the Moorebank Avenue, as summarised below and assessed in detail in **Appendix D.6**.

5.6.1 Intermodal Trip Distribution

While trips between the Intermodal and many regional locations are more efficient via the **Regional Route** (which for ease of reference includes Moorebank Avenue, the M5, Hume Highway and Hume Motorway) the SIMTA TIA identifies very significant delays along the Regional Route upon the completion of the 1M Intermodal. In Moorebank Avenue for example, a PM northbound trip through Anzac Road and then to the M5 west is reported to incur average delays of some 7 minutes, and these delays appear to be little reduced even further to the implementation of all SIMTA TIA road network upgrade recommendations.

Under such circumstances, the **Local Route** (which for ease of reference includes Cambridge Avenue and Glenfield Road between Moorebank Avenue and Campbelltown Road) – which already provides comparable travel times for some SIMTA TIA identified trip demands to the south and south-west – must be considered a viable alternative; the route to the Hume Motorway south is a good example given the availability of the on-ramp from Campbelltown Road south of Glenfield Road.

There are also trips identified in the SIMTA TIA that are not only as efficient via the Local Route, but more legible also, particularly for staff trips. A high number of trips are identified travelling to/from the Hume Highway south of the M5, a route that would only be used to/from either Camden Valley Way or Campbelltown Road.

With little identifiable demand for trips to/from Camden Valley Way, this can only suggest trips to/from Campbelltown Road, and necessarily trips to/from Campbelltown Road south of Glenfield Road. Even without the identified delays further to Intermodal operations, the Local Route again appears a more than viable route for these trips.

5.6.2 Local Route Vehicle Restrictions

The SIMTA TIA states that the Local Route is not accessible by heavy vehicles, and restricts the total trip distribution to the Local Route to 5% of [smaller] rigid vehicles. The Local Route however is accessible to all heavy vehicles that accord with the RMS *General Access Vehicle* classification, being up to 19m in length and less than 42.5t; further to discussions with the RMS and container transport companies, these limits are specifically considered in the allowance for container weights precisely so that containers can be transported using GAV routes.

It is the case that oversized RAV's are not permitted to use the section of Cambridge Avenue between Moorebank Avenue and GWS Road 1, but the SIMTA TIA estimates that only 30% of all articulated vehicles would be RAV's. All other articulated vehicles could potentially use the entire Local Route between Moorebank Avenue and Campbelltown Road.

5.6.3 Potential Intermodal Trip Generation to the Local Route

Further to consideration of the issues raised above, and with specific reference to the delays forecast in the SIMTA TIA along the Regional Route; and the delays forecast in the CR TTM and this TIA for the Local Route; an assessment of the potential Intermodal trip distribution to the Local Route can be identified. While full details of this assessment are provided in **Appendix D.6**, the assessment suggests the following: -

- The Local Route is estimated to provide faster trip times for trips to and from Campbelltown Road south of Glenfield Road in both the AM and PM; key Regional Route movement delays influencing this estimate include Hume Highway to M5 eastbound (over 160 seconds average in both peaks) and Moorebank Avenue to M5 westbound (283 seconds average in the PM).

- The Local Route is estimated to provide faster trips times for trips to the Hume Motorway via the Campbelltown Road on-ramp in the PM, based on the same Regional Route delays identified above, as well as the northbound delay in Moorebank Avenue through Anzac Road (120 seconds average delay).

In terms of trip generation, the assessment in **Appendix D.6** reports the resulting potential for significantly higher flows than estimated in the SIMTA TIA to use the Local Route during the AM and – to an even greater extent given the Hume Motorway on-ramp from Campbelltown Road – PM.

Necessarily, ARC has conducted sensitivity testing at key intersections along the Local Route, acknowledging the fact that the addition of Intermodal trips would itself increase delays along the Local Route. The assessment identifies a potential "tipping point" where the delays along the Regional Route further to a decrease in trips (diverting to the Local Route) may equal delays along the Local Route (further to an increase in trips diverting from the Regional Route).

However, this finding relates only to a comparison of the [only available] SIMTA TIA delays along the Regional Route - i.e. based on a 1M Intermodal – while the Local Route analysis provided in **Appendix D.6** includes the potential trip generation of a 1.7M Intermodal.

5.6.4 Intermodal Summary

It is important that the findings outlined above (and detailed in **Appendix D.6**) are acknowledged as one potential outcome of the Intermodal development, particularly given that the Intermodal design and planning process is ongoing; and that without detailed Regional Route movement delays provided for a scenario with a 1.7M Intermodal and the implementation of all [SIMTA TIA] upgrade recommendations, it is not possible to provide a comprehensive route comparison.

Notwithstanding, even with all the SIMTA TIA recommended upgrades, the SIMTA TIA reports that average delays at the key intersections in Moorebank Avenue – and particularly at the M5 Interchange – are not significant reduced. These are results based on a 1M container Intermodal; while some trip generation efficiencies may be generated by a 1.7M Intermodal, it appears inevitable that a southern "release valve" will be required.

Based on these findings, it is fundamentally inappropriate to include an assessment of the Intermodal impacts in this TIA. Simply, the assessment detailed in **Appendix D.6** indicates the potential for the 1.7M Intermodal to generate hundreds of vehicle trips to Local Route, compared to the current SIMTA TIA estimate of 50vph to the Local Route. This range is simply too broad to assign with any confidence as part of this TIA.

6 Future Traffic Flows

6.1 2024 Base Flows

The base 2024 road network will include existing trips (**Section 2**); additional GRURA trips (**Section 5.1** and **Appendix D.1**); additional trips at the intersection of Campbelltown Road & Glenfield Road (**Section 5.2** and **Appendix D.2**); and average annual growth (**Section 5.3** and **Appendix D.3**).

The resulting flows are shown in **Figure 6.1.1** (2024 AM) and **Figure 6.1.2** (2024 PM).

6.2 2024 + Proposal

The forecast trip generation of the Proposal (**Section 4**) has been added to the 'base' 2024 network flows identified in **Section 6.1** above.

The resulting flows are shown in **Figure 6.2.1** (2024 AM) and **Figure 6.2.2** (2024 PM).

6.3 2024 + Proposal + Rezoning Proposal

Given the concurrent GWS Rezoning Proposal, an assessment of the combined projects is warranted. The forecast trip generation of the Rezoning Proposal (**Section 5.5** and **Appendix D.5**) has therefore been added to the 2024 + Proposal network flows identified in **Section 6.2** above.

The resulting flows are shown in **Figure 6.3.1** (2024 AM) and **Figure 6.3.2** (2024 PM).

Figure 6.1.1 2024 AM

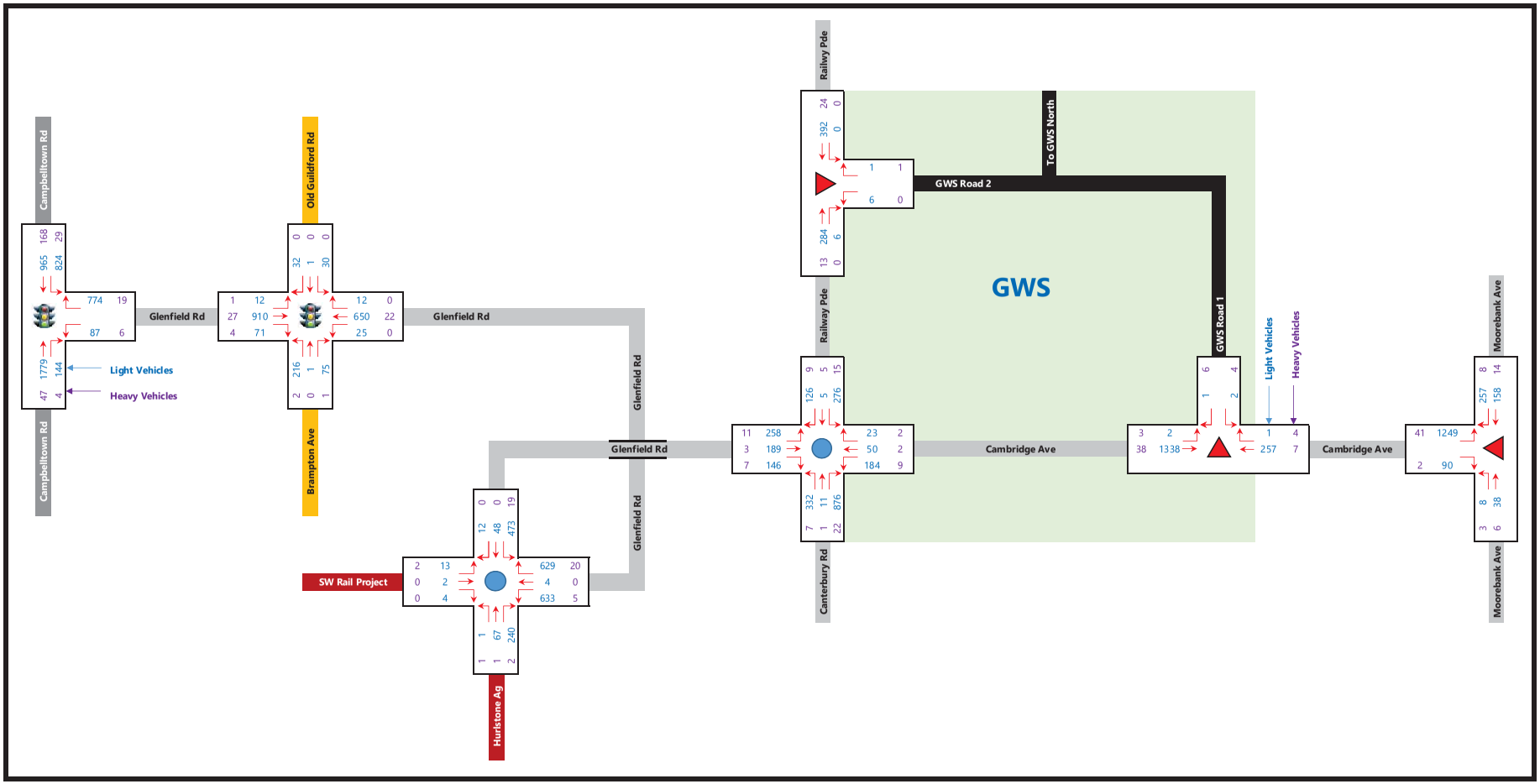


Figure 6.1.2 2024 PM

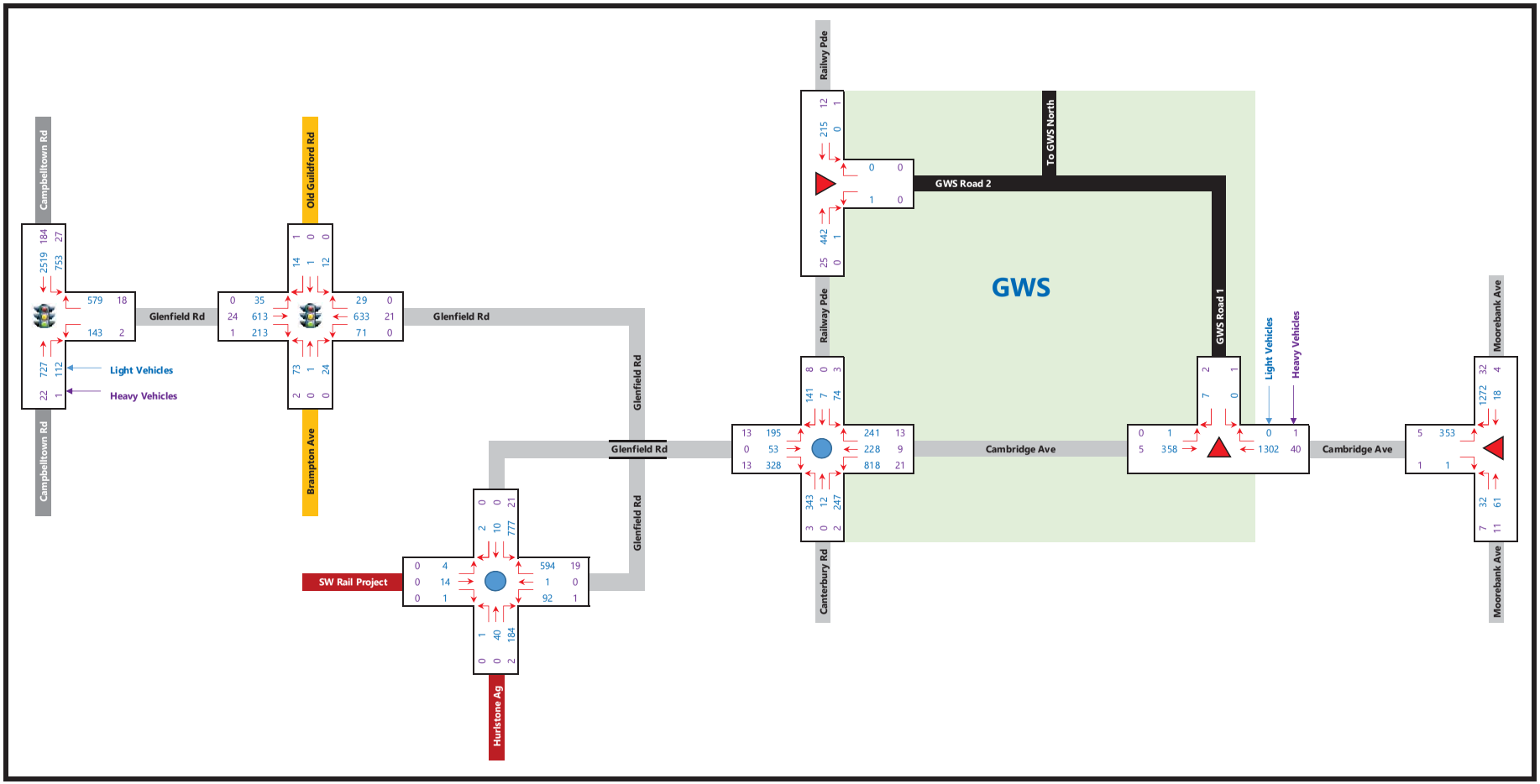


Figure 6.2.1 2024 AM + Proposal

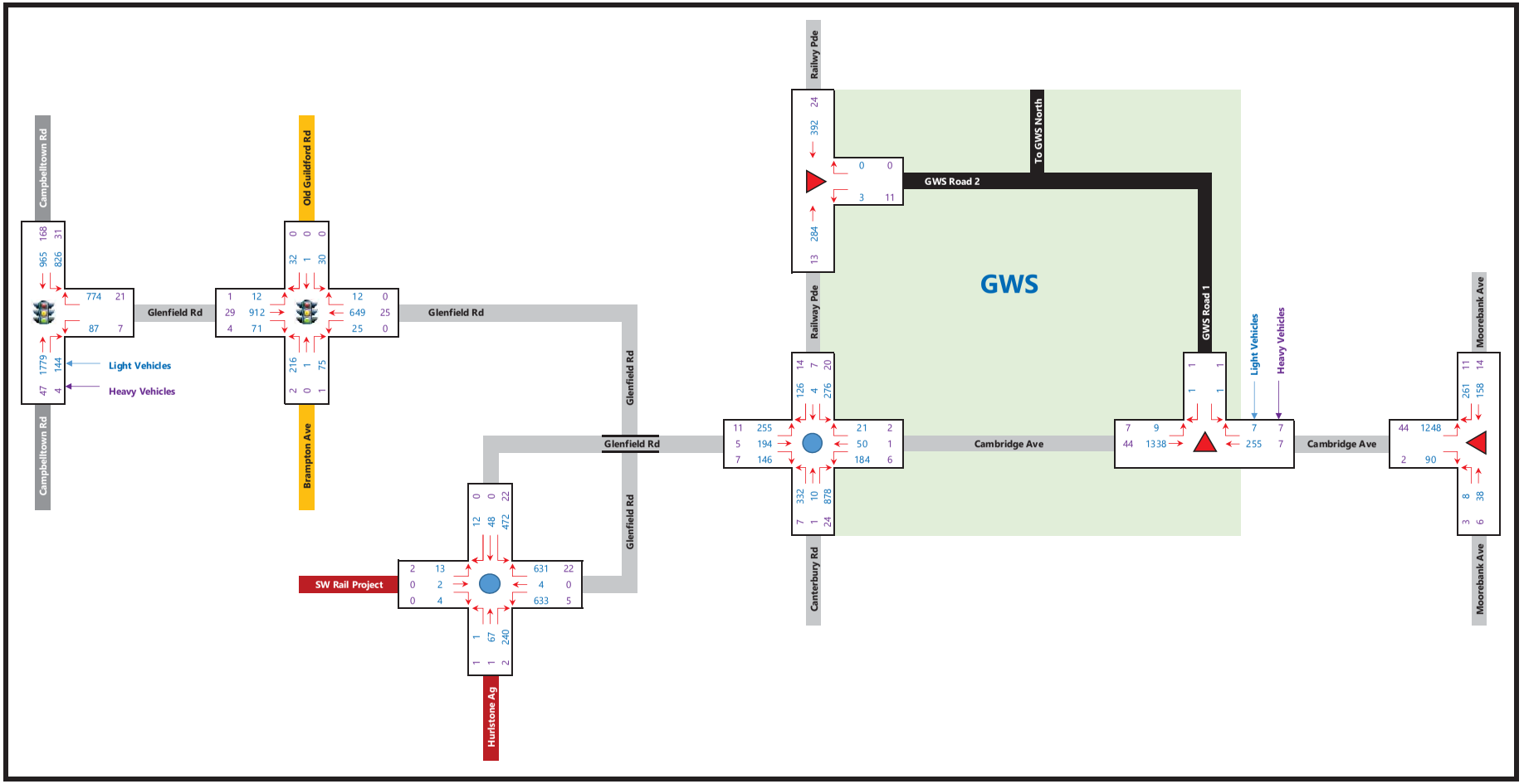


Figure 6.2.2 2024 PM + Proposal

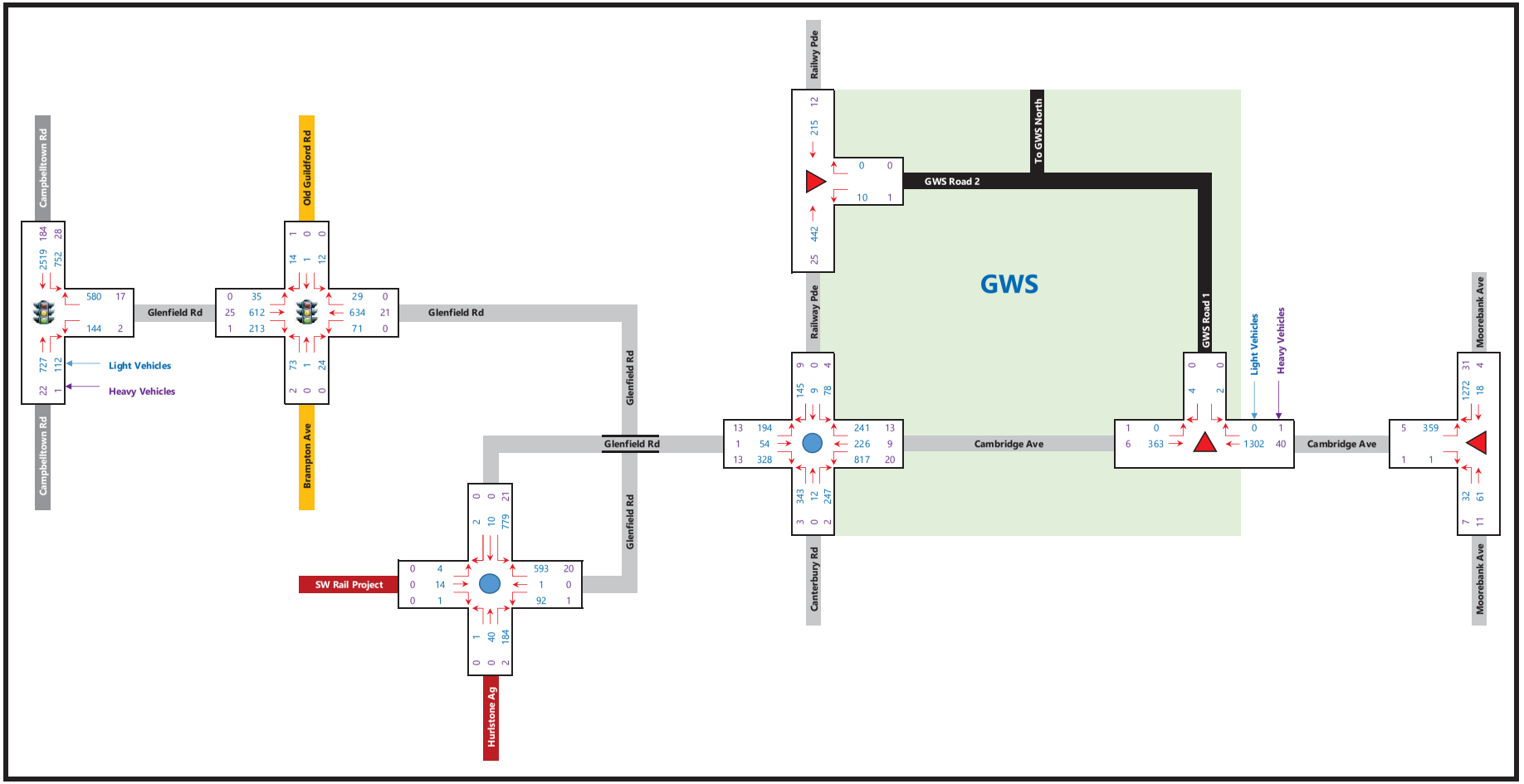


Figure 6.3.1 2024 AM + Proposal + Rezoning Proposal

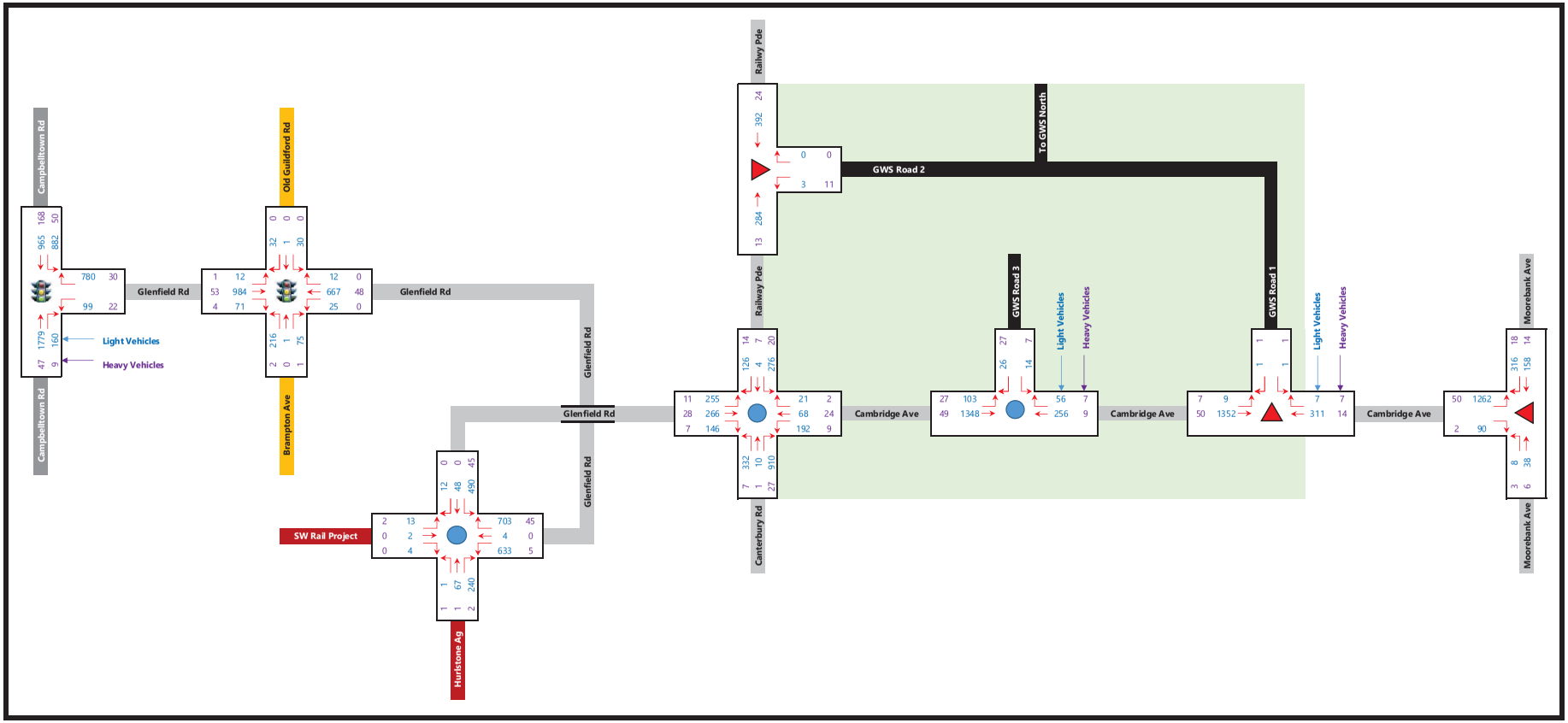
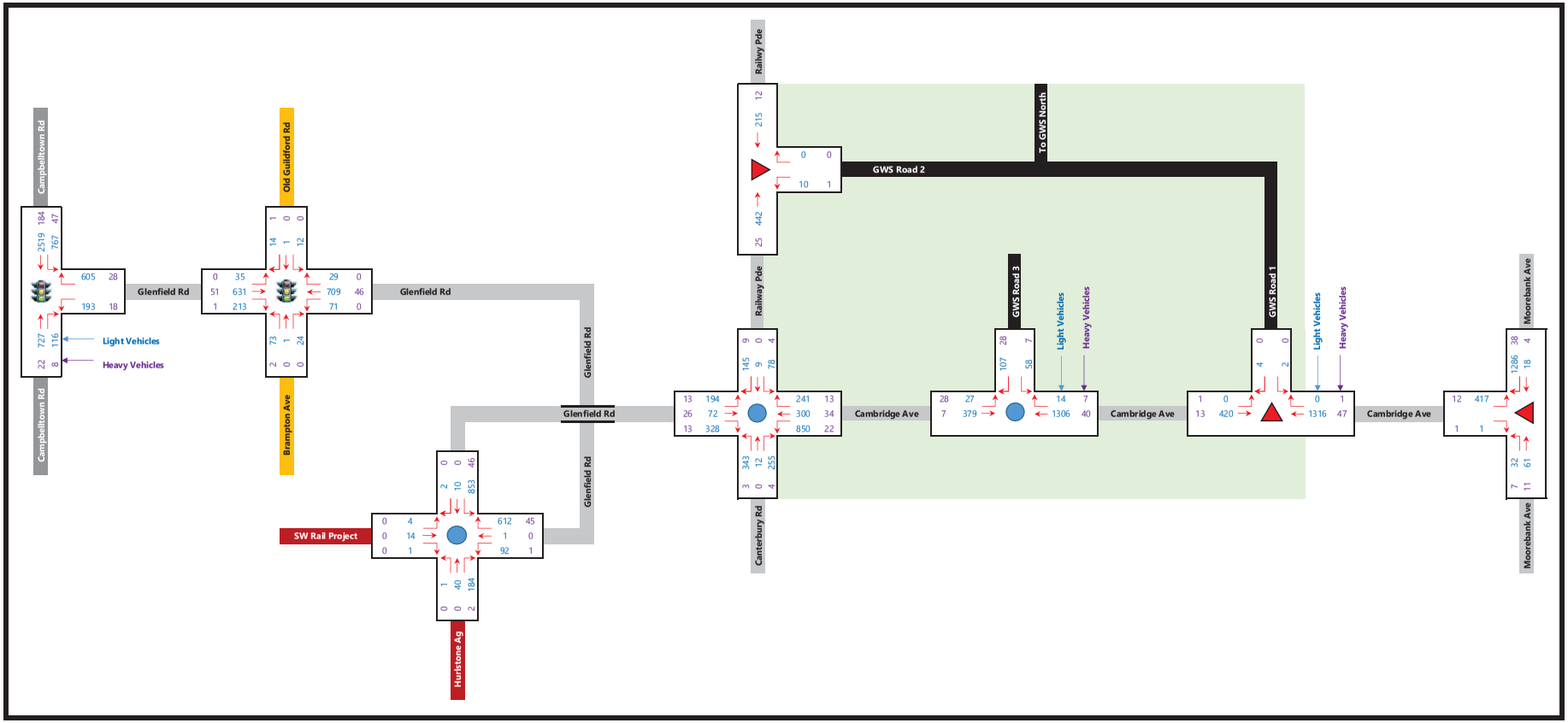


Figure 6.3.2 2024 PM + Proposal + Rezoning Proposal



7 Future Traffic Operations

7.1 Intersection Upgrades

While the geometry of most intersection will remain unchanged through 2024, a number of changes/upgrades have been included in the SIDRA modelling of the 2024 forecast scenarios.

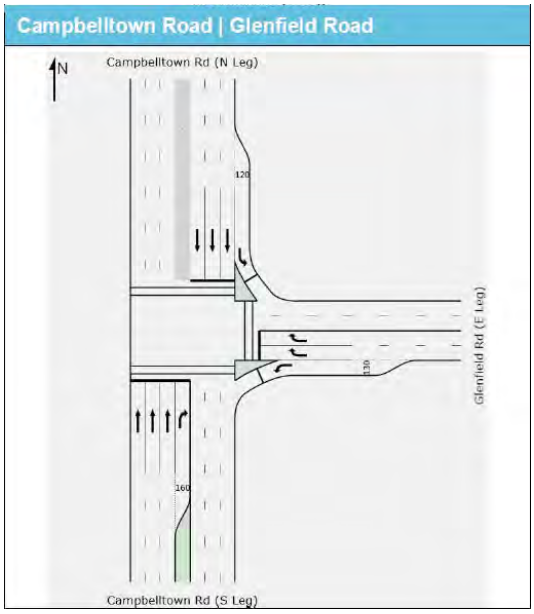
7.1.1 GWS 2 & Railway Parade

The 'upgrade' of this intersection would provide for departure movements only from GWS Road 2 to Railway Parade, and as such there would be no turning movements from Railway Parade to GWS Road 2.

7.1.2 Campbelltown Road & Glenfield Road

The CR TTMA provides the following [SIDRA] layout plan for the upgraded intersection of Campbelltown Road & Glenfield Road: -

Figure 7.1.2 Campbelltown Road & Glenfield Road Upgrade Proposal



Source: CR TTMA

3 components of the Upgrade – the extended right turn and left turn bays from Campbelltown Road to Glenfield Road, and the extended left turn lane Glenfield Road to Campbelltown Road – are likely to be formalised in future final planning for the intersection. Less clear is the [indicated] widening of Glenfield Road to provide to provide 2 eastbound lanes and 2 westbound lanes (plus the left turn lane).

At present, one of the 2 right turn approach lanes to Glenfield Road is a "short lane" (as defined in SIDRA) with a length of approximately 90m, while the kerbside eastbound lane is also a short lane requiring a merge to the single eastbound through lane, approximately 100m from Campbelltown Road. The result of providing a short lane as opposed to a "full length" lane (again as defined in SIDRA) is that queues are not as likely to form or be as significant on an approach with 2 full length lanes, as they are when there is only one full length lane and 1 short lane. Once queues reach a certain length, this can also impact delay and capacity.

It is also the case that if these lane extend east to the intersection of Glenfield Road & Brampton Avenue & Old Glenfield Road, capacity at that intersection would also improve.

Finally, the intersection layout also shows pedestrian crossings on each approach of the intersection, which do not exist.

Further to our discussions with the RMS Upgrade Project Team indicating the likelihood of the intersection upgrade occurring by 2024, the SIDRA modelling of the 2024 forecast scenarios has included the proposed upgrades as per **Figure 7.1.2**, but removed the pedestrian crossings from all approaches.

7.1.3 GWS Road 3 & Cambridge Avenue

For the purpose of providing an indicative assessment of a future intersection to Cambridge Avenue providing for the Rezoning Proposal – and with reference to the Rezoning TIA - the intersection of **GWS Road 3** & Cambridge Road provides a two lane roundabout.

The operation of this intersection – and the broader impacts of the Rezoning Proposal – are fully detailed in the Rezoning TIA. While the result of the analysis (in **Table 7.2.3**) indicate that the trips generated by the Proposal could in and of themselves be accommodated by the local road network, the Rezoning TIA examines a number of broader issues that may have a bearing on the Rezoning Proposal, but not on the Proposal. Of more importance in providing these results is the fact that, with or without the Rezoning Proposal, the Proposal itself has little impact on the local road network through 2024.

7.2 Future Intersection Operations

The operations of all key intersections under the different 2024 forecast scenarios outlined in **Section 6** have been assessed using SIDRA, with the results provided in the tables below.

Table 7.2.1 2024 "Base" Intersection Operations

2024 Base Conditions	Level of Service		Average Deelay (s)		Worst Delay (s)		Degree of Saturation		Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
GWS Road 1 & Cambridge Avenue	F [A]	D	1.1	0.4	135.0	49.1	0.72	0.70	7.8	2.8
GWS Road 2 & Railway Parade	A	A	0.6	0.5	7.1	6.4	0.13	0.21	6.5	9.5
Cambridge Avenue & Moorebank Avenue	A	F [A]	5.6	7.7	9.2	95.2	0.85	0.81	89.7	131.9
Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade	A	A	12.8	7.4	29.3	11.7	0.66	0.39	51.1	16.0
Glenfield Road & Hurlstone College & South West Rail Access	A	A	7.2	7.6	14.2	13.5	0.78	0.61	85.4	38.6
Glenfield Road & Brampton Avenue & Old Glenfield Road	B	B	24.9	25.2	33.1	30.0	0.77	0.66	171.1	123.4
Glenfield Road & Campbelltown Road	C	B	29.1	20.2	72.6	88.6	0.61	0.84	206.2	240.0

Table 7.2.2 2024 + Proposal Intersection Operations

2024 + Proposal	Level of Service		Average Deelay (s)		Worst Delay (s)		Degree of Saturation		Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
GWS Road 1 & Cambridge Avenue	F [A]	C	0.6	0.2	71.1	34.3	0.72	0.70	2.9	0.7
GWS Road 2 & Railway Parade	A	A	0.0	0.0	1.6	0.8	0.13	0.21	0.7	0.2
Cambridge Avenue & Moorebank Avenue	A	F [A]	5.6	7.7	9.3	94.7	0.85	0.81	91.1	130.9
Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade	A	A	13.6	7.4	33.6	11.8	0.67	0.39	58.6	15.9
Glenfield Road & Hurlstone College & South West Rail Access	A	A	7.2	7.5	14.3	13.5	0.78	0.61	86.9	38.5
Glenfield Road & Brampton Avenue & Old Glenfield Road	B	B	24.9	25.4	33.1	30.0	0.77	0.61	161.2	114.8
Glenfield Road & Campbelltown Road	C	B	29.0	20.2	72.6	88.6	0.62	0.84	192.2	224.9

Table 7.2.3 2024 + Rezoning Proposal Intersection Operations

2024 + Rezoning Proposal	Level of Service		Average Deelay (s)		Worst Delay (s)		Degree of Saturation		Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
GWS Road 1 & Cambridge Avenue	F [A]	E	1.2	0.5	182.2	60.9	0.73	0.72	9.8	3.3
GWS Road 2 & Railway Parade	A	A	0.6	0.5	7.1	6.4	0.13	0.21	6.5	9.5
GWS Road 3 & Cambridge Avenue (roundabout)	A	A	3.9	4.1	7.4	10.4	0.50	0.50	28.0	27.7
Cambridge Avenue & Moorebank Avenue	A	F [A]	5.7	7.9	10.0	103.4	0.87	0.82	99.1	146.3
Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade	A	A	13.7	7.4	25.7	12.1	0.70	0.44	51.0	19.0
Glenfield Road & Hurlstone College & South West Rail Access	A	A	7.3	8.0	14.3	14.1	0.84	0.70	116.6	56.4
Glenfield Road & Brampton Avenue & Old Glenfield Road	B	B	24.2	24.7	34.0	30.8	0.85	0.67	176.7	136.8
Glenfield Road & Campbelltown Road	C	B	30.1	22.2	70.3	91.0	0.69	0.87	195.0	247.0

Table 7.2.4 2024 + Proposal + Rezoning Proposal Intersection Operations

2024 + Proposal + Rezoning Proposal	Level of Service		Average Deelay (s)		Worst Delay (s)		Degree of Saturation		Queue (m)	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
GWS Road 1 & Cambridge Avenue	F [A]	C	0.7	0.3	86.1	40.6	0.74	0.72	3.1	0.9
GWS Road 2 & Railway Parade	A	A	0.0	0.0	1.6	0.8	0.13	0.21	0.7	0.2
GWS Road 3 & Cambridge Avenue (roundabout)	A	A	3.9	4.1	7.3	10.4	0.51	0.50	28.7	27.5
Cambridge Avenue & Moorebank Avenue	A	F [A]	5.7	7.9	10.1	103.4	0.88	0.82	100.1	146.3
Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade	A	A	14.1	7.5	27.6	12.1	0.71	0.44	52.7	18.7
Glenfield Road & Hurlstone College & South West Rail Access	A	A	7.3	8.0	14.3	14.1	0.84	0.70	118.5	56.5
Glenfield Road & Brampton Avenue & Old Glenfield Road	B	B	24.2	24.7	34.0	30.8	0.85	0.67	178.0	136.9
Glenfield Road & Campbelltown Road	C	B	30.1	22.3	70.3	91.0	0.69	0.87	195.0	247.0

7.3 Future Local Road Network Performance

7.3.1 Impacts of the Proposal - Intersections

With reference to the intersection performance results provided in **Table 7.2.1** and **Table 7.2.2**, it is clear that the Proposal will have little impact on the operation of the local road network, with all performance measures almost identical to those reported for 2024 performance without the Proposal.

- LoS is unchanged further to the Proposal at all but the intersection of GWS Road 1 & Cambridge Avenue, where LoS improves to a LoS "C" in the PM as the [existing] right turn demand to Cambridge Avenue – and specifically heavy vehicle demand - is largely redirected to Railway Parade under the Proposal.

- While queue lengths at all intersections are little changed further to the Proposal, the 95%ile queue length in Railway Parade (on the approach to the roundabout of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade) in the AM is reported as 58.6m, increasing from 51.1m under base 2024 conditions. This means that the roundabout approach queue in Railway Parade would at times extend to the GWS Road 2 intersection.

  In our opinion, this is an acceptable proposition, as vehicles will merge into the approach queue in a manner identical to that at minor intersections [roads or access driveways] downstream from signals and roundabouts all over Sydney, and again the number of these merging movements is very low, the equivalent of one vehicle on average every 5 minutes. Under such circumstances, merging to either the left and through or right and though approach lanes to the roundabout would not in our opinion have a significant impact in regard to traffic efficiency or road safety.

  With reference to **Table 7.2.4**, ARC notes that the introduction of Rezoning Proposal trips would reduce this AM queue length as the minor increase in westbound vehicles opposing the key Canterbury Road to Cambridge Avenue movement in turn provides more gaps for vehicles to enter the roundabout from the Railway Parade approach (thereby reducing queue length in Railway Parade).

- The high delays to the minor right turn movements at GWS Road 1 & Cambridge Avenue in the AM, and from Cambridge Avenue to Moorebank Road in the PM, remain, but as discussed in **Section 2.4** these delays apply to a small number of vehicles only. Indeed, the delay at the intersection of GWS Road 1 & Cambridge Avenue would actually be reduced from that under base 2024 conditions further to the redistribution of the majority of right turn trips to GWS Road 2 and then Railway Parade.

- The impact of the Proposal at the intersections along Glenfield Road through to Cambridge Avenue is very minimal, which simply reflects the very minor additional trip generation of the Proposal to these intersections.

More broadly across the day, traffic flows through the local road network reduce quickly and significantly outside of the AM and PM, such that the higher hourly flows generated by the Proposal "through the day" would oppose significantly lower flows at key intersections, and as such would similarly have only minor impact on intersection operations.

Finally, reference to **Table 7.3.4** and **Table 7.4.4** indicates that were the Rezoning Proposal trips included within the base 2024 traffic flows, the subsequent additional of the Proposal trips would similarly have no impact on LoS, capacity or queue lengths through the local road network.

In summary, ARC has concluded that the trip generation of the Proposal would have no significant impact on the operation of intersections through the local road network through 2024.

7.3.2 Impacts of the Proposal – The Causeway

While acknowledging in earlier sections the Causeway may be operating at or over a theoretical capacity, it remains the case that it does accommodate high flows principally as a result of the distance to, and capacity of, the booked intersections to the east and west; and the fact that the constraints of the Causeway are limited to a very short distance of the otherwise well designed Cambridge Avenue.

The Proposal itself would generate few trips to the Causeway during the peak periods, some 24 trips in the AM (approximately 1.4% of the two-way flow) and 8 trips in the PM (approximately 0.5% of the two-way flow). In both peaks, the Site currently generates some 50% of these forecast flows, so that the additional trips generated by the Proposal to the Causeway are estimated to represent less than 1% of 2024 total flows in both the AM and PM.

In and of itself, ARC has concluded that such minor additional generation could not be considered as having a significant impact on the capacity or general operations of the Causeway.

8 Construction

Full details of the construction of the Facility are unknown at this time, and would only be finalised further to the commission of a suitable contractor for the construction works. Notwithstanding, it is our opinion that the construction trip generation would be unlikely to exceed the forecast peak period trip generation of the Proposal as outlined in sections above, and as such it is expected that any impacts on the local road network would be no different to – and more likely less than – the impacts of the Proposal as detailed in **Section 7**.

A more detailed assessment of construction impacts will regardless be required *in due course* (to quote the RMS response to the DGRs); such an assessment would form part of a Construction Traffic Management Plan (**CTMP**) to include the following areas of assessment as a minimum: -

- Construction vehicle types
- Construction vehicle Site access
- Construction vehicle routes, including RAV routes is required and means of reducing impacts on residential areas
- Construction vehicle operating times (generally 7:00am – 6:00pm Monday to Friday, and 7:00am – 1:00pm Saturday, i.e. very similar times to the current GWS operations)
- Peak period and daily construction trip generation
- An assessment of construction trip impacts on the local road network
- On-site staff and construction vehicle parking/standing areas
- Where necessary, appropriate traffic control measures to maximise safety and accessibility

ARC is of the opinion that there are no significant impediments to the construction of the Facility occurring in a manner which maximises the safety and amenity for the local community, and the efficiency of the construction process.

9 Conclusions

ARC has prepared a detailed and independent assessment of the Proposal, specifically focusing on the potential of trips generated by the Proposal to impact the local road network. The assessment has included a detailed analysis of the trip generation and distribution characteristics of the Proposal, as well as detailed analysis of potential sub-regional trip generating projects so as provide an appropriate assignment of Proposal trips to the local road network for a forecast year 2024.

9.1 Traffic Impacts

With reference to SIDRA intersection analysis, and a review of AustRoads, RMS and other design guidelines, ARC has concluded that the Proposal would have no significant impact on the local road network through 2024. In summary: -

- No delay increases such as would reduce LoS are reported in 2024 further to the implementation of the Proposal, nor are there reports of any significant capacity reductions or queue length increases attributable to the additional Proposal trips.

- The intersection of GWS Road 1 & Cambridge Avenue continues to report a poor LoS in both the AM and PM through 2024, being entirely attributable to the right turn GWS Road 1 to Cambridge Avenue. This delay relates to a handful of vehicles per hour, and has no impact on the broader operation of the intersection or on queue lengths in GWS Road 1 or Cambridge Avenue; moreover, these delays would be reduced under the Proposal, as the majority of the right turn demand to Cambridge Avenue would be redistributed to GWS Road 2.

- The roundabout of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade will continue to operate at a good LoS through 2024 in the AM and PM. In the AM, the potential exists for 95%ile queues to extend north in Railway Parade towards the intersection with GWS Road 2, but this is no different to any number of industrial access points in proximity to intersections, and with no significant sight distance or other safety issues – and again only a minor flow from GWS Road 2 in the AM – this is an acceptable condition.

- Further to the above, the intersection of GWS Road 2 & Railway Parade will operate at a high LoS across the day.

- The roundabout of Glenfield Road & Hurlstone Agricultural College & [for the short term] a South West Railway Construction Access operates at a good LoS in the AM and PM through 2024, though the single lane capacity is reduced, and queue lengths increased. The Proposal in and of itself has little if any impact on capacity or queues at this intersection.

- The signalised intersection of Glenfield Road & Brampton Avenue & Old Glenfield Road will continue to operate at a good LoS with moderate delays, though queue lengths will be increased. The Proposal in and of itself has little if any impact on these queues.

- The intersection of Campbelltown Road & Glenfield Road will accommodate significantly increased traffic flows by 2024. While the intersection will continue to operate at a good LoS (specifically further to the Campbelltown Road Upgrade) queue lengths in Campbelltown Road and in Glenfield Road in both the AM and PM will likely still be significant. Again though, these increases relate to broader sub-regional traffic flow increases, with the trip generation of the Proposal in and of itself having little if any impact on these queues.

  Further to discussions with the RMS Upgrade Project Team, final planning for the upgrade of this intersection has not been completed, and further assessments will review current [RMS] traffic flow forecasts, particularly given the significantly higher [than currently forecast] flows to/from Glenfield Road identified in this TIA.

- The intersection of Cambridge Avenue & Moorebank Avenue reports a similarly poor LoS in the PM to the intersection of Cambridge Avenue & GWS Road 1, but this delay also relates to a very small number of vehicles turning right from Cambridge Avenue to Moorebank Avenue. As for the intersection of Cambridge Avenue & GWS Road 1, this has no impact on the broader operation of the intersection, and again the Proposal in and of itself has little if any impact on these queues.

- The Cambridge Avenue Causeway is estimated to accommodate some 1,800vph in the AM and PM by 2024. While this flow is well within the theoretical capacity of a two lane road, consideration of the width of the Causeway, directional splits and the lack of an adjacent verge suggests a much lower capacity; conversely, the Causeway represents only a very small section of Cambridge Avenue which more generally provides the characteristics suitable to accommodate higher flows. As importantly, there is significant separation between the Causeway and the 'bookend' intersections to the east and west.

  While there is growing pressure to replace the Causeway (with a high level bridge) to ameliorate both traffic and [perhaps more importantly] flooding issues, the trips generated by the Proposal would in and of themselves have little if any impact on the operation of the Causeway, constituting less than 1% of two-way flows in 2024.

9.2 Design & Construction

The design of the Facility remains to be finalised, but will necessarily be required to provide internal access roads which can accommodate the maximum vehicle requirements with reference to the appropriate Australian Standards; and loading/unloading areas and staff and visitor parking spaces with reference to the appropriate Australian Standards.

In addition, the construction of the Facility would occur only further to the preparation and implementation of a detailed CTMP, which would necessarily detail construction trip generation, vehicle routes, construction hours and Site access amongst other considerations.

In regard to construction traffic impacts, construction trips are unlikely to exceed the trip generation potential of the Proposal, and as such have a similarly negligible impact on the local road network. Notwithstanding, any such impacts would be examined as part of the CTMP assessment.

9.3 Sub-Regional Issues

While the local road network will operate at a generally good LoS through 2024, it is nonetheless the case that upgrade requirements are already being considered. The provision of a [four lane] bridge to replace the Causeway remains a subject of much debate, with the greatest potential for implementation linked very specifically to the Intermodal; however, with the SIMTA TIA reporting only a very minor generation via Cambridge Avenue, this link is somewhat tenuous.

The assessment of the Intermodal provided in this TIA suggests the potential for significant Intermodal trip generation through the local road network, particularly for trips to/from Campbelltown Road; and trips to the Hume Motorway via the Campbelltown Road on-ramp. If such potential is realised, it may be that the bridge [and potentially the Link Road] may be required so as to take pressure off Moorebank Avenue and the M5 Interchange, at which the SIMTA TIA reports all but unacceptable delays even further to recommended upgrade works.

Given that the SIMTA TIA considers only an Intermodal of 1M container capacity – and that the final Intermodal will provide 1.7M unit capacity – a viable southern route appears essential to the sustainability of the broader sub-regional road network.

9.4 Conclusion

Notwithstanding the broader sub-regional trip generation and infrastructure issues outlined above, **it is the conclusion of ARC that the Proposal is inherently supportable, primarily as a result of very moderate trip generation during the peak periods, and the commitment of GWS to provide for construction and operational infrastructure that will conform to appropriate guidelines and standards.**

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix A Traffic Survey Data

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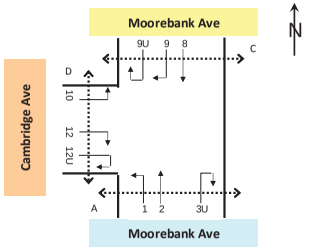
Contents

All traffic surveys conducted and reported by Skyhigh Traffic.

Table 1.1 Cambridge Avenue & Moorebank Avenue

Job No. : N1284
Client : ARC
Suburb : Glenfield
Location : Cambridge Ave/Moorebank Ave

Day/Date : Thursday, 12th Dec 2013
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



SKYHIGH - THE TRAFFIC SURVEY COMPANY

Approach	Moorebank Ave											
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	8	3	0	**11**	36	5	1	**42**	0	0	0	**0**
7:15 to 8:15	10	4	0	**14**	53	4	1	**58**	0	0	0	**0**
7:30 to 8:30	11	6	0	**17**	68	3	0	**71**	0	0	0	**0**
7:45 to 8:45	11	5	0	**16**	76	5	0	**81**	0	0	0	**0**
8:00 to 9:00	10	5	1	**16**	79	6	0	**85**	0	0	0	**0**
AM Totals	**18**	**8**	**1**	**27**	**115**	**11**	**1**	**127**	**0**	**0**	**0**	**0**
16:00 to 17:00	30	7	0	**37**	58	10	0	**68**	0	0	0	**0**
16:15 to 17:15	43	14	0	**57**	52	6	0	**58**	0	0	0	**0**
16:30 to 17:30	43	16	0	**59**	36	4	0	**40**	0	0	0	**0**
16:45 to 17:45	53	15	0	**68**	35	4	0	**39**	0	0	0	**0**
17:00 to 18:00	63	14	0	**77**	34	1	0	**35**	0	0	0	**0**
PM Totals	**93**	**21**	**0**	**114**	**92**	**11**	**0**	**103**	**0**	**0**	**0**	**0**

Approach	Moorebank Ave												Cambridge Ave							
Direction	Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 12 (Right Turn)				Direction 12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	150	9	4	**163**	238	8	0	**246**	0	0	0	**0**	1,135	39	0	**1,174**	86	2	0	**88**	0	0	0	**0**
7:15 to 8:15	107	4	4	**115**	264	11	0	**275**	0	0	0	**0**	1,113	36	0	**1,149**	63	2	0	**65**	0	0	0	**0**
7:30 to 8:30	85	3	1	**89**	289	17	0	**306**	0	0	0	**0**	1,056	29	1	**1,086**	38	2	0	**40**	0	0	0	**0**
7:45 to 8:45	86	3	0	**89**	293	19	3	**315**	0	0	0	**0**	983	25	2	**1,010**	34	3	0	**37**	0	0	0	**0**
8:00 to 9:00	88	5	0	**93**	280	16	6	**302**	0	0	0	**0**	847	25	2	**874**	33	2	0	**35**	0	0	0	**0**
AM Totals	**238**	**14**	**4**	**256**	**518**	**24**	**6**	**548**	**0**	**0**	**0**	**0**	**1,982**	**64**	**2**	**2,048**	**119**	**4**	**0**	**123**	**0**	**0**	**0**	**0**
16:00 to 17:00	17	4	0	**21**	1,125	30	0	**1,155**	0	0	0	**0**	331	4	1	**336**	1	1	0	**2**	0	0	0	**0**
16:15 to 17:15	14	4	0	**18**	1,143	28	0	**1,171**	0	0	0	**0**	330	3	1	**334**	2	1	0	**3**	0	0	0	**0**
16:30 to 17:30	12	1	0	**13**	1,191	22	0	**1,213**	0	0	0	**0**	326	4	1	**331**	5	1	0	**6**	0	0	0	**0**
16:45 to 17:45	12	1	0	**13**	1,209	25	0	**1,234**	0	0	0	**0**	328	4	1	**333**	8	1	0	**9**	0	0	0	**0**
17:00 to 18:00	14	1	0	**15**	1,193	26	0	**1,219**	0	0	0	**0**	326	3	1	**330**	10	0	0	**10**	0	0	0	**0**
PM Totals	**31**	**5**	**0**	**36**	**2,318**	**56**	**0**	**2,374**	**0**	**0**	**0**	**0**	**657**	**7**	**2**	**666**	**11**	**1**	**0**	**12**	**0**	**0**	**0**	**0**

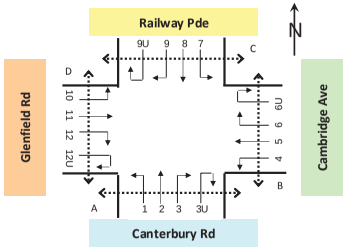
Table 1.2 Cambridge Avenue & GWS Road 1

Approach			Cambridge Avenue Westbound								GWS Road 1								Cambridge Avenue Eastbound							
Direction			Through				Right Turn				Left Turn				Right Turn				Left Turn				Through			
Time Period			Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
6:00	to	6:15	26	0	0	**26**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	6	0	0	**6**	273	12	0	**285**
6:15	to	6:30	43	2	0	**45**	0	1	0	**1**	0	0	0	**0**	0	0	0	**0**	2	0	0	**2**	294	14	0	**308**
6:30	to	6:45	51	2	0	**53**	1	2	0	**3**	0	1	0	**1**	0	0	0	**0**	0	1	0	**1**	336	14	0	**350**
6:45	to	7:00	56	2	0	**58**	2	0	0	**2**	0	3	0	**3**	0	0	0	**0**	0	1	0	**1**	282	14	0	**296**
7:00	to	7:15	41	3	0	**44**	1	2	0	**3**	1	1	0	**2**	1	0	0	**1**	1	0	0	**1**	316	10	0	**326**
7:15	to	7:30	51	1	0	**52**	0	1	0	**1**	1	1	0	**2**	0	1	0	**1**	0	1	0	**1**	353	3	0	**356**
7:30	to	7:45	59	1	0	**60**	0	1	0	**1**	0	1	0	**1**	0	2	0	**2**	0	2	0	**2**	280	1	0	**281**
7:45	to	8:00	72	1	1	**74**	0	0	0	**0**	0	1	0	**1**	0	3	0	**3**	1	0	0	**1**	281	8	0	**289**
8:00	to	8:15	84	2	0	**86**	0	1	0	**1**	0	1	0	**1**	1	0	0	**1**	0	2	0	**2**	264	8	0	**272**
8:15	to	8:30	87	3	0	**90**	1	0	0	**1**	0	0	0	**0**	0	2	0	**2**	0	1	0	**1**	267	13	2	**282**
8:30	to	8:45	99	2	0	**101**	0	2	0	**2**	0	1	0	**1**	1	1	0	**2**	1	0	0	**1**	244	6	0	**250**
8:45	to	9:00	83	2	0	**85**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	4	0	**4**	162	5	0	**167**
9:00	to	9:15	70	1	0	**71**	2	0	0	**2**	0	2	0	**2**	0	2	0	**2**	1	0	0	**1**	148	2	2	**152**
9:15	to	9:30	46	1	0	**47**	0	0	0	**0**	0	1	0	**1**	2	0	0	**2**	1	0	0	**1**	139	2	1	**142**
9:30	to	9:45	55	0	1	**56**	0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	0	0	0	**0**	106	1	0	**107**
9:45	to	10:00	50	4	0	**54**	0	2	0	**2**	0	0	0	**0**	0	0	0	**0**	1	2	0	**3**	91	4	0	**95**
10:00	to	10:15	44	4	0	**48**	0	3	0	**3**	0	1	0	**1**	1	2	0	**3**	1	3	0	**4**	85	6	0	**91**
10:15	to	10:30	48	5	0	**53**	1	0	0	**1**	0	2	0	**2**	2	3	0	**5**	1	0	0	**1**	74	4	0	**78**
10:30	to	10:45	66	1	0	**67**	0	0	0	**0**	0	1	0	**1**	2	1	0	**3**	0	1	0	**1**	75	2	0	**77**
10:45	to	11:00	56	2	0	**58**	0	1	0	**1**	0	0	0	**0**	0	0	0	**0**	0	3	0	**3**	78	2	0	**80**
11:00	to	11:15	41	2	1	**44**	0	3	0	**3**	0	0	0	**0**	0	1	0	**1**	2	2	0	**4**	72	1	0	**73**
11:15	to	11:30	52	1	0	**53**	1	1	0	**2**	0	2	0	**2**	2	5	0	**7**	1	0	0	**1**	72	3	0	**75**
11:30	to	11:45	46	5	0	**51**	0	0	0	**0**	0	2	0	**2**	1	1	0	**2**	0	3	0	**3**	64	1	1	**66**
11:45	to	12:00	53	0	0	**53**	0	2	0	**2**	0	2	0	**2**	0	1	0	**1**	0	2	0	**2**	72	3	1	**76**
12:00	to	12:15	58	1	0	**59**	0	1	0	**1**	0	3	0	**3**	1	0	0	**1**	1	0	0	**1**	69	0	1	**70**
12:15	to	12:30	76	4	0	**80**	1	0	0	**1**	0	1	0	**1**	0	1	0	**1**	1	1	0	**2**	97	2	0	**99**
12:30	to	12:45	69	3	0	**72**	0	0	0	**0**	1	0	0	**1**	4	0	0	**4**	3	0	0	**3**	65	0	1	**66**
12:45	to	13:00	68	2	0	**70**	0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	1	1	0	**2**	83	1	0	**84**
13:00	to	13:15	80	5	0	**85**	0	3	0	**3**	0	0	0	**0**	3	2	0	**5**	0	0	0	**0**	74	1	0	**75**
13:15	to	13:30	81	0	0	**81**	0	2	0	**2**	0	4	0	**4**	0	0	0	**0**	1	1	0	**2**	66	0	1	**67**
13:30	to	13:45	92	3	0	**95**	1	0	0	**1**	0	1	0	**1**	0	0	0	**0**	0	0	0	**0**	83	1	0	**84**
13:45	to	14:00	90	2	0	**92**	0	1	0	**1**	0	0	0	**0**	1	0	0	**1**	1	2	0	**3**	94	2	1	**97**
14:00	to	14:15	95	2	1	**98**	1	1	0	**2**	0	1	0	**1**	1	1	0	**2**	1	0	0	**1**	90	1	0	**91**
14:15	to	14:30	121	6	0	**127**	1	1	0	**2**	1	0	0	**1**	2	1	0	**3**	1	0	0	**1**	78	1	0	**79**
14:30	to	14:45	137	2	0	**139**	0	0	0	**0**	1	0	0	**1**	1	0	0	**1**	1	3	0	**4**	106	1	1	**108**
14:45	to	15:00	152	3	2	**157**	0	0	0	**0**	1	1	0	**2**	2	1	0	**3**	0	0	0	**0**	92	0	0	**92**
15:00	to	15:15	178	4	0	**182**	0	2	0	**2**	0	0	0	**0**	0	2	0	**2**	0	1	0	**1**	93	1	0	**94**
15:15	to	15:30	214	3	0	**217**	1	2	0	**3**	0	1	0	**1**	1	1	0	**2**	1	1	0	**2**	128	3	1	**132**
15:30	to	15:45	255	5	0	**260**	1	0	0	**1**	1	1	0	**2**	2	2	0	**4**	0	0	0	**0**	109	1	0	**110**
15:45	to	16:00	229	1	0	**230**	0	0	0	**0**	1	0	0	**1**	0	4	0	**4**	1	0	0	**1**	88	0	0	**88**
16:00	to	16:15	292	5	0	**297**	0	1	0	**1**	0	0	0	**0**	0	1	0	**1**	0	0	0	**0**	87	2	0	**89**
16:15	to	16:30	305	9	1	**315**	0	0	0	**0**	0	1	0	**1**	5	1	0	**6**	0	0	0	**0**	83	1	0	**84**
16:30	to	16:45	305	4	0	**309**	0	0	0	**0**	0	0	0	**0**	2	0	0	**2**	0	0	0	**0**	86	0	0	**86**
16:45	to	17:00	287	9	0	**296**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	79	2	0	**81**
17:00	to	17:15	306	7	0	**313**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	85	1	0	**86**
17:15	to	17:30	301	1	0	**302**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	89	0	0	**89**
17:30	to	17:45	288	8	0	**296**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	72	0	0	**72**
17:45	to	18:00	267	4	0	**271**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	60	1	0	**61**
12hr Totals			**5,725**	**140**	**7**	**5,872**	**15**	**36**	**0**	**51**	**8**	**37**	**0**	**45**	**39**	**43**	**0**	**82**	**32**	**38**	**0**	**70**	**6,484**	**161**	**13**	**6,658**

Table 1.3 Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade

Job No. : N1284
Client : ARC
Suburb : Glenfield
Location : Glenfield Rd/Railway Pde/Canterbury Rd

Day/Date : Thursday, 12th Dec 2013
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



SKYHIGH - THE TRAFFIC SURVEY COMPANY

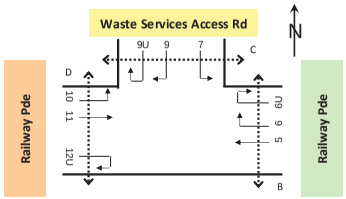
Approach	Canterbury Rd																Cambridge Ave															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	273	4	3	**280**	10	1	0	**11**	833	19	0	**852**	0	0	0	**0**	175	7	0	**182**	41	1	0	**42**	22	1	0	**23**	0	0	0	**0**
7:15 to 8:15	266	1	4	**271**	10	1	0	**11**	798	20	0	**818**	0	0	0	**0**	185	9	0	**194**	51	2	0	**53**	22	1	0	**23**	0	0	0	**0**
7:30 to 8:30	265	5	1	**271**	10	1	0	**11**	739	19	0	**758**	1	0	0	**1**	204	11	0	**215**	54	2	0	**56**	30	1	0	**31**	0	0	0	**0**
7:45 to 8:45	272	5	2	**279**	10	0	0	**10**	678	19	0	**697**	1	0	0	**1**	205	13	0	**218**	58	2	0	**60**	39	2	2	**43**	0	0	0	**0**
8:00 to 9:00	257	9	2	**268**	10	0	0	**10**	579	18	0	**597**	1	0	0	**1**	191	12	1	**204**	51	2	0	**53**	43	2	5	**50**	0	0	0	**0**
AM Totals	**530**	**13**	**5**	**548**	**20**	**1**	**0**	**21**	**1,412**	**37**	**0**	**1,449**	**1**	**0**	**0**	**1**	**366**	**19**	**1**	**386**	**92**	**3**	**0**	**95**	**65**	**3**	**5**	**73**	**0**	**0**	**0**	**0**
16:00 to 17:00	199	3	0	**202**	11	0	0	**11**	235	1	1	**237**	0	0	0	**0**	778	20	0	**798**	132	9	0	**141**	229	12	0	**241**	0	0	0	**0**
16:15 to 17:15	191	4	0	**195**	14	0	0	**14**	235	1	1	**237**	0	0	0	**0**	804	19	0	**823**	137	18	0	**155**	242	11	0	**253**	0	0	0	**0**
16:30 to 17:30	185	3	0	**188**	13	0	0	**13**	230	3	1	**234**	0	0	0	**0**	829	14	0	**843**	135	23	0	**158**	260	7	0	**267**	0	0	0	**0**
16:45 to 17:45	180	4	0	**184**	10	0	0	**10**	236	3	0	**239**	1	0	0	**1**	845	16	0	**861**	139	22	0	**161**	254	8	0	**262**	0	0	0	**0**
17:00 to 18:00	189	2	0	**191**	6	0	0	**6**	228	3	0	**231**	1	0	0	**1**	856	21	0	**877**	148	18	0	**166**	244	5	0	**249**	0	0	0	**0**
PM Totals	**388**	**5**	**0**	**393**	**17**	**0**	**0**	**17**	**463**	**4**	**1**	**468**	**1**	**0**	**0**	**1**	**1,634**	**41**	**0**	**1,675**	**280**	**27**	**0**	**307**	**473**	**17**	**0**	**490**	**0**	**0**	**0**	**0**

Approach	Railway Pde																Glenfield Rd															
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	263	14	0	**277**	5	0	0	**5**	104	3	6	**113**	0	0	0	**0**	173	3	7	**183**	127	3	0	**130**	98	6	1	**105**	0	0	0	**0**
7:15 to 8:15	239	15	0	**254**	4	0	0	**4**	111	3	5	**119**	0	0	0	**0**	207	4	7	**218**	110	2	0	**112**	126	7	1	**134**	0	0	0	**0**
7:30 to 8:30	230	9	0	**239**	4	0	0	**4**	119	3	4	**126**	0	0	0	**0**	211	3	7	**221**	99	1	1	**101**	158	6	1	**165**	0	0	0	**0**
7:45 to 8:45	210	5	0	**215**	0	0	0	**0**	111	2	5	**118**	0	0	0	**0**	204	2	5	**211**	102	2	2	**106**	192	5	1	**198**	0	0	0	**0**
8:00 to 9:00	177	3	0	**180**	0	1	0	**1**	101	3	3	**107**	0	0	0	**0**	174	1	5	**180**	95	1	2	**98**	212	6	0	**218**	0	0	0	**0**
AM Totals	**440**	**17**	**0**	**457**	**5**	**1**	**0**	**6**	**205**	**6**	**9**	**220**	**0**	**0**	**0**	**0**	**347**	**4**	**12**	**363**	**222**	**4**	**2**	**228**	**310**	**12**	**1**	**323**	**0**	**0**	**0**	**0**
16:00 to 17:00	70	3	0	**73**	7	0	0	**7**	82	1	7	**90**	1	0	0	**1**	168	5	7	**180**	46	0	0	**46**	282	9	3	**294**	1	0	0	**1**
16:15 to 17:15	65	3	0	**68**	7	0	0	**7**	91	1	7	**99**	1	0	0	**1**	182	6	6	**194**	46	0	0	**46**	288	10	4	**302**	1	0	0	**1**
16:30 to 17:30	63	3	0	**66**	6	0	0	**6**	101	3	9	**113**	1	0	0	**1**	185	3	7	**195**	51	0	0	**51**	263	7	4	**274**	0	0	0	**0**
16:45 to 17:45	63	1	0	**64**	4	0	0	**4**	115	3	9	**127**	0	0	0	**0**	184	1	9	**194**	49	0	0	**49**	275	6	2	**283**	0	0	0	**0**
17:00 to 18:00	65	0	0	**65**	1	0	0	**1**	118	2	9	**129**	0	0	0	**0**	174	1	6	**181**	51	0	0	**51**	266	3	2	**271**	0	0	0	**0**
PM Totals	**135**	**3**	**0**	**138**	**8**	**0**	**0**	**8**	**200**	**3**	**16**	**219**	**1**	**0**	**0**	**1**	**342**	**6**	**13**	**361**	**97**	**0**	**0**	**97**	**548**	**12**	**5**	**565**	**1**	**0**	**0**	**1**

Table 1.4 Railway Parade & GWS 2

Job No. : N1284
Client : ARC
Suburb : Glenfield
Location : Railway Pde/Waste Services Access Rd

Day/Date : Thursday, 12th Dec 2013
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



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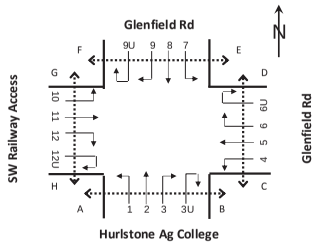
Approach		Railway Pde											
Direction		Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period		Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00		198	5	7	**210**	6	0	0	**6**	0	0	0	**0**
7:15 to 8:15		238	7	7	**252**	7	1	0	**8**	0	0	0	**0**
7:30 to 8:30		236	5	6	**247**	9	1	0	**10**	0	0	0	**0**
7:45 to 8:45		245	4	7	**256**	8	1	0	**9**	0	0	0	**0**
8:00 to 9:00		223	4	11	**238**	8	1	0	**9**	0	0	0	**0**
AM Totals		**421**	**9**	**18**	**448**	**14**	**1**	**0**	**15**	**0**	**0**	**0**	**0**
16:00 to 17:00		403	17	7	**427**	0	0	0	**0**	1	0	0	**1**
16:15 to 17:15		421	16	6	**443**	0	0	0	**0**	1	0	0	**1**
16:30 to 17:30		442	9	7	**458**	0	0	0	**0**	1	0	0	**1**
16:45 to 17:45		427	8	9	**444**	0	0	0	**0**	1	0	0	**1**
17:00 to 18:00		410	5	6	**421**	0	0	0	**0**	0	0	0	**0**
PM Totals		**813**	**22**	**13**	**848**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**

Approach	Glenfield Waste Services Road 2												Railway Pde											
Direction	Direction 7 (Left Turn)					Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)					Direction 12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total		Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total		Cars	Trucks	Buses	Total
7:00 to 8:00	6	0	0	**6**		1	1	0	**2**	0	0	0	**0**	0	0	0	**0**	357	17	6	**380**		0	0	0	**0**
7:15 to 8:15	5	1	0	**6**		1	1	0	**2**	0	0	0	**0**	1	0	0	**1**	341	19	6	**366**		2	0	0	**2**
7:30 to 8:30	6	1	0	**7**		1	1	0	**2**	0	0	0	**0**	1	0	0	**1**	337	13	6	**356**		2	0	0	**2**
7:45 to 8:45	4	1	0	**5**		0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	309	8	6	**323**		2	0	0	**2**
8:00 to 9:00	3	1	0	**4**		0	0	0	**0**	0	0	0	**0**	1	0	0	**1**	270	7	5	**282**		2	0	0	**2**
AM Totals	**9**	**1**	**0**	**10**		**1**	**1**	**0**	**2**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**627**	**24**	**11**	**662**		**2**	**0**	**0**	**2**
16:00 to 17:00	1	0	0	**1**		0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	152	4	7	**163**		0	0	0	**0**
16:15 to 17:15	1	0	0	**1**		0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	152	4	7	**163**		0	0	0	**0**
16:30 to 17:30	1	0	0	**1**		0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	161	6	9	**176**		0	0	0	**0**
16:45 to 17:45	0	0	0	**0**		0	0	0	**0**	0	0	0	**0**	0	1	0	**1**	176	4	9	**189**		0	0	0	**0**
17:00 to 18:00	0	0	0	**0**		0	0	0	**0**	0	0	0	**0**	0	0	0	**0**	182	2	9	**193**		0	0	0	**0**
PM Totals	**1**	**0**	**0**	**1**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**334**	**6**	**16**	**356**		**0**	**0**	**0**	**0**

Table 1.5 Glenfield Road & Hurlstone Agricultural College & South-West Railway Access

Job No. : N1415
Client : ARC
Suburb : Glenfield
Location : 3. Glenfield Rd / Railway Parking

Day/Date : Wed, 21st May 2014
Weather : Fine
Description : Classified Intersection Count 0.006 0.243 0.751
: Hourly Summary 321



SKYHIGH - THE TRAFFIC SURVEY COMPANY

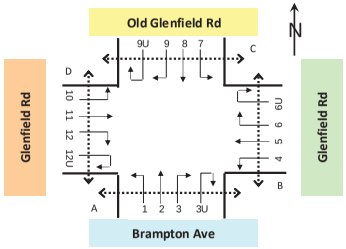
Approach	Hurlstone Ag College																Glenfield Rd															
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	1	1	0	**2**	77	1	0	**78**	239	2	0	**241**	0	0	0	**0**	662	5	1	**668**	5	0	0	**5**	525	13	10	**548**	2	0	0	**2**
7:15 to 8:15	0	1	0	**1**	86	1	0	**87**	261	1	1	**263**	0	0	0	**0**	535	4	1	**540**	2	0	0	**2**	582	16	6	**604**	1	0	0	**1**
7:30 to 8:30	0	1	0	**1**	94	1	0	**95**	284	2	1	**287**	0	0	0	**0**	425	4	1	**430**	1	0	0	**1**	590	16	5	**611**	0	0	0	**0**
7:45 to 8:45	0	1	0	**1**	98	0	0	**98**	272	3	1	**276**	0	0	0	**0**	375	2	0	**377**	0	0	0	**0**	589	17	6	**612**	0	0	0	**0**
8:00 to 9:00	0	0	0	**0**	95	0	0	**95**	239	2	1	**242**	0	0	0	**0**	314	0	0	**314**	0	0	0	**0**	545	15	5	**565**	0	0	0	**0**
AM Totals	**1**	**1**	**0**	**2**	**172**	**1**	**0**	**173**	**478**	**4**	**1**	**483**	**0**	**0**	**0**	**0**	**976**	**5**	**1**	**982**	**5**	**0**	**0**	**5**	**1,070**	**28**	**15**	**1,113**	**2**	**0**	**0**	**2**
16:00 to 17:00	0	0	0	**0**	42	0	0	**42**	211	1	1	**213**	0	0	0	**0**	94	1	0	**95**	0	0	0	**0**	566	14	7	**587**	0	0	0	**0**
16:15 to 17:15	0	0	0	**0**	37	0	0	**37**	251	3	1	**255**	0	0	0	**0**	106	1	0	**107**	1	0	0	**1**	546	12	8	**566**	0	0	0	**0**
16:30 to 17:30	0	0	0	**0**	35	0	0	**35**	287	3	0	**290**	0	0	0	**0**	124	1	0	**125**	1	0	0	**1**	541	12	8	**561**	0	0	0	**0**
16:45 to 17:45	0	0	0	**0**	35	0	0	**35**	343	2	0	**345**	0	0	0	**0**	143	0	0	**143**	1	0	0	**1**	513	12	7	**532**	0	0	0	**0**
17:00 to 18:00	0	0	0	**0**	33	0	0	**33**	408	2	0	**410**	0	0	0	**0**	170	0	0	**170**	1	0	0	**1**	504	8	9	**521**	0	0	0	**0**
PM Totals	**0**	**0**	**0**	**0**	**75**	**0**	**0**	**75**	**619**	**3**	**1**	**623**	**0**	**0**	**0**	**0**	**264**	**1**	**0**	**265**	**1**	**0**	**0**	**1**	**1,070**	**22**	**16**	**1,108**	**0**	**0**	**0**	**0**

Approach	Glenfield Rd																SW Railway Access															
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	405	17	9	**431**	48	0	0	**48**	12	0	0	**12**	0	0	0	**0**	15	2	0	**17**	2	0	0	**2**	4	0	0	**4**	0	0	0	**0**
7:15 to 8:15	418	13	9	**440**	56	1	0	**57**	10	0	0	**10**	0	0	0	**0**	14	2	0	**16**	0	0	0	**0**	6	0	0	**6**	0	0	0	**0**
7:30 to 8:30	413	11	9	**433**	72	2	0	**74**	12	0	0	**12**	0	0	0	**0**	13	0	0	**13**	0	0	0	**0**	6	0	0	**6**	0	0	0	**0**
7:45 to 8:45	411	9	8	**428**	92	2	0	**94**	14	0	0	**14**	0	0	0	**0**	10	0	0	**10**	0	0	0	**0**	6	0	0	**6**	0	0	0	**0**
8:00 to 9:00	402	7	8	**417**	85	2	0	**87**	11	0	0	**11**	1	0	0	**1**	8	0	0	**8**	2	1	0	**3**	4	0	0	**4**	0	0	0	**0**
AM Totals	**807**	**24**	**17**	**848**	**133**	**2**	**0**	**135**	**23**	**0**	**0**	**23**	**1**	**0**	**0**	**1**	**23**	**2**	**0**	**25**	**4**	**1**	**0**	**5**	**8**	**0**	**0**	**8**	**0**	**0**	**0**	**0**
16:00 to 17:00	545	10	7	**562**	11	0	0	**11**	2	0	0	**2**	0	0	0	**0**	4	0	0	**4**	13	0	0	**13**	0	0	0	**0**	0	0	0	**0**
16:15 to 17:15	535	12	8	**555**	12	1	0	**13**	1	0	0	**1**	0	0	0	**0**	5	0	0	**5**	9	0	0	**9**	2	0	0	**2**	0	0	0	**0**
16:30 to 17:30	540	14	7	**561**	12	1	0	**13**	0	0	0	**0**	0	0	0	**0**	5	0	0	**5**	9	0	0	**9**	2	0	0	**2**	0	0	0	**0**
16:45 to 17:45	550	12	8	**570**	12	1	0	**13**	0	0	0	**0**	0	0	0	**0**	6	0	0	**6**	5	0	0	**5**	2	0	0	**2**	0	0	0	**0**
17:00 to 18:00	565	10	9	**584**	15	1	0	**16**	1	0	0	**1**	0	0	0	**0**	6	0	0	**6**	8	0	0	**8**	2	0	0	**2**	0	0	0	**0**
PM Totals	**1,110**	**20**	**16**	**1,146**	**26**	**1**	**0**	**27**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**10**	**0**	**0**	**10**	**21**	**0**	**0**	**21**	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**

Table 1.6 Glenfield Road & Brampton Avenue & Old Glenfield Road

Job No. : N1284
Client : ARC
Suburb : Glenfield
Location : Glenfield Rd/Old Glenfield Rd/Brampton Rd

Day/Date : Thursday, 12th Dec 2013
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



SKYHIGH - THE TRAFFIC SURVEY COMPANY

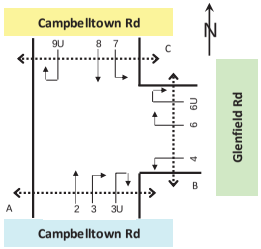
Approach	Brampton Ave																Glenfield Rd											
Direction	Direction 1 (Left Turn)				Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)				Direction 5 (Through)				Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	127	2	0	129	0	0	0	0	107	1	0	108	0	0	0	0	29	0	0	29	566	10	11	587	2	0	0	2	0	0	0	0
7:15 to 8:15	139	2	0	141	0	0	0	0	107	1	0	108	0	0	0	0	32	0	0	32	582	9	9	600	1	0	0	1	0	0	0	0
7:30 to 8:30	135	3	0	138	0	0	0	0	107	0	0	107	0	0	0	0	32	0	0	32	569	10	7	586	1	0	0	1	0	0	0	0
7:45 to 8:45	123	4	0	127	0	0	0	0	93	0	0	93	0	0	0	0	27	0	0	27	581	9	7	597	1	0	0	1	0	0	0	0
8:00 to 9:00	111	4	0	115	0	0	0	0	77	0	0	77	0	0	0	0	23	0	0	23	524	12	5	541	1	0	0	1	0	0	0	0
AM Totals	**238**	**6**	**0**	**244**	**0**	**0**	**0**	**0**	**184**	**1**	**0**	**185**	**0**	**0**	**0**	**0**	**52**	**0**	**0**	**52**	**1,090**	**22**	**16**	**1,128**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**
16:00 to 17:00	55	2	0	57	0	0	0	0	22	0	0	22	0	0	0	0	24	0	0	24	594	12	8	614	0	0	0	0	0	0	0	0
16:15 to 17:15	53	0	0	53	0	0	0	0	21	0	0	21	0	0	0	0	31	0	0	31	615	23	9	647	0	0	0	0	0	0	0	0
16:30 to 17:30	57	0	0	57	0	0	0	0	28	0	0	28	0	0	0	0	36	0	0	36	671	28	9	708	0	0	0	0	0	0	0	0
16:45 to 17:45	51	0	0	51	0	0	0	0	30	0	0	30	0	0	0	0	54	0	0	54	671	28	10	709	0	0	0	0	0	0	0	0
17:00 to 18:00	45	0	0	45	0	0	0	0	36	0	0	36	0	0	0	0	63	0	0	63	704	24	9	737	3	0	0	3	0	0	0	0
PM Totals	**100**	**2**	**0**	**102**	**0**	**0**	**0**	**0**	**58**	**0**	**0**	**58**	**0**	**0**	**0**	**0**	**87**	**0**	**0**	**87**	**1,298**	**36**	**17**	**1,351**	**3**	**0**	**0**	**3**	**0**	**0**	**0**	**0**

Approach	Old Glenfield Rd																Glenfield Rd											
Direction	Direction 7 (Left Turn)				Direction 8 (Through)				Direction 9 (Right Turn)				Direction 9U (U Turn)				Direction 10 (Left Turn)				Direction 11 (Through)				Direction 12 (Right Turn)				Direction 12U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00	1	0	0	1	0	0	0	0	3	0	0	3	0	0	0	0	2	1	0	3	844	16	10	870	32	4	0	36	0	0	0	0
7:15 to 8:15	1	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	2	1	0	3	782	17	9	808	25	3	0	28	0	0	0	0
7:30 to 8:30	1	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	2	0	0	2	688	13	8	709	22	2	0	24	0	0	0	0
7:45 to 8:45	1	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	3	0	0	3	646	10	5	661	26	4	0	30	0	0	0	0
8:00 to 9:00	1	0	0	1	0	0	0	0	4	0	0	4	0	0	0	0	3	0	0	3	571	9	5	585	32	2	0	34	0	0	0	0
AM Totals	**2**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**7**	**0**	**0**	**7**	**0**	**0**	**0**	**0**	**5**	**1**	**0**	**6**	**1,415**	**25**	**15**	**1,455**	**64**	**6**	**0**	**70**	**0**	**0**	**0**	**0**
16:00 to 17:00	2	0	0	2	0	0	0	0	4	1	0	5	0	0	0	0	6	0	0	6	517	12	11	540	86	1	0	87	0	0	0	0
16:15 to 17:15	2	0	0	2	0	0	0	0	4	1	0	5	0	0	0	0	5	0	0	5	548	14	11	573	77	1	0	78	1	0	0	1
16:30 to 17:30	2	0	0	2	0	0	0	0	4	1	0	5	0	0	0	0	4	0	0	4	538	11	12	561	80	1	0	81	1	0	0	1
16:45 to 17:45	2	0	0	2	0	0	0	0	2	0	0	2	0	0	0	0	6	0	0	6	536	8	11	555	100	1	0	101	1	0	0	1
17:00 to 18:00	1	0	0	1	1	0	0	1	1	0	0	1	0	0	0	0	5	0	0	5	536	6	8	550	109	1	0	110	1	0	0	1
PM Totals	**3**	**0**	**0**	**3**	**1**	**0**	**0**	**1**	**5**	**1**	**0**	**6**	**0**	**0**	**0**	**0**	**11**	**0**	**0**	**11**	**1,053**	**18**	**19**	**1,090**	**195**	**2**	**0**	**197**	**1**	**0**	**0**	**1**

Table 1.7 Campbelltown Road & Glenfield Road

Job No. : N1284
Client : ARC
Suburb : Glenfield
Location : Campbelltown Rd/Glenfield Rd

Day/Date : Thursday, 12th Dec 2013
Weather : Fine
Description : Classified Intersection Count
: Hourly Summary



SKYHIGH - THE TRAFFIC SURVEY COMPANY

Approach	Campbelltown Rd												Glenfield Rd											
Direction		Direction 2 (Through)				Direction 3 (Right Turn)				Direction 3U (U Turn)				Direction 4 (Left Turn)					Direction 6 (Right Turn)				Direction 6U (U Turn)			
Time Period		Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total		Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total
7:00 to 8:00		728	37	3	**768**	127	3	1	**131**	2	0	0	**2**	67	6	0	**73**		595	8	10	**613**	0	0	0	**0**
7:15 to 8:15		675	41	5	**721**	107	3	1	**111**	2	0	0	**2**	64	4	0	**68**		645	9	8	**662**	0	0	0	**0**
7:30 to 8:30		551	41	7	**599**	98	2	0	**100**	2	0	0	**2**	59	2	0	**61**		628	12	5	**645**	0	0	0	**0**
7:45 to 8:45		473	34	6	**513**	94	5	0	**99**	0	0	0	**0**	64	3	0	**67**		619	11	6	**636**	0	0	0	**0**
8:00 to 9:00		418	33	4	**455**	89	4	0	**93**	0	0	0	**0**	66	2	0	**68**		568	14	5	**587**	0	0	0	**0**
AM Totals		**1,146**	**70**	**7**	**1,223**	**216**	**7**	**1**	**224**	**2**	**0**	**0**	**2**	**133**	**8**	**0**	**141**		**1,163**	**22**	**15**	**1,200**	**0**	**0**	**0**	**0**
16:00 to 17:00		356	19	0	**375**	79	0	1	**80**	1	0	0	**1**	130	2	0	**132**		526	9	8	**543**	0	0	0	**0**
16:15 to 17:15		321	15	0	**336**	74	0	1	**75**	1	0	0	**1**	123	4	0	**127**		549	17	8	**574**	0	0	0	**0**
16:30 to 17:30		333	14	0	**347**	81	0	1	**82**	1	0	0	**1**	115	4	0	**119**		610	22	9	**641**	0	0	0	**0**
16:45 to 17:45		323	17	0	**340**	85	0	0	**85**	0	0	0	**0**	118	4	0	**122**		590	21	10	**621**	0	0	0	**0**
17:00 to 18:00		303	15	0	**318**	78	0	0	**78**	0	0	0	**0**	122	4	0	**126**		626	17	9	**652**	0	0	0	**0**
PM Totals		**659**	**34**	**0**	**693**	**157**	**0**	**1**	**158**	**1**	**0**	**0**	**1**	**252**	**6**	**0**	**258**		**1,152**	**26**	**17**	**1,195**	**0**	**0**	**0**	**0**

Approach	Campbelltown Rd											
Direction	Direction 7 (Left Turn)				Direction 8 (Through)					Direction 9U (U Turn)			
Time Period	Cars	Trucks	Buses	Total	Cars	Trucks	Buses	Total		Cars	Trucks	Buses	Total
7:00 to 8:00	727	20	8	**755**	725	85	1	**811**		1	0	0	**1**
7:15 to 8:15	650	17	6	**673**	778	79	1	**858**		0	0	0	**0**
7:30 to 8:30	605	14	7	**626**	803	93	0	**896**		0	0	0	**0**
7:45 to 8:45	567	10	6	**583**	798	89	0	**887**		0	0	0	**0**
8:00 to 9:00	525	7	5	**537**	823	89	1	**913**		0	0	0	**0**
AM Totals	**1,252**	**27**	**13**	**1,292**	**1,548**	**174**	**2**	**1,724**		**1**	**0**	**0**	**1**
16:00 to 17:00	533	12	14	**559**	1,556	79	2	**1,637**		1	0	0	**1**
16:15 to 17:15	567	12	13	**592**	1,593	76	2	**1,671**		0	0	0	**0**
16:30 to 17:30	537	15	11	**563**	1,646	68	2	**1,716**		1	0	0	**1**
16:45 to 17:45	571	11	7	**589**	1,687	62	1	**1,750**		1	0	0	**1**
17:00 to 18:00	576	7	8	**591**	1,655	55	1	**1,711**		1	0	0	**1**
PM Totals	**1,109**	**19**	**22**	**1,150**	**3,211**	**134**	**3**	**3,348**		**2**	**0**	**0**	**2**

Table 2.1 Cambridge Avenue Average Daily Traffic Two-Way

Job No	N1284
Client	ARC
Road	Cambridge Avenue 100m west of GWS Road 1
Location	Glenfield
Site No.	2
Start Date	12-Dec-13
Description	Volume Summary
Direction	Combined

Average Weekday	17,225
7 Day Average	15,421

	Day of Week								
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Ave	7 Day
Time	16-Dec	17-Dec	18-Dec	12-Dec	13-Dec	14-Dec	15-Dec	W'day	Ave
AM Peak	1423	1465	1426	1511	1461	731	591		
PM Peak	1569	1483	1523	1614	1483	812	680		
0:00	128	139	127	148	141	252	270	137	172
1:00	70	89	75	94	103	140	142	86	102
2:00	56	74	94	81	86	119	93	78	86
3:00	85	106	107	114	119	138	96	106	109
4:00	227	234	233	244	232	176	114	234	209
5:00	796	838	882	866	852	365	187	847	684
6:00	1423	1465	1426	1511	1461	478	233	1457	1142
7:00	1362	1400	1322	1479	1360	466	220	1385	1087
8:00	1178	1168	1135	1174	1152	566	347	1161	960
9:00	730	707	682	669	723	693	477	702	669
10:00	613	593	599	587	580	731	528	594	604
11:00	548	545	566	501	586	683	591	549	574
12:00	650	636	608	581	678	765	680	631	657
13:00	783	750	706	673	793	800	643	741	735
14:00	950	956	877	914	1005	812	679	940	885
15:00	1337	1321	1216	1330	1295	766	644	1300	1130
16:00	1480	1440	1428	1534	1402	806	636	1457	1247
17:00	1569	1483	1523	1614	1483	745	624	1534	1292
18:00	1138	1110	990	1123	1128	708	580	1098	968
19:00	601	597	595	602	577	468	506	594	564
20:00	584	426	499	480	464	368	437	491	465
21:00	482	399	442	473	465	361	442	452	438
22:00	373	305	394	375	442	378	323	378	370
23:00	273	240	252	263	333	349	200	272	273
Total	17433	17022	16778	17430	17460	12133	9692	17225	15421
7-19	12336	12109	11652	12179	12185	8541	6649	12092	10807
6-22	15426	14996	14614	15245	15152	10216	8267	15087	13417
6-24	16071	15541	15260	15883	15927	10943	8790	15736	14059
0-24	17433	17022	16778	17430	17460	12133	9692	17225	15421

Table 2.2 Cambridge Avenue Average Daily Traffic Eastbound

Job No	N1284
Client	ARC
Road	Cambridge Avenue 100m west of GWS Road 1
Location	Glenfield
Site No.	2
Start Date	12-Dec-13
Description	Volume Summary
Direction	EB

Average Weekday	8,670
7 Day Average	7,743

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	16-Dec	17-Dec	18-Dec	12-Dec	13-Dec	14-Dec	15-Dec		
AM Peak	1274	1294	1231	1323	1285	443	359		
PM Peak	429	428	355	427	428	353	340		
0:00	33	30	25	32	26	76	63	29	41
1:00	27	35	27	39	39	50	46	33	38
2:00	29	38	44	44	42	66	41	39	43
3:00	64	72	78	81	72	65	42	73	68
4:00	199	199	195	205	193	106	66	198	166
5:00	750	781	823	809	783	303	129	789	625
6:00	1274	1294	1231	1323	1285	382	159	1281	993
7:00	1157	1174	1129	1230	1134	328	135	1165	898
8:00	885	867	821	864	853	380	239	858	701
9:00	486	470	439	459	465	443	329	464	442
10:00	356	345	373	356	322	408	345	350	358
11:00	307	299	328	271	319	370	359	305	322
12:00	321	314	289	291	329	353	340	309	319
13:00	354	329	352	317	316	349	319	334	334
14:00	341	354	314	366	356	341	316	346	341
15:00	429	428	355	427	428	323	277	413	381
16:00	339	294	316	326	341	318	269	323	315
17:00	359	306	294	323	366	346	259	330	322
18:00	305	278	237	276	328	309	252	285	284
19:00	238	187	207	213	254	225	217	220	220
20:00	190	154	185	189	188	167	205	181	183
21:00	177	144	151	169	176	147	182	163	164
22:00	116	95	102	120	141	152	103	115	118
23:00	65	56	65	61	85	103	50	66	69
Total	8798	8543	8380	8791	8841	6110	4742	8670	7743
7-19	5637	5457	5247	5506	5557	4268	3439	5481	5016
6-22	7515	7236	7021	7400	7460	5189	4202	7326	6575
6-24	7696	7387	7188	7581	7686	5444	4355	7508	6762
0-24	8798	8543	8380	8791	8841	6110	4742	8670	7743

Table 2.3 Cambridge Avenue Average Daily Traffic Westbound

Job No	N1284
Client	ARC
Road	Cambridge Avenue 100m west of GWS Road 1
Location	Glenfield
Site No.	2
Start Date	12-Dec-13
Description	Volume Summary
Direction	WB

Average Weekday	8,554
7 Day Average	7,678

	Day of Week							Ave	7 Day
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	W'day	Ave
Time	16-Dec	17-Dec	18-Dec	12-Dec	13-Dec	14-Dec	15-Dec		
AM Peak	293	301	314	310	299	323	232		
PM Peak	1211	1177	1229	1291	1117	488	367		
0:00	95	109	102	116	115	176	207	107	131
1:00	43	54	48	55	64	90	96	53	64
2:00	27	36	50	37	44	53	52	39	43
3:00	21	34	29	33	47	73	54	33	42
4:00	28	35	38	39	39	70	48	36	42
5:00	46	57	59	57	69	62	58	58	58
6:00	149	171	195	188	176	96	74	176	150
7:00	205	227	193	249	226	138	85	220	189
8:00	293	301	314	310	299	186	108	303	259
9:00	244	237	243	210	258	250	148	238	227
10:00	257	249	226	231	258	323	183	244	247
11:00	241	246	238	230	267	313	232	244	252
12:00	330	323	319	290	349	412	340	322	337
13:00	429	421	354	356	477	451	324	407	402
14:00	609	602	563	548	649	471	363	594	544
15:00	908	893	861	903	867	443	367	886	749
16:00	1142	1146	1112	1208	1061	488	367	1134	932
17:00	1211	1177	1229	1291	1117	399	365	1205	970
18:00	833	832	753	847	800	399	328	813	685
19:00	364	410	388	389	323	243	289	375	344
20:00	394	272	314	291	276	201	232	309	283
21:00	305	255	291	304	289	214	260	289	274
22:00	257	210	292	255	301	226	220	263	252
23:00	209	184	187	202	248	246	150	206	204
Total	8636	8479	8398	8639	8619	6023	4950	8554	7678
7-19	6700	6652	6405	6673	6628	4273	3210	6612	5792
6-22	7911	7760	7593	7845	7692	5027	4065	7760	6842
6-24	8376	8154	8072	8302	8241	5499	4435	8229	7297
0-24	8636	8479	8398	8639	8619	6023	4950	8554	7678

Table 2.4 Cambridge Avenue Vehicle Class Summary

Road Cambridge Avenue 100m west of GWS Road 1
Location Glenfield
Site No. 2
Start Date 12-Dec-13
Day Weekday Ave.
Description Class Summary

M'Cycle & P'Cycle	1%
Cars	95%
LGV	3%
OGV1 & PSV	1%
OGV2	0%

	EB						WB						Combined					
	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total	M'Cycle & P'Cycle	Cars	LGV	OGV1 & PSV	OGV2	Total
0:00	0	28	1	0	0	29	1	104	3	0	0	107	1	131	3	1	0	137
1:00	0	33	0	0	0	33	1	50	1	1	0	53	1	83	1	1	0	86
2:00	0	38	0	1	0	39	0	37	1	0	0	39	0	75	1	2	0	78
3:00	1	69	3	0	1	73	0	32	0	1	0	33	1	101	4	1	1	106
4:00	1	185	8	2	2	198	1	33	2	0	0	36	2	218	10	2	2	234
5:00	2	742	40	4	2	789	1	54	2	0	1	58	3	796	42	4	3	847
6:00	6	1200	60	12	4	1281	2	167	5	2	0	176	8	1366	65	14	4	1457
7:00	3	1115	38	6	3	1165	1	208	8	3	0	220	4	1323	46	8	3	1385
8:00	2	823	24	8	2	858	2	287	11	3	0	303	3	1110	35	11	3	1161
9:00	3	434	18	5	4	464	2	223	10	4	0	238	5	657	28	9	4	702
10:00	1	322	18	4	4	350	1	218	18	6	2	244	2	540	36	10	6	594
11:00	0	281	15	6	3	305	3	223	15	3	1	244	3	504	29	9	4	549
12:00	0	294	11	2	2	309	3	302	12	3	2	322	3	596	23	5	4	631
13:00	1	314	16	2	1	334	3	380	20	4	2	407	4	694	35	6	2	741
14:00	1	322	20	3	0	346	6	554	25	4	5	594	7	876	44	7	6	940
15:00	1	398	11	2	1	413	15	832	30	4	4	886	16	1231	42	6	5	1300
16:00	1	313	9	1	0	323	11	1079	31	8	5	1134	12	1392	39	9	5	1457
17:00	0	319	9	1	0	330	9	1143	37	11	4	1205	10	1463	47	11	5	1534
18:00	1	276	8	0	1	285	5	785	21	1	2	813	5	1061	28	1	3	1098
19:00	1	213	6	0	0	220	0	363	11	0	0	375	1	576	17	0	0	594
20:00	0	178	3	0	0	181	1	302	6	0	0	309	1	480	9	0	0	491
21:00	0	160	3	0	0	163	0	286	2	0	0	289	0	446	5	0	1	452
22:00	0	113	2	0	0	115	4	257	2	0	0	263	4	370	4	0	0	378
23:00	0	65	1	0	0	66	3	202	2	0	0	206	3	267	3	0	0	272
Total	24	8234	323	59	31	8670	75	8119	273	57	30	8554	99	16352	597	116	61	17225

Table 2.5 Skyhigh Traffic Vehicle Classification Scheme

Level 1	Level 2		Level 3	ARX			
Length	Axles and Groups		Vehicle Type	Classification			
Type	Axles	Groups	Description	Class		Parameters	Spreadsheet Classification
Short	Light Vehicles						
up to 5.5m	2	1 or 2	Very Short Bicycle or Motorcycle	MC	1	d(1) < 1.7m and axles = 2	M'Cycles
	2	1 or 2	Short Sedan, Wagon, 4WD, Utility, Light Van, Bicycle, Motorcycle, etc.	SV	2	d(1) >= 1.7m, d(1) <= 3.2m and axles = 2	Cars
Medium 5.5m to 14.5m	3, 4 or 5	3	Short - Towing Trailer, Caravan, Boat, etc.	SVT	3	groups = 3, d(1) >= 2.1m, d(1) <= 3.2m, d(2) >= 2.1m and axles = 3,4,5	
	Heavy Vehicles						
	2	2	Two Axle Truck or Bus	TB2	4	d(1) > 3.2m and axles = 2	LGV
	3	2	Three Axle Truck or Bus	TB3	5	axles = 3 and groups = 2	OGV & PSV
	> 3	2	Four Axle Truck	T4	6	axles > 3 and groups = 2	
Long 11.5m to 19.0m	3	3	Three Axle Articulated Three axle articulated vehicle or Rigid vehicle and trailer	ART3	7	d(1) > 3.2m, axles = 3 and groups = 3	OGV2
	4	> 2	Four Axle Articulated Four axle articulated vehicle or Rigid vehicle and trailer	ART4	8	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 4 and groups > 2	
	5	> 2	Five Axle Articulated Five axle articulated vehicle or Rigid vehicle and trailer	ART5	9	d(2) < 2.1m or d(1) < 2.1m or d(1) > 3.2m axles = 5 and groups > 2	
	>= 6	> 2	Six Axle Articulated Six (or more) axle articulated vehicle or Rigid vehicle and trailer	ART6	10	axles = 6 and groups > 2 or axles > 6 and groups = 3	
Medium and Long Combination	> 6	4	B Double B Double or Heavy truck and trailer	BD	11	groups = 4 and axles > 6	
Over 17.5m	> 6	>=5	Double or Triple Road Train Double road train or Heavy truck and two trailers	DRT	12	groups = 5 or 6 and axles > 6	

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B1

Intersection Cambridge Avenue & Moorebank Avenue

SIDRA Report

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ACN: 150 259 493

Table B1.1.1 AM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave AM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	11	27.3	0.031	5.9	LOS A	0.0	0.0	0.00	0.12	56.1
2	T1	42	14.3	0.031	0.0	LOS A	0.0	0.0	0.00	0.12	59.0
Approach		53	17.0	0.031	1.2	NA	0.0	0.0	0.00	0.12	58.4
North: Moorebank Avenue											
8	T1	163	8.0	0.088	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	246	3.3	0.145	5.7	LOS A	0.7	4.9	0.16	0.55	52.8
Approach		409	5.1	0.145	3.5	NA	0.7	4.9	0.10	0.33	55.4
West: Cambridge Avenue											
10	L2	1174	3.3	0.755	6.1	LOS A	9.0	60.6	0.33	0.51	52.5
12	R2	88	2.3	0.128	8.9	LOS A	0.5	3.4	0.54	0.75	50.5
Approach		1262	3.2	0.755	6.3	LOS A	9.0	60.6	0.34	0.53	52.3
All Vehicles		1724	4.1	0.755	5.4	NA	9.0	60.6	0.27	0.47	53.2

Table B1.1.2 AM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave AM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	11	27.3	0.032	5.9	LOS A	0.0	0.0	0.00	0.12	56.2
2	T1	44	13.6	0.032	0.0	LOS A	0.0	0.0	0.00	0.12	59.1
Approach		55	16.4	0.032	1.2	NA	0.0	0.0	0.00	0.12	58.5
North: Moorebank Avenue											
8	T1	172	8.1	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	265	3.0	0.157	5.7	LOS A	0.8	5.3	0.17	0.55	52.8
Approach		437	5.0	0.157	3.5	NA	0.8	5.3	0.10	0.33	55.4
West: Cambridge Avenue											
10	L2	1290	3.2	0.850	6.3	LOS A	13.4	90.0	0.43	0.50	52.2
12	R2	92	2.2	0.139	9.2	LOS A	0.6	3.7	0.55	0.77	50.3
Approach		1382	3.1	0.850	6.5	LOS A	13.4	90.0	0.44	0.52	52.0
All Vehicles		1874	3.9	0.850	5.6	NA	13.4	90.0	0.35	0.46	52.9

Table B1.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave AM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	11	27.3	0.032	5.9	LOS A	0.0	0.0	0.00	0.12	56.2
2	T1	44	13.6	0.032	0.0	LOS A	0.0	0.0	0.00	0.12	59.1
Approach		55	16.4	0.032	1.2	NA	0.0	0.0	0.00	0.12	58.5
North: Moorebank Avenue											
8	T1	172	8.1	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	272	4.0	0.162	5.8	LOS A	0.8	5.6	0.17	0.55	52.7
Approach		444	5.6	0.162	3.5	NA	0.8	5.6	0.10	0.34	55.3
West: Cambridge Avenue											
10	L2	1292	3.4	0.853	6.3	LOS A	13.6	91.4	0.43	0.50	52.1
12	R2	92	2.2	0.141	9.3	LOS A	0.6	3.8	0.56	0.78	50.2
Approach		1384	3.3	0.853	6.5	LOS A	13.6	91.4	0.44	0.52	52.0
All Vehicles		1883	4.2	0.853	5.6	NA	13.6	91.4	0.35	0.46	52.9

Table B1.1.4 AM 2014 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave AM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	11	27.3	0.032	5.9	LOS A	0.0	0.0	0.00	0.12	56.2
2	T1	44	13.6	0.032	0.0	LOS A	0.0	0.0	0.00	0.12	59.1
Approach		55	16.4	0.032	1.2	NA	0.0	0.0	0.00	0.12	58.5
North: Moorebank Avenue											
8	T1	172	8.1	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	328	4.6	0.196	5.8	LOS A	1.0	7.0	0.17	0.55	52.7
Approach		500	5.8	0.196	3.8	NA	1.0	7.0	0.11	0.36	55.0
West: Cambridge Avenue											
10	L2	1311	3.7	0.874	6.4	LOS A	14.8	99.5	0.46	0.49	52.0
12	R2	92	2.2	0.153	10.0	LOS A	0.6	4.0	0.58	0.81	49.8
Approach		1403	3.6	0.874	6.6	LOS A	14.8	99.5	0.47	0.51	51.9
All Vehicles		1958	4.5	0.874	5.7	NA	14.8	99.5	0.36	0.46	52.8

Table B1.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave AM 2024 + SSD + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	11	27.3	0.032	5.9	LOS A	0.0	0.0	0.00	0.12	56.2
2	T1	44	13.6	0.032	0.0	LOS A	0.0	0.0	0.00	0.12	59.1
Approach		55	16.4	0.032	1.2	NA	0.0	0.0	0.00	0.12	58.5
North: Moorebank Avenue											
8	T1	172	8.1	0.093	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	334	5.4	0.200	5.8	LOS A	1.1	7.3	0.17	0.55	52.7
Approach		506	6.3	0.200	3.8	NA	1.1	7.3	0.11	0.36	54.9
West: Cambridge Avenue											
10	L2	1312	3.8	0.876	6.4	LOS A	14.9	100.5	0.46	0.49	52.0
12	R2	92	2.2	0.154	10.1	LOS A	0.6	4.1	0.59	0.81	49.7
Approach		1404	3.7	0.876	6.6	LOS A	14.9	100.5	0.47	0.51	51.9
All Vehicles		1965	4.7	0.876	5.7	NA	14.9	100.5	0.37	0.46	52.8

Table B1.2.1 PM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave PM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	37	18.9	0.061	5.8	LOS A	0.0	0.0	0.00	0.21	55.8
2	T1	68	14.7	0.061	0.0	LOS A	0.0	0.0	0.00	0.21	58.2
Approach		105	16.2	0.061	2.0	NA	0.0	0.0	0.00	0.21	57.3
North: Moorebank Avenue											
8	T1	21	19.0	0.012	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	1155	2.6	0.713	7.1	LOS A	10.0	66.8	0.47	0.58	51.9
Approach		1176	2.9	0.713	7.0	NA	10.0	66.8	0.46	0.57	52.0
West: Cambridge Avenue											
10	L2	336	1.5	0.219	5.8	LOS A	1.0	6.9	0.18	0.55	53.0
12	R2	2	50.0	0.030	58.2	LOS E	0.1	0.8	0.94	0.98	29.4
Approach		338	1.8	0.219	6.1	LOS A	1.0	6.9	0.19	0.55	52.7
All Vehicles		1619	3.5	0.713	6.5	NA	10.0	66.8	0.37	0.54	52.5

Table B1.2.2 PM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave PM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	39	17.9	0.064	5.8	LOS A	0.0	0.0	0.00	0.21	55.8
2	T1	72	15.3	0.064	0.0	LOS A	0.0	0.0	0.00	0.21	58.2
Approach		111	16.2	0.064	2.0	NA	0.0	0.0	0.00	0.21	57.3
North: Moorebank Avenue											
8	T1	22	18.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	1304	2.5	0.809	8.7	LOS A	19.8	131.9	0.59	0.62	50.9
Approach		1326	2.7	0.809	8.5	NA	19.8	131.9	0.58	0.61	51.1
West: Cambridge Avenue											
10	L2	358	1.4	0.234	5.8	LOS A	1.1	7.4	0.19	0.55	53.0
12	R2	2	50.0	0.053	95.2	LOS F	0.1	1.4	0.97	0.99	22.6
Approach		360	1.7	0.234	6.3	LOS A	1.1	7.4	0.20	0.55	52.6
All Vehicles		1797	3.3	0.809	7.7	NA	19.8	131.9	0.47	0.57	51.7

Table B1.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave PM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	39	17.9	0.064	5.8	LOS A	0.0	0.0	0.00	0.21	55.8
2	T1	72	15.3	0.064	0.0	LOS A	0.0	0.0	0.00	0.21	58.2
Approach		111	16.2	0.064	2.0	NA	0.0	0.0	0.00	0.21	57.3
North: Moorebank Avenue											
8	T1	22	18.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	1303	2.4	0.808	8.7	LOS A	19.7	130.9	0.58	0.62	51.0
Approach		1325	2.6	0.808	8.5	NA	19.7	130.9	0.57	0.61	51.1
West: Cambridge Avenue											
10	L2	364	1.4	0.238	5.8	LOS A	1.1	7.6	0.19	0.55	53.0
12	R2	2	50.0	0.053	94.7	LOS F	0.1	1.4	0.97	0.99	22.7
Approach		366	1.6	0.238	6.3	LOS A	1.1	7.6	0.20	0.55	52.6
All Vehicles		1802	3.3	0.808	7.7	NA	19.7	130.9	0.46	0.57	51.7

Table B1.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave PM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	39	17.9	0.064	5.8	LOS A	0.0	0.0	0.00	0.21	55.8
2	T1	72	15.3	0.064	0.0	LOS A	0.0	0.0	0.00	0.21	58.2
Approach		111	16.2	0.064	2.0	NA	0.0	0.0	0.00	0.21	57.3
North: Moorebank Avenue											
8	T1	22	18.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	1324	2.9	0.823	9.0	LOS A	21.9	146.3	0.61	0.63	50.7
Approach		1346	3.1	0.823	8.9	NA	21.9	146.3	0.60	0.62	50.8
West: Cambridge Avenue											
10	L2	423	2.8	0.278	5.9	LOS A	1.4	9.4	0.20	0.55	52.9
12	R2	2	50.0	0.058	103.4	LOS F	0.2	1.5	0.97	0.99	21.6
Approach		425	3.1	0.278	6.3	LOS A	1.4	9.4	0.21	0.55	52.5
All Vehicles		1882	3.9	0.823	7.9	NA	21.9	146.3	0.47	0.58	51.5

Table B1.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Moorebank Ave PM 2024 + SSD + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Moorebank Avenue											
1	L2	39	17.9	0.064	5.8	LOS A	0.0	0.0	0.00	0.21	55.8
2	T1	72	15.3	0.064	0.0	LOS A	0.0	0.0	0.00	0.21	58.2
Approach		111	16.2	0.064	2.0	NA	0.0	0.0	0.00	0.21	57.3
North: Moorebank Avenue											
8	T1	22	18.2	0.013	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
9	R2	1324	2.9	0.823	9.0	LOS A	21.9	146.3	0.61	0.63	50.7
Approach		1346	3.1	0.823	8.9	NA	21.9	146.3	0.60	0.62	50.8
West: Cambridge Avenue											
10	L2	429	2.8	0.282	5.9	LOS A	1.4	9.6	0.20	0.55	52.9
12	R2	2	50.0	0.058	103.4	LOS F	0.2	1.5	0.97	0.99	21.6
Approach		431	3.0	0.282	6.3	LOS A	1.4	9.6	0.21	0.55	52.5
All Vehicles		1888	3.9	0.823	7.9	NA	21.9	146.3	0.47	0.58	51.5

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B2

Intersection Cambridge Avenue & GWS Road 1

SIDRA Report

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Table B2.1.1 AM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 AM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	245	2.9	0.128	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	5	80.0	0.035	31.1	LOS C	0.1	1.2	0.91	0.96	24.5
Approach		250	4.4	0.128	0.6	NA	0.1	1.2	0.02	0.02	58.3
North: GWS Road 1											
7	L2	6	66.7	0.051	28.4	LOS B	0.1	1.6	0.92	0.92	23.4
9	R2	7	85.7	0.158	77.4	LOS F	0.4	5.0	0.96	0.98	17.7
Approach		13	76.9	0.158	54.8	LOS D	0.4	5.0	0.94	0.95	19.9
West: Cambridge Avenue											
10	L2	5	60.0	0.004	6.3	LOS A	0.0	0.0	0.00	0.57	51.1
11	T1	1256	2.9	0.656	0.2	LOS A	0.0	0.0	0.00	0.00	59.7
Approach		1261	3.1	0.656	0.2	NA	0.0	0.0	0.00	0.00	59.6
All Vehicles		1524	3.9	0.656	0.7	NA	0.4	5.0	0.01	0.01	58.4

Table B2.1.2 AM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 AM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	264	2.7	0.138	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	5	80.0	0.054	44.0	LOS D	0.2	1.8	0.94	0.98	22.6
Approach		269	4.1	0.138	0.8	NA	0.2	1.8	0.02	0.02	58.2
North: GWS Road 1											
7	L2	6	66.7	0.082	45.3	LOS D	0.2	2.4	0.95	0.95	21.1
9	R2	7	85.7	0.254	135.7	LOS F	0.7	7.9	0.98	1.01	13.8
Approach		13	76.9	0.254	94.0	LOS F	0.7	7.9	0.97	0.98	16.4
West: Cambridge Avenue											
10	L2	5	60.0	0.004	6.3	LOS A	0.0	0.0	0.00	0.57	51.1
11	T1	1376	2.8	0.718	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
Approach		1381	3.0	0.718	0.2	NA	0.0	0.0	0.00	0.00	59.5
All Vehicles		1663	3.7	0.718	1.1	NA	0.7	7.9	0.01	0.01	58.1

Table B2.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 AM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	264	2.7	0.138	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	14	50.0	0.100	31.8	LOS C	0.3	2.9	0.93	0.97	24.4
Approach		278	5.0	0.138	1.6	NA	0.3	2.9	0.05	0.05	55.9
North: GWS Road 1											
7	L2	2	50.0	0.021	34.5	LOS C	0.1	0.6	0.94	0.94	22.6
9	R2	2	50.0	0.044	71.3	LOS F	0.1	1.1	0.96	0.97	18.4
Approach		4	50.0	0.044	52.9	LOS D	0.1	1.1	0.95	0.95	20.3
West: Cambridge Avenue											
10	L2	16	43.8	0.011	6.1	LOS A	0.0	0.0	0.00	0.57	51.8
11	T1	1382	3.2	0.723	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
Approach		1398	3.6	0.723	0.3	NA	0.0	0.0	0.00	0.01	59.5
All Vehicles		1680	4.0	0.723	0.6	NA	0.3	2.9	0.01	0.02	58.6

Table B2.1.4 AM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 AM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	327	4.3	0.172	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	5	80.0	0.059	47.4	LOS D	0.2	2.0	0.95	0.98	22.1
Approach		332	5.4	0.172	0.7	NA	0.2	2.0	0.01	0.01	58.5
North: GWS Road 1											
7	L2	6	66.7	0.091	50.0	LOS D	0.2	2.6	0.96	0.96	20.5
9	R2	7	85.7	0.320	183.1	LOS F	0.8	9.8	0.99	1.03	11.7
Approach		13	76.9	0.320	121.7	LOS F	0.8	9.8	0.97	0.99	14.6
West: Cambridge Avenue											
10	L2	5	60.0	0.004	6.3	LOS A	0.0	0.0	0.00	0.57	51.1
11	T1	1396	3.2	0.731	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
Approach		1401	3.4	0.731	0.3	NA	0.0	0.0	0.00	0.00	59.5
All Vehicles		1746	4.3	0.731	1.2	NA	0.8	9.8	0.01	0.01	58.0

Table B2.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 AM 2024 + SSD + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	325	4.3	0.171	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
6	R2	14	50.0	0.109	33.8	LOS C	0.3	3.1	0.93	0.97	24.0
Approach		339	6.2	0.171	1.4	NA	0.3	3.1	0.04	0.04	56.5
North: GWS Road 1											
7	L2	2	50.0	0.023	37.9	LOS C	0.1	0.6	0.94	0.94	22.1
9	R2	2	50.0	0.054	86.4	LOS F	0.1	1.3	0.97	0.97	17.1
Approach		4	50.0	0.054	62.2	LOS E	0.1	1.3	0.96	0.96	19.3
West: Cambridge Avenue											
10	L2	16	43.8	0.011	6.1	LOS A	0.0	0.0	0.00	0.57	51.8
11	T1	1402	3.6	0.736	0.2	LOS A	0.0	0.0	0.00	0.00	59.5
Approach		1418	4.0	0.736	0.3	NA	0.0	0.0	0.00	0.01	59.4
All Vehicles		1761	4.5	0.736	0.7	NA	0.3	3.1	0.01	0.02	58.6

Table B2.2.1 PM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 PM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	1192	3.2	0.624	0.1	LOS A	0.0	0.0	0.00	0.00	59.7
6	R2	1	100.0	0.001	8.2	LOS A	0.0	0.1	0.47	0.54	29.0
Approach		1193	3.3	0.624	0.1	NA	0.0	0.1	0.00	0.00	59.7
North: GWS Road 1											
7	L2	1	100.0	0.001	2.4	LOS A	0.0	0.1	0.45	0.24	28.2
9	R2	9	22.2	0.084	31.7	LOS C	0.2	1.9	0.92	0.93	23.2
Approach		10	30.0	0.084	28.7	LOS C	0.2	1.9	0.88	0.86	23.6
West: Cambridge Avenue											
10	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	341	1.5	0.177	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		342	1.5	0.177	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1545	3.0	0.624	0.3	NA	0.2	1.9	0.01	0.01	59.1

Table B2.2.2 PM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 PM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	1342	3.0	0.702	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
6	R2	1	100.0	0.001	8.3	LOS A	0.0	0.1	0.48	0.55	28.9
Approach		1343	3.1	0.702	0.2	NA	0.0	0.1	0.00	0.00	59.6
North: GWS Road 1											
7	L2	1	100.0	0.001	2.6	LOS A	0.0	0.1	0.47	0.25	28.2
9	R2	9	22.2	0.132	49.1	LOS D	0.4	2.8	0.95	0.96	20.9
Approach		10	30.0	0.132	44.4	LOS D	0.4	2.8	0.91	0.89	21.4
West: Cambridge Avenue											
10	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	363	1.4	0.188	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		364	1.4	0.188	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1717	2.9	0.702	0.4	NA	0.4	2.8	0.01	0.01	59.0

Table B2.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 PM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	1342	3.0	0.702	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
6	R2	1	100.0	0.001	8.4	LOS A	0.0	0.1	0.48	0.55	28.9
Approach		1343	3.1	0.702	0.2	NA	0.0	0.1	0.00	0.00	59.6
North: GWS Road 1											
7	L2	2	0.0	0.002	1.1	LOS A	0.0	0.0	0.39	0.18	29.0
9	R2	4	0.0	0.042	34.3	LOS C	0.1	0.7	0.93	0.94	23.0
Approach		6	0.0	0.042	23.2	LOS B	0.1	0.7	0.75	0.69	24.7
West: Cambridge Avenue											
10	L2	1	100.0	0.001	6.2	LOS A	0.0	0.0	0.00	0.57	51.5
11	T1	369	1.6	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		370	1.9	0.191	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1719	2.8	0.702	0.2	NA	0.1	0.7	0.00	0.00	59.4

Table B2.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 PM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	1363	3.4	0.715	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
6	R2	1	100.0	0.001	8.9	LOS A	0.0	0.1	0.52	0.56	28.8
Approach		1364	3.5	0.715	0.2	NA	0.0	0.1	0.00	0.00	59.5
North: GWS Road 1											
7	L2	4	0.0	0.004	1.3	LOS A	0.0	0.1	0.42	0.23	29.0
9	R2	9	22.2	0.160	60.9	LOS E	0.4	3.3	0.96	0.97	19.6
Approach		13	15.4	0.160	42.6	LOS D	0.4	3.3	0.80	0.75	21.7
West: Cambridge Avenue											
10	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	428	2.8	0.223	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		429	2.8	0.223	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1806	3.4	0.715	0.5	NA	0.4	3.3	0.01	0.01	58.9

Table B2.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & GWS Road 1 PM 2024 + SSD + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
East: Cambridge Avenue											
5	T1	1363	3.4	0.715	0.2	LOS A	0.0	0.0	0.00	0.00	59.6
6	R2	1	100.0	0.001	9.0	LOS A	0.0	0.1	0.52	0.56	28.8
Approach		1364	3.5	0.715	0.2	NA	0.0	0.1	0.00	0.00	59.5
North: GWS Road 1											
7	L2	2	0.0	0.002	1.3	LOS A	0.0	0.0	0.42	0.22	29.0
9	R2	4	0.0	0.049	40.6	LOS C	0.1	0.9	0.95	0.95	22.1
Approach		6	0.0	0.049	27.5	LOS B	0.1	0.9	0.77	0.70	24.0
West: Cambridge Avenue											
10	L2	1	0.0	0.001	5.6	LOS A	0.0	0.0	0.00	0.58	53.6
11	T1	433	3.0	0.226	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		434	3.0	0.226	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		1804	3.4	0.715	0.3	NA	0.1	0.9	0.00	0.00	59.3

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B3

Intersection Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde

SIDRA Report

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Table B3.1.1 AM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde AM 2014

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	280	2.5	0.291	4.8	LOS A	1.6	10.5	0.41	0.53	54.6
2	T1	11	9.1	0.291	4.8	LOS A	1.6	10.5	0.41	0.53	56.2
3	R2	854	2.5	0.600	10.1	LOS A	5.0	33.6	0.52	0.64	52.1
Approach		1145	2.5	0.600	8.8	LOS A	5.0	33.6	0.49	0.62	52.7
East: Cambridge Avenue											
4	L2	184	4.9	0.033	4.2	LOS A	0.1	1.0	0.07	0.47	55.4
5	T1	43	4.7	0.055	4.3	LOS A	0.2	1.7	0.34	0.52	55.0
6	R2	24	8.3	0.055	9.9	LOS A	0.2	1.7	0.34	0.52	55.1
Approach		251	5.2	0.078	4.7	LOS A	0.2	1.7	0.14	0.48	55.3
North: Railway Parade											
7	L2	277	5.1	0.468	14.6	LOS B	4.1	28.6	0.98	1.03	48.1
8	T1	10	50.0	0.468	14.8	LOS B	4.1	28.6	0.98	1.03	48.8
9	R2	113	8.0	0.257	19.0	LOS B	1.6	11.2	0.88	0.95	47.3
Approach		400	7.0	0.468	15.9	LOS B	4.1	28.6	0.95	1.01	47.9
West: Glenfield Road											
10	L2	183	5.5	0.284	8.7	LOS A	1.7	11.6	0.78	0.85	52.1
11	T1	130	2.3	0.288	7.7	LOS A	1.9	12.9	0.80	0.81	52.5
12	R2	105	6.7	0.288	13.3	LOS A	1.9	12.9	0.80	0.81	52.5
Approach		418	4.8	0.288	9.6	LOS A	1.9	12.9	0.79	0.83	52.3
All Vehicles		2214	4.1	0.600	9.8	LOS A	5.0	33.6	0.59	0.71	52.0

Table B3.1.2 AM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde AM 2024

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	339	2.1	0.339	5.0	LOS A	1.9	12.9	0.46	0.57	54.4
2	T1	12	8.3	0.659	5.0	LOS A	6.0	40.1	0.61	0.67	51.6
3	R2	898	2.4	0.659	10.4	LOS A	6.0	40.1	0.61	0.67	51.9
Approach		1249	2.4	0.659	8.9	LOS A	6.0	40.1	0.57	0.64	52.5
East: Cambridge Avenue											
4	L2	193	4.7	0.035	4.2	LOS A	0.2	1.0	0.08	0.47	55.4
5	T1	52	3.8	0.065	4.5	LOS A	0.3	2.0	0.39	0.53	55.0
6	R2	25	8.0	0.065	10.1	LOS A	0.3	2.0	0.39	0.53	55.0
Approach		270	4.8	0.083	4.8	LOS A	0.3	2.0	0.17	0.49	55.3
North: Railway Parade											
7	L2	291	5.2	0.627	29.1	LOS C	7.4	51.1	1.00	1.24	40.4
8	T1	10	50.0	0.627	29.3	LOS C	7.4	51.1	1.00	1.24	40.9
9	R2	135	6.7	0.384	25.7	LOS B	2.8	19.1	0.97	1.03	43.7
Approach		436	6.7	0.627	28.1	LOS B	7.4	51.1	0.99	1.17	41.4
West: Glenfield Road											
10	L2	269	4.1	0.489	13.1	LOS A	3.9	26.6	0.93	1.03	49.1
11	T1	192	1.6	0.494	11.4	LOS A	4.4	29.7	0.96	1.00	50.4
12	R2	153	4.6	0.494	16.9	LOS B	4.4	29.7	0.96	1.00	50.5
Approach		614	3.4	0.494	13.5	LOS A	4.4	29.7	0.94	1.01	49.8
All Vehicles		2569	3.6	0.659	12.8	LOS A	7.4	51.1	0.69	0.80	49.9

Table B3.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde AM 2024 + SSD

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	338	2.1	0.340	5.1	LOS A	2.0	13.0	0.47	0.57	54.4
2	T1	12	8.3	0.665	5.0	LOS A	6.2	41.2	0.63	0.67	51.6
3	R2	902	2.7	0.665	10.5	LOS A	6.2	41.2	0.63	0.67	51.8
Approach		1252	2.6	0.665	8.9	LOS A	6.2	41.2	0.58	0.64	52.5
East: Cambridge Avenue											
4	L2	190	3.2	0.034	4.2	LOS A	0.1	1.0	0.08	0.47	55.5
5	T1	51	2.0	0.062	4.5	LOS A	0.3	1.9	0.39	0.53	55.0
6	R2	23	8.7	0.062	10.1	LOS A	0.3	1.9	0.39	0.53	55.0
Approach		264	3.4	0.081	4.8	LOS A	0.3	1.9	0.17	0.49	55.3
North: Railway Parade											
7	L2	296	6.8	0.666	33.6	LOS C	8.3	58.9	1.00	1.29	38.5
8	T1	11	63.6	0.666	33.8	LOS C	8.3	58.9	1.00	1.29	38.9
9	R2	140	10.0	0.419	28.1	LOS B	3.1	22.2	0.98	1.06	42.5
Approach		447	9.2	0.666	31.9	LOS C	8.3	58.9	0.99	1.22	39.7
West: Glenfield Road											
10	L2	266	4.1	0.491	13.2	LOS A	3.9	26.7	0.93	1.03	49.0
11	T1	199	2.5	0.511	11.8	LOS A	4.7	31.7	0.97	1.01	50.1
12	R2	153	4.6	0.511	17.3	LOS B	4.7	31.7	0.97	1.01	50.2
Approach		618	3.7	0.511	13.8	LOS A	4.7	31.7	0.95	1.02	49.7
All Vehicles		2581	4.1	0.666	13.7	LOS A	8.3	58.9	0.70	0.82	49.3

Table B3.1.4 AM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde AM 2024 + Rezone

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	339	2.1	0.354	5.3	LOS A	1.9	12.7	0.49	0.60	54.3
2	T1	12	8.3	0.702	5.8	LOS A	6.9	46.1	0.66	0.73	51.4
3	R2	932	2.7	0.702	11.2	LOS A	6.9	46.1	0.66	0.73	51.7
Approach		1283	2.6	0.702	9.6	LOS A	6.9	46.1	0.61	0.70	52.4
East: Cambridge Avenue											
4	L2	205	6.3	0.040	4.2	LOS A	0.2	1.3	0.06	0.47	55.5
5	T1	93	26.9	0.096	4.8	LOS A	0.4	3.5	0.40	0.52	54.7
6	R2	25	8.0	0.096	10.2	LOS A	0.4	3.5	0.41	0.52	55.0
Approach		323	12.4	0.096	4.8	LOS A	0.4	3.5	0.18	0.49	55.2
North: Railway Parade											
7	L2	291	5.2	0.611	25.6	LOS B	6.5	44.9	1.00	1.21	42.0
8	T1	10	50.0	0.611	25.8	LOS B	6.5	44.9	1.00	1.21	42.6
9	R2	135	6.7	0.379	24.6	LOS B	2.5	17.6	0.94	1.02	44.3
Approach		436	6.7	0.611	25.3	LOS B	6.5	44.9	0.98	1.15	42.7
West: Glenfield Road											
10	L2	269	4.1	0.589	16.7	LOS B	5.4	36.6	0.98	1.11	46.8
11	T1	287	9.1	0.649	16.8	LOS B	7.3	51.2	1.00	1.16	47.2
12	R2	153	4.6	0.649	22.3	LOS B	7.3	51.2	1.00	1.16	47.2
Approach		709	6.2	0.649	18.0	LOS B	7.3	51.2	0.99	1.14	47.1
All Vehicles		2751	5.3	0.702	13.7	LOS A	7.3	51.2	0.72	0.86	49.5

Table B3.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde AM 2024 +SSD + Rezone

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	339	2.1	0.356	5.3	LOS A	1.9	12.8	0.49	0.61	54.3
2	T1	11	9.1	0.708	5.9	LOS A	7.1	47.8	0.67	0.74	51.4
3	R2	937	2.9	0.708	11.3	LOS A	7.1	47.8	0.67	0.74	51.7
Approach		1287	2.7	0.708	9.7	LOS A	7.1	47.8	0.63	0.70	52.3
East: Cambridge Avenue											
4	L2	201	4.5	0.039	4.2	LOS A	0.2	1.2	0.05	0.47	55.5
5	T1	92	26.1	0.093	4.9	LOS A	0.4	3.3	0.41	0.52	54.8
6	R2	23	8.7	0.093	10.3	LOS A	0.4	3.3	0.41	0.52	55.0
Approach		316	11.1	0.093	4.8	LOS A	0.4	3.3	0.18	0.49	55.3
North: Railway Parade											
7	L2	296	6.8	0.638	27.6	LOS B	7.0	49.3	1.00	1.24	41.1
8	T1	11	63.6	0.638	27.9	LOS B	7.0	49.3	1.00	1.24	41.5
9	R2	140	10.0	0.406	25.9	LOS B	2.8	19.8	0.95	1.04	43.5
Approach		447	9.2	0.638	27.1	LOS B	7.0	49.3	0.98	1.18	41.8
West: Glenfield Road											
10	L2	266	4.1	0.599	17.2	LOS B	5.6	37.8	0.99	1.12	46.6
11	T1	294	9.5	0.661	17.4	LOS B	7.6	53.3	1.00	1.17	46.8
12	R2	153	4.6	0.661	22.9	LOS B	7.6	53.3	1.00	1.17	46.9
Approach		713	6.5	0.661	18.5	LOS B	7.6	53.3	0.99	1.15	46.7
All Vehicles		2763	5.7	0.708	14.2	LOS A	7.6	53.3	0.73	0.87	49.1

Table B3.2.1 PM 2014

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde PM 2014

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	202	1.5	0.209	5.9	LOS A	1.1	7.4	0.56	0.65	54.0
2	T1	11	0.0	0.217	5.4	LOS A	1.2	8.1	0.56	0.71	52.1
3	R2	237	0.8	0.217	10.9	LOS A	1.2	8.1	0.56	0.71	52.3
Approach		450	1.1	0.217	8.5	LOS A	1.2	8.1	0.56	0.68	53.0
East: Cambridge Avenue											
4	L2	798	2.5	0.143	4.3	LOS A	0.7	4.6	0.09	0.49	55.4
5	T1	141	6.4	0.336	5.3	LOS A	1.9	13.0	0.53	0.66	53.3
6	R2	241	5.0	0.336	10.8	LOS A	1.9	13.0	0.53	0.66	53.5
Approach		1180	3.5	0.339	5.7	LOS A	1.9	13.0	0.23	0.54	54.7
North: Railway Parade											
7	L2	73	4.1	0.085	5.8	LOS A	0.4	2.6	0.52	0.62	54.1
8	T1	7	0.0	0.085	5.6	LOS A	0.4	2.6	0.52	0.62	55.9
9	R2	90	8.9	0.083	10.9	LOS A	0.4	2.7	0.51	0.70	52.0
Approach		170	6.5	0.085	8.5	LOS A	0.4	2.7	0.51	0.66	53.0
West: Glenfield Road											
10	L2	180	6.7	0.237	6.1	LOS A	1.2	8.5	0.56	0.65	53.8
11	T1	46	0.0	0.261	6.0	LOS A	1.5	9.9	0.56	0.65	55.5
12	R2	294	4.1	0.261	11.1	LOS A	1.5	9.9	0.56	0.73	52.0
Approach		520	4.6	0.261	8.9	LOS A	1.5	9.9	0.56	0.69	52.9
All Vehicles		2320	3.5	0.339	7.2	LOS A	1.9	13.0	0.39	0.61	53.8

Table B3.2.2 PM 2024

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde PM 2024

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	346	0.9	0.321	5.9	LOS A	1.8	11.8	0.63	0.71	53.8
2	T1	12	0.0	0.295	6.2	LOS A	1.5	10.0	0.63	0.81	51.8
3	R2	249	0.8	0.295	11.7	LOS A	1.5	10.0	0.63	0.81	52.0
Approach		607	0.8	0.321	8.3	LOS A	1.8	11.8	0.63	0.75	53.0
East: Cambridge Avenue											
4	L2	839	2.5	0.165	4.3	LOS A	0.8	5.6	0.06	0.48	55.5
5	T1	237	3.8	0.392	5.7	LOS A	2.4	16.0	0.59	0.67	53.8
6	R2	254	5.1	0.392	11.4	LOS A	2.4	16.0	0.62	0.71	53.2
Approach		1330	3.2	0.392	5.9	LOS A	2.4	16.0	0.26	0.56	54.7
North: Railway Parade											
7	L2	77	3.9	0.100	6.2	LOS A	0.5	3.1	0.56	0.66	53.9
8	T1	7	0.0	0.100	6.1	LOS A	0.5	3.1	0.56	0.66	55.8
9	R2	149	5.4	0.141	11.1	LOS A	0.7	4.8	0.56	0.74	51.9
Approach		233	4.7	0.141	9.4	LOS A	0.7	4.8	0.56	0.71	52.7
West: Glenfield Road											
10	L2	208	6.3	0.280	6.4	LOS A	1.5	10.5	0.60	0.67	53.7
11	T1	53	0.0	0.309	6.2	LOS A	1.8	12.4	0.60	0.68	55.3
12	R2	341	3.8	0.309	11.3	LOS A	1.8	12.4	0.60	0.75	51.9
Approach		602	4.3	0.309	9.2	LOS A	1.8	12.4	0.60	0.72	52.7
All Vehicles		2772	3.1	0.392	7.4	LOS A	2.4	16.0	0.44	0.65	53.7

Table B3.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde PM 2024 + SSD

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	346	0.9	0.321	5.9	LOS A	1.8	11.8	0.63	0.71	53.8
2	T1	12	0.0	0.296	6.3	LOS A	1.5	10.0	0.63	0.81	51.8
3	R2	249	0.8	0.296	11.8	LOS A	1.5	10.0	0.63	0.81	52.0
Approach		607	0.8	0.321	8.3	LOS A	1.8	11.8	0.63	0.75	53.0
East: Cambridge Avenue											
4	L2	837	2.4	0.165	4.3	LOS A	0.8	5.6	0.06	0.48	55.5
5	T1	235	3.8	0.391	5.7	LOS A	2.3	15.9	0.59	0.68	53.8
6	R2	254	5.1	0.391	11.4	LOS A	2.3	15.9	0.62	0.71	53.2
Approach		1326	3.2	0.391	5.9	LOS A	2.3	15.9	0.26	0.56	54.7
North: Railway Parade											
7	L2	82	4.9	0.108	6.3	LOS A	0.5	3.4	0.56	0.66	53.9
8	T1	9	0.0	0.108	6.1	LOS A	0.5	3.4	0.56	0.66	55.7
9	R2	154	5.8	0.146	11.1	LOS A	0.7	5.0	0.56	0.74	51.9
Approach		245	5.3	0.146	9.3	LOS A	0.7	5.0	0.56	0.71	52.7
West: Glenfield Road											
10	L2	207	6.3	0.281	6.4	LOS A	1.5	10.5	0.60	0.68	53.6
11	T1	55	1.8	0.310	6.2	LOS A	1.8	12.4	0.60	0.68	55.2
12	R2	341	3.8	0.310	11.3	LOS A	1.8	12.4	0.60	0.75	51.9
Approach		603	4.5	0.310	9.2	LOS A	1.8	12.4	0.60	0.72	52.7
All Vehicles		2781	3.1	0.391	7.4	LOS A	2.3	15.9	0.44	0.65	53.7

Table B3.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde PM 2024 + Rezone

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Average Speed
		Total	HV				Vehicles	Distance			
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	346	0.9	0.339	6.1	LOS A	1.9	12.5	0.67	0.74	53.7
2	T1	12	0.0	0.329	6.6	LOS A	1.7	11.3	0.67	0.86	51.7
3	R2	259	1.5	0.329	12.1	LOS A	1.7	11.3	0.67	0.86	51.9
Approach		617	1.1	0.339	8.7	LOS A	1.9	12.5	0.67	0.79	52.8
East: Cambridge Avenue											
4	L2	874	2.6	0.185	4.2	LOS A	0.9	6.7	0.03	0.47	55.6
5	T1	340	10.3	0.438	5.9	LOS A	2.7	19.0	0.60	0.66	53.8
6	R2	254	5.1	0.438	11.5	LOS A	2.7	19.0	0.65	0.71	53.2
Approach		1468	4.8	0.438	5.8	LOS A	2.7	19.0	0.27	0.55	54.8
North: Railway Parade											
7	L2	77	3.9	0.105	6.5	LOS A	0.5	3.2	0.59	0.68	53.8
8	T1	7	0.0	0.105	6.3	LOS A	0.5	3.2	0.59	0.68	55.6
9	R2	149	5.4	0.146	11.3	LOS A	0.7	5.1	0.59	0.76	51.8
Approach		233	4.7	0.146	9.6	LOS A	0.7	5.1	0.59	0.73	52.5
West: Glenfield Road											
10	L2	208	6.3	0.313	6.7	LOS A	1.7	12.6	0.62	0.69	53.5
11	T1	98	26.5	0.345	6.5	LOS A	2.1	14.6	0.62	0.71	53.7
12	R2	341	3.8	0.345	11.5	LOS A	2.1	14.6	0.63	0.75	52.1
Approach		647	8.0	0.345	9.2	LOS A	2.1	14.6	0.62	0.73	52.8
All Vehicles		2965	4.8	0.438	7.4	LOS A	2.7	19.0	0.46	0.66	53.7

Table B3.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Cambridge Ave & Canterbury Rd & Glenfield Rd & Railway Pde PM 2024 + SSD + Rezone

Roundabout

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total	HV	Deg. Satn	Average Delay	Level of Service	95% Back of Queue Vehicles	Distance	Prop. Queued	Effective Stop Rate	Average Speed
		veh/h	%	v/c	sec		veh	m		per veh	km/h
South: Canterbury Road											
1	L2	346	0.9	0.339	6.1	LOS A	1.9	12.5	0.67	0.74	53.7
2	T1	12	8.3	0.330	6.7	LOS A	1.7	11.4	0.67	0.86	51.5
3	R2	259	1.5	0.330	12.1	LOS A	1.7	11.4	0.67	0.86	51.9
Approach		617	1.3	0.339	8.7	LOS A	1.9	12.5	0.67	0.79	52.8
East: Cambridge Avenue											
4	L2	872	2.5	0.184	4.2	LOS A	0.9	6.6	0.03	0.47	55.6
5	T1	334	10.2	0.435	5.9	LOS A	2.7	18.7	0.60	0.66	53.8
6	R2	254	5.1	0.435	11.5	LOS A	2.7	18.7	0.64	0.72	53.2
Approach		1460	4.7	0.435	5.8	LOS A	2.7	18.7	0.27	0.56	54.8
North: Railway Parade											
7	L2	82	4.9	0.113	6.5	LOS A	0.5	3.6	0.59	0.69	53.7
8	T1	9	0.0	0.113	6.4	LOS A	0.5	3.6	0.59	0.69	55.6
9	R2	154	5.8	0.152	11.3	LOS A	0.8	5.3	0.59	0.76	51.8
Approach		245	5.3	0.152	9.5	LOS A	0.8	5.3	0.59	0.73	52.5
West: Glenfield Road											
10	L2	207	6.3	0.312	6.7	LOS A	1.7	12.6	0.62	0.69	53.5
11	T1	98	26.5	0.344	6.5	LOS A	2.1	14.5	0.62	0.71	53.7
12	R2	341	3.8	0.344	11.5	LOS A	2.1	14.5	0.63	0.75	52.1
Approach		646	8.0	0.344	9.2	LOS A	2.1	14.5	0.62	0.73	52.8
All Vehicles		2968	4.8	0.435	7.5	LOS A	2.7	18.7	0.46	0.66	53.7

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B4

Intersection Railway Parade & GWS Road 2

SIDRA Report

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Table B4.1.1 AM 2014

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 AM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	210	5.7	0.097	1.1	LOS A	0.6	4.4	0.37	0.02	58.2
3	R2	6	0.0	0.097	6.9	LOS A	0.6	4.4	0.45	0.02	30.2
Approach		216	5.6	0.097	1.3	NA	0.6	4.4	0.37	0.02	56.8
East: GWS Road 2											
4	L2	6	0.0	0.005	0.7	LOS A	0.0	0.1	0.27	0.13	29.1
6	R2	1	0.0	0.005	1.0	LOS A	0.0	0.1	0.27	0.13	29.0
Approach		7	0.0	0.005	0.7	LOS A	0.0	0.1	0.27	0.13	29.1
North: Railway Parade											
7	L2	1	0.0	0.102	5.5	LOS A	0.0	0.0	0.00	0.00	58.1
8	T1	380	6.1	0.102	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		381	6.0	0.102	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		604	5.8	0.102	0.5	NA	0.6	4.4	0.14	0.01	58.0

Table B4.1.2 AM 2024

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 AM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	296	4.4	0.134	1.3	LOS A	1.0	6.5	0.40	0.01	58.2
3	R2	6	0.0	0.134	7.1	LOS A	1.0	6.5	0.49	0.02	30.2
Approach		302	4.3	0.134	1.4	NA	1.0	6.5	0.41	0.01	57.1
East: GWS Road 2											
4	L2	6	0.0	0.005	0.8	LOS A	0.0	0.1	0.29	0.14	29.1
6	R2	1	0.0	0.005	1.1	LOS A	0.0	0.1	0.29	0.14	29.0
Approach		7	0.0	0.005	0.8	LOS A	0.0	0.1	0.29	0.14	29.1
North: Railway Parade											
7	L2	1	0.0	0.111	5.5	LOS A	0.0	0.0	0.00	0.00	58.2
8	T1	416	5.8	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		417	5.8	0.111	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		726	5.1	0.134	0.6	NA	1.0	6.5	0.17	0.01	58.1

Table B4.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 AM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	296	4.4	0.026	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		296	4.4	0.130	0.0	NA	0.0	0.0	0.00	0.00	60.0
East: GWS Road 2											
4	L2	14	78.6	0.016	1.3	LOS A	0.1	0.7	0.34	0.21	28.1
6	R2	1	0.0	0.016	1.6	LOS A	0.1	0.7	0.34	0.21	29.0
Approach		15	73.3	0.016	1.3	LOS A	0.1	0.7	0.34	0.21	28.1
North: Railway Parade											
8	T1	416	5.8	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		416	5.8	0.111	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		727	6.6	0.130	0.0	NA	0.1	0.7	0.01	0.00	58.6

Table B4.1.4 AM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 AM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	296	4.4	0.134	1.3	LOS A	1.0	6.5	0.40	0.01	58.2
3	R2	6	0.0	0.134	7.1	LOS A	1.0	6.5	0.49	0.02	30.2
Approach		302	4.3	0.134	1.4	NA	1.0	6.5	0.41	0.01	57.1
East: GWS Road 2											
4	L2	6	0.0	0.005	0.8	LOS A	0.0	0.1	0.29	0.14	29.1
6	R2	1	0.0	0.005	1.1	LOS A	0.0	0.1	0.29	0.14	29.0
Approach		7	0.0	0.005	0.8	LOS A	0.0	0.1	0.29	0.14	29.1
North: Railway Parade											
7	L2	1	0.0	0.111	5.5	LOS A	0.0	0.0	0.00	0.00	58.2
8	T1	416	5.8	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		417	5.8	0.111	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		726	5.1	0.134	0.6	NA	1.0	6.5	0.17	0.01	58.1

Table B4.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 AM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	296	4.4	0.026	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		296	4.4	0.130	0.0	NA	0.0	0.0	0.00	0.00	60.0
East: GWS Road 2											
4	L2	14	78.6	0.016	1.3	LOS A	0.1	0.7	0.34	0.21	28.1
6	R2	1	0.0	0.016	1.6	LOS A	0.1	0.7	0.34	0.21	29.0
Approach		15	73.3	0.016	1.3	LOS A	0.1	0.7	0.34	0.21	28.1
North: Railway Parade											
8	T1	416	5.8	0.111	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		416	5.8	0.111	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		727	6.6	0.130	0.0	NA	0.1	0.7	0.01	0.00	58.6

Table B4.2.1 PM 2014

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 PM 2014

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	427	5.6	0.190	0.5	LOS A	1.2	8.1	0.26	0.00	58.9
3	R2	1	0.0	0.190	6.1	LOS A	1.2	8.1	0.31	0.00	30.4
Approach		428	5.6	0.190	0.5	NA	1.2	8.1	0.26	0.00	58.7
East: GWS Road 2											
4	L2	1	0.0	0.002	1.0	LOS A	0.0	0.0	0.18	0.10	29.1
6	R2	1	0.0	0.002	1.2	LOS A	0.0	0.0	0.18	0.10	29.1
Approach		2	0.0	0.002	1.1	LOS A	0.0	0.0	0.18	0.10	29.1
North: Railway Parade											
7	L2	1	0.0	0.044	5.5	LOS A	0.0	0.0	0.00	0.01	57.9
8	T1	163	6.7	0.044	0.0	LOS A	0.0	0.0	0.00	0.00	59.8
Approach		164	6.7	0.044	0.0	NA	0.0	0.0	0.00	0.00	59.8
All Vehicles		594	5.9	0.190	0.4	NA	1.2	8.1	0.19	0.00	58.8

Table B4.2.2 PM 2024

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 PM 2024

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	467	5.4	0.207	0.7	LOS A	1.4	9.5	0.32	0.00	58.6
3	R2	1	0.0	0.207	6.4	LOS A	1.4	9.5	0.38	0.00	30.3
Approach		468	5.3	0.207	0.8	NA	1.4	9.5	0.32	0.00	58.5
East: GWS Road 2											
4	L2	1	0.0	0.002	1.2	LOS A	0.0	0.0	0.23	0.13	29.1
6	R2	1	0.0	0.002	1.5	LOS A	0.0	0.0	0.23	0.13	29.0
Approach		2	0.0	0.002	1.3	LOS A	0.0	0.0	0.23	0.13	29.0
North: Railway Parade											
7	L2	1	0.0	0.060	5.5	LOS A	0.0	0.0	0.00	0.01	58.0
8	T1	227	5.3	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		228	5.3	0.060	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		698	5.3	0.207	0.5	NA	1.4	9.5	0.21	0.00	58.8

Table B4.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 PM 2024 + SSD

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	467	5.4	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		467	5.4	0.207	0.0	NA	0.0	0.0	0.00	0.00	60.0
East: GWS Road 2											
4	L2	11	9.1	0.009	0.5	LOS A	0.0	0.2	0.20	0.08	29.1
6	R2	1	0.0	0.009	0.8	LOS A	0.0	0.2	0.20	0.08	29.1
Approach		12	8.3	0.009	0.5	LOS A	0.0	0.2	0.20	0.08	29.1
North: Railway Parade											
8	T1	227	5.3	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		227	5.3	0.060	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		706	5.4	0.207	0.0	NA	0.0	0.2	0.00	0.00	58.9

Table B4.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 PM 2024 + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	467	5.4	0.207	0.7	LOS A	1.4	9.5	0.32	0.00	58.6
3	R2	1	0.0	0.207	6.4	LOS A	1.4	9.5	0.38	0.00	30.3
Approach		468	5.3	0.207	0.8	NA	1.4	9.5	0.32	0.00	58.5
East: GWS Road 2											
4	L2	1	0.0	0.002	1.2	LOS A	0.0	0.0	0.23	0.13	29.1
6	R2	1	0.0	0.002	1.5	LOS A	0.0	0.0	0.23	0.13	29.0
Approach		2	0.0	0.002	1.3	LOS A	0.0	0.0	0.23	0.13	29.0
North: Railway Parade											
7	L2	1	0.0	0.060	5.5	LOS A	0.0	0.0	0.00	0.01	58.0
8	T1	227	5.3	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	59.9
Approach		228	5.3	0.060	0.0	NA	0.0	0.0	0.00	0.00	59.9
All Vehicles		698	5.3	0.207	0.5	NA	1.4	9.5	0.21	0.00	58.8

Table B4.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Railway Parade & GWS Road 2 PM 2024 + SSD + Rezone

Giveway / Yield (Two-Way)

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Railway Parade											
2	T1	467	5.4	0.041	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		467	5.4	0.207	0.0	NA	0.0	0.0	0.00	0.00	60.0
East: GWS Road 2											
4	L2	11	9.1	0.009	0.5	LOS A	0.0	0.2	0.20	0.08	29.1
6	R2	1	0.0	0.009	0.8	LOS A	0.0	0.2	0.20	0.08	29.1
Approach		12	8.3	0.009	0.5	LOS A	0.0	0.2	0.20	0.08	29.1
North: Railway Parade											
8	T1	227	5.3	0.060	0.0	LOS A	0.0	0.0	0.00	0.00	60.0
Approach		227	5.3	0.060	0.0	NA	0.0	0.0	0.00	0.00	60.0
All Vehicles		706	5.4	0.207	0.0	NA	0.0	0.2	0.00	0.00	58.9

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B5

Intersection Glenfield Rd & Hurlstone Agricultural College

SIDRA Report

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Table B5.1.1 AM 2014

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag AM 2014

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	2	50.0	0.299	6.8	LOS A	1.9	12.5	0.64	0.74	49.6
2	T1	64	1.6	0.299	6.4	LOS A	1.9	12.5	0.64	0.74	52.0
3	R2	231	0.9	0.299	11.5	LOS A	1.9	12.5	0.64	0.74	52.0
Approach		297	1.3	0.299	10.4	LOS A	1.9	12.5	0.64	0.74	52.0
East: Glenfield Road West											
4	L2	607	0.8	0.638	4.2	LOS A	7.2	47.9	0.36	0.52	53.1
5	T1	4	0.0	0.638	4.2	LOS A	7.2	47.9	0.36	0.52	54.4
6	R2	451	4.2	0.638	9.3	LOS A	7.2	47.9	0.36	0.52	54.3
Approach		1062	2.3	0.638	6.3	LOS A	7.2	47.9	0.36	0.52	53.6
North: Glenfield Road East											
7	L2	403	4.5	0.389	5.2	LOS A	2.8	19.0	0.54	0.59	53.7
8	T1	46	0.0	0.389	5.2	LOS A	2.8	19.0	0.54	0.59	55.2
9	R2	11	0.0	0.389	10.2	LOS A	2.8	19.0	0.54	0.59	55.3
Approach		460	3.9	0.389	5.3	LOS A	2.8	19.0	0.54	0.59	53.9
West: SW Railway Access											
10	L2	14	14.3	0.026	8.0	LOS A	0.2	1.1	0.69	0.65	51.3
11	T1	2	0.0	0.026	8.0	LOS A	0.2	1.1	0.69	0.65	53.0
12	R2	4	0.0	0.026	13.0	LOS A	0.2	1.1	0.69	0.65	53.0
Approach		20	10.0	0.026	9.0	LOS A	0.2	1.1	0.69	0.65	51.8
All Vehicles		1839	2.6	0.638	6.7	LOS A	7.2	47.9	0.46	0.57	53.4

Table B5.1.2 AM 2024

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag AM 2024

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	2	50.0	0.382	8.5	LOS A	2.7	17.9	0.80	0.85	48.6
2	T1	68	1.5	0.382	8.1	LOS A	2.7	17.9	0.80	0.85	50.9
3	R2	242	0.8	0.382	13.1	LOS A	2.7	17.9	0.80	0.85	50.9
Approach		312	1.3	0.382	12.0	LOS A	2.7	17.9	0.80	0.85	50.9
East: Glenfield Road West											
4	L2	638	0.8	0.770	4.4	LOS A	12.6	83.3	0.49	0.51	52.4
5	T1	4	0.0	0.770	4.4	LOS A	12.6	83.3	0.49	0.51	53.7
6	R2	649	3.1	0.770	9.5	LOS A	12.6	83.3	0.49	0.51	53.6
Approach		1291	1.9	0.770	6.9	LOS A	12.6	83.3	0.49	0.51	53.0
North: Glenfield Road East											
7	L2	492	3.9	0.472	5.3	LOS A	3.8	25.7	0.61	0.61	53.5
8	T1	48	0.0	0.472	5.4	LOS A	3.8	25.7	0.61	0.61	55.0
9	R2	12	0.0	0.472	10.4	LOS A	3.8	25.7	0.61	0.61	55.0
Approach		552	3.4	0.472	5.5	LOS A	3.8	25.7	0.61	0.61	53.7
West: SW Railway Access											
10	L2	15	13.3	0.035	10.5	LOS A	0.2	1.6	0.81	0.72	49.7
11	T1	2	0.0	0.035	10.4	LOS A	0.2	1.6	0.81	0.72	51.2
12	R2	4	0.0	0.035	15.5	LOS B	0.2	1.6	0.81	0.72	51.2
Approach		21	9.5	0.035	11.4	LOS A	0.2	1.6	0.81	0.72	50.1
All Vehicles		2176	2.3	0.770	7.3	LOS A	12.6	83.3	0.57	0.59	52.8

Table B5.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag AM 2024 + SSD

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	2	50.0	0.384	8.6	LOS A	2.7	18.0	0.81	0.85	48.6
2	T1	68	1.5	0.384	8.2	LOS A	2.7	18.0	0.81	0.85	50.9
3	R2	242	0.8	0.384	13.2	LOS A	2.7	18.0	0.81	0.85	50.9
Approach		312	1.3	0.384	12.1	LOS A	2.7	18.0	0.81	0.85	50.9
East: Glenfield Road West											
4	L2	638	0.8	0.773	4.4	LOS A	12.7	84.6	0.50	0.51	52.4
5	T1	4	0.0	0.773	4.4	LOS A	12.7	84.6	0.50	0.51	53.7
6	R2	653	3.4	0.773	9.5	LOS A	12.7	84.6	0.50	0.51	53.6
Approach		1295	2.1	0.773	7.0	LOS A	12.7	84.6	0.50	0.51	53.0
North: Glenfield Road East											
7	L2	494	4.5	0.475	5.4	LOS A	3.9	26.1	0.62	0.61	53.5
8	T1	48	0.0	0.475	5.4	LOS A	3.9	26.1	0.62	0.61	55.0
9	R2	12	0.0	0.475	10.4	LOS A	3.9	26.1	0.62	0.61	55.0
Approach		554	4.0	0.475	5.5	LOS A	3.9	26.1	0.62	0.61	53.7
West: SW Railway Access											
10	L2	15	13.3	0.036	10.6	LOS A	0.2	1.6	0.81	0.72	49.6
11	T1	2	0.0	0.036	10.5	LOS A	0.2	1.6	0.81	0.72	51.1
12	R2	4	0.0	0.036	15.5	LOS B	0.2	1.6	0.81	0.72	51.2
Approach		21	9.5	0.036	11.5	LOS A	0.2	1.6	0.81	0.72	50.1
All Vehicles		2182	2.5	0.773	7.4	LOS A	12.7	84.6	0.57	0.59	52.8

Table B5.1.4 AM 2014 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag AM 2024 + Rezone

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	2	50.0	0.438	10.2	LOS A	3.5	22.9	0.89	0.93	47.6
2	T1	68	1.5	0.438	9.8	LOS A	3.5	22.9	0.89	0.93	49.8
3	R2	242	0.8	0.438	14.9	LOS B	3.5	22.9	0.89	0.93	49.8
Approach		312	1.3	0.438	13.7	LOS A	3.5	22.9	0.89	0.93	49.8
East: Glenfield Road West											
4	L2	638	0.8	0.829	4.5	LOS A	17.1	115.0	0.58	0.50	52.0
5	T1	4	0.0	0.829	4.6	LOS A	17.1	115.0	0.58	0.50	53.3
6	R2	744	5.8	0.829	9.7	LOS A	17.1	115.0	0.58	0.50	53.1
Approach		1386	3.5	0.829	7.3	LOS A	17.1	115.0	0.58	0.50	52.6
North: Glenfield Road East											
7	L2	533	7.9	0.519	5.5	LOS A	4.5	31.0	0.65	0.63	53.3
8	T1	48	0.0	0.519	5.5	LOS A	4.5	31.0	0.65	0.63	54.9
9	R2	12	0.0	0.519	10.5	LOS A	4.5	31.0	0.65	0.63	54.9
Approach		593	7.1	0.519	5.6	LOS A	4.5	31.0	0.65	0.63	53.4
West: SW Railway Access											
10	L2	15	13.3	0.042	12.3	LOS A	0.3	2.0	0.88	0.75	48.5
11	T1	2	0.0	0.042	12.3	LOS A	0.3	2.0	0.88	0.75	49.9
12	R2	4	0.0	0.042	17.3	LOS B	0.3	2.0	0.88	0.75	50.0
Approach		21	9.5	0.042	13.3	LOS A	0.3	2.0	0.88	0.75	48.9
All Vehicles		2312	4.2	0.829	7.8	LOS A	17.1	115.0	0.65	0.59	52.4

Table B5.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag AM 2024 + SSD + Rezone

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	2	50.0	0.441	10.3	LOS A	3.5	23.2	0.90	0.93	47.5
2	T1	68	1.5	0.441	9.9	LOS A	3.5	23.2	0.90	0.93	49.7
3	R2	242	0.8	0.441	15.0	LOS B	3.5	23.2	0.90	0.93	49.8
Approach		312	1.3	0.441	13.8	LOS A	3.5	23.2	0.90	0.93	49.7
East: Glenfield Road West											
4	L2	638	0.8	0.832	4.6	LOS A	17.4	116.9	0.59	0.50	52.0
5	T1	4	0.0	0.832	4.6	LOS A	17.4	116.9	0.59	0.50	53.3
6	R2	748	6.0	0.832	9.7	LOS A	17.4	116.9	0.59	0.50	53.1
Approach		1390	3.6	0.832	7.3	LOS A	17.4	116.9	0.59	0.50	52.6
North: Glenfield Road East											
7	L2	535	8.4	0.522	5.5	LOS A	4.5	31.5	0.66	0.63	53.3
8	T1	48	0.0	0.522	5.5	LOS A	4.5	31.5	0.66	0.63	54.8
9	R2	12	0.0	0.522	10.5	LOS A	4.5	31.5	0.66	0.63	54.9
Approach		595	7.6	0.522	5.6	LOS A	4.5	31.5	0.66	0.63	53.4
West: SW Railway Access											
10	L2	15	13.3	0.042	12.4	LOS A	0.3	2.0	0.88	0.76	48.4
11	T1	2	0.0	0.042	12.4	LOS A	0.3	2.0	0.88	0.76	49.9
12	R2	4	0.0	0.042	17.4	LOS B	0.3	2.0	0.88	0.76	49.9
Approach		21	9.5	0.042	13.4	LOS A	0.3	2.0	0.88	0.76	48.8
All Vehicles		2318	4.4	0.832	7.8	LOS A	17.4	116.9	0.65	0.59	52.4

Table B5.2.1 PM 2014

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag PM 2014

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	1	0.0	0.220	6.6	LOS A	1.3	8.4	0.61	0.74	50.6
2	T1	38	0.0	0.220	6.7	LOS A	1.3	8.4	0.61	0.74	51.8
3	R2	177	1.1	0.220	11.7	LOS A	1.3	8.4	0.61	0.74	51.8
Approach		216	0.9	0.220	10.8	LOS A	1.3	8.4	0.61	0.74	51.8
East: Glenfield Road West											
4	L2	88	1.1	0.369	3.8	LOS A	2.8	18.9	0.10	0.60	52.3
5	T1	1	0.0	0.369	3.8	LOS A	2.8	18.9	0.10	0.60	53.5
6	R2	530	3.4	0.369	8.9	LOS A	2.8	18.9	0.10	0.60	53.4
Approach		619	3.1	0.369	8.2	LOS A	2.8	18.9	0.10	0.60	53.3
North: Glenfield Road East											
7	L2	494	4.0	0.405	4.9	LOS A	3.0	20.2	0.49	0.55	54.0
8	T1	10	0.0	0.405	4.9	LOS A	3.0	20.2	0.49	0.55	55.5
9	R2	2	0.0	0.405	9.9	LOS A	3.0	20.2	0.49	0.55	55.6
Approach		506	4.0	0.405	4.9	LOS A	3.0	20.2	0.49	0.55	54.1
West: SW Railway Access											
10	L2	4	0.0	0.022	7.6	LOS A	0.1	0.8	0.67	0.60	52.6
11	T1	13	0.0	0.022	7.6	LOS A	0.1	0.8	0.67	0.60	53.8
12	R2	1	0.0	0.022	12.7	LOS A	0.1	0.8	0.67	0.60	53.9
Approach		18	0.0	0.022	7.9	LOS A	0.1	0.8	0.67	0.60	53.5
All Vehicles		1359	3.0	0.405	7.4	LOS A	3.0	20.2	0.34	0.61	53.3

Table B5.2.2 PM 2024

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag PM 2024

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	1	0.0	0.245	7.3	LOS A	1.5	9.7	0.67	0.78	50.2
2	T1	40	0.0	0.245	7.4	LOS A	1.5	9.7	0.67	0.78	51.3
3	R2	186	1.1	0.245	12.4	LOS A	1.5	9.7	0.67	0.78	51.3
Approach		227	0.9	0.245	11.5	LOS A	1.5	9.7	0.67	0.78	51.3
East: Glenfield Road West											
4	L2	93	1.1	0.420	3.8	LOS A	3.6	24.3	0.12	0.60	52.2
5	T1	1	0.0	0.420	3.8	LOS A	3.6	24.3	0.12	0.60	53.4
6	R2	613	3.1	0.420	8.9	LOS A	3.6	24.3	0.12	0.60	53.4
Approach		707	2.8	0.420	8.2	LOS A	3.6	24.3	0.12	0.60	53.2
North: Glenfield Road East											
7	L2	798	2.6	0.638	5.4	LOS A	6.3	42.2	0.66	0.61	53.5
8	T1	10	0.0	0.638	5.4	LOS A	6.3	42.2	0.66	0.61	55.0
9	R2	2	0.0	0.638	10.4	LOS A	6.3	42.2	0.66	0.61	55.0
Approach		810	2.6	0.638	5.4	LOS A	6.3	42.2	0.66	0.61	53.5
West: SW Railway Access											
10	L2	4	0.0	0.025	8.5	LOS A	0.1	1.0	0.72	0.63	51.9
11	T1	14	0.0	0.025	8.6	LOS A	0.1	1.0	0.72	0.63	53.2
12	R2	1	0.0	0.025	13.6	LOS A	0.1	1.0	0.72	0.63	53.2
Approach		19	0.0	0.025	8.8	LOS A	0.1	1.0	0.72	0.63	52.9
All Vehicles		1763	2.4	0.638	7.3	LOS A	6.3	42.2	0.45	0.62	53.1

Table B5.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag PM 2024 + SSD

Roundabout

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	1	0.0	0.245	7.3	LOS A	1.5	9.7	0.67	0.78	50.2
2	T1	40	0.0	0.245	7.4	LOS A	1.5	9.7	0.67	0.78	51.3
3	R2	186	1.1	0.245	12.4	LOS A	1.5	9.7	0.67	0.78	51.3
Approach		227	0.9	0.245	11.5	LOS A	1.5	9.7	0.67	0.78	51.3
East: Glenfield Road West											
4	L2	93	1.1	0.418	3.8	LOS A	3.6	24.2	0.11	0.60	52.2
5	T1	1	0.0	0.418	3.8	LOS A	3.6	24.2	0.11	0.60	53.5
6	R2	613	3.3	0.418	8.9	LOS A	3.6	24.2	0.11	0.60	53.4
Approach		707	3.0	0.418	8.2	LOS A	3.6	24.2	0.11	0.60	53.2
North: Glenfield Road East											
7	L2	800	2.6	0.639	5.4	LOS A	6.3	42.3	0.66	0.61	53.5
8	T1	10	0.0	0.639	5.4	LOS A	6.3	42.3	0.66	0.61	55.0
9	R2	1	0.0	0.639	10.4	LOS A	6.3	42.3	0.66	0.61	55.0
Approach		811	2.6	0.639	5.4	LOS A	6.3	42.3	0.66	0.61	53.5
West: SW Railway Access											
10	L2	4	0.0	0.025	8.5	LOS A	0.1	1.0	0.72	0.63	51.9
11	T1	14	0.0	0.025	8.6	LOS A	0.1	1.0	0.72	0.63	53.2
12	R2	1	0.0	0.025	13.6	LOS A	0.1	1.0	0.72	0.63	53.2
Approach		19	0.0	0.025	8.8	LOS A	0.1	1.0	0.72	0.63	52.9
All Vehicles		1764	2.5	0.639	7.3	LOS A	6.3	42.3	0.44	0.62	53.1

Table B5.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag PM 2024 + Rezone

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	1	0.0	0.256	7.8	LOS A	1.6	10.4	0.70	0.80	49.9
2	T1	40	0.0	0.256	7.9	LOS A	1.6	10.4	0.70	0.80	51.0
3	R2	186	1.1	0.256	12.9	LOS A	1.6	10.4	0.70	0.80	51.0
Approach		227	0.9	0.256	12.0	LOS A	1.6	10.4	0.70	0.80	51.0
East: Glenfield Road West											
4	L2	93	1.1	0.451	3.8	LOS A	4.2	29.0	0.12	0.59	52.2
5	T1	1	0.0	0.451	3.8	LOS A	4.2	29.0	0.12	0.59	53.4
6	R2	658	6.8	0.451	8.9	LOS A	4.2	29.0	0.12	0.59	53.2
Approach		752	6.1	0.451	8.3	LOS A	4.2	29.0	0.12	0.59	53.1
North: Glenfield Road East											
7	L2	898	5.2	0.724	6.1	LOS A	8.7	59.6	0.76	0.65	53.2
8	T1	10	0.0	0.724	6.1	LOS A	8.7	59.6	0.76	0.65	54.6
9	R2	1	0.0	0.724	11.1	LOS A	8.7	59.6	0.76	0.65	54.7
Approach		909	5.2	0.724	6.1	LOS A	8.7	59.6	0.76	0.65	53.2
West: SW Railway Access											
10	L2	4	0.0	0.026	9.2	LOS A	0.2	1.0	0.75	0.65	51.4
11	T1	14	0.0	0.026	9.2	LOS A	0.2	1.0	0.75	0.65	52.7
12	R2	1	0.0	0.026	14.3	LOS A	0.2	1.0	0.75	0.65	52.7
Approach		19	0.0	0.026	9.5	LOS A	0.2	1.0	0.75	0.65	52.4
All Vehicles		1907	5.0	0.724	7.7	LOS A	8.7	59.6	0.50	0.64	52.9

Table B5.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Hurlstone Ag PM 2024 + SSD + Rezone

Roundabout

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Hurlstone Ag											
1	L2	1	0.0	0.256	7.8	LOS A	1.6	10.4	0.70	0.80	49.9
2	T1	40	0.0	0.256	7.8	LOS A	1.6	10.4	0.70	0.80	51.0
3	R2	186	1.1	0.256	12.9	LOS A	1.6	10.4	0.70	0.80	51.0
Approach		227	0.9	0.256	12.0	LOS A	1.6	10.4	0.70	0.80	51.0
East: Glenfield Road West											
4	L2	93	1.1	0.451	3.8	LOS A	4.2	28.9	0.12	0.59	52.2
5	T1	1	0.0	0.451	3.8	LOS A	4.2	28.9	0.12	0.59	53.4
6	R2	657	6.8	0.451	8.9	LOS A	4.2	28.9	0.12	0.59	53.2
Approach		751	6.1	0.451	8.3	LOS A	4.2	28.9	0.12	0.59	53.1
North: Glenfield Road East											
7	L2	899	5.1	0.724	6.0	LOS A	8.7	59.6	0.76	0.65	53.2
8	T1	10	0.0	0.724	6.1	LOS A	8.7	59.6	0.76	0.65	54.6
9	R2	1	0.0	0.724	11.1	LOS A	8.7	59.6	0.76	0.65	54.7
Approach		910	5.1	0.724	6.1	LOS A	8.7	59.6	0.76	0.65	53.2
West: SW Railway Access											
10	L2	4	0.0	0.026	9.2	LOS A	0.2	1.0	0.75	0.65	51.5
11	T1	14	0.0	0.026	9.2	LOS A	0.2	1.0	0.75	0.65	52.7
12	R2	1	0.0	0.026	14.2	LOS A	0.2	1.0	0.75	0.65	52.7
Approach		19	0.0	0.026	9.5	LOS A	0.2	1.0	0.75	0.65	52.4
All Vehicles		1907	4.9	0.724	7.7	LOS A	8.7	59.6	0.50	0.64	52.9

Glenfield Waste Services

SSD Rezoning Proposal

Traffic Impact Assessment

October 2014

Appendix B6

Intersection Glenfield Road & Brampton Avenue & Old Glenfield Road

SIDRA Report

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Table B6.1.1 AM 2014

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd AM 2014

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	129	1.6	0.217	31.5	LOS C	4.6	30.2	0.74	0.74	36.4
2	T1	1	0.0	0.217	27.0	LOS B	4.6	30.2	0.74	0.74	35.0
3	R2	108	0.9	0.235	32.2	LOS C	3.9	25.9	0.78	0.73	36.2
Approach		238	1.3	0.235	31.8	LOS C	4.6	30.2	0.76	0.73	36.3
East: Glenfield Road											
4	L2	29	0.0	0.287	26.1	LOS B	7.3	49.1	0.67	0.59	41.1
5	T1	587	3.6	0.474	22.4	LOS B	13.5	90.8	0.73	0.63	43.7
6	R2	2	0.0	0.005	16.6	LOS B	0.0	0.3	0.50	0.60	43.3
Approach		618	3.4	0.474	22.6	LOS B	13.5	90.8	0.72	0.63	43.6
North: Old Glenfield Road											
7	L2	1	0.0	0.005	37.6	LOS C	0.1	0.5	0.78	0.55	35.1
8	T1	1	0.0	0.005	33.1	LOS C	0.1	0.5	0.78	0.55	33.7
9	R2	3	0.0	0.007	29.4	LOS C	0.1	0.6	0.72	0.60	37.4
Approach		5	0.0	0.007	31.7	LOS C	0.1	0.6	0.75	0.58	36.1
West: Glenfield Road											
10	L2	3	33.3	0.394	27.7	LOS B	10.6	71.4	0.71	0.62	40.5
11	T1	870	3.0	0.710	24.7	LOS B	21.9	146.7	0.80	0.71	42.7
12	R2	36	11.1	0.077	17.4	LOS B	0.8	6.0	0.52	0.66	42.9
Approach		909	3.4	0.710	24.4	LOS B	21.9	146.7	0.79	0.70	42.7
All Vehicles		1770	3.1	0.710	24.8	LOS B	21.9	146.7	0.76	0.68	42.0

Table B6.1.2 AM 2024

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd AM 2024

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	218	0.9	0.362	33.1	LOS C	8.1	53.5	0.79	0.77	35.9
2	T1	1	0.0	0.362	28.6	LOS C	8.1	53.5	0.79	0.77	34.4
3	R2	76	1.3	0.170	31.7	LOS C	2.7	18.0	0.76	0.71	36.4
Approach		295	1.0	0.362	32.8	LOS C	8.1	53.5	0.78	0.75	36.0
East: Glenfield Road											
4	L2	25	0.0	0.317	25.8	LOS B	8.3	55.5	0.67	0.59	41.4
5	T1	672	3.3	0.523	22.2	LOS B	15.5	104.0	0.74	0.64	43.9
6	R2	12	0.0	0.031	17.0	LOS B	0.3	1.8	0.51	0.63	43.2
Approach		709	3.1	0.523	22.3	LOS B	15.5	104.0	0.73	0.64	43.8
North: Old Glenfield Road											
7	L2	30	0.0	0.053	30.4	LOS C	1.0	6.7	0.70	0.67	36.9
8	T1	1	0.0	0.053	25.9	LOS B	1.0	6.7	0.70	0.67	35.4
9	R2	32	0.0	0.078	30.7	LOS C	1.1	7.2	0.74	0.67	36.9
Approach		63	0.0	0.078	30.5	LOS C	1.1	7.2	0.72	0.67	36.9
West: Glenfield Road											
10	L2	13	7.7	0.427	27.1	LOS B	11.9	79.5	0.72	0.63	40.8
11	T1	937	2.9	0.769	24.5	LOS B	23.9	159.6	0.81	0.72	42.8
12	R2	75	5.3	0.168	17.8	LOS B	1.8	12.4	0.54	0.68	42.7
Approach		1025	3.1	0.769	24.1	LOS B	23.9	159.6	0.79	0.72	42.7
All Vehicles		2092	2.7	0.769	24.9	LOS B	23.9	159.6	0.77	0.70	41.8

Table B6.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd AM 2024 + SSD

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	218	0.9	0.362	33.1	LOS C	8.1	53.5	0.79	0.77	35.9
2	T1	1	0.0	0.362	28.6	LOS C	8.1	53.5	0.79	0.77	34.4
3	R2	76	1.3	0.170	31.7	LOS C	2.7	18.0	0.76	0.71	36.4
Approach		295	1.0	0.362	32.8	LOS C	8.1	53.5	0.78	0.75	36.0
East: Glenfield Road											
4	L2	25	0.0	0.318	25.8	LOS B	8.3	55.9	0.67	0.59	41.4
5	T1	674	3.7	0.526	22.3	LOS B	15.6	105.0	0.74	0.65	43.8
6	R2	12	0.0	0.031	17.0	LOS B	0.3	1.8	0.51	0.63	43.2
Approach		711	3.5	0.526	22.3	LOS B	15.6	105.0	0.73	0.64	43.7
North: Old Glenfield Road											
7	L2	30	0.0	0.053	30.4	LOS C	1.0	6.7	0.70	0.67	36.9
8	T1	1	0.0	0.053	25.9	LOS B	1.0	6.7	0.70	0.67	35.4
9	R2	32	0.0	0.078	30.7	LOS C	1.1	7.2	0.74	0.67	36.9
Approach		63	0.0	0.078	30.5	LOS C	1.1	7.2	0.72	0.67	36.9
West: Glenfield Road											
10	L2	13	7.7	0.430	27.1	LOS B	11.9	80.1	0.72	0.63	40.8
11	T1	941	3.1	0.773	24.6	LOS B	24.0	161.0	0.81	0.72	42.7
12	R2	75	5.3	0.169	17.8	LOS B	1.8	12.4	0.54	0.68	42.7
Approach		1029	3.3	0.773	24.1	LOS B	24.0	161.0	0.79	0.72	42.7
All Vehicles		2098	3.0	0.773	24.9	LOS B	24.0	161.0	0.77	0.70	41.7

Table B6.1.4 AM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd AM 2024 + Rezone

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	218	0.9	0.373	34.0	LOS C	8.3	54.3	0.80	0.77	35.5
2	T1	1	0.0	0.373	29.4	LOS C	8.3	54.3	0.80	0.77	34.1
3	R2	76	1.3	0.177	32.8	LOS C	2.8	18.5	0.77	0.71	36.0
Approach		295	1.0	0.373	33.7	LOS C	8.3	54.3	0.79	0.76	35.7
East: Glenfield Road											
4	L2	25	0.0	0.330	24.6	LOS B	8.7	59.7	0.66	0.58	41.9
5	T1	713	6.3	0.545	21.1	LOS B	16.1	110.9	0.72	0.64	44.5
6	R2	12	0.0	0.035	16.6	LOS B	0.3	1.7	0.50	0.63	43.4
Approach		750	6.0	0.545	21.1	LOS B	16.1	110.9	0.72	0.64	44.4
North: Old Glenfield Road											
7	L2	30	0.0	0.054	31.2	LOS C	1.1	6.8	0.71	0.68	36.6
8	T1	1	0.0	0.054	26.7	LOS B	1.1	6.8	0.71	0.68	35.1
9	R2	32	0.0	0.082	31.7	LOS C	1.1	7.4	0.75	0.67	36.5
Approach		63	0.0	0.082	31.4	LOS C	1.1	7.4	0.73	0.67	36.5
West: Glenfield Road											
10	L2	13	7.7	0.469	26.3	LOS B	13.4	91.8	0.72	0.63	41.2
11	T1	1033	4.9	0.844	23.7	LOS B	26.0	177.2	0.82	0.73	43.2
12	R2	75	5.3	0.178	17.4	LOS B	1.8	12.2	0.53	0.68	42.9
Approach		1121	5.0	0.844	23.3	LOS B	26.0	177.2	0.80	0.72	43.1
All Vehicles		2229	4.7	0.844	24.2	LOS B	26.0	177.2	0.77	0.70	42.1

Table B6.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd AM 2024 + SSD + Rezone

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	218	0.9	0.373	34.0	LOS C	8.3	54.3	0.80	0.77	35.5
2	T1	1	0.0	0.373	29.4	LOS C	8.3	54.3	0.80	0.77	34.1
3	R2	76	1.3	0.177	32.8	LOS C	2.8	18.5	0.77	0.71	36.0
Approach		295	1.0	0.373	33.7	LOS C	8.3	54.3	0.79	0.76	35.7
East: Glenfield Road											
4	L2	25	0.0	0.331	24.6	LOS B	8.7	60.1	0.66	0.58	41.9
5	T1	715	6.7	0.547	21.1	LOS B	16.1	111.9	0.72	0.64	44.5
6	R2	12	0.0	0.035	16.6	LOS B	0.3	1.7	0.50	0.63	43.4
Approach		752	6.4	0.547	21.2	LOS B	16.1	111.9	0.72	0.64	44.4
North: Old Glenfield Road											
7	L2	30	0.0	0.054	31.2	LOS C	1.1	6.8	0.71	0.68	36.6
8	T1	1	0.0	0.054	26.7	LOS B	1.1	6.8	0.71	0.68	35.1
9	R2	32	0.0	0.082	31.7	LOS C	1.1	7.4	0.75	0.67	36.5
Approach		63	0.0	0.082	31.4	LOS C	1.1	7.4	0.73	0.67	36.5
West: Glenfield Road											
10	L2	13	7.7	0.472	26.4	LOS B	13.5	92.5	0.72	0.64	41.2
11	T1	1037	5.1	0.849	23.7	LOS B	26.1	178.5	0.82	0.73	43.2
12	R2	75	5.3	0.178	17.4	LOS B	1.8	12.2	0.53	0.68	42.9
Approach		1125	5.2	0.849	23.4	LOS B	26.1	178.5	0.80	0.73	43.1
All Vehicles		2235	4.9	0.849	24.2	LOS B	26.1	178.5	0.77	0.70	42.1

Table B6.2.1 PM 2014

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd PM 2014

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	57	3.5	0.092	28.7	LOS C	1.9	12.7	0.68	0.69	37.5
2	T1	1	0.0	0.092	24.1	LOS B	1.9	12.7	0.68	0.69	36.0
3	R2	22	0.0	0.043	27.7	LOS B	0.7	4.6	0.70	0.66	37.9
Approach		80	2.5	0.092	28.4	LOS B	1.9	12.7	0.69	0.68	37.6
East: Glenfield Road											
4	L2	24	0.0	0.337	30.1	LOS C	8.3	55.8	0.73	0.64	39.4
5	T1	614	3.3	0.556	26.8	LOS B	15.4	103.2	0.79	0.69	41.6
6	R2	1	0.0	0.002	18.0	LOS B	0.0	0.2	0.53	0.59	42.7
Approach		639	3.1	0.556	26.9	LOS B	15.4	103.2	0.79	0.69	41.5
North: Old Glenfield Road											
7	L2	2	0.0	0.006	35.2	LOS C	0.1	0.7	0.75	0.57	35.7
8	T1	1	0.0	0.006	30.6	LOS C	0.1	0.7	0.75	0.57	34.3
9	R2	5	20.0	0.011	27.5	LOS B	0.2	1.2	0.70	0.61	37.8
Approach		8	12.5	0.011	29.8	LOS C	0.2	1.2	0.72	0.60	36.8
West: Glenfield Road											
10	L2	6	0.0	0.275	29.4	LOS C	6.6	44.4	0.71	0.60	39.9
11	T1	540	4.3	0.495	26.0	LOS B	13.2	89.4	0.77	0.66	42.0
12	R2	87	1.1	0.176	19.3	LOS B	2.2	14.5	0.57	0.69	42.0
Approach		633	3.8	0.495	25.1	LOS B	13.2	89.4	0.74	0.66	42.0
All Vehicles		1360	3.5	0.556	26.2	LOS B	15.4	103.2	0.76	0.68	41.5

Table B6.2.2 PM 2024

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd PM 2024

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	75	2.7	0.122	29.0	LOS C	2.5	16.7	0.69	0.71	37.3
2	T1	1	0.0	0.122	24.4	LOS B	2.5	16.7	0.69	0.71	35.8
3	R2	24	0.0	0.049	28.7	LOS C	0.8	5.1	0.72	0.66	37.5
Approach		100	2.0	0.122	28.9	LOS C	2.5	16.7	0.70	0.70	37.4
East: Glenfield Road											
4	L2	71	0.0	0.370	29.1	LOS C	9.6	63.9	0.73	0.66	39.5
5	T1	653	3.1	0.610	25.9	LOS B	17.1	114.6	0.80	0.70	41.9
6	R2	29	0.0	0.060	18.2	LOS B	0.7	4.5	0.54	0.66	42.6
Approach		753	2.7	0.610	25.9	LOS B	17.1	114.6	0.78	0.70	41.7
North: Old Glenfield Road											
7	L2	12	0.0	0.022	30.0	LOS C	0.4	2.8	0.69	0.64	37.1
8	T1	1	0.0	0.022	25.4	LOS B	0.4	2.8	0.69	0.64	35.6
9	R2	15	6.7	0.033	28.5	LOS C	0.5	3.4	0.71	0.64	37.6
Approach		28	3.6	0.033	29.0	LOS C	0.5	3.4	0.70	0.64	37.3
West: Glenfield Road											
10	L2	35	0.0	0.319	28.5	LOS B	8.0	53.9	0.71	0.63	40.0
11	T1	637	3.8	0.575	25.6	LOS B	16.5	111.5	0.79	0.69	42.1
12	R2	214	0.5	0.459	20.1	LOS B	5.8	37.9	0.62	0.73	41.6
Approach		886	2.8	0.575	24.4	LOS B	16.5	111.5	0.74	0.70	41.9
All Vehicles		1767	2.7	0.610	25.3	LOS B	17.1	114.6	0.76	0.70	41.5

Table B6.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd PM 2024 + SSD

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	75	2.7	0.122	29.0	LOS C	2.5	16.7	0.69	0.71	37.3
2	T1	1	0.0	0.122	24.4	LOS B	2.5	16.7	0.69	0.71	35.8
3	R2	24	0.0	0.049	28.7	LOS C	0.8	5.1	0.72	0.66	37.5
Approach		100	2.0	0.122	28.9	LOS C	2.5	16.7	0.70	0.70	37.4
East: Glenfield Road											
4	L2	71	0.0	0.371	29.1	LOS C	9.6	64.2	0.73	0.66	39.5
5	T1	655	3.2	0.613	25.9	LOS B	17.2	115.2	0.80	0.71	41.9
6	R2	29	0.0	0.060	18.2	LOS B	0.7	4.5	0.54	0.66	42.6
Approach		755	2.8	0.613	25.9	LOS B	17.2	115.2	0.78	0.70	41.7
North: Old Glenfield Road											
7	L2	12	0.0	0.022	30.0	LOS C	0.4	2.8	0.69	0.64	37.1
8	T1	1	0.0	0.022	25.4	LOS B	0.4	2.8	0.69	0.64	35.6
9	R2	15	6.7	0.033	28.5	LOS C	0.5	3.4	0.71	0.64	37.6
Approach		28	3.6	0.033	29.0	LOS C	0.5	3.4	0.70	0.64	37.3
West: Glenfield Road											
10	L2	35	0.0	0.320	28.5	LOS C	8.0	54.0	0.71	0.63	40.0
11	T1	637	3.9	0.576	25.6	LOS B	16.5	111.7	0.79	0.69	42.1
12	R2	214	0.5	0.460	20.1	LOS B	5.8	37.9	0.62	0.73	41.6
Approach		886	2.9	0.576	24.4	LOS B	16.5	111.7	0.74	0.70	41.9
All Vehicles		1769	2.8	0.613	25.4	LOS B	17.2	115.2	0.76	0.70	41.5

Table B6.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd PM 2024 + Rezone

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	75	2.7	0.125	29.8	LOS C	2.5	17.0	0.70	0.71	37.1
2	T1	1	0.0	0.125	25.2	LOS B	2.5	17.0	0.70	0.71	35.6
3	R2	24	0.0	0.051	29.5	LOS C	0.8	5.3	0.73	0.66	37.2
Approach		100	2.0	0.125	29.7	LOS C	2.5	17.0	0.71	0.70	37.1
East: Glenfield Road											
4	L2	71	0.0	0.407	28.1	LOS B	10.9	74.1	0.73	0.66	39.9
5	T1	754	6.2	0.673	25.3	LOS B	19.8	136.8	0.81	0.72	42.2
6	R2	29	0.0	0.063	17.7	LOS B	0.7	4.4	0.53	0.66	42.8
Approach		854	5.5	0.673	25.2	LOS B	19.8	136.8	0.79	0.71	42.0
North: Old Glenfield Road											
7	L2	12	0.0	0.023	30.8	LOS C	0.4	2.8	0.70	0.64	36.8
8	T1	1	0.0	0.023	26.2	LOS B	0.4	2.8	0.70	0.64	35.3
9	R2	15	6.7	0.034	29.4	LOS C	0.5	3.5	0.72	0.65	37.3
Approach		28	3.6	0.034	29.9	LOS C	0.5	3.5	0.71	0.64	37.0
West: Glenfield Road											
10	L2	35	0.0	0.331	27.3	LOS B	8.4	58.1	0.70	0.62	40.5
11	T1	682	7.3	0.596	24.5	LOS B	17.5	122.1	0.78	0.69	42.7
12	R2	214	0.5	0.504	19.6	LOS B	5.7	37.4	0.61	0.73	41.9
Approach		931	5.5	0.596	23.4	LOS B	17.5	122.1	0.74	0.69	42.4
All Vehicles		1913	5.3	0.673	24.7	LOS B	19.8	136.8	0.76	0.70	41.8

Table B6.2.5 PM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Glenfield Rd & Brampton Ave & Old Glenfield Rd PM 2024 + Rezone + SSD

Signals - Actuated Cycle Time = 100 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Brampton Avenue											
1	L2	75	2.7	0.125	29.8	LOS C	2.5	17.0	0.70	0.71	37.1
2	T1	1	0.0	0.125	25.2	LOS B	2.5	17.0	0.70	0.71	35.6
3	R2	24	0.0	0.051	29.5	LOS C	0.8	5.3	0.73	0.66	37.2
Approach		100	2.0	0.125	29.7	LOS C	2.5	17.0	0.71	0.70	37.1
East: Glenfield Road											
4	L2	71	0.0	0.408	28.1	LOS B	10.9	74.1	0.73	0.66	39.9
5	T1	755	6.1	0.673	25.3	LOS B	19.8	136.9	0.81	0.72	42.2
6	R2	29	0.0	0.063	17.7	LOS B	0.7	4.4	0.53	0.66	42.8
Approach		855	5.4	0.673	25.3	LOS B	19.8	136.9	0.79	0.71	42.0
North: Old Glenfield Road											
7	L2	12	0.0	0.023	30.8	LOS C	0.4	2.8	0.70	0.64	36.8
8	T1	1	0.0	0.023	26.2	LOS B	0.4	2.8	0.70	0.64	35.3
9	R2	15	6.7	0.034	29.4	LOS C	0.5	3.5	0.72	0.65	37.3
Approach		28	3.6	0.034	29.9	LOS C	0.5	3.5	0.71	0.64	37.0
West: Glenfield Road											
10	L2	35	0.0	0.332	27.3	LOS B	8.4	58.2	0.70	0.62	40.5
11	T1	682	7.5	0.597	24.5	LOS B	17.5	122.3	0.78	0.69	42.7
12	R2	214	0.5	0.504	19.6	LOS B	5.7	37.4	0.61	0.73	41.9
Approach		931	5.6	0.597	23.4	LOS B	17.5	122.3	0.74	0.69	42.4
All Vehicles		1914	5.3	0.673	24.7	LOS B	19.8	136.9	0.76	0.70	41.8

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix B7

Intersection Campbelltown Road & Glenfield Road

SIDRA Report

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Table B7.1.1 AM 2014

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd AM 2014

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	768	5.2	0.255	20.4	LOS B	10.0	68.4	0.58	0.50	50.4
3	R2	131	3.1	0.446	68.6	LOS E	8.8	58.7	0.95	0.80	29.2
Approach		899	4.9	0.446	27.4	LOS B	10.0	68.4	0.64	0.55	45.6
East: GLENFIELD RD											
4	L2	73	8.2	0.041	5.7	LOS A	0.0	0.0	0.00	0.52	54.6
6	R2	613	2.9	0.453	40.8	LOS C	17.5	116.8	0.78	0.80	36.6
Approach		686	3.5	0.453	37.1	LOS C	17.5	116.8	0.70	0.77	37.9
North: CAMPBELLTOWN RD - NORTH											
7	L2	755	3.7	0.543	8.5	LOS A	11.1	74.8	0.29	0.68	55.4
8	T1	811	10.6	0.449	41.0	LOS C	13.7	98.9	0.75	0.64	39.3
Approach		1566	7.3	0.543	25.3	LOS B	13.7	98.9	0.53	0.66	45.7
All Vehicles		3151	5.8	0.543	28.5	LOS B	17.5	116.8	0.60	0.65	43.7

Table B7.1.2 AM 2024

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd AM 2024

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	1826	2.6	0.575	23.7	LOS B	28.8	192.2	0.71	0.65	48.2
3	R2	148	2.7	0.574	72.6	LOS F	10.3	68.8	0.99	0.81	28.2
Approach		1974	2.6	0.575	27.3	LOS B	28.8	192.2	0.73	0.66	45.8
East: GLENFIELD RD											
4	L2	93	6.5	0.087	8.9	LOS A	1.4	9.7	0.26	0.62	52.8
6	R2	793	2.4	0.576	45.5	LOS D	22.9	152.4	0.86	0.83	35.0
Approach		886	2.8	0.576	41.7	LOS C	22.9	152.4	0.79	0.81	36.3
North: CAMPBELLTOWN RD - NORTH											
7	L2	853	3.4	0.611	9.2	LOS A	16.2	108.7	0.36	0.71	54.8
8	T1	1133	14.8	0.573	37.7	LOS C	19.4	145.0	0.76	0.67	40.8
Approach		1986	9.9	0.611	25.4	LOS B	19.4	145.0	0.59	0.68	45.8
All Vehicles		4846	5.6	0.611	29.2	LOS C	28.8	192.2	0.69	0.70	43.7

Table B7.1.3 AM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd AM 2024 + SSD

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	1826	2.6	0.575	23.7	LOS B	28.8	192.2	0.71	0.65	48.2
3	R2	148	2.7	0.574	72.6	LOS F	10.3	68.8	0.99	0.81	28.2
Approach		1974	2.6	0.575	27.3	LOS B	28.8	192.2	0.73	0.66	45.8
East: GLENFIELD RD											
4	L2	94	7.4	0.089	8.9	LOS A	1.4	9.9	0.26	0.62	52.6
6	R2	795	2.6	0.578	45.6	LOS D	23.0	153.3	0.86	0.83	35.0
Approach		889	3.1	0.578	41.7	LOS C	23.0	153.3	0.79	0.81	36.2
North: CAMPBELLTOWN RD - NORTH											
7	L2	857	3.6	0.615	9.2	LOS A	16.4	110.2	0.37	0.71	54.8
8	T1	1133	14.8	0.573	37.7	LOS C	19.4	145.0	0.76	0.67	40.8
Approach		1990	10.0	0.615	25.4	LOS B	19.4	145.0	0.59	0.68	45.8
All Vehicles		4853	5.7	0.615	29.2	LOS C	28.8	192.2	0.69	0.70	43.7

Table B7.1.4 AM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd AM 2024 + REZONE

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	1826	2.6	0.568	23.0	LOS B	28.4	189.3	0.70	0.64	48.7
3	R2	169	5.3	0.584	70.3	LOS E	11.6	79.5	0.98	0.82	28.7
Approach		1995	2.8	0.584	27.0	LOS B	28.4	189.3	0.73	0.65	46.0
East: GLENFIELD RD											
4	L2	120	17.5	0.120	9.4	LOS A	1.9	14.8	0.28	0.62	50.2
6	R2	807	3.3	0.600	46.7	LOS D	23.7	159.4	0.87	0.84	34.5
Approach		927	5.2	0.600	41.9	LOS C	23.7	159.4	0.79	0.81	36.0
North: CAMPBELLTOWN RD - NORTH											
7	L2	928	5.2	0.684	10.0	LOS A	21.9	149.5	0.44	0.73	54.1
8	T1	1133	14.8	0.595	39.8	LOS C	20.1	150.2	0.79	0.69	39.8
Approach		2061	10.5	0.684	26.4	LOS B	21.9	150.2	0.63	0.71	45.2
All Vehicles		4983	6.4	0.684	29.5	LOS C	28.4	189.3	0.70	0.71	43.4

Table B7.1.5 AM 2024 + SSD Proposal + Rezoning Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd AM 2024 + SSD + REZONE

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

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	1826	2.6	0.568	23.0	LOS B	28.4	189.3	0.70	0.64	48.7
3	R2	169	5.3	0.584	70.3	LOS E	11.6	79.5	0.98	0.82	28.7
Approach		1995	2.8	0.584	27.0	LOS B	28.4	189.3	0.73	0.65	46.0
East: GLENFIELD RD											
4	L2	121	18.2	0.121	9.4	LOS A	2.0	15.1	0.28	0.62	50.0
6	R2	810	3.7	0.604	46.8	LOS D	23.9	160.9	0.87	0.84	34.5
Approach		931	5.6	0.604	41.9	LOS C	23.9	160.9	0.80	0.81	35.9
North: CAMPBELLTOWN RD - NORTH											
7	L2	932	5.4	0.688	10.0	LOS A	22.2	151.8	0.45	0.74	54.1
8	T1	1133	14.8	0.595	39.8	LOS C	20.1	150.2	0.79	0.69	39.8
Approach		2065	10.6	0.688	26.4	LOS B	22.2	151.8	0.63	0.71	45.2
All Vehicles		4991	6.5	0.688	29.5	LOS C	28.4	189.3	0.70	0.71	43.4

Table B7.2.1 PM 2014

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd PM 2014

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

Movement Performance - Vehicles											
Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	376	5.3	0.105	11.7	LOS A	3.6	24.3	0.42	0.35	57.3
3	R2	80	1.3	0.538	80.7	LOS F	5.8	38.5	1.00	0.77	26.6
Approach		456	4.6	0.538	23.8	LOS B	5.8	38.5	0.52	0.42	47.6
East: GLENFIELD RD											
4	L2	132	1.5	0.071	5.6	LOS A	0.0	0.0	0.00	0.53	54.9
6	R2	543	3.1	0.572	52.8	LOS D	19.0	127.5	0.89	0.82	32.7
Approach		675	2.8	0.572	43.6	LOS D	19.0	127.5	0.71	0.76	35.5
North: CAMPBELLTOWN RD - NORTH											
7	L2	559	4.7	0.375	7.6	LOS A	5.1	35.0	0.20	0.65	56.1
8	T1	1637	4.9	0.564	20.4	LOS B	20.5	140.1	0.57	0.51	50.4
Approach		2196	4.9	0.564	17.2	LOS B	20.5	140.1	0.47	0.54	51.7
All Vehicles		3327	4.4	0.572	23.4	LOS B	20.5	140.1	0.53	0.57	46.8

Table B7.2.2 PM 2024

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd PM 2024

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	749	2.9	0.178	6.7	LOS A	5.6	37.2	0.34	0.29	62.1
3	R2	113	0.9	0.826	88.6	LOS F	8.9	58.5	1.00	0.90	25.1
Approach		862	2.7	0.826	17.4	LOS B	8.9	58.5	0.42	0.37	52.0
East: GLENFIELD RD											
4	L2	145	1.4	0.247	20.8	LOS B	5.4	35.6	0.57	0.73	45.9
6	R2	597	3.0	0.840	75.4	LOS F	22.8	152.6	1.00	0.92	27.2
Approach		742	2.7	0.840	64.8	LOS E	22.8	152.6	0.92	0.88	29.6
North: CAMPBELLTOWN RD - NORTH											
7	L2	780	3.5	0.515	8.3	LOS A	10.9	73.3	0.28	0.67	55.6
8	T1	2703	6.8	0.779	12.3	LOS A	32.4	224.9	0.55	0.51	56.7
Approach		3483	6.1	0.779	11.4	LOS A	32.4	224.9	0.49	0.55	56.5
All Vehicles		5087	5.0	0.840	20.2	LOS B	32.4	224.9	0.54	0.57	49.2

Table B7.2.3 PM 2024 + SSD Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd PM 2024 + SSD

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	749	2.9	0.178	6.7	LOS A	5.6	37.2	0.34	0.29	62.1
3	R2	113	0.9	0.826	88.6	LOS F	8.9	58.5	1.00	0.90	25.1
Approach		862	2.7	0.826	17.4	LOS B	8.9	58.5	0.42	0.37	52.0
East: GLENFIELD RD											
4	L2	146	1.4	0.249	20.9	LOS B	5.4	35.9	0.57	0.73	45.9
6	R2	597	2.8	0.840	75.3	LOS F	22.8	152.2	1.00	0.92	27.2
Approach		743	2.6	0.840	64.6	LOS E	22.8	152.2	0.92	0.88	29.6
North: CAMPBELLTOWN RD - NORTH											
7	L2	780	3.6	0.515	8.3	LOS A	10.9	73.5	0.28	0.67	55.6
8	T1	2703	6.8	0.779	12.3	LOS A	32.4	224.9	0.55	0.51	56.7
Approach		3483	6.1	0.779	11.4	LOS A	32.4	224.9	0.49	0.55	56.5
All Vehicles		5088	5.0	0.840	20.2	LOS B	32.4	224.9	0.54	0.57	49.2

Table B7.2.4 PM 2024 + Rezoning Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd PM 2024 + REZONE

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	749	2.9	0.179	7.0	LOS A	5.7	38.1	0.34	0.30	61.7
3	R2	124	6.5	0.864	91.0	LOS F	10.0	69.3	1.00	0.94	24.7
Approach		873	3.4	0.864	19.0	LOS B	10.0	69.3	0.44	0.39	50.9
East: GLENFIELD RD											
4	L2	211	8.5	0.364	26.0	LOS B	9.6	68.1	0.69	0.78	42.1
6	R2	632	4.4	0.869	78.3	LOS F	24.9	169.2	1.00	0.95	26.6
Approach		843	5.5	0.869	65.2	LOS E	24.9	169.2	0.92	0.91	29.3
North: CAMPBELLTOWN RD - NORTH											
7	L2	814	5.7	0.551	8.8	LOS A	13.5	92.6	0.32	0.69	55.1
8	T1	2703	6.8	0.796	13.9	LOS A	35.6	247.0	0.60	0.56	55.3
Approach		3517	6.5	0.796	12.8	LOS A	35.6	247.0	0.54	0.59	55.3
All Vehicles		5233	5.8	0.869	22.2	LOS B	35.6	247.0	0.58	0.61	47.7

Table B7.2.5 PM 2024 + Rezoning Proposal + SSD Proposal

MOVEMENT SUMMARY

Site: Campbelltown Rd & Glenfield Rd PM 2024 + SSD + REZONE

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

Movement Performance - Vehicles

Mov ID	ODMov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: CAMPBELLTOWN RD - SOUTH											
2	T1	749	2.9	0.179	7.0	LOS A	5.7	38.1	0.34	0.30	61.7
3	R2	124	6.5	0.864	91.0	LOS F	10.0	69.3	1.00	0.94	24.7
Approach		873	3.4	0.864	19.0	LOS B	10.0	69.3	0.44	0.39	50.9
East: GLENFIELD RD											
4	L2	211	8.5	0.364	26.0	LOS B	9.6	68.1	0.69	0.78	42.1
6	R2	633	4.4	0.870	78.5	LOS F	25.0	169.7	1.00	0.95	26.5
Approach		844	5.5	0.870	65.4	LOS E	25.0	169.7	0.92	0.91	29.2
North: CAMPBELLTOWN RD - NORTH											
7	L2	814	5.8	0.551	8.8	LOS A	13.5	92.8	0.32	0.69	55.1
8	T1	2703	6.8	0.796	13.9	LOS A	35.6	247.0	0.60	0.56	55.3
Approach		3517	6.6	0.796	12.8	LOS A	35.6	247.0	0.54	0.59	55.3
All Vehicles		5234	5.9	0.870	22.3	LOS B	35.6	247.0	0.58	0.61	47.7

Glenfield Waste Services

Industrial Rezoning Proposal

Traffic Impact Assessment

October 2014

Appendix C RMS Crash Data

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Contents

Table 1.1 Cambridge Avenue Detailed Crash Report 2008 - 2013

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
Sydney Region																					
Campbelltown LGA																					
Glenfield																					
Cambridge Ave																					
656716	06/02/2009	Fri	07:00	200 m	E	CANTERBURY RD	2WY	STR	Fine	Dry	60	2	CAR	U U	W in CAMBRIDGE AVE	Unk Incorrect side		I	0	1	F
E36581531							RUM: 20	Head on					M/C	M53	E in CAMBRIDGE AVE	Unk Proceeding in lane					
779226	07/10/2011	Fri	16:10	200 m	E	CANTERBURY RD	2WY	STR	Overcast	Dry	60	1	CAR	F50	W in CAMBRIDGE AVE	55 Proceeding in lane		I	0	1	F
E46283829							RUM: 71	Off rd left => obj					Signpost								
816178	18/10/2012	Thu	20:11	200 m	E	CANTERBURY RD	2WY	STR	Fine	Dry	60	2	OMV	U U	E in CAMBRIDGE AVE	Unk Incorrect side		I	0	1	F
E49910369							RUM: 20	Head on					4WD	M20	W in CAMBRIDGE AVE	60 Proceeding in lane					
644883	07/11/2008	Fri	17:10	300 m	E	CANTERBURY RD	2WY	STR	Fine	Dry	60	3	CAR	F26	W in CAMBRIDGE AVE	10 Proceeding in lane		N	0	0	
E35886151							RUM: 30	Rear end					CAR	F36	W in CAMBRIDGE AVE	5 Proceeding in lane					
													CAR	M21	W in CAMBRIDGE AVE	5 Proceeding in lane					
677862	08/08/2009	Sat	11:00	500 m	E	CANTERBURY RD	2WY	STR	Fine	Dry	70	2	WAG	F61	E in CAMBRIDGE AVE	50 Perform U-turn		I	0	1	
E38478658							RUM: 40	U turn					CAR	M42	E in CAMBRIDGE AVE	60 Proceeding in lane					
734443	27/11/2010	Sat	02:42	25 m	W	GEORGES RIVER BDGE	2WY	STR	Fine	Dry	60	1	CAR	F36	E in CAMBRIDGE AVE	100 Proceeding in lane		I	0	1	S
E43044162							RUM: 73	Off rd rght => obj					Other fixed object								
Canterbury Rd																					
689955	17/11/2009	Tue	06:06		at	CAMBRIDGE AVE	RDB	STR	Fine	Dry	60	1	M/C	M39	W in CANTERBURY RD	20 Proceeding in lane		I	0	1	
E39248766							RUM: 74	On road-out of cont.													
720183	29/07/2010	Thu	07:45		at	CAMBRIDGE AVE	RDB	CRV	Overcast	Wet	60	2	UTE	F21	E in CAMBRIDGE AVE	Unk Proceeding in lane		N	0	0	S
E41961058							RUM: 33	Lane sideswipe					CAR	F58	E in CAMBRIDGE AVE	30 Proceeding in lane					
739008	15/01/2011	Sat	14:30		at	CAMBRIDGE AVE	RDB	STR	Fine	Dry	50	1	CAR	M48	W in CAMBRIDGE AVE	50 Proceeding in lane		I	0	1	
E45111785							RUM: 71	Off rd left => obj					Fence (prior to 2014)								
669765	17/05/2009	Sun	20:30	5 m	S	GLENFIELD RD	RDB	STR	Fine	Dry	60	2	CAR	U U	N in CANTERBURY RD	20 Proceeding in lane		I	0	1	
E153733294							RUM: 33	Lane sideswipe					CAR	F32	N in CANTERBURY RD	0 Stationary					
Liverpool LGA																					
Glenfield																					
Cambridge Ave																					
756565	08/06/2011	Wed	16:10	5 m	W	MOOREBANK AVE	TJN	STR	Fine	Dry	50	2	CAR	M38	E in CAMBRIDGE AVE	Unk Proceeding in lane		I	0	1	
E45263174							RUM: 30	Rear end					TRK	M41	E in CAMBRIDGE AVE	0 Stationary					

Table 1.1 Cambridge Avenue Detailed Crash Report 2008 – 2013 (Continued)

Detailed Crash Report

Transport for NSW — Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
766340	03/09/2011	Sat	01:45	300 m	W	MOOREBANK AVE	2WY	STR	Fine	Dry	60	1	CAR	M33	E in CAMBRIDGE AVE	45 Proceeding in lane		N	0	0	
E46439353							RUM:	71	Off rd left => obj				Tree/bush								
746968	17/03/2011	Thu	12:45	500 m	W	MOOREBANK AVE	2WY	CRV	Overcast	Dry	60	3	CAR	M24	W in CAMBRIDGE AVE	Unk Proceeding in lane		N	0	0	S
E44095419							RUM:	30	Rear end				CAR	M59	W in CAMBRIDGE AVE	0 Stationary					
													UTE	U U	W in CAMBRIDGE AVE	0 Stationary					
Holsworthy																					
Cambridge Ave																					
647901	28/11/2008	Fri	12:24		at	MOOREBANK AVE	TJN	STR	Raining	Wet	50	2	CAR	M37	S in MOOREBANK AVE	Unk Turning right		N	0	0	S
E36014129							RUM:	21	Right through				4WD	M28	N in MOOREBANK AVE	60 Proceeding in lane					
679222	10/08/2009	Mon	16:00		at	MOOREBANK AVE	TJN	STR	Fine	Dry	60	2	CAR	M33	S in MOOREBANK AVE	Unk Turning right		N	0	0	
E37989075							RUM:	21	Right through				TRK	M20	N in MOOREBANK AVE	50 Proceeding in lane					
767738	15/09/2011	Thu	16:20		at	MOOREBANK AVE	TJN	STR	Fine	Dry	60	2	LOR	M35	S in CAMBRIDGE AVE	20 Proceeding in lane		I	0	2	
E45916831							RUM:	32	Right rear				CAR	M40	S in CAMBRIDGE AVE	0 Wait turn right					
785639	27/02/2012	Mon	07:00		at	MOOREBANK AVE	TJN	STR	Fine	Dry	70	2	VAN	F47	S in MOOREBANK AVE	5 Turning right		N	0	0	
E49694788							RUM:	21	Right through				CAR	M47	N in MOOREBANK AVE	55 Proceeding in lane					
652522	08/01/2009	Thu	06:45	5 m	W	MOOREBANK AVE	TJN	STR	Overcast	Dry	60	2	UTE	M22	E in CAMBRIDGE AVE	Unk Proceeding in lane		I	0	1	
E37986080							RUM:	30	Rear end				CAR	M U	E in CAMBRIDGE AVE	0 Stationary					
677102	03/08/2009	Mon	14:45	5 m	W	MOOREBANK AVE	TJN	STR	Fine	Dry	60	2	CAR	F27	E in CAMBRIDGE AVE	Unk Proceeding in lane		I	0	1	
E73711201							RUM:	32	Right rear				CAR	F49	E in CAMBRIDGE AVE	0 Wait turn right					
778246	16/12/2011	Fri	09:30	5 m	W	MOOREBANK AVE	TJN	CRV	Fine	Dry	60	2	CAR	M30	E in CAMBRIDGE AVE	20 Proceeding in lane		N	0	0	
E47249341							RUM:	31	Left rear				CAR	M43	E in CAMBRIDGE AVE	20 Turning left					
829273	05/03/2013	Tue	08:05	5 m	W	MOOREBANK AVE	TJN	STR	Overcast	Dry	70	2	CAR	F35	E in CAMBRIDGE AVE	20 Proceeding in lane		I	0	1	
E51292943							RUM:	31	Left rear				WAG	F37	E in CAMBRIDGE AVE	0 Waiting turn left					
738121	01/12/2010	Wed	14:10	600 m	W	MOOREBANK AVE	2WY	CRV	Raining	Wet	60	3	TRK	M43	W in CAMBRIDGE AVE	40 Incorrect side		I	0	4	
E43203329							RUM:	20	Head on				LOR	M41	E in CAMBRIDGE AVE	50 Proceeding in lane					
													CAR	M54	W in CAMBRIDGE AVE	50 Proceeding in lane					
Moorebank Ave																					
734991	30/08/2010	Mon	16:20	10 m	N	CAMBRIDGE AVE	TJN	STR	Fine	Dry	60	3	CAR	F37	S in MOOREBANK AVE	Unk Proceeding in lane		I	0	1	
E81047401							RUM:	30	Rear end				CAR	F57	S in MOOREBANK AVE	0 Stationary					
													UTE	M56	S in MOOREBANK AVE	0 Stationary					
Moorebank																					
Moorebank Ave																					

Table 1.1 Cambridge Avenue Detailed Crash Report 2008 – 2013 (Continued)

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
671639	27/05/2009	Wed	15:15		at	CAMBRIDGE ST	TJN	STR	Raining	Wet	60	2	CAR	M20	S in MOOREBANK AVE	40	Turning right	I	0	1	
E37343722							RUM:	21	Right through				CAR	F51	N in MOOREBANK AVE	40	Proceeding in lane				

Report Totals: Total Crashes: 24 Fatal Crashes: 0 Injury Crashes: 16 Killed: 0 Injured: 20

Crashid dataset 5959 - Cambridge Av - Moorebank to Canterbury - July08 to June13

Table 1.2 Cambridge Avenue Summary Crash Report 2008 – 2013

Summary Crash Report

Transport for NSW – Centre for Road Safety

# Crash Type		
Car Crash	23	95.8%
Light Truck Crash	3	12.5%
Rigid Truck Crash	2	8.3%
Articulated Truck Crash	0	0.0%
'Heavy Truck Crash	(2)	(8.3%)
Bus Crash	0	0.0%
"Heavy Vehicle Crash	(2)	(8.3%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	2	8.3%
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	15	62.5%
Non intersection	9	37.5%

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

Collision Type		
Single Vehicle	5	20.8%
Multi Vehicle	19	79.2%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	0	0.0%
Other Classified Road	4	16.7%
Unclassified Road	20	83.3%

Contributing Factors		
Speeding	4	16.7%
Fatigue	3	12.5%

Weather		
Fine	16	66.7%
Rain	3	12.5%
Overcast	5	20.8%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	4	16.7%
Dry	20	83.3%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	8.3%
Daylight	18	75.0%
Dusk	0	0.0%
Darkness	4	16.7%

Crash Movement		
Intersection, adjacent approaches	0	0.0%
Head-on (not overtaking)	3	12.5%
Opposing vehicles; turning	4	16.7%
U-turn	1	4.2%
Rear-end	9	37.5%
Lane change	2	8.3%
Parallel lanes; turning	0	0.0%
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	0	0.0%
Off road on straight, hit object	4	16.7%
Out of control on straight	1	4.2%
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%

Speed Limit					
~ 40km/h or less	0	0.0%			
40 km/h or less	0	0.0%	80 km/h zone	0	0.0%
50 km/h zone	3	12.5%	90 km/h zone	0	0.0%
60 km/h zone	18	75.0%	100 km/h zone	0	0.0%
70 km/h zone	3	12.5%	110 km/h zone	0	0.0%

CRASHES	24	
Fatal crash	0	0.0%
Injury crash	16	66.7%
Non-casualty crash	8	33.3%

CASUALTIES	20	
Killed	0	0.0%
Injured	20	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	8.3%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	2	8.3%	4.2%
07:00 - 07:59	3	12.5%	4.2%
08:00 - 08:59	1	4.2%	4.2%
09:00 - 09:59	1	4.2%	4.2%
10:00 - 10:59	0	0.0%	4.2%
11:00 - 11:59	1	4.2%	4.2%
12:00 - 12:59	2	8.3%	4.2%
13:00 - 13:59	0	0.0%	4.2%
14:00 - 14:59	3	12.5%	4.2%
15:00 - 15:59	1	4.2%	4.2%
16:00 - 16:59	5	20.8%	4.2%
17:00 - 17:59	1	4.2%	4.2%
18:00 - 18:59	0	0.0%	4.2%
19:00 - 19:59	0	0.0%	4.2%
20:00 - 21:59	2	8.3%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil		% of Dark
0	of 4 in Dark	0.0%

Crashes		Casualties
1	2013	1
2	2012	1
7	2011	5
4	2010	6
8	2009	7
2	2008	0

~ School Travel Time		
Involvement	9	37.5%

McLean Periods			% Week
A	6	25.0%	17.9%
B	0	0.0%	7.1%
C	5	20.8%	17.9%
D	2	8.3%	3.5%
E	0	0.0%	3.6%
F	4	16.7%	10.7%
G	4	16.7%	7.1%
H	1	4.2%	7.1%
I	0	0.0%	12.5%
J	2	8.3%	10.7%

Day of the Week						# Holiday Periods					
Monday	4	16.7%	Thursday	5	20.8%	Sunday	1	4.2%	New Year	0	0.0%
Tuesday	2	8.3%	Friday	5	20.8%	WEEKDAY	19	79.2%	Aust. Day	0	0.0%
Wednesday	3	12.5%	Saturday	4	16.7%	WEEKEND	5	20.8%	Easter	0	0.0%
									Anzac Day	0	0.0%

Queen's BD	0	0.0%	Easter SH	0	0.0%
Labour Day	0	0.0%	June/July SH	0	0.0%
Christmas	0	0.0%	Sept./Oct. SH	1	4.2%
January SH	2	8.3%	December SH	0	0.0%

Table 2.1 Glenfield Road Detailed Crash Report 2008 – 2013

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
Sydney Region																					
Campbelltown LGA																					
Cross Roads																					
Glenfield Rd																					
651982	18/12/2008	Thu	20:00	50 m	E	HUME HWY	2WY	STR	Overcast	Dry	60	2	CAR	M34	E in GLENFIELD RD	10 Perform U-turn		N	0	0	
E36247307							RUM:	40	U turn				CAR	F46	E in GLENFIELD RD	40 Proceeding in lane					
Hume Hwy																					
745513	15/03/2011	Tue	19:45		at	GLENFIELD RD	TJN	STR	Raining	Wet	70	2	CAR	F28	W in GLENFIELD RD	10 Turning right		N	0	0	
E43593635							RUM:	13	Right near				CAR	M61	S in HUME HWY	40 Proceeding in lane					
711983	28/05/2010	Fri	09:15	5 m	N	GLENFIELD RD	TJN	STR	Fine	Dry	70	2	CAR	M72	S in HUME HWY	70 Proceeding in lane		N	0	0	
E42991989							RUM:	30	Rear end				CAR	F42	S in HUME HWY	0 Stationary					
Glenfield																					
Canterbury Rd																					
689955	17/11/2009	Tue	06:06		at	CAMBRIDGE AVE	RDB	STR	Fine	Dry	60	1	M/C	M39	W in CANTERBURY RD	20 Proceeding in lane		I	0	1	
E39248766							RUM:	74	On road-out of cont.												
720183	29/07/2010	Thu	07:45		at	CAMBRIDGE AVE	RDB	CRV	Overcast	Wet	60	2	UTE	F21	E in CAMBRIDGE AVE	Unk Proceeding in lane		N	0	0	S
E41961058							RUM:	33	Lane sideswipe				CAR	F58	E in CAMBRIDGE AVE	30 Proceeding in lane					
739008	15/01/2011	Sat	14:30		at	CAMBRIDGE AVE	RDB	STR	Fine	Dry	50	1	CAR	M48	W in CAMBRIDGE AVE	50 Proceeding in lane		I	0	1	
E45111785							RUM:	71	Off rd left => obj				Fence (prior to 2014)								
669765	17/05/2009	Sun	20:30	5 m	S	GLENFIELD RD	RDB	STR	Fine	Dry	60	2	CAR	U U	N in CANTERBURY RD	20 Proceeding in lane		I	0	1	
E153733294							RUM:	33	Lane sideswipe				CAR	F32	N in CANTERBURY RD	0 Stationary					
Glenfield Rd																					
698026	03/02/2010	Wed	21:00		at	BRAMPTON AVE	XJN	STR	Raining	Wet	60	2	CAR	M27	E in GLENFIELD RD	20 Turning right		I	0	1	
E40094279							RUM:	21	Right through				CAR	F41	W in GLENFIELD RD	60 Proceeding in lane					
750164	07/04/2011	Thu	07:50		at	BRAMPTON AVE	XJN	STR	Fine	Dry	60	3	CAR	F50	W in GLENFIELD RD	50 Proceeding in lane		I	0	2	
E44284438							RUM:	30	Rear end				CAR	M51	W in GLENFIELD RD	0 Stationary					
													4WD	F30	W in GLENFIELD RD	0 Stationary					
762537	02/08/2011	Tue	18:10		at	BRAMPTON AVE	XJN	STR	Fine	Dry	60	2	CAR	F29	E in GLENFIELD RD	10 Turning right		N	0	0	
E44981335							RUM:	21	Right through				CAR	F19	W in GLENFIELD RD	50 Proceeding in lane					
828978	13/02/2013	Wed	11:33		at	BRAMPTON AVE	TJN	CRV	Fine	Dry	60	1	LOR	M31	E in GLENFIELD RD	40 Turning right		N	0	0	S
E51483178							RUM:	80	Off left/right bend												
826607	05/02/2013	Tue	18:55	10 m	E	BRAMPTON AVE	XJN	STR	Fine	Dry	60	2	STA	M54	W in GLENFIELD RD	15 Veering left		N	0	0	
E50436972							RUM:	35	Lane change left				CAR	M33	W in GLENFIELD RD	10 Proceeding in lane					

Table 2.1 Glenfield Road Detailed Crash Report 2008 – 2013 (Continued)

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
786028	23/11/2011	Wed	14:45	100 m	E	BRAMPTON AVE	DIV	STR	Raining	Wet	70	2	4WD	F20	E in GLENFIELD RD	Unk	Incorrect side	I	0	2	F
E45872470							RUM: 20	Head on					CAR	F31	W in GLENFIELD RD	Unk	Proceeding in lane				
835071	28/04/2013	Sun	17:55	1.2 km	E	BRAMPTON AVE	2WY	CRV	Fine	Dry	60	1	CAR	M31	E in GLENFIELD RD	60	Proceeding in lane	N	0	0	S F
E51414903							RUM: 81	Off left/rt bnd=>obj					Roadwork equipment								
765583	01/09/2011	Thu	17:10	200 m	N	GLENFIELD ROAD OP	2WY	STR	Fine	Dry	40	1	TRK	M56	N in GLENFIELD RD	30	Veering left	N	0	0	
E45787031							RUM: 65	Temp roadworks					Roadwork equipment								
640195	01/10/2008	Wed	17:00	55 m	E	HUME HWY	OTH	CRV	Fine	Dry	60	1	M/C	M64	E in GLENFIELD RD	30	Proceeding in lane	I	0	1	S
E34752330							RUM: 88	Out of cont on bend													
631223	15/07/2008	Tue	09:40	100 m	E	HUME HWY	2WY	STR	Fine	Dry	60	1	CAR	F35	W in GLENFIELD RD	60	Proceeding in lane	I	0	2	F
E34761029							RUM: 71	Off rd left => obj					Drain/culvert								
732073	03/11/2010	Wed	15:09	100 m	E	HUME HWY	2WY	STR	Fine	Dry	60	2	CAR	M40	E in GLENFIELD RD	70	Incorrect side	I	0	2	S
E42643304							RUM: 20	Head on					CAR	F24	W in GLENFIELD RD	60	Proceeding in lane				
701770	05/03/2010	Fri	16:15	200 m	E	HUME HWY	2WY	CRV	Raining	Wet	60	2	UTE	M46	E in GLENFIELD RD	20	Proceeding in lane	I	0	1	
E40412079							RUM: 30	Rear end					TRK	M29	E in GLENFIELD RD	10	Proceeding in lane				
781814	22/01/2012	Sun	13:50	675 m	E	HUME HWY	2WY	STR	Fine	Dry	40	2	CAR	F37	E in GLENFIELD RD	10	Perform U-turn	N	0	0	
E47009638							RUM: 40	U turn					CAR	M54	W in GLENFIELD RD	40	Proceeding in lane				
806766	13/08/2012	Mon	11:54	5 m	E	HURLSTONE AGRI ENT	DIV	STR	Fine	Dry	60	2	CAR	M54	W in GLENFIELD RD	45	Proceeding in lane	N	0	0	
E50966484							RUM: 30	Rear end					TRK	M33	W in GLENFIELD RD	0	Stationary				
801314	26/06/2012	Tue	21:20	5 m	N	HURLSTONE AGRI ENT	DIV	STR	Overcast	Wet	40	2	CAR	M48	N in GLENFIELD RD	Unk	Proceeding in lane	N	0	0	
E48201605							RUM: 30	Rear end					CAR	M18	N in GLENFIELD RD	0	Stationary				
701002	09/02/2010	Tue	06:50		at	HURLSTONE HIGH ENT	2WY	CRV	Fine	Dry	50	2	CAR	M U	S in GLENFIELD RD	20	Turning left	I	0	1	
E39434320							RUM: 37	Left turn sideswipe					P/C	M40	S in GLENFIELD RD		Proceeding in lane				
675906	17/07/2009	Fri	10:55	5 m	E	OLD GLENFIELD RD	XJN	STR	Overcast	Dry	60	2	CAR	M21	W in GLENFIELD RD	Unk	Proceeding in lane	N	0	0	
E37866227							RUM: 30	Rear end					TRK	M37	W in GLENFIELD RD	0	Stationary				
725035	11/09/2010	Sat	18:50	600 m	E	OLD GLENFIELD RD	2WY	STR	Fine	Dry	60	2	CAR	M20	E in GLENFIELD RD	60	Incorrect side	I	0	6	F
E42353373							RUM: 20	Head on					CAR	M33	W in GLENFIELD RD	60	Proceeding in lane				
Hume Hwy																					
705885	13/04/2010	Tue	14:15		at	GLENFIELD RD	TJN	STR	Fine	Dry	70	3	CAR	F50	W in GLENFIELD RD	15	Turning right	I	0	2	
E40543206							RUM: 13	Right near					CAR	F57	S in HUME HWY	Unk	Proceeding in lane				
													CAR	F61	W in GLENFIELD RD	15	Turning right				
724053	05/09/2010	Sun	18:50		at	GLENFIELD RD	TJN	STR	Fine	Dry	60	2	CAR	M39	W in GLENFIELD RD	20	Turning right	N	0	0	
E41810323							RUM: 13	Right near					WAG	M86	S in HUME HWY	50	Proceeding in lane				

Table 2.1 Glenfield Road Detailed Crash Report 2008 – 2013 (Continued)

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
742822	06/02/2011	Sun	19:30		at	GLENFIELD RD	TJN	STR	Fine	Dry	60	2	4WD	M66	S in HUME HWY	50	Proceeding in lane	N	0	0	
E43683650							RUM:	10	Cross traffic				CAR	F42	W in GLENFIELD RD	20	Proceeding in lane				
767583	10/09/2011	Sat	09:30		at	GLENFIELD RD	TJN	STR	Fine	Dry	60	3	CAR	M30	S in HUME HWY	60	Proceeding in lane	N	0	0	
E45868431							RUM:	10	Cross traffic				CAR	M32	W in GLENFIELD RD	60	Proceeding in lane				
													CAR	F51	W in GLENFIELD RD	60	Proceeding in lane				
792107	19/01/2012	Thu	21:20		at	GLENFIELD RD	TJN	STR	Fine	Dry	70	2	CAR	M31	W in GLENFIELD RD	15	Turning left	I	0	1	
E46727705							RUM:	16	Left near				CAR	M38	S in HUME HWY	65	Proceeding in lane				
787939	09/03/2012	Fri	19:00		at	GLENFIELD RD	TJN	STR	Fine	Dry	60	2	CAR	F29	N in HUME HWY	40	Turning right	I	0	2	
E48133253							RUM:	21	Right through				CAR	M46	S in HUME HWY	Unk	Proceeding in lane				
805641	02/08/2012	Thu	15:00		at	GLENFIELD RD	TJN	STR	Fine	Dry	70	2	TRK	M48	N in HUME HWY	10	Turning right	I	0	2	
E290206492							RUM:	21	Right through				TRK	M49	S in HUME HWY	70	Proceeding in lane				
821459	15/12/2012	Sat	17:00		at	GLENFIELD RD	TJN	STR	Overcast	Dry	80	2	CAR	M46	N in HUME HWY	10	Turning right	I	0	2	
E50044118							RUM:	21	Right through				CAR	M77	S in HUME HWY	Unk	Proceeding in lane				
842156	06/06/2013	Thu	09:00		at	GLENFIELD RD	TJN	STR	Fine	Dry	80	2	CAR	F44	W in GLENFIELD RD	Unk	Turning right	I	0	1	
E51319835							RUM:	13	Right near				CAR	M79	S in HUME HWY	45	Proceeding in lane				
665826	01/05/2009	Fri	09:35	5 m	N	GLENFIELD RD	TJN	STR	Fine	Dry	80	2	BDBL	M51	S in HUME HWY	80	Proceeding in lane	I	0	1	
E36970352							RUM:	30	Rear end				CAR	F38	S in HUME HWY	0	Stationary				
669353	02/06/2009	Tue	00:20	5 m	N	GLENFIELD RD	TJN	STR	Fine	Dry	70	2	CAR	M19	S in HUME HWY	Unk	Proceeding in lane	N	0	0	
E39275382							RUM:	30	Rear end				CAR	M33	S in HUME HWY	0	Stationary				
732140	07/11/2010	Sun	18:00	5 m	N	GLENFIELD RD	TJN	STR	Fine	Dry	70	2	CAR	M24	S in HUME HWY	Unk	Proceeding in lane	N	0	0	
E42217670							RUM:	30	Rear end				CAR	M U	S in HUME HWY	0	Stationary				
697191	15/01/2010	Fri	09:30	10 m	N	GLENFIELD RD	TJN	STR	Overcast	Dry	70	3	TRK	F24	S in HUME HWY	45	Proceeding in lane	I	0	1	
E39620711							RUM:	30	Rear end				CAR	M61	S in HUME HWY	0	Stationary				
													CAR	F47	S in HUME HWY	0	Stationary				
700830	28/02/2010	Sun	09:00	10 m	N	GLENFIELD RD	TJN	STR	Overcast	Dry	70	3	CAR	M20	S in HUME HWY	60	Proceeding in lane	I	0	1	
E40245145							RUM:	30	Rear end				M/C	M53	S in HUME HWY	5	Proceeding in lane				
													OMV	U U	S in HUME HWY	0	Stationary				
Liverpool LGA Casula Glenfield Rd																					
839591	27/05/2013	Mon	06:50	20 m	E	HUME HWY	OTH	CRV	Fine	Dry	50	2	TRK	M27	E in GLENFIELD RD	Unk	Pulling out	N	0	0	
E51019209							RUM:	42	Leaving parking				CAR	M55	E in GLENFIELD RD	Unk	Proceeding in lane				

Table 2.1 Glenfield Road Detailed Crash Report 2008 – 2013 (Continued)

Detailed Crash Report

Transport for NSW – Centre for Road Safety

Crash No.	Date	Day of Week	Time	Distance		ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
																					S F
670228	09/06/2009	Tue	02:20	880 m	E	HUME HWY	2WY	CRV	Fine	Dry	60	2	CAR	F33	E in GLENFIELD RD	60	Proceeding in lane	N	0	0	S F
E37483523							RUM:	81	Off left/rt bnd=>obj				CAR		E in GLENFIELD RD	0	Parked				
736828	13/12/2010	Mon	08:10	10 m	E	OLD GLENFIELD RD	TJN	STR	Fine	Dry	60	2	CAR	F37	E in GLENFIELD RD	50	Proceeding in lane	I	0	1	
E43694841							RUM:	30	Rear end				TRK	M42	E in GLENFIELD RD	0	Stationary				
723073	18/06/2010	Fri	08:45	200 m	E	WHITELEY CL	2WY	STR	Fine	Wet	60	2	VAN	F36	E in GLENFIELD RD	Unk	Perform U-turn	N	0	0	
E43197189							RUM:	40	U turn				CAR	M66	E in GLENFIELD RD	60	Proceeding in lane				
Hume Hwy																					
723824	22/08/2010	Sun	13:30		at	GLENFIELD RD	TJN	STR	Fine	Dry	80	2	CAR	F45	S in HUME HWY	5	Perform U-turn	N	0	0	
E41671423							RUM:	40	U turn				CAR	M59	N in HUME HWY	70	Proceeding in lane				
Glenfield																					
Glenfield Rd																					
795328	06/05/2012	Sun	02:35	390 m	W	BRAMPTON AVE	2WY	CRV	Fine	Dry	50	1	CAR	F24	W in GLENFIELD RD	Unk	Proceeding in lane	I	0	2	S F
E47848148							RUM:	85	Off rt/lft bnd=>obj				Roadwork equipment								
632258	24/07/2008	Thu	17:26	20 m	E	OLD GLENFIELD RD	2WY	STR	Fine	Wet	60	2	CAR	M24	E in GLENFIELD RD	Unk	Proceeding in lane	I	0	1	
E66820601							RUM:	30	Rear end				CAR	M67	E in GLENFIELD RD	40	Proceeding in lane				
Hume Hwy																					
689914	15/11/2009	Sun	01:30		at	GLENFIELD RD	TJN	STR	Fine	Dry	60	1	CAR	M20	W in GLENFIELD RD	80	Turning right	N	0	0	S
E39328931							RUM:	81	Off left/rt bnd=>obj				Signal pole								
661976	01/04/2009	Wed	07:30	5 m	N	GLENFIELD RD	TJN	STR	Raining	Wet	70	2	LOR	M50	S in HUME HWY	70	Proceeding in lane	N	0	0	
E529917690							RUM:	30	Rear end				CAR	F33	S in HUME HWY	0	Stationary				
717478	11/07/2010	Sun	10:30	5 m	N	GLENFIELD RD	TJN	STR	Overcast	Dry	60	2	CAR	F42	S in HUME HWY	30	Proceeding in lane	I	0	1	
E41997667							RUM:	30	Rear end				4WD	M29	S in HUME HWY	20	Proceeding in lane				
646317	24/10/2008	Fri	12:30	10 m	N	GLENFIELD RD	TJN	STR	Fine	Dry	70	3	CAR	M42	S in HUME HWY	60	Proceeding in lane	N	0	0	
E35471326							RUM:	30	Rear end				TRK	M18	S in HUME HWY	0	Stationary				
													4WD	M53	S in HUME HWY	0	Stationary				

Report Totals: Total Crashes: 50 Fatal Crashes: 0 Injury Crashes: 25 Killed: 0 Injured: 39

Crashid dataset 5959 - Glenfield Rd - Campbelltown Rd to Canterbury Rd - July08 to June13

Glenfield Waste Services

SSD Proposal

Traffic Impact Assessment

October 2014

Appendix D Sub-Regional Projects

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Introduction

So as to appropriately assess the potential impacts of the Proposal on the local road network, forecast flows for a year 2024 have been prepared which account for traffic increases through that network, as well a potential changes arising from the upgrade of network infrastructure. These projects are detailed in the following sections: -

- **Section 1 The Glenfield Road Urban Release Area**
- **Section 2 The Campbelltown Road Upgrade**
- **Section 3 Average Annual Traffic Flow Increases**
- **Section 4 The Glenfield Link Road**
- **Section 5 The GWS State Significant Development**
- **Section 6 The Moorebank Avenue Intermodal**

1 Glenfield Road Urban Release Area

1.1 Location & Stage of Development

The Glenfield Road Urban Release Area (**GRURA**) is bordered by Glenfield Road, Old Glenfield Road, Campbelltown Road and Hurlstone Agricultural High School, and upon completion is estimated to provide a total of approximately 1,100 residential dwellings including stand-alone dwellings (980) and townhouses (120).

Based on our discussions with Mirvac (who are developing the majority of the GRURA) and with CC Council, it is estimated that more than two-thirds of the GRURA is currently (August 2014) occupied – CC Council estimates only a further 220 dwellings to be completed, i.e. that some 880 dwellings are completed and occupied. Based on the building schedule provided in the CC Council Section 94 Development Contributions Plan - Glenfield Road Urban Release Area all of the GRURA would be fully constructed and occupied within the next few years.

1.2 GRURA Trip Characteristics

1.2.1 GRURA Trip Generation

Pairing the GRURA occupancy estimates above with the surveyed trip generation at the GRURA access intersections at Glenfield Road & Brampton Avenue & Old Glenfield Road, and at Glenfield Road & Atlantic Boulevard, suggests a current trip generation per dwelling significantly lower that standard, such that GRURA dwellings are on average generating less than 0.5 trips per dwelling in the peak periods. No detailed traffic studies relating to the GRURA have become available for review such as might justify this low generation rate

It is difficult to justify the application of these surveyed generation rates to a completed GRURA. If the GRURA was directly adjacent to Glenfield Station, or to high frequency bus services; or to immediately available employment and service centres, then perhaps a reduced generation might be appropriate. However, this is not the case at the GRURA, and as such the potential for future higher rates must be accounted for.

With reference to more "standard" generation rates (RTA Guide to Traffic Generation Developments) it is estimated that: -

- Houses would generate 0.85vph in the AM and PM
- Townhouses would generate 0.65vph in the AM and PM
- A small percentage of trips would be internal, but the majority external to the GRURA

Based on these factors, it is estimated that the GRURA would generate some 820vph in the AM and PM external to the GRURA, i.e. to the local road network and specifically to Glenfield Road.

1.2.2 GRURA Trip Distribution

While not providing a detailed assessment of the GRURA trip generation, the 2010 Glenfield Road Assessment of Intersection Requirements report (**GR AIR**) prepared by Transport & Urban Planning provides a forecast of GRURA trip distribution. While not connected to the main estate at this time, the GR AIR estimates that once Atlantic Boulevard is linked internally, 50% of GRURA trips will utilise the intersection of Glenfield Road & Atlantic Boulevard for primary access to Glenfield Road, with a majority of those trips being to/from the east. The broader distribution profile for the GRURA provided in the GR AIR can be summarised as follows: -

- 50% of trips via the intersection of Glenfield Road & Brampton Avenue & Old Glenfield Road, of which: -
    - 75% to/from the west
    - 25% to/from the east

- 50% of trips via the intersection of Glenfield Road & Atlantic Boulevard, of which: -
    - 25% to/from the west
    - 75% to/from the east

While the GR AIR provides what might be considered a worst case assessment in regard to the trip assignment to Atlantic Boulevard, it is the case that this distribution profile does not consider the location of GRURA dwellings in Old Glenfield Road. As such, while the external origin and destination profile remains valid, the intersection of Glenfield Road & Brampton Avenue & Old Guildford Road is estimated to generate approximately 55% of all trips (with approximately 10% generated to/from Old Glenfield Road) and the remaining trips would be generated to/from Atlantic Boulevard.

Away from the GRURA access intersections, trips have been distributed proportionally with reference to existing surveyed approach distribution. It is estimated that 25% of trips would be inbound in the AM, and 75% of trips inbound in the PM.

1.3 GRURA Forecast Flows

With reference to the trip generation and distribution characteristics of a completed GRURA as outlined above, the resulting GRURA trips to the local road network which will form part of "Base" 2024 traffic flows are shown in the figures below. It is noted that these flows represent the total generation of the GRURA, and would not therefore be additional to the existing GRURA flows generated by occupied sections of the estate.

Figure 1.3.1 AM GRURA Trips

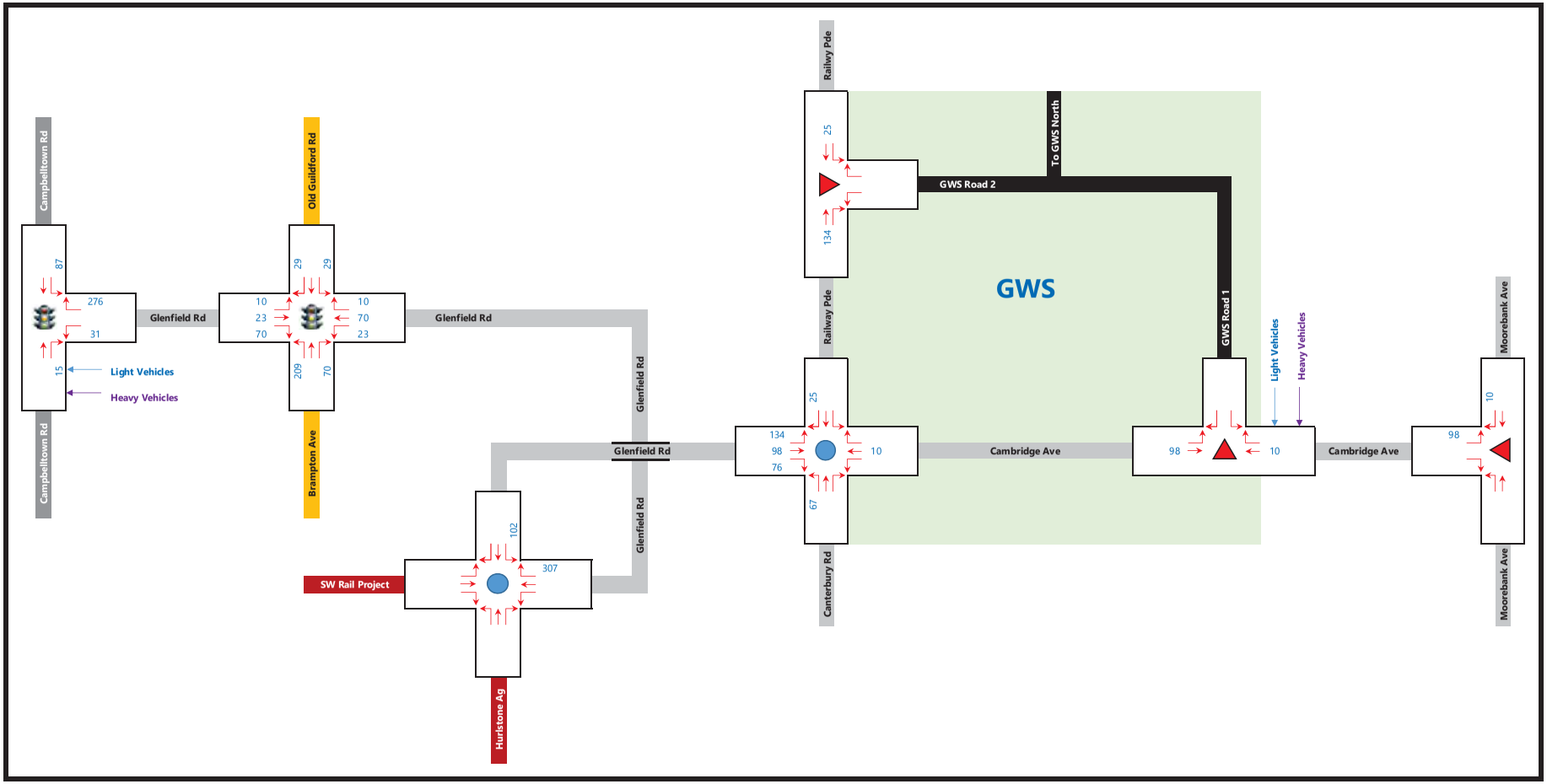
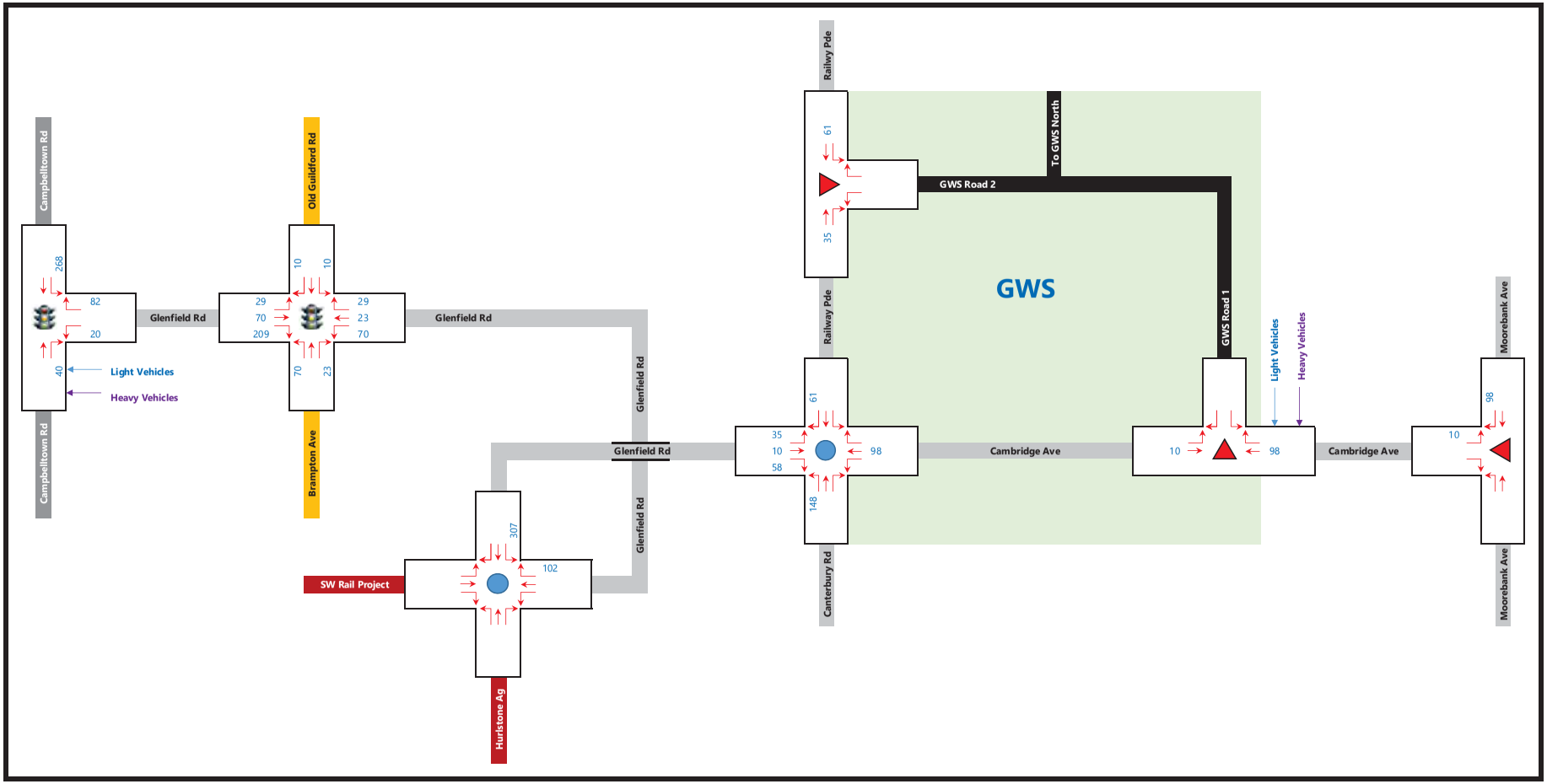


Figure 1.3.1 PM GRURA Trips



2 Campbelltown Road Upgrade

2.1 Project Documents

The RMS is currently finalising proposals for the upgrade of Campbelltown Road between Casula and Denham Court (the **Upgrade**); much of the Upgrade is in response to the development of Urban Activation Precincts (**UAP**s) along Campbelltown Road (south of Glenfield Road) as well as existing traffic demands. Based on our discussions with the RMS Campbelltown Road **Upgrade Project Team**, the southern sections of the upgrade would be completed first, with the upgrade of the intersection of Glenfield Road likely to be one of the later upgrades (but prior to 2024).

The 2013 Campbelltown Road Upgrade Review of Environmental Factors: Traffic and Transport Modelling Assessment (**CR TTMA**) prepared by AECOM, and supplementary Campbelltown Road REF Supplementary Traffic Assessment (**CR REF STA**) outline the traffic analysis undertaken to determine the scope of required upgrades to Campbelltown Road. The outcomes of these traffic assessments are examined in sections below so as to provide an appropriate forecast of Base 2024 flows at the intersection – and specifically of through movements in Campbelltown Road.

2.2 Campbelltown Road Flow Forecasts

Recent (2011 and 2013) traffic surveys conducted by ARC at the intersection of Campbelltown Road & Glenfield Road indicate AM northbound through flows in Campbelltown Road significantly lower than those identified as Base 2011 flows in the CR REF STA and southbound flows in the PM much higher than the Base 2011 flows in the CR REF STA. A comparison of these flows is provided below.

Table 2.1 Campbelltown Road south of Glenfield Road Traffic Counts

Campbelltown Road south of Glenfield Road	Northbound		Southbound		TOTAL	
	AM	PM	AM	PM	AM	PM
2011 Survey (CR REF STA)	1083	570	529	1338	1612	1908
2011 ADT (TCS Instruments)	496	331	871	1628	1367	1959
2013 Survey (Skyhigh)	548	396	986	1784	1534	2180

The CR REF STA then forecasts significant growth increases in Campbelltown Road 2026, with the total future flow forecasts through the intersection with Glenfield Road summarised below: -

- 1,826vph northbound in the AM 2026
- 1,133vph southbound in the AM 2026
- 749vph northbound in the PM 2026
- 2,703vph southbound in the PM 2026

Based on the differences between the CR REF STA Base 2011 flows and the recent surveyed flows as per **Table 2.1**, the potential exists that the forecast AM northbound flow is overstated by some 500vph; and the PM southbound flow is understated by some 400vph.

2.3 Glenfield Road Flow Forecasts

The CR TTMA reports that some of the traffic flows to and from Glenfield Road – and particularly to and from the South - will be lower in 2026 than the 2011 flows. The scope of these reductions differs between the CR TTMA and the subsequent CR REF STA, but some examples include: -

- Glenfield Road left to Campbelltown Road flow reduced from 74vph in 2011 to 44vph in 2026 in the AM; and from 146vph in 2011 to 63vph in 2026 in the PM
- Glenfield Road right to Campbelltown Road flow reduced from 559vph in 2011 to 514vph in 2026 in the PM
- Campbelltown Road left to Glenfield Road flow reduced from 656vph in 2011 to 614vph in 2026 in the AM

To date ARC has not been able to determine the reason for these lower flows. If it were the case that the CR REF STA analysis included the potential **Link Road** from Glenfield Road at the railway to Campbelltown Road (see **Section 4** below) then [somewhat] similar flow reductions might occur, but the RMS has stated that a new eastern approach to the intersection of Campbelltown Road & Beech Road identified in the CR REF STA does not represent the Link Road. Rather, it represents an additional trip generator [on the Hurlstone Agricultural College site). Certainly the new approach (which generates some 1,000vph in the AM and PM in 2026) does not have the expected characteristics of the Link Road, with primary flows being through flows across Campbelltown Road between the new approach and Beech Road.

Of equal important is the surveys commissioned as part of this TIA indicate turning flows from Glenfield Road – and particularly to the north – are already higher than the 2026 estimates in the CR REF STA, and thence significantly higher further to consideration of the additional GRURA trip generation as detailed in **Section 1** above.

As stated, ARC has discussed these issues with the Upgrade Project Team; the RMS has acknowledged these potential issues, but have stated the upgrade of the Campbelltown Road & Glenfield Road intersection will occur in the later stages of the Upgrade, and only further to additional (updated) assessment of Upgrade requirements prior to a final Upgrade determination.

2.4 2024 Forecast Flows

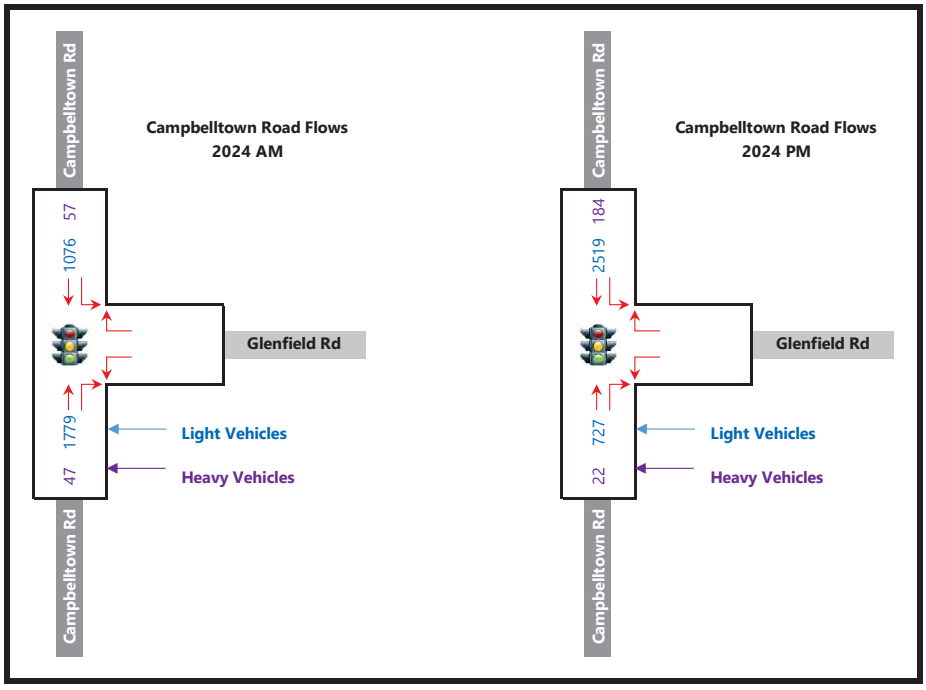
Notwithstanding the issues raised above, ARC has adopted the following forecast method: -

- Forecast future through movements in Campbelltown Road with reference to the CR REF STA 2026 volumes; given the progress of development at many of the residential estates south of Glenfield Road, these [2026] increases have the potential to be largely evident by the forecast year 2024 used in this TIA.

- Forecast future turning movement to/from Glenfield Road with reference to the analysis provided in this TIA, and specifically including existing (2013 surveyed) traffic; GRURA traffic flows; and [minor] average annual increases (see **Section 3**). As discussed, these turning movements are significantly higher than those reported in 2026 in the CR REF STA.

As such, the additional flows used to provide a Base 2024 flow forecast are restricted to the additional through movements in Campbelltown Road at the intersection with Glenfield Road. These additional flows are assigned below, with heavy vehicle numbers based on the heavy vehicle percentages specified in the CR REF STA.

Figure 2.4 Campbelltown Road Flows 2024



3 Average Annual Traffic Growth

A review of available traffic data for the sub-region has been undertaken, including available traffic and transport reports relating to sub-regional development proposals and road proposals; and RMS Average Annual Daily Traffic (**AADT**) and Average Daily Traffic (**ADT**) data.

A summary of available AADT and ADT traffic flows in the local network is provided in **Table 4**.

Table 4 AADT and ADT Data

Location		RMS AADT								Hyder ADT[1]	ARC ADT[2]
		1989	1991	1993	1996	1999	2002	2005	2009	2010	2013
Moorebank Avenue	at East Hills Railway Overbridge			18779	15295	14767	14348	15903	14098	16500	
Glenfield Road	North of Cambridge Avenue Bridge			12338	11189	11811	12424	12232	12841		
Cambridge Avenue	East of Canterbury Road	19075	18960	18891							15421

Note 1 *Sydney Intermodal Terminal Alliance Transport and Accessibility Impact Assessment, Hyder 2013*

Note 2 *December 2013 ATC Survey* (**Appendix A**)

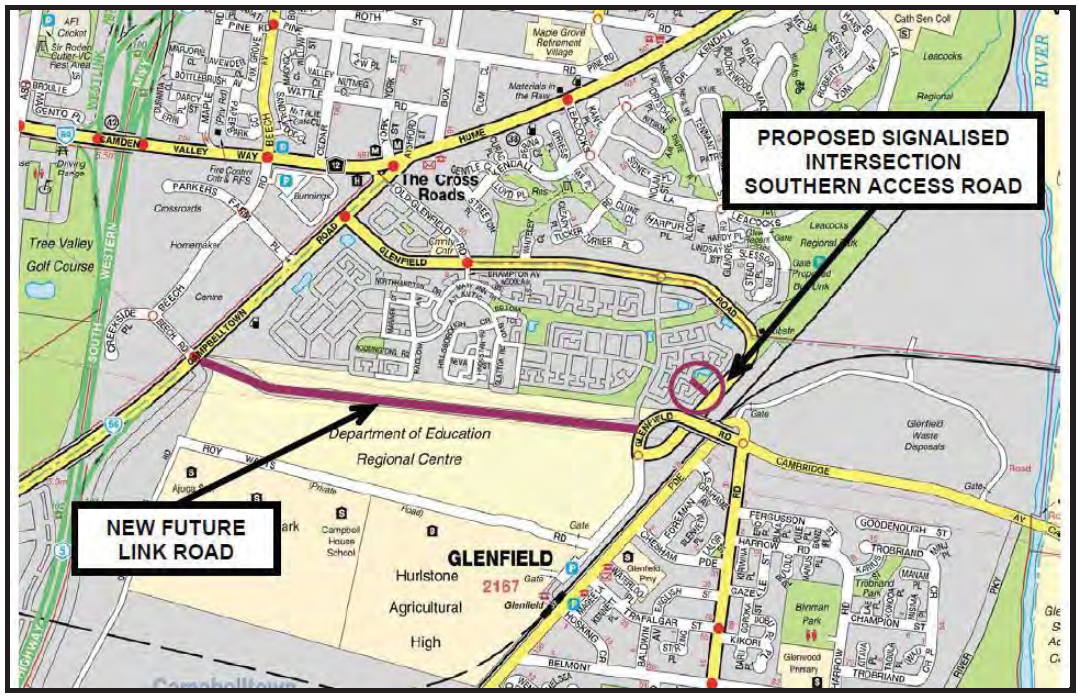
This data suggests that the traffic flows in Glenfield Road and Cambridge Road are essentially stagnant, and while there is certainly potential for targeted growth further to local developments (as detailed in this **Appendix**) those developments will in and of themselves constitute the overwhelming majority of "annual growth". As such, a rate of 0.5% per annum has been applied to background growth through the local network, i.e. the 2013/2014 surveyed flows have been factored by 0.5% per year over 10 years.

4 Glenfield Link Road

4.1 The Link Road

Further to **Section 2.3** above, CC Council has examined the potential for a new sub-regional road which would reduce the existing (and future) traffic demands in Glenfield Road (and at the intersection of Campbelltown Road). Based on our discussions with CC Council and a review of available information, the link would potentially extend from the existing Glenfield Road Bridge at the railway, across the Hurlstone Agricultural College to a new link at Campbelltown Road, likely (based on the alignment of the link) to an intersection with Beech Road. The link is described in the GR AIR referenced in **Section 2**, and is shown in **Figure 4.1** below. As discussed, this appears to be a similar approach to that modelled in the CR REF STA, but again the RMS have indicated that the new approach is not the Link Road.

Figure 4.1 Potential Link Road Alignment



Source: GR AIR

The GR AIR further provides the following in regard to the Link Road: -

> *Discussions with Campbelltown City Council's Manager of Technical Services confirms that there is a Council proposal for the construction of a future link road between Glenfield Road and Campbelltown Road. The road would be south of the proposed subdivision* [the GRURA] *and located on Department of Education land and link to Campbelltown Road at Beech Road at its western end and to Glenfield Road south of the bridge over the rail line, at its eastern end…*

The new link road would become the main road and the existing section of Glenfield Road north of the link road would be downgraded. Future traffic volumes using Glenfield Road will decrease substantially following the construction of the new link road…

The timing of the new link road is not finalised, although it is understood that the road may be provided around 2021, depending on authority agreements.

4.2 Link Road Current Status

Further to our discussions with CC Council, the Link Road remains a priority for CC Council, particularly with reference to the potential generation of the Moorebank Avenue Intermodal to and from the south and south west, a point raised in CC Council submissions in regard to the Intermodal project (see **Section 6** below).

Significantly, an addendum to the CR TTMA does include a new eastern approach to the Campbelltown Road & Beech Road intersection – i.e. to where the Link Road is envisaged to meet Campbelltown Road - but information provided by the Upgrade Project Team has specifically stated that this is not representative of the Link Road, but rather a new access for the Hurlstone Agricultural College (**HAC**) as stated in RMS Campbelltown Upgrade Supplementary Land Use and Socio-Economic Impact Assessment (Appendix E of the Upgrade documentation available on the RMS website): -

There is currently no access to the school from Campbelltown Road. The proposal would create a southern approach to the Beech Road intersection, which would facilitate improved access to Roy Watts Road in the future, thereby improving accessibility of the Hurlstone Agricultural High School.

This new access road has the potential to significantly reduce trips to the HAC via the roundabout off Glenfield Road, but the Upgrade documentation does not provide any sub-regional modelling in regard to such reductions.

The greatest potential for "a" Link Road to be developed would arise from future assessments of the Intermodal which identify a trip demand to the south and south west via the local road network. In turn, it is likely that the Link Road might itself be connected to an upgraded Cambridge Avenue, and again in turn to a new bridge to replace the Cambridge Avenue Causeway.

However, given the current state of planning for the Glenfield and Moorebank areas – and specifically with reference to the traffic assessments of the Intermodal indicating [essentially] no trip generation through Glenfield – the potential for the Link Road to be constructed in the next 10 years remains remote, and moreover a connection to Beech Avenue as previously proposed appears unlikely.

As such, this TIA has not considered the potential [benefits] of the Link Road.

5 GWS Industrial Rezoning Proposal

5.1 The Industrial Rezoning Proposal

Concurrent to the Proposal, GWS proposes the rezoning of certain land at the Site. The **Rezoning Proposal** would apply to some 45ha of land across the southern portion of the Site, and provide for future industrial development. The Rezoning Proposal would realise gross floor area of approximately 198,000m^2.

ARC has prepared a detailed Traffic Impact Assessment to appropriately assess the potential traffic and transport impacts arising from the Rezoning Proposal. A summary of the Rezoning Proposal TIA findings is provided below.

5.2 Access

While the Site currently provides 2 existing access points to the local road network (via GWS Road 1 to Cambridge Avenue; and via GWS Road 2 to Railway Parade), the volume of additional trips generated by the Rezoning Proposal – along with upgrade constraints at the intersection – dictates that a new intersection be provided to Cambridge Avenue to service the rezoned land.

A new access road (termed **GWS Road 3** for ease of reference) is proposed to intersect Cambridge Avenue, likely at a mid-point between GWS Road 1 and Canterbury Road; the distance between these existing intersections is some 900m, so that a new intersection would be able to provide appropriate separation.

At this time, it is anticipated that the resulting intersection would be provided as a roundabout, with a design incorporating the potential for a southern approach accessing parking [or other complying active uses] on the land south of Cambridge Avenue, which forms part of a transmission easement and is accessible to the main part of the Site via an existing underpass below Cambridge Avenue. It is noted that the use of the land south of Cambridge Avenue would necessarily be the subject of a future rezoning/development application, and is not part of the SSD Proposal.

5.3 Traffic Generation

The trip generation of the Rezoning Proposal has been determined with reference to recent RMS surveys of industrial precincts, and specifically with reference to the surveyed trip generation of the Erskine Park Industrial Estate, which provides warehousing development similar to that forecast for the rezoned land.

In the AM, the trip generation of the Rezoning Proposal is estimated at 265vph, and in the PM is estimated at 275vph.

5.4 Trip Distribution

With reference to 2011 Journey to Work data sets, it is expected that a majority of staff trips will be generated to and from west of the Site, including trips to/from the south, south-west, north and north-west.

The distribution of heavy vehicle trips is not as easily forecast as staff trips, and will to a large extend depend on the future Site operators. Notwithstanding, given the potential for the Site to provide [independent but] ancillary operations for the Intermodal, it is estimated that the distribution of heavy vehicle trips would be similar to that forecast for the Intermodal, with the majority of heavy vehicle trips distributed to the north-west, west and south of the Site.

In the AM, it is estimated that some 80% of employee vehicle trips would be inbound, with 20% outbound. In the PM, this distribution would be reversed, with 20% of employee trips being inbound and 80% outbound.

In the AM and PM, it is estimated that heavy vehicle trips would generally be split between inbound and outbound trips.

5.5 Rezoning Proposal Forecast Flows

With reference to the trip generation and distribution characteristics of the Rezoning Proposal as outlined above, the resulting Rezoning Proposal trips to the local road network are shown in the figures below.

Figure 5.5.1 AM Rezoning Proposal Trips

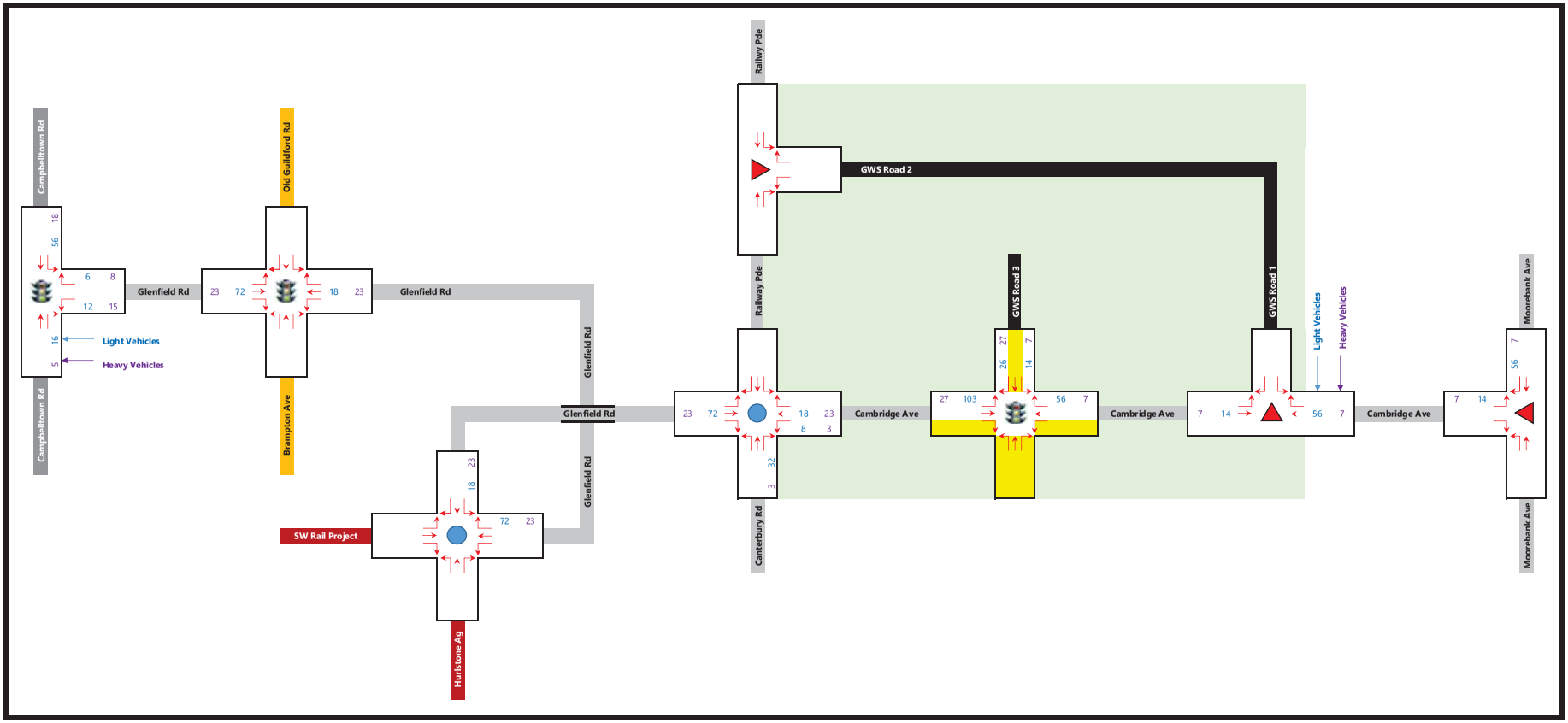
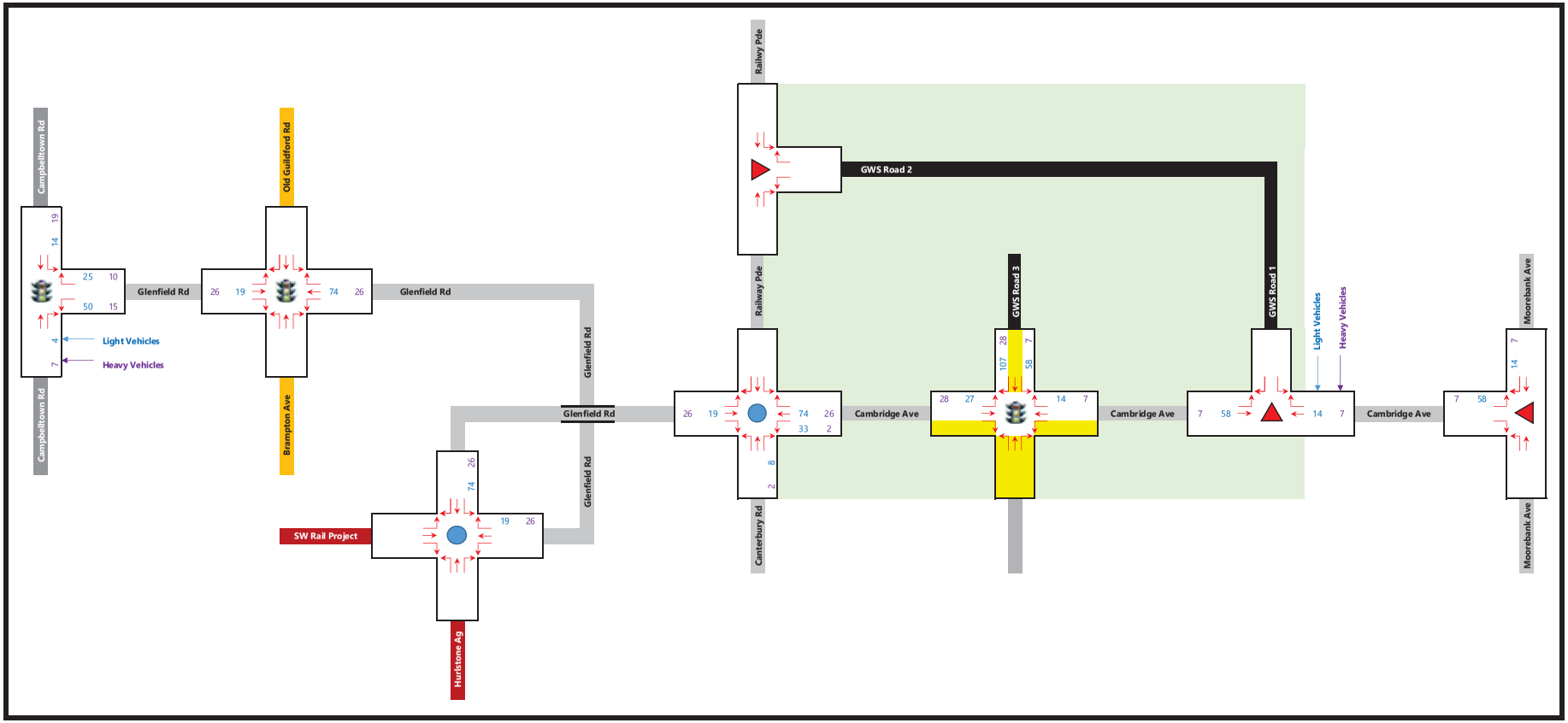


Figure 5.5.1 PM Rezoning Proposal Trips



6 Moorebank Avenue Intermodal

6.1 The Intermodal Proposal

Two Intermodal facilities have been proposed on Department of Defence and privately owned land in Moorebank, and specifically accessing Moorebank Avenue south of Anzac Road. The Moorebank Intermodal Terminal Facility to the east of Moorebank Avenue has been proposed by the Sydney Intermodal Terminal Alliance (**SIMTA Intermodal**), while the Commonwealth Government has long held plans to develop the Moorebank Intermodal Terminal (currently under the guidance of the Moorebank Intermodal Company – **MIC Intermodal**) to the west of Moorebank Avenue.

More recently (May 2014) it has been proposed that the Intermodal projects be combined. While this will require future confirmation, it is nonetheless the case that the basic traffic and transport impacts of the Intermodal developed as either a single or separate venture are unlikely to be significantly different - **the Intermodal will regardless generate all vehicle trips to Moorebank Avenue, and from there either to the north or south**.

6.2 Intermodal Capacity

Original estimates of the capacity of the Intermodal were for the distribution of some 2.7 million *Twenty Foot Equivalent Units* (**TEU**s) per year (1M TEUs at the SIMTA Intermodal, 1.7M TEUs at the MIC Intermodal); however, based on the QUBE and MIC media releases of 22nd May 2014, it appears that a more appropriate estimate of capacity would be for a total of some 1.7M TEUs per year through the Intermodal.

6.3 Intermodal Distribution Routes

Sections below examine the potential for the Intermodal to generate vehicle trips to the **Local Route** through Glenfield, and specifically along Cambridge Avenue and Glenfield Road between Moorebank Avenue and Campbelltown Road respectively. The potential distribution of Intermodal trips to the Local Route has been discussed at length with CC Council, LC Council, TNSW, and the RMS.

6.3.1 SIMTA TIA Trip Distribution – Weight Restrictions

The 2013 SIMTA Transport and Accessibility Impact Assessment (**SIMTA TIA**) states that only a very small number of trips will be generated to Cambridge Avenue due to weight limit restrictions: -

> *The Cambridge Avenue south to the SIMTA site has weight limitations which would inhibit the use of this road for heavy trucks. Hyder's traffic assessment considered that it may be possible for this road to be used by small distribution vehicles and employee cars only.*

Reference to the 2010 RMS *Heavy Vehicle Mass Limits* fact sheet - and further to discussions with the RMS and numerous freight (container transport) companies - confirms that articulated vehicles up to 42.5tonnes in weight and length of up to 19m can use the Local Route at any time of the day. The majority of freight companies stipulate the maximum weight of [container] cargo precisely so that container carrying articulated vehicles fall into the RMS vehicle category of ***General Access Vehicles*** (**GAV**s) which are able to use any road that is not specifically weight limited. Cambridge Avenue and Glenfield Road have no such weight limits.

It is the case that Cambridge Avenue west of GWS Road 1 provides a ***Restricted Access Vehicle*** (**RAV**) route, specifically allowing for overweight and/or oversized vehicles to travel to and from the GWS Site. RAVs are therefore not able to use Cambridge Avenue between GWS Road 1 and Moorebank Avenue, but all other vehicles can use this section of road.

This issue was also raised in submissions in regard to the SIMTA TIA by both CC Council and LC Council; the December 2013 **SIMTA Submissions Report** provides the following response: -

> *It is also noted that Cambridge Avenue is currently subject to restrictions under the Roads Transport (Mass Loading and Access) Regulation 2005 and the Road Transport (Vehicle Registration) Regulation 2007, which prevents restricted access vehicles (RAVs) from using roads outside of the routes identified on RMS RAV maps. Trucks accessing the SIMTA site would be bound to follow this legislation, preventing 'rat running' and restricting them from using roads that have not been prescribed as heavy vehicle access routes. As only sections of Cambridge Avenue currently allow for 'Restricted Access Vehicles' and timing restrictions are applicable for its use, its feasibility and practicality as an access route, even for rigid trucks is limited.*

2013/2014 traffic surveys indicate than some 800 heavy vehicles currently use Cambridge Avenue on an average weekday, specifically including articulated vehicles (many of which visit the Site having arrived from the east). The SIMTA TIA identifies RAVs as comprising 30% of all articulated vehicle trips; while these vehicles could not use the Local Route, the majority of articulated vehicles, all rigid trucks and all staff vehicles could use the Local Route.

Given that the SIMTA TIA includes sub-regional traffic modelling - and further to the trip distribution analysis below indicating potential trips being generated to the Local Route - it may be the case that the Intermodal trip generation to the Local Route has been specifically restricted as part of modelling analysis, potentially based on the weight restriction issue outlined above.

6.3.2 Moorebank Avenue Future Capacity Constraints

Looking more holistically at the issue of Intermodal trip distribution, discussions with LC Council indicate that LC Council has [recently] requested that the traffic assessment for the MIC Intermodal specifically include an assessment of "the" or "a" southern route, i.e. Intermodal trip distribution to the Local Route. This is seen as essential as the key intersections along the **Regional Route** (and specifically Moorebank Avenue to the M5 Interchange and Hume Highway/Motorway) are reported in the SIMTA TIA as being at (and indeed significantly over) capacity further to the 1M TEU Intermodal alone.

For example, for PM trips **to** the south and south-west (i.e. trips for which the Local Route provides an alternative) the SIMTA TIA reports an average delay of 120 seconds to travel north through the intersection of Anzac Road, and then an average delay of 283 seconds to access the westbound slip lane from Moorebank Avenue to the M5 as shown in **Table 6.3.2.1** below.

Table 6.3.2.1 SIMTA TIA 2031 Reported Delays No Network Upgrades

Table 6-5 Level of Service Summary PM Peak (2031 Future Base Case with SIMTA)

Model :2031 PM with SIMTA

Intersection	Approach	Average Delay	LoS (Delay)	Average Delay	LoS
Moorebank Avenue-Anzac Road (Signal)	North	32	C	71	F
	East	105	F		
	South	120	F		
	North - Slip Lane	3	A		
M5 Motorway-Moorebank Avenue (Signal)	North - Right Turn	64	E	68	E
	North - Through	28	B		
	East	32	C		
	South - Right Turn	56	D		
	South - Through	53	D		
	West	36	C		
	North - Slip Lane	17	B		
	East -Slip Lane	30	C		
	South - Slip Lane	283	F		

Source: SIMTA TIA (Table 6.5)

Further to the suite of upgrade recommendations provided in the SIMTA TIA – principally at the Moorebank Avenue & M5 Interchange, and in Moorebank Avenue - the SIMTA TIA reports the following delays: -

Table 6.3.2.2 SIMTA TIA 2031 Reported Delays All Network Upgrades

Table 8-2 Intersection LoS Results – 2031 *Improve* Case

Intersection	AM Peak		PM Peak	
	Overall Average Delay	LoS	Overall Average Delay	LoS
Moorebank Avenue-Anzac Road (Signal)	41	C	52	D
M5 Motorway-Moorebank Ave (Signal)	34	C	66	E
Moorebank Ave-Northern Access (Signal)	13	A	16	B
Moorebank Ave-Central Access (Signal)	21	B	41	C
Moorebank Ave-Southern Access (Signal)	16	B	12	A

Source: SIMTA TIA (Table 8.2)

While the SIMTA TIA does not provide individual movement delays for the network upgrade forecast scenario reported in **Table 6.3.2.2** above, at the M5 Interchange the upgrades provide only 2 seconds average delay improvement; the potential exists that the high delays to key movements remain even further to the upgrade.

The SIMTA TIA also reports significant delays at the intersections along the Hume Highway south from the M5 but no intersection upgrades are proposed for these. Average delays at the intersection of Hume Highway & Kurrajong Road in the AM for example are reported at 294 seconds, and 220 seconds at the intersection of Hume Highway & De Meyrick Avenue. Primary delays at these intersections would be to the minor approaches, but even through movements would likely have significant delays based on such averages.

Perhaps most significantly, **the SIMTA TIA results are based only on the trip generation of a 1M TEU Intermodal**. The capacity 1.7M TEU Intermodal would theoretically provide some 70% additional capacity; while there may be some efficiencies (in regard to traffic and transport) arising from a joint venture, it is likely that even the full suite of network upgrades proposed in the SIMTA TIA would be unable to accommodate the trip generation of a 1.7M TEU Intermodal along the Regional Route without reporting delays the equal to or higher than reported for pre-upgrade conditions.

As such, it is almost inevitable that traffic capacity will need to be found elsewhere to alleviate delays along Moorebank Avenue north from the Intermodal (and hence the nexus between the Intermodal and the bridge to replace the Causeway by successive State Governments - see **Section 2.5** of the TIA); a route to the south – where more than 50% of heavy vehicle trips and almost 40% of staff vehicle trips have their origin/destination – appears inevitable.

6.4 Distribution Routes

6.4.1 Intermodal to/from the "South"

The SIMTA TIA limits the 1M TEU Intermodal trip generation to "The South" to 5% of rigid trips and 5% of staff trips. While the SIMTA TIA does not provide any further information in regard to these trips (i.e. after they leave Moorebank Avenue to – necessarily – Cambridge Avenue) these trips have likely been assessed as travelling to/from Canterbury Road and then south towards Campbelltown).

6.4.2 Intermodal to/from Campbelltown Road

The SIMTA TIA assigns 13% of both articulated and car trips, and 10% of rigid trips, to the Hume Highway **south** of the M5 Motorway. In response to CC Council identifying in their submission the high percentage of trips to be generated by the 1M TEU Intermodal to the south and south-west, the SIMTA Submissions Report states: -

> *As identified in the Freight Demand Modelling report, the freight catchment that is serviced by the SIMTA proposal is located largely to the north and west of the SIMTA site. The Macarthur Intermodal Shipping Terminal services the freight catchment that the Campbelltown LGA is located within.*

This statement would seem contradictory to the distribution profile identified in the SIMTA TIA, with the majority of heavy vehicle trips generated by the 1M TEU Intermodal in fact travelling to/from the south and south-west. In addition, the SIMTA Submissions Report provides the following: -

It is also noted that the trip to access the Hume Highway, heading north-west from the SIMTA site, via Cambridge Avenue and Glenfield Road is a distance of approximately 11 km, while the trip via the Hume Highway via Moorebank Avenue and the M5 Motorway is approximately 3 km. There would be no incentive for vehicles to take the longer route.

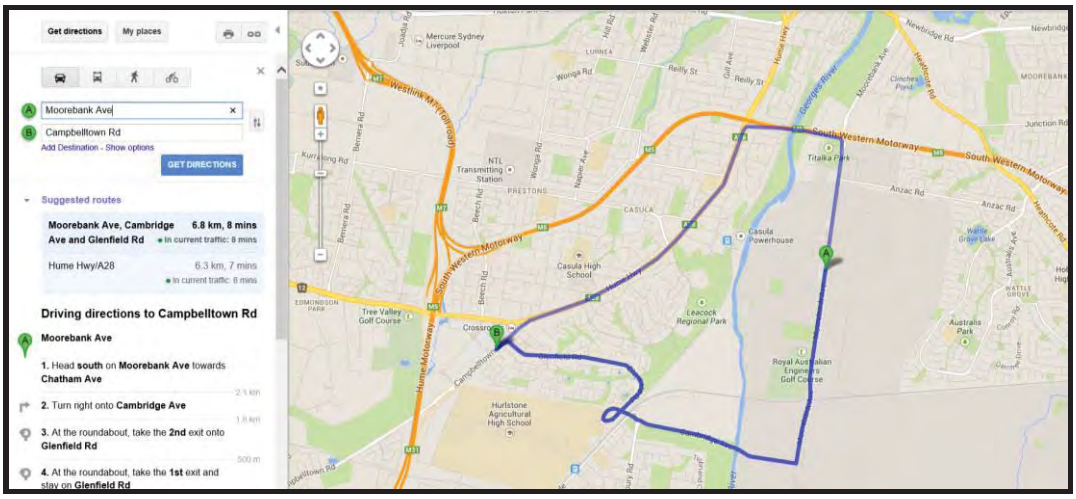
This response does not address the issue raised – the potential for Intermodal vehicles to use the Local Route to travel to the Hume Highway south of the M5.

Following the Hume Highway south from the M5, the only origins/destinations are Campbelltown Road and Camden Valley. Trips to/from Camden Valley Way would represent only a very minor percentage of demand (if any), while Campbelltown Road and its access to significant industrial precincts and residential suburbs is the only apparent origin/destination for these trips, and necessarily a point in Campbelltown Road south of Glenfield Road (as there is no demand generator between Hume Highway/Camden Valley Way and Glenfield Road).

There is significant evidence to suggest that these Intermodal trips would use the Local Route rather than the Regional Route.

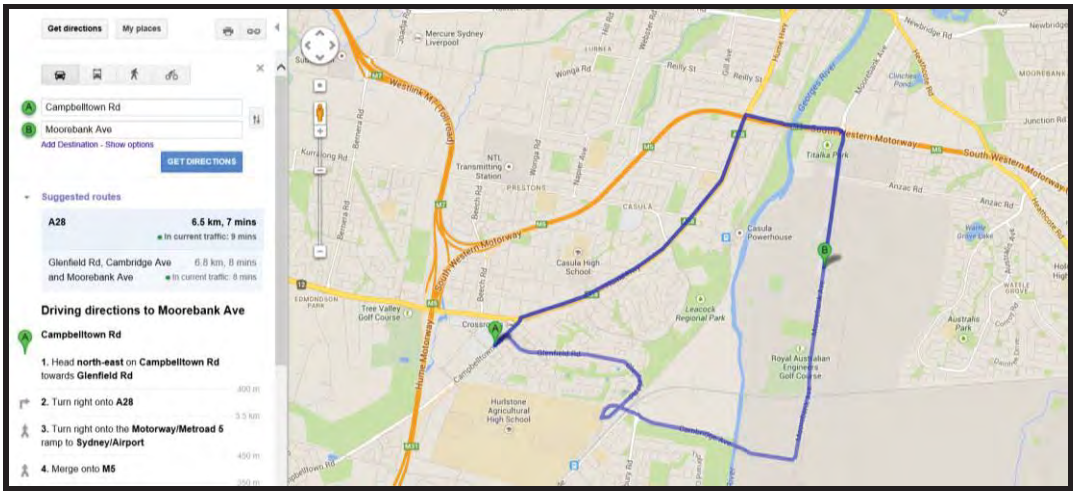
Base travel time summaries have been prepared for the available routes between Campbelltown Road (south of Glenfield Road) and the Intermodal (centred on the signalised Defence National Storage Distribution Centre intersection with Moorebank Avenue) using the Google Maps *Get Directions* tool. While acknowledging from the outset that this tool is not infallible, it provides a more than valid tool by which to provide a preliminary assessment of the available routes, as shown in the figures below.

Figure 6.4.2.1 Trip Times Intermodal to Campbelltown Road



Source: Google Maps

Figure 6.4.2.2 Trip Times Campbelltown Road to Intermodal



Source: Google Maps

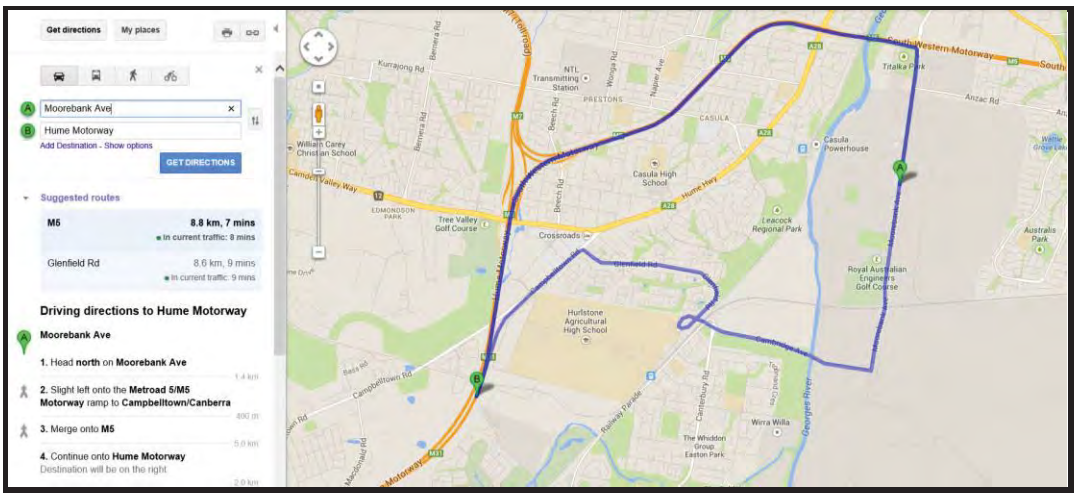
As shown in the figures above, there is little difference in the base travel times between the Intermodal and Campbelltown Road south of Glenfield Road via the Regional Route or the Local Route.

6.4.3 Intermodal to/from Hume Motorway

The SIMTA TIA assigns 41% of articulated trips, 35% of rigid trips and 18% of car trips to the Hume Highway south of the M5 Motorway. Again, there is evidence to suggest that these trips would use the Local Route, and specifically for the outbound trip (Intermodal to Hume Motorway) given the availability of the Campbelltown Road on-ramp to the Hume Motorway south of Glenfield Road.

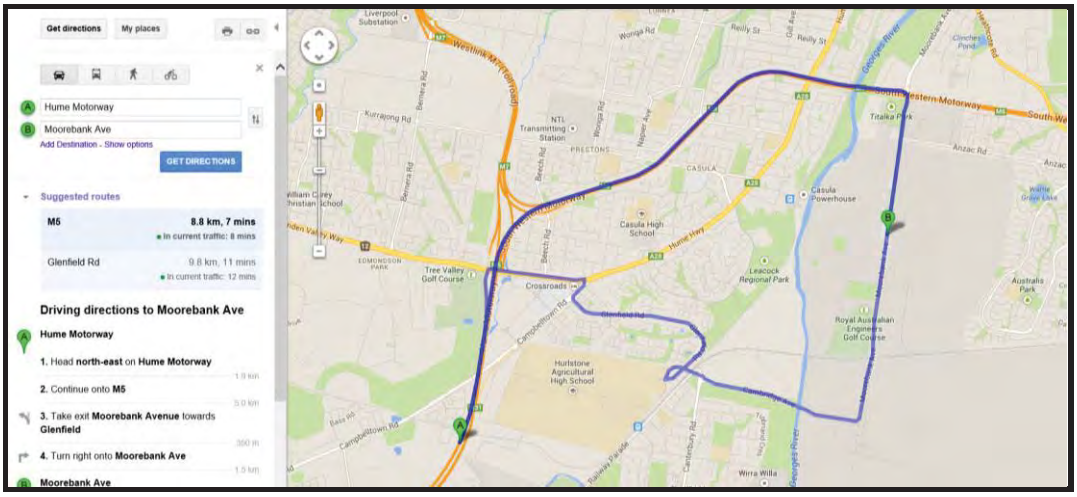
The routes from the Intermodal to the Hume Motorway; and from the Hume Motorway to the Intermodal, are shown below.

Figure 6.4.3.1 Intermodal to Hume Motorway



Source: Google Maps

Figure 6.4.3.2 Hume Motorway to Intermodal



Source: Google Maps

For arrival trips (Hume Motorway to Intermodal) the Regional Route is significantly faster than the Local Route, while for the departure trip (Intermodal to Hume Motorway) the difference is again minor between the Regional Route and the Local Route.

6.5 Future Travel Times

In determining the likelihood for trips to move from the SIMTA TIA identified Regional Route to the Local Route, it is necessary to consider base travel times (as estimated in **Section 6.4** above) and then also examine future delays along each route as those delays will be the primary driver of route change.

In this regard, the assessment below is based on the following: -

- The SIMTA TIA identified delays to key through and turning movements at the intersections along the Regional Route in 2031

- Delays to key through and turning movements at the intersections along the Local Route, based on SIDRA modelling of the forecast 2024 traffic flows provided in this TIA plus the peak trip generation of a 1M TEU Intermodal to the routes identified above, i.e. to and from Campbelltown Road south of Glenfield Road.

- Delays to key through and turning movements at the intersection of Campbelltown Road & Glenfield Road, and Campbelltown Road & Beech Road, based on SIDRA modelling of the forecast 2036 traffic flows provided in the CR REF STA and the peak trip generation of a 1M TEU Intermodal to the routes identified above, i.e. to and from Campbelltown Road south of Glenfield Road.

From the outset, it is acknowledged that the movement delays reported further to this analysis method along the Local Route, even with all known development including the 1M TEU Intermodal, still at their base represent a forecast year 2024. However: -

- The potential for any significant additional growth along the Local Route other than that generated by targeted developments such as those included in the assessment is minimal. Reference to the AADT and ADT data in **Section 3** above shows little growth along the route over the past 10 years, and there is no indication that average annual growth would in the future increase from existing levels. Other than at the intersection of Campbelltown Road & Glenfield Road (which is modelled based on 2036 flows) there is no information to suggest that 2031 flows along the Local Route would be significant different from those forecast for 2024.

- Moreover, the analysis provided below is designed to show the **potential** for Intermodal trips to use the Local Route. While it is outside of the scope of this TIA to prepare detailed sub-regional modelling to examine the unrestricted distribution of the Intermodal to/from key south and south-west locations, it is nonetheless important to examine the potential for such to be greater than the 5% of staff and rigid trips assigned in the SIMTA TIA, particularly given the assignment of more than 50% of heavy vehicle trips and almost 40% of staff trips to the south and south-west.

6.5.1 Intersection Delay Analysis

With reference to the SIMTA TIA, CR REF STA and the SIDRA analysis provided in **Appendix B** of this TIA, it is possible to identify the delay increases for specific turning/through movements for "a" forecast year comparable with the SIMTA TIA forecast year 2031. These delays (in seconds) are summarised below; for reference: -

- **BLACK** delays are taken from the SIMTA TIA for the year 2031 without upgrades
- **RED** delays are also derived from the SIMTA TIA for the year 2031 without upgrades but represent only Average Delays for the whole intersection (as available)
- **BLUE** delays are taken from **Appendix B** of this TIA and represent 2024 Local Route delays further to the introduction of trips from known projects and a 1M TEU Intermodal
- **PURPLE** figures are based on SIDRA modelling of the 2036 flows provided in the CR REF STA with the addition of a 1M TEU Intermodal trips.

Again, the delays along the Local Route include the peak potential trip generation of a 1M TEU Intermodal to/from Campbelltown Road south of Glenfield Road; and to the Hume Motorway via the Campbelltown Road on-ramp south of Beech Road. These peak flows are examined in **Section 6.6** below.

Table 6.5.1.1 Future Intersection Movement Delays

Key Movement	AM Delay (s)	PM Delay (s)
Moorebank & Anzac Northbound	44	120
Moorebank & Anzac Southbound	102	32
M5 & Moorebank South to West	65	283
M5 & Moorebank West to South	40	36
M5 & Hume South to East	163	172
M5 & Hume East to South	50	86
Hume & CVW Average	80	69
Hume & Kurrajong Average	294	77
Hume & De Meyrick	220	22
Campbelltown & Glenfield North to South	20	17
Campbelltown & Glenfield South to North	47	7
Campbelltown & Glenfield East to South	12	46
Campbelltown & Glenfield South to East	64	94
Glenfield & Brampton East to West	25	26
Glenfield & Brampton West to East	22	24
Glenfield & Hurlstone East to West	6	9
Glenfield & Hurlstone West to East	10	14
Cambridge & Glenfield East to West	5	7
Cambridge & Glenfield West to East	26	7
Moorebank & Cambridge North to West	6	39
Moorebank & Cambridge West to North	27	6
Campbelltown & Beech South to North	34	35
Campbelltown & Beech North to South	41	51

Source: SIMTA TIA and CR REF STA and ARC

The high AM average intersection delay at Hume Highway & Kurrajong Road and Hume Highway & De Meyrick Avenue would not appropriately represent the additional delay to through movements in the Hume Highway, which would be prioritised. With reference to reported delays at surrounding intersections, it is estimated that there is the potential for the through movement delays at these intersections to average 40 seconds (northbound and southbound) in the AM, and average 20 seconds (northbound and southbound) in the PM.

ARC notes that the CR TTMA does not provide any flows or analysis in regard to the intersection of Hume Highway & Camden Valley Way & Campbelltown Road by which to better inform this analysis. As such, the key movements – Hume Highway to Campbelltown Road, and Campbelltown Road to Hume Highway, have been assigned delays of 40 seconds in both the AM and PM.

6.5.2 Total Trip Route Times

Looking at the trip route options for the southern and south-western origins/destinations identified in **Section 6.4**, and including the base travel times (**Section 6.4**) and movement delays (**Section 6.5**) provides a basic summary of estimated total future travel times between the Intermodal and the south and south-west.

Table 6.5.2.1 AM Travel Times

Origin AM	Destination AM	Route	Distance	Time	Time + Traffic	Delay along Route	Future Time	Future Time + Traffic
Intermodal	Campbelltown Road south of Glenfield Road	Local Route	6.8	8	8	55	8.9	8.9
		Regional Route	6.3	7	8	299	12.0	13.0
Campbelltown Road south of Glenfield Road	Intermodal	Local Route	6.8	8	8	149	10.5	10.5
		Regional Route	6.5	7	9	472	14.9	16.9
Intermodal	Hume Motorway south of Campbelltown Road	Local Route	8.6	9	9	96	10.6	10.6
		Regional Route	8.8	7	8	109	8.8	9.8

Table 6.5.2.2 PM Travel Times

Origin PM	Destination PM	Route	Distance	Time	Time + Traffic	Delay along Route[1]	Future Time	Future Time + Traffic
Intermodal	Campbelltown Road south of Glenfield Road	Local Route	6.8	8	8	127	10.1	10.1
		Regional Route	6.3	7	8	586	16.8	17.8
Campbelltown Road south of Glenfield Road	Intermodal	Local Route	6.8	8	8	144	10.4	10.4
		Regional Route	6.5	7	9	327	12.4	14.4
Intermodal	Hume Motorway south of Campbelltown Road	Local Route	8.6	9	9	178	12.0	12.0
		Regional Route	8.8	7	8	403	13.7	14.7

6.5.3 Trip Time Summary

With reference to the tables above: -

- Intermodal to/from Campbelltown Road

  In both peaks, the Local Route between the Intermodal and Campbelltown Road (and vice versa) is potentially faster than the Regional Route, a result of the increased delays forecast along the Hume Highway north of Camden Valley Way; at the M5 & Moorebank Avenue Interchange; and southbound in Moorebank Avenue through Anzac Road. Moreover, for most drivers arriving from or departing to Campbelltown Road south of Glenfield Road, the Local Route would be a more legible route.

- Intermodal to Hume Motorway

  In the PM, the Local Route between the Intermodal and the Hume Motorway (via the Campbelltown on-ramp) is potentially faster than the Regional Route. While the base times for both routes are similarly, the key difference is the SIMTA TIA identified delays to northbound trips in Moorebank Avenue through Anzac Road; and to westbound trips from Moorebank Avenue to the M5.

Even without consideration of the additional delays at the key northern intersections in Moorebank Avenue further to the 1.7M TEU Intermodal, the analysis above indicates that travel times along the Local Route will potentially be as fast if not faster than the travel times along the Regional Route for the following trips: -

- Intermodal to/from Campbelltown Road in the AM and PM
- Intermodal to Hume Motorway in the PM

6.6 Intermodal Trip Generation to the Local Route

The 1.7M TEU Intermodal trip potential to the Local Route further to the analysis provided above is detailed in the rolling tables below, with figures in **RED** taken directly from the SIMTA TIA. The SIMTA Environmental Assessment states staff numbers of up to 2,840 for the 1M TEU Intermodal, but the primary analysis below uses the base 2,258 staff estimated used in the SIMTA TIA.

In all cases, the characteristics of the 1.7M TEU Intermodal have been assessed as being 70% higher than the 1M TEU Intermodal described in the SIMTA TIA.

Table 6.6.1 1.7M TEU Intermodal Daily Trips

1.7M TEU Intermodal Daily Trips	Articulated	Rigid	Cars	Total Trips
Articulated 1M TEU	**1603**			
Articulated 1.7M TEU	**2725**			
Rigid 1M TEU		**1035**		
Rigid 1.7M TEU		**1760**		
Staff 1M TEU			2258	
Staff 1.7M TEU			3839	
Car Driver			80%	
Vehicle trips per Day	**2725**	**1760**	**6142**	**10626**

Table 6.6.2 1.7M TEU Intermodal Peak Hour Trips

1.7M TEU Intermodal Peak Trips	Articulated	Rigid	Cars	Total Trips
AM Peak % of Daily	7.70%	7.70%	19.15%	
Vehicle Trips Per Hour	**210**	**135**	**1176**	**1521**
PM Peak % of Daily	9.30%	9.30%	17.44%	
Vehicle Trips Per Hour	**253**	**164**	**1071**	**1488**

Table 6.6.3 1.7M TEU Intermodal Local Route Accessible Trips (No Restricted Access Vehicles)

1.7M TEU Intermodal Local Route Accessible Trips (No RAVs)	Articulated	Rigid	Cars	Total Trips
Daily Trips	70%	100%	100%	
Vehicle trips per Day	**1908**	**1760**	**6142**	**9809**
AM Peak % of Daily	7.70%	7.70%	19.15%	
Vehicle Trips Per Hour	**147**	**135**	**1176**	**1459**
PM Peak % of Daily	9.30%	9.30%	17.44%	
Vehicle Trips Per Hour	**177**	**164**	**1071**	**1412**

Table 6.6.4 1.7M TEU Intermodal Arrival & Departure Profile

1.7M TEU Intermodal Arrival & Departure Profile	Articulated	Rigid	Cars	All Vehicles
AM Arrival TIA %	50%	50%	90%	
Vehicle trips per Hour	**73**	**68**	**1059**	**1200**
AM Departure TIA %	50%	50%	10%	
Vehicle trips per Hour	**73**	**68**	**118**	**259**
PM Arrival TIA %	50%	50%	20%	
Vehicle trips per Hour	**89**	**82**	**214**	**385**
PM Departure TIA %	50%	50%	80%	
Vehicle trips per Hour	**89**	**82**	**857**	**1027**

Table 6.6.5 1.7M TEU Intermodal SIMTA TIA Assigned Southern Trips

1.7M TEU Intermodal SIMTA TIA Assigned Southern Trips	Articulated	Rigid	Cars	All Vehicles
Distribution to/from Southern Route	0%	5%	5%	
AM Peak	**0**	**7**	**59**	**66**
Arrival vehicle trips	0	3	53	56
Departure vehicle trips	0	3	6	9
PM Peak	**0**	**8**	**54**	**62**
Arrival vehicle trips	0	4	11	15
Departure vehicle trips	0	4	43	47

Table 6.6.6 1.7M TEU Intermodal to/from Campbelltown Road via Local Route Trip Potential

1.7M TEU Intermodal to/from Campbelltown Road via Local Route Trip Potential	Articulated	Rigid	Cars	All Vehicles
Distribution to Campbelltown Road	13%	10%	13%	
AM Peak Total vehicle trips	**19**	**14**	**153**	**186**
Arrival vehicle trips	10	7	138	154
Departure vehicle trips	10	7	15	32
PM Peak Total vehicle trips	**23**	**16**	**139**	**179**
Arrival vehicle trips	12	8	28	48
Departure vehicle trips	12	8	111	131

Table 6.6.7 1.7M TEU Intermodal to Hume Motorway via Local Route Trip Potential

1.7M TEU Intermodal to Hume Motorway via Local Route Trip Potential	Articulated	Rigid	Cars	Al Vehicles
Distribution to Hume Motorway	41%	35%	18%	
AM Peak Total vehicle trips	60	47	212	**319**
Arrival vehicle trips	0	0	0	0
Departure vehicle trips	30	24	21	75
PM Peak Total vehicle trips	73	57	193	**323**
Arrival vehicle trips	0	0	0	0
Departure vehicle trips	36	29	154	219

Table 6.6.8 1.7M TEU Intermodal Total Trip Potential to/from Local Route (SIMTA TIA Staff)

1.7M TEU Intermodal Total Trip Potential to/from Local Route SIMTA TIA Staff Estimate	Articulated	Rigid	Cars	All Vehicles
AM Peak				
Arrival	10	10	191	210
Departure	40	34	42	116
TOTAL	49	44	233	**326**
PM Peak				
Arrival	12	12	39	62
Departure	48	41	308	397
TOTAL	59	53	347	**460**

Table 6.6.9 1.7M TEU Intermodal Total Trip Potential to/from Local Route (SIMTA EA Staff)

1.7M TEU Intermodal Total Trip Potential to/from Local Route SIMTA EA Staff Estimate	Articulated	Rigid	Cars	All Vehicles
AM Peak				
Arrival	10	10	240	259
Departure	40	34	53	127
TOTAL	49	44	293	**386**
PM Peak				
Arrival	12	12	48	72
Departure	48	41	388	477
TOTAL	59	53	436	**549**

6.7 Intermodal Flow Forecasts

Based on the broader SIMTA TIA origins and destinations, and with the application of the potential trip generation via the Local Route as detailed in **Section 6.5**, the potential 1.7M TEU Intermodal trips to key intersections along the Local Route are shown in the figures below.

Figure 6.7.1 AM Intermodal (1.7M TEU Intermodal SIMTA TIA Staff Estimate)

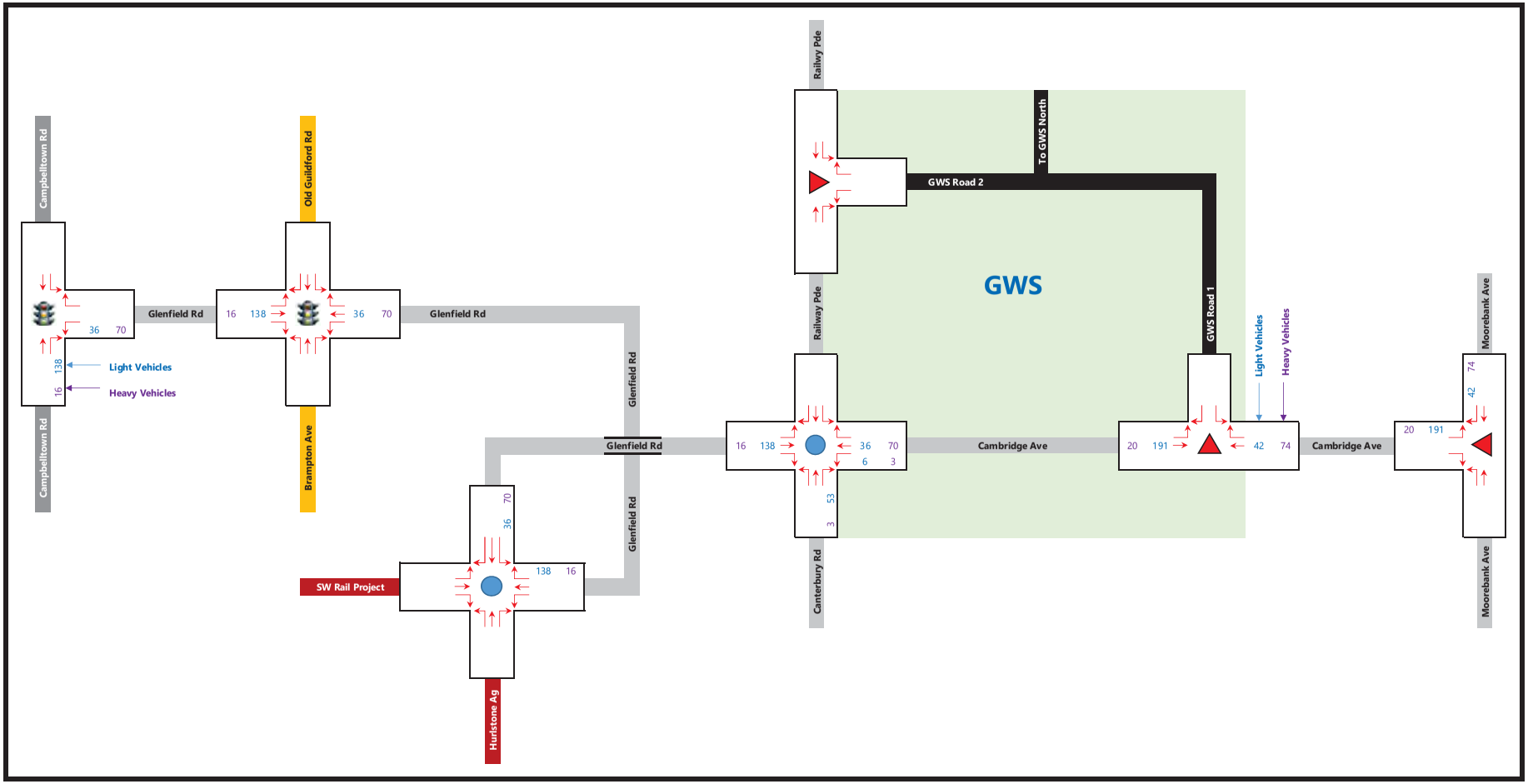
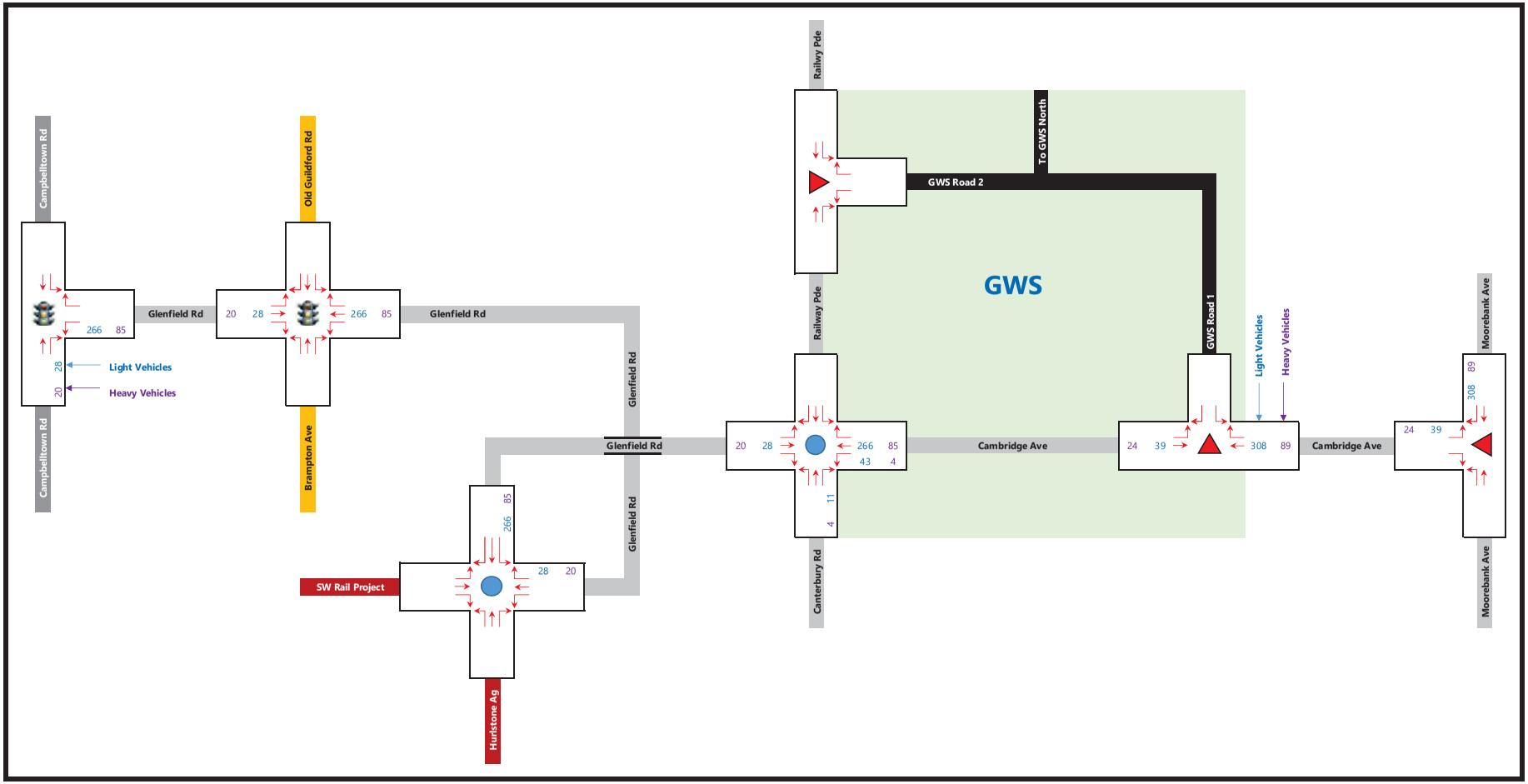


Figure 6.7.2 PM Intermodal (1.7M TEU Intermodal SIMTA TIA Staff Estimate)



6.8 Intermodal Summary

6.8.1 Intermodal Local Route Impacts

As part of the delay time assessment detailed in **Section 6.5**, preliminary SIDRA analysis of the Local Route intersections (**2024 plus the 1M TEU Intermodal, SIMTA TIA Staff**) reports that most intersections continue to perform at acceptable Levels of Service, though many have little spare capacity, and 95%ile queue lengths in some instances increase significantly.

Additional sensitivity testing using the SIMTA EA staff estimate and a 1.7M TEU Intermodal suggests that all intersections operate at a poor LoS with the exception of Cambridge Avenue & Canterbury Road & Glenfield Road & Railway Parade. Under this scenario, flows on the Causeway would also exceed 2,300vph in the PM, with a westbound flow of over 1,800vph.

Notwithstanding, the distribution of Intermodal trips to Local Route could in turn reduce delays along the Regional Road, particularly for key movements such as Moorebank Avenue south to M5 west. As such, there is likely to be some sort of balance in the future between the routes, but such could only be determined with further sub-regional modelling.

Finally, and further to the above, it must be acknowledged that the distribution of the smaller number of 1M TEU Intermodal trips as per the SIMTA TIA (5% of rigid and 5% of staff vehicles) has little if any impact on the Local Route.

6.8.2 Intermodal Conclusions

The potential Intermodal trip generation and distribution detailed above has been prepared further to discussions with CC Council, the RMS and TfNSW to provide an overview of sub-regional traffic generating development potential as appropriate to this TIA. As per our discussions with TNSW, further detailed traffic assessments will be required prior to any development commencing on the Intermodal, and specifically an assessment based on the full capacity of the Intermodal.

The outcomes of these future assessments cannot be determined at this time, and as such ARC has not provided a detailed assessment of the impacts of these additional flows on the local road network concurrent to the Proposal, as the range of potential Intermodal trips is simply too great to assign with appropriate certainty.

Table 2.2 Glenfield Road Summary Crash Report 2008 – 2013

Summary Crash Report

Transport for NSW – Centre for Road Safety

# Crash Type		
Car Crash	45	90.0%
Light Truck Crash	9	18.0%
Rigid Truck Crash	2	4.0%
Articulated Truck Crash	1	2.0%
'Heavy Truck Crash	(3)	(6.0%)
Bus Crash	1	2.0%
"Heavy Vehicle Crash	(4)	(8.0%)
Emergency Vehicle Crash	0	0.0%
Motorcycle Crash	3	6.0%
Pedal Cycle Crash	1	2.0%
Pedestrian Crash	0	0.0%

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

Location Type		
*Intersection	32	64.0%
Non intersection	18	36.0%

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

Collision Type		
Single Vehicle	9	18.0%
Multi Vehicle	41	82.0%

Road Classification		
Freeway/Motorway	0	0.0%
State Highway	21	42.0%
Other Classified Road	29	58.0%
Unclassified Road	0	0.0%

Contributing Factors		
Speeding	8	16.0%
Fatigue	6	12.0%

Weather		
Fine	37	74.0%
Rain	5	10.0%
Overcast	8	16.0%
Fog or mist	0	0.0%
Other	0	0.0%

Road Surface Condition		
Wet	9	18.0%
Dry	41	82.0%
Snow or ice	0	0.0%

Natural Lighting		
Dawn	2	4.0%
Daylight	29	58.0%
Dusk	4	8.0%
Darkness	15	30.0%

Crash Movement		
Intersection, adjacent approaches	7	14.0%
Head-on (not overtaking)	3	6.0%
Opposing vehicles; turning	5	10.0%
U-turn	4	8.0%
Rear-end	16	32.0%
Lane change	3	6.0%
Parallel lanes; turning	1	2.0%
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	0	0.0%
Off road on straight, hit object	2	4.0%
Out of control on straight	1	2.0%
Off road, on curve	0	0.0%
Off road on curve, hit object	3	6.0%
Out of control on curve	1	2.0%
Other crash type	4	8.0%

Speed Limit				
40 km/h or less	3	6.0%	80 km/h zone	4	8.0%
50 km/h zone	4	8.0%	90 km/h zone	0	0.0%
60 km/h zone	27	54.0%	100 km/h zone	0	0.0%
70 km/h zone	12	24.0%	110 km/h zone	0	0.0%

~ 40km/h or less 0 0.0%

CRASHES	50	
Fatal crash	0	0.0%
Injury crash	25	50.0%
Non-casualty crash	25	50.0%

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

Time Group		% of Day	
00:01 - 02:59	4	8.0%	12.5%
03:00 - 04:59	0	0.0%	8.3%
05:00 - 05:59	0	0.0%	4.2%
06:00 - 06:59	3	6.0%	4.2%
07:00 - 07:59	3	6.0%	4.2%
08:00 - 08:59	2	4.0%	4.2%
09:00 - 09:59	7	14.0%	4.2%
10:00 - 10:59	2	4.0%	4.2%
11:00 - 11:59	2	4.0%	4.2%
12:00 - 12:59	1	2.0%	4.2%
13:00 - 13:59	2	4.0%	4.2%
14:00 - 14:59	3	6.0%	4.2%
15:00 - 15:59	2	4.0%	4.2%
16:00 - 16:59	1	2.0%	4.2%
17:00 - 17:59	5	10.0%	4.2%
18:00 - 18:59	5	10.0%	4.2%
19:00 - 19:59	3	6.0%	4.2%
20:00 - 21:59	5	10.0%	8.3%
22:00 - 24:00	0	0.0%	8.3%

Street Lighting Off/Nil	% of Dark
1 of 15 in Dark	6.7%

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

Crashes		Casualties
5	2013	1
8	2012	9
8	2011	5
16	2010	17
8	2009	3
5	2008	4

~ School Travel Time		
Involvement	11	22.0%

McLean Periods			% Week
A	8	16.0%	17.9%
B	0	0.0%	7.1%
C	11	22.0%	17.9%
D	2	4.0%	3.5%
E	4	8.0%	3.6%
F	5	10.0%	10.7%
G	6	12.0%	7.1%
H	7	14.0%	7.1%
I	4	8.0%	12.5%
J	3	6.0%	10.7%

Day of the Week						# Holiday Periods					
Monday	3	6.0%	Thursday	8	16.0%	Sunday	11	22.0%	New Year	0	0.0%
Tuesday	10	20.0%	Friday	8	16.0%	WEEKDAY	35	70.0%	Aust. Day	0	0.0%
Wednesday	6	12.0%	Saturday	4	8.0%	WEEKEND	15	30.0%	Easter	0	0.0%
									Anzac Day	0	0.0%

Queen's BD	0	0.0%	Easter SH	2	4.0%	
Labour Day	0	0.0%	June/July SH	3	6.0%	
Christmas	0	0.0%	Sept./Oct. SH	1	2.0%	
January SH	4	8.0%	December SH	0	0.0%	