



**Lots 50 and M1456 Great Northern
Hwy, Muchea**

**Proposed Amendments to the Town
Planning Scheme No. 6**

Transport Impact Assessment

**PREPARED FOR:
Tallangatta Beef Pty Ltd**

July 2021

Document history and status

Author	Revision	Approved by	Date approved	Revision type
M Rasouli	r01	B Bordbar	07/12/2020	Draft
M Rasouli	r01a	B Bordbar	27/07/2021	Final

File name: t20.116.mr.r01a

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Project: Lots 50 and M1456 Great Northern Hwy, Muchea

Document revision: r01a

Project number: t20.116

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1.0 Introduction and Background

This Transport Impact Assessment (TIA) has been prepared by Transcore for the proposed Amendment to the Shire of Chittering's Town Planning Scheme No. 6 for Lots 50 & M1456 Great Northern Highway, Muchea (subject site). The proposed amendment includes rezoning of the subject site from "Agricultural Resource" to 'Industrial'. As part of the proposed rezoning a Preliminary Structure Plan Development Concept (SPDC) was also prepared by Taylor Burrell Barnett for the site consistent with Draft Muchea Industrial Park Structure Plan (DMIPSP). Copies of the proposed SPDC and DMIPSP are provided in **Appendix A**.

As shown in **Figure 1** the subject site is located within "Precinct 2 – South" under Muchea Employment Node Structure Plan (MENSP) and is identified as "Proposed Industrial Development". The Western Australian Planning Commission (WAPC) have recently prepared the DMIPSP. When finalised, DMIPSP will replace MENSP.

The DMIPSP has been prepared to coordinate the development of the Muchea Industrial Park to provide industrial land and employment opportunities in the Shire of Chittering. The DMIPSP reviews and updates the WAPC's 2011 MENSP.

Figure 2 shows the location of the subject site. The subject site is located at the south-east corner of the intersection of Great Northern Highway and Muchea Road. Muchea Road traverses under the recently constructed North Link and forms a four-way signalised intersection with Great Northern Highway.

This TIA will review the traffic generation and distribution resulting from the proposed SPDC and will assess the traffic operations of the SPDC area and its impact on the signalised intersection of Great Northern Highway and Muchea Road.

During the course of preparation of this TIA, amongst other relevant publications, the following documents have been reviewed:

- ✚ Muchea Employment Node Structure Plan by Department of Planning (August 2011); and,
- ✚ Draft Muchea Industrial Park Structure Plan by WAPC (October 2020).

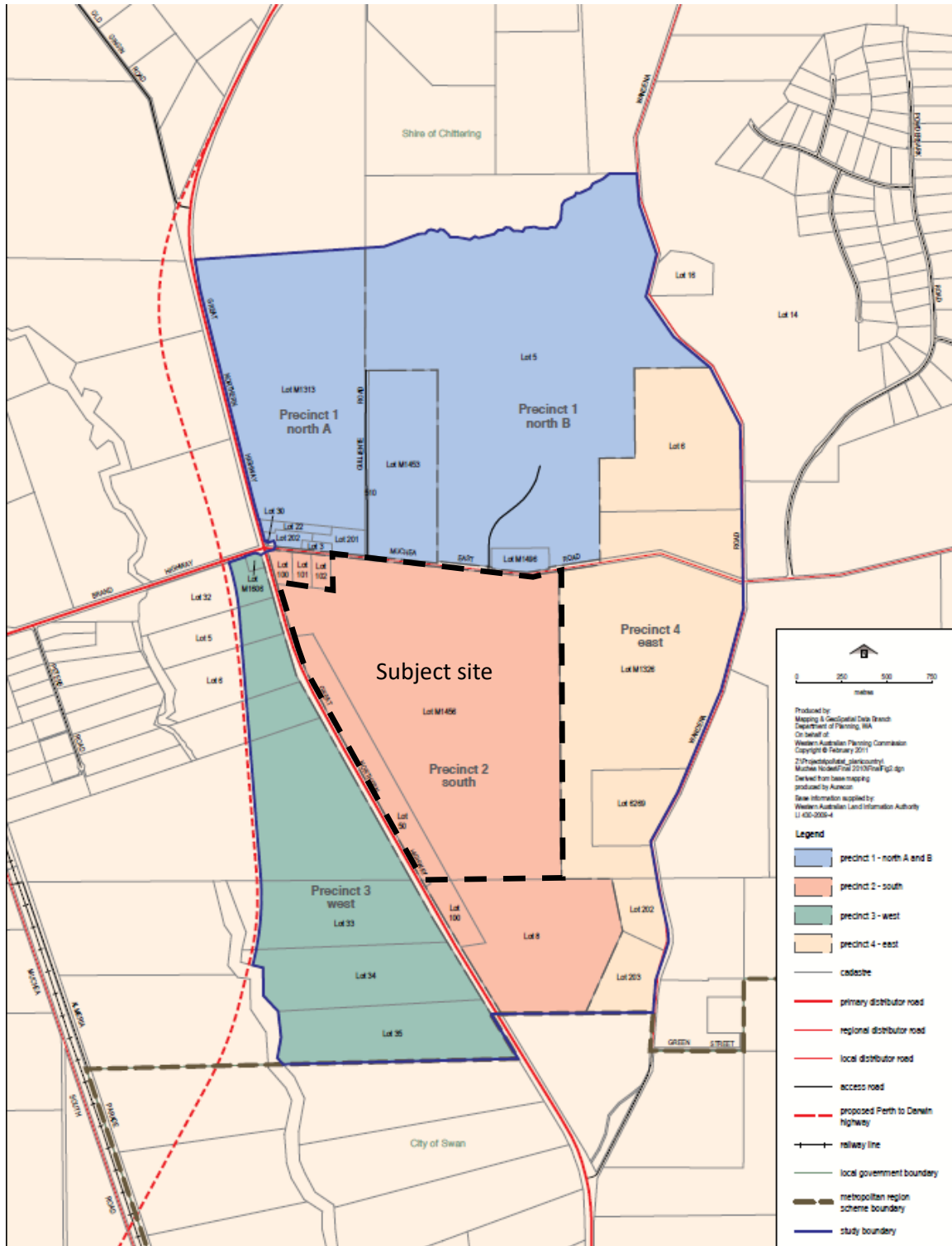


Figure 1: Location of subject site within the proposed Precinct Plan of Muchea Employment Node



Figure 2: Location of the subject site

2.0 Proposed Structure Plan Development Concept

Figure 3 illustrates the Preliminary Structure Plan Development Concept for the site.

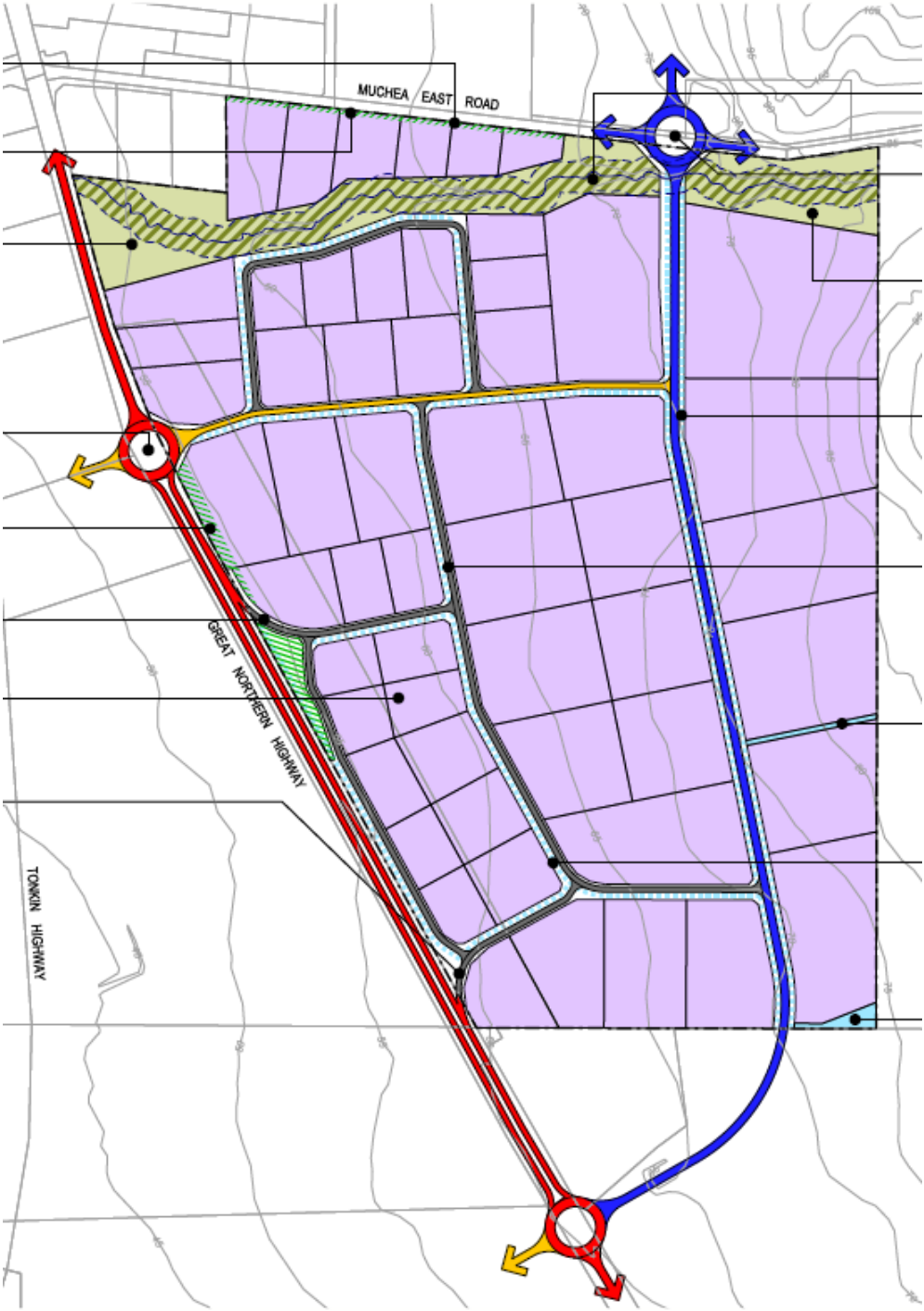


Figure 3: Preliminary Structure Plan Development Concept

The proposed SPDC is located within Precinct 2. According to DMIPSP *“this precinct forms the central-most area of the industrial park with the least fragmented land ownership, and is the most suited area within the industrial park for general industry”*.

The proposed SPDC will provide about 171 ha of developable Lot area for general industry land uses.

The key part of the future DMIPSP road network proposed to serve the North and South Precincts, including the subject site, is the Loop Road which connects to Great Northern Highway north and south of Muchea East Road intersection and loops through the North and South Precincts intersecting with Muchea East Road.

The road network of the proposed SPDC area has been established in line with the proposed road network for the DMIPSP. The road network proposes a distributor road network designed to accommodate RAV10 vehicles which integrates with the DMIPSP RAV 10 road network.

The proposed SPDC includes an internal road parallel to GNH which connects to GNH at two locations with provision of separate left in and left out intersections on GNH at both ends. This internal road (or service road) will improve the accessibility of the proposed smaller Lots along GNH without disrupting the GNH traffic. The proposed left in intersection will be used by all vehicles including RAV 10 vehicles. Appropriate left turn lane on GNH will be provided to improve traffic operations and safety and satisfy Austroads requirements. The left-out intersection on GNH will be used by light vehicles only.

3.0 Existing Situation

3.1 Existing Land Use

The subject site is currently vacant land. The surrounding lands to the south and east are also mainly vacant rural lands. Great Northern Highway is forming the western boundary of the subject site.

3.2 Existing Road Network

The Muchea industrial park including the subject site is located at the junction of three primary distributor roads being GNH, Brand Highway and Tonkin Highway (NorthLink). Muchea East Road is a regional distributor road and Wandena Road, to the east of the park, is a local distributor.

Great Northern Highway runs north-south connecting Perth's suburb of Midland with the far north regions of WA passing through a number of major agriculture and resource industry nodes. It carries a significant portion of heavy vehicles in the traffic mix. Great Northern Highway is a Primary Distributor Road under care and control of Main Roads WA. It is generally constructed as a two-lane, single carriageway road with posted speed limit of 110kmh in the vicinity of the subject site. The recently constructed North Link is expected to take significant volume of regional traffic, particularly heavy vehicles away from Great Northern Highway.

According to Main Roads WA Restricted Access Vehicle (RAV) mapping Great Northern Highway at this location is classified as RAV 7 (refer **Figure 4**) but it is planned to be upgraded to RAV 10.

Muchea East Road extends eastwards of Brand Highway providing an important east-west link to Chittering Road to the east. It is classified as a Regional Distributor road under control of Local Government. Muchea East Road is currently constructed as a single carriageway two-lane road.

According to Main Roads WA Restricted Access Vehicle (RAV) mapping Muchea East Road is classified as RAV 7 in the vicinity of the subject site (refer **Figure 4**).

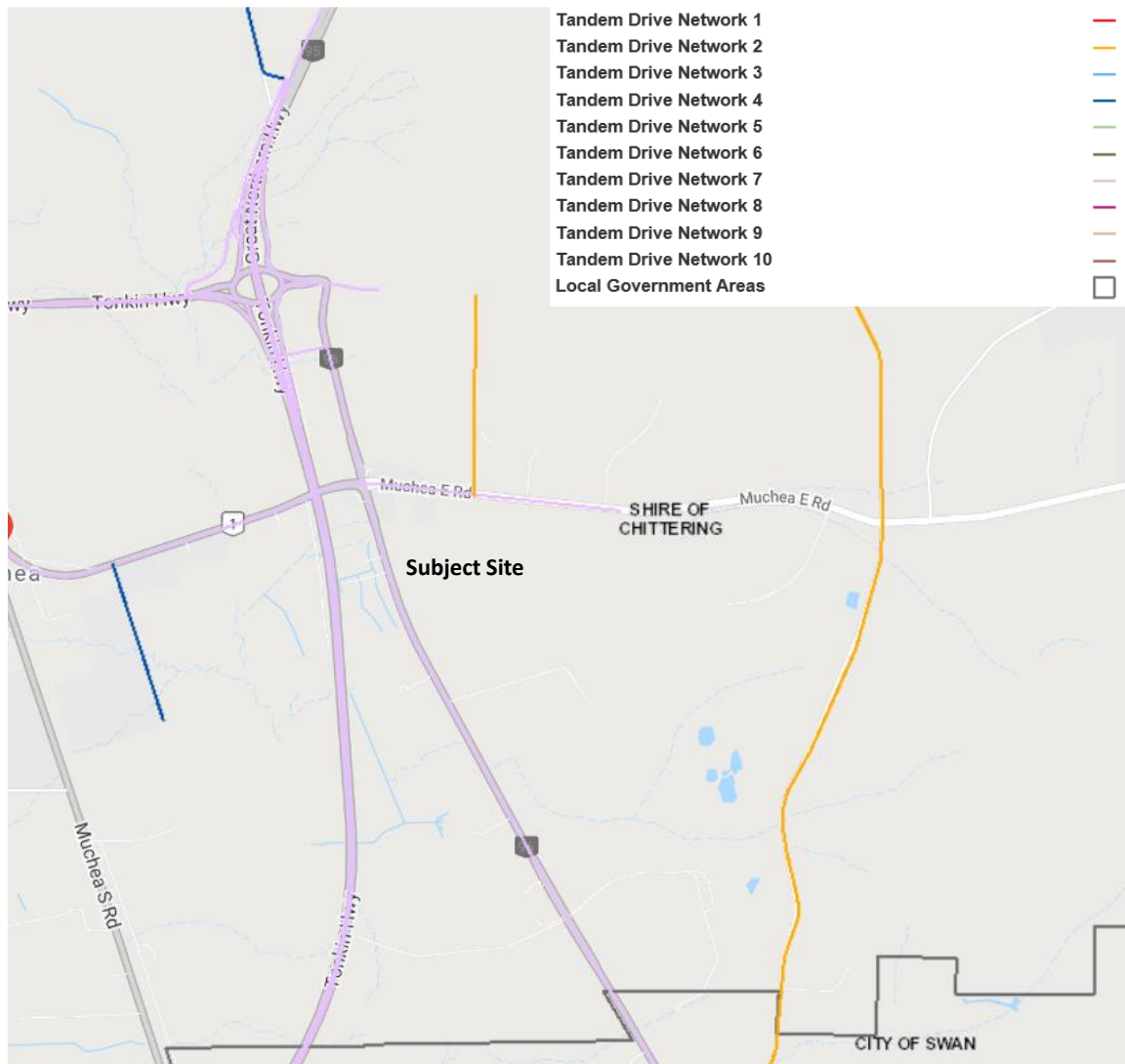


Figure 4: Existing RAV network

3.3 Existing Traffic Counts

Existing average weekday traffic (AWT) volumes on surrounding roads have been obtained from Main Roads WA and are illustrated in **Figure 5**. The latest SCATS data for the signalised intersection of GNH/ Muchea East Road was also obtained and is reported in this figure. The turn movements which were not captured by SCATS were surveyed by Transcore in early December 2020. The PM peak hour tuning volumes are shown in blue in this figure.

As outlined before it is expected that the current traffic volumes on Great Northern Highway are less than that reported in Figure 5.

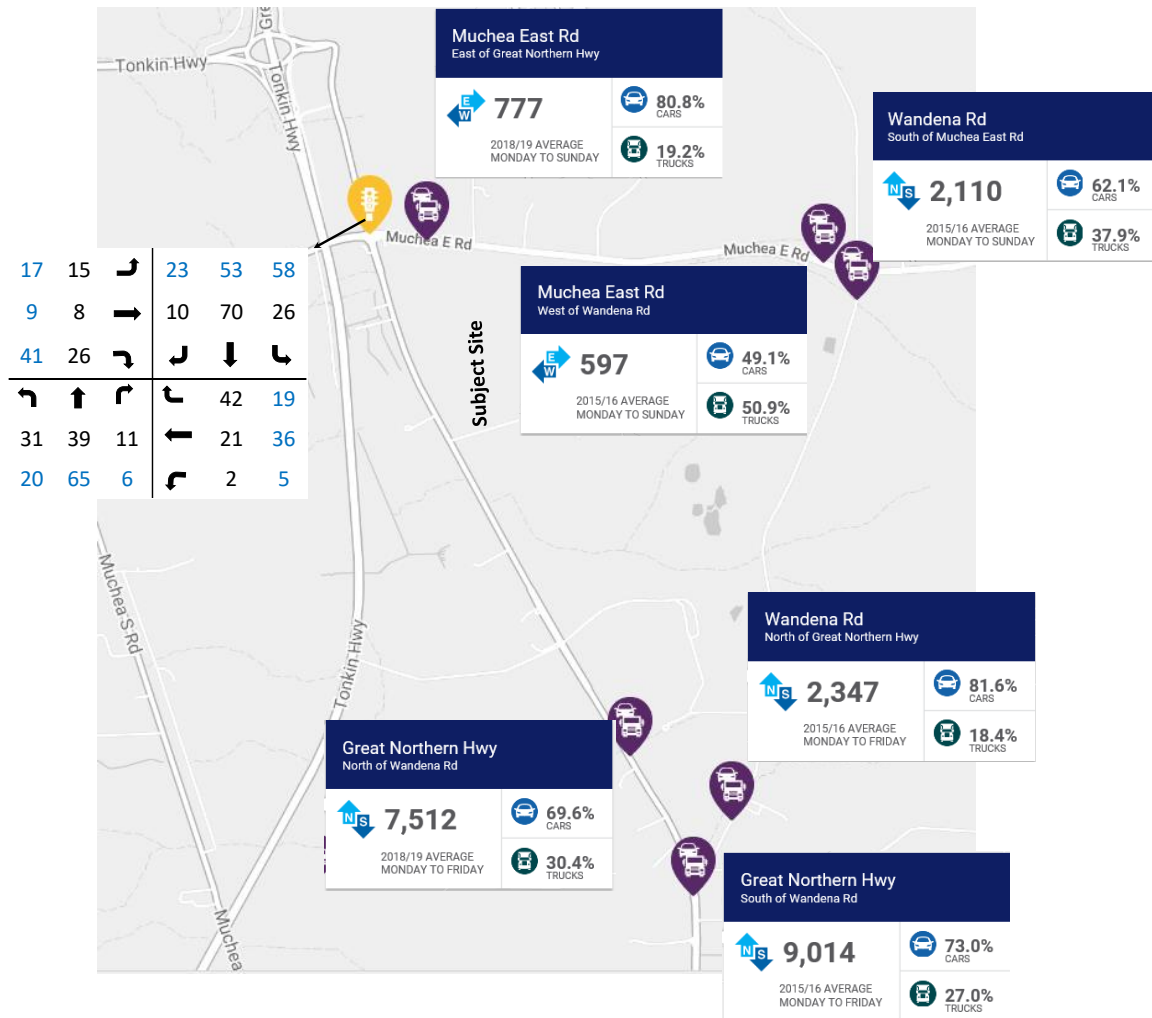


Figure 5: Existing traffic counts

3.4 Public Transport

Currently, there are no bus services to the subject site. The Midland to Geraldton railway line is located to the west of the subject site.

The line is strategically important as a freight route between Perth (Midland) and the northern Wheatbelt and Mid-West regions. The freight rail network provides connections to and between the ports of Esperance, Albany, Bunbury, Fremantle (Perth) and Geraldton.

3.5 Pedestrian and Cyclist Facilities

Currently, there are no pedestrian and cyclist facilities on the surrounding road network around the subject site. According to the Muchea Employment Node Structure Plan "No formal cycle or pedestrian facilities are provided in the structure plan. A sealed shoulder is recommended in the road cross-sections which could be used by cyclists. The

large-scale industrial land use would largely make provision of a pedestrian network difficult. Pedestrian links could be developed in subdivision guide plans if desire lines are identified”.

3.6 Changes to the Surrounding Road Network

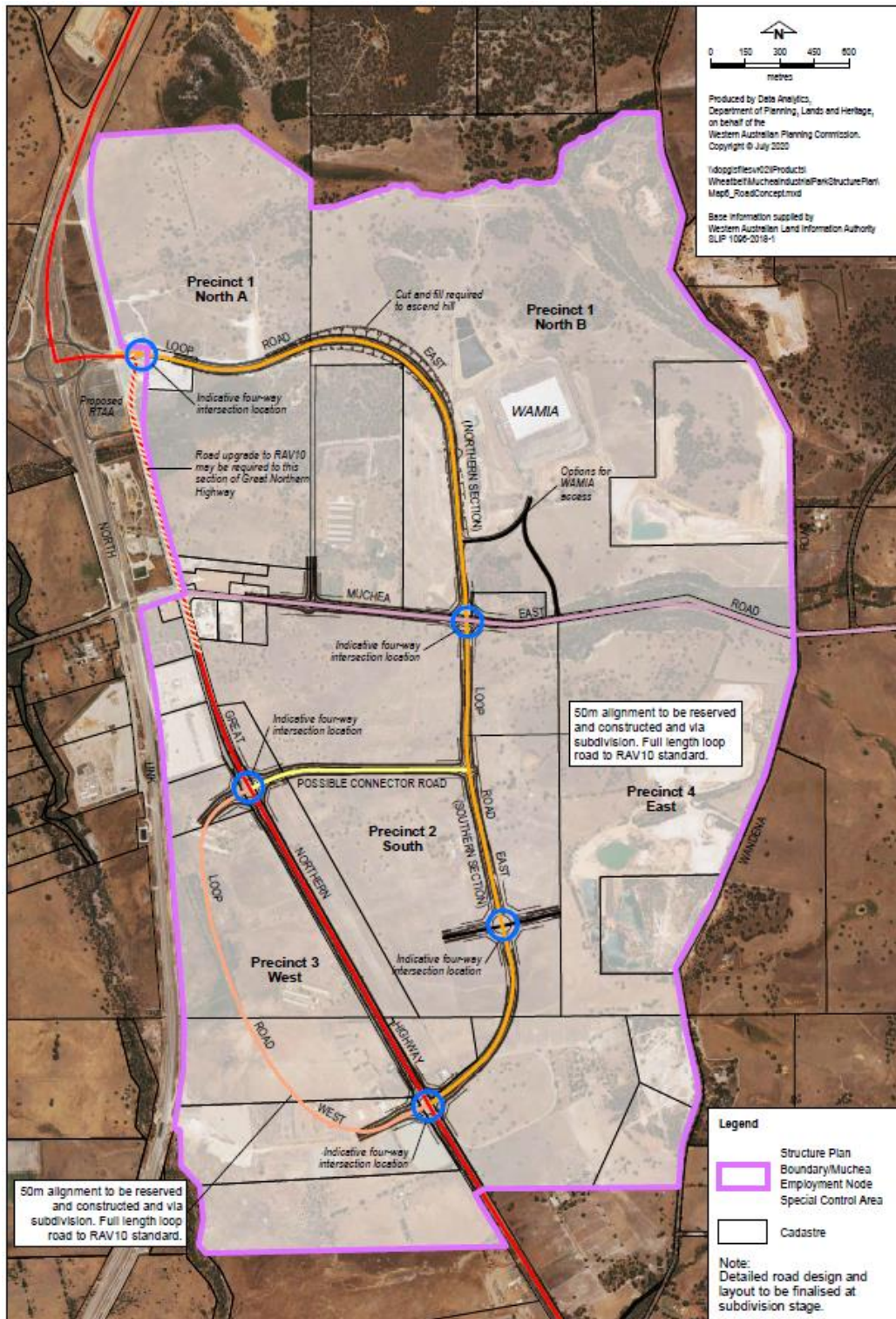
The major changes to the surrounding road network in this locality in accordance with DMIPSP are the completion of NorthLink project, which includes an interchange directly adjoining the industrial park and planned RAV10 upgrades to 220km of GNH north of Muchea to Wubin, including the Bindoon Bypass resulting in triple road trains up to 53.5m long (RAV10 vehicles) being able to travel on these roads.

The proposed road network of the DMIPSP (refer **Figure 6**) shows the alignment and connectivity of the surrounding road network including Great Northern Highway, Brand Highway and North Link. This figure also shows the proposed loop road which will run through the proposed SPDC area and would have two intersections on Great Northern Highway:

- Northern Loop Road/Great Northern Highway intersection: Loop Road connects at its northern end to Northlink/Great Northern Highway/Brand Highway (realigned) interchange at the western side of MIPSP; and,
- Southern Loop Road/Great Northern Highway intersection north of existing Wandena Road intersection with Loop Road terminating on approach to Great Northern Highway in the form of a roundabout intersection.

With the implementation of the Loop Road through the rezoning area and other Precincts of MENSP, the access to the rezoning area would be shifted from Muchea East Road to the new Loop Road. This road’s primary objective is to take over the current function of Muchea East Road and provide high capacity freight route with access opportunities for future developments within the structure plan area. Loop Road would be designed to accommodate vehicles exceeding current 36.5m limit (up to 53.5m road trains) in anticipation of re-classification of Great Northern Highway from RAV 7 to RAV 10 network.

The SPDC area shows a central connection to GNH in the form of a roundabout intersection in line with the DMIPSP road network as shown in **Figure 6**. Separate left in and left out intersections are also planned on GNH between the central and southern roundabout intersections to improve accessibility of the smaller lots along GNH.



3.7 Public Transport Network Planning

According to the Mucnea Employment Node Structure Plan *“The provision of public transport facilities has not been included in the structure plan. The large-scale industrial land uses proposed for the site would make feasible provision of public transport difficult to achieve. The proposed road network is designed to provide access for trucks, and would enable bus routes to be introduced if desired in the future”*.

4.0 Proposed Movement Network

4.1 Road reservations

The design of the internal road network of the SPDC area will be in line with WAPC's D.C. 4.1 Policy for industrial estates, Muchea Employment Node Structure Plan and Draft Muchea Industrial Park Structure Plan. The internal road network of the SPDC area would exclude cul-de-sac or battle-axe lot access configurations.

According to WAPC's D.C. 4.1 Policy, *"In industrial areas, a minimum road reserve width of 20 metres is required to provide for safe and efficient traffic movement. For heavily trafficked/major through routes, a minimum road reserve width of 25 metres is required. Carriageway widths of 10 metres are favoured"*.

All roads and intersections accommodating RAV10 vehicles, will need to be designed to safely accommodate RAV10 vehicles and other road users in accordance with Main Roads WA specifications.

The DMIPSP Road design indicates that *"Based on the trips generated and the distribution of trips outlined above there is no demand for two lanes on the loop road even with the fully realised ultimate development as less than 10,000vpd would be on the loop road"*. Therefore, Loop Road would be designed as single carriageway standard road within a 40m road reserve as shown in the SPDC. The roundabout intersection of Loop Road/Muchae East Road would also be designed as single lane roundabout intersection.

The projected traffic volumes on GNH are expected to be less than 10,000vpd and GNH is expected to remain as single carriageway standard road. The proposed roundabout intersections on GNH would also be designed as single lane roundabout intersections.

The internal roads are not expected to carry more than 5,000vpd and therefore the 20m road reserve with 10m traffic lanes should be sufficient for all internal roads.

Table 1 summarises the proposed road reserve widths and classifications for the key internal and external roads. However, more detailed traffic modelling and analysis would be required during the local structure planning and subdivision stage of the project to inform the accurate design and cross sections of the key roads within and surrounding the proposed SPDC area.

Table 1: Proposed road reservations for major internal and external roads

Key Roads	Proposed Road Category	Proposed number of traffic lanes	Recommended road reserve width (ultimate)
GNH (fronting the site)	Primary Distributor	2 lanes	40m
Loop Road (Within the site)	Integrator A	2 lanes	40m
Muchea E Road	Integrator A	2 lanes	40m

The level of upgrades on GNH will depend on the staging and timing of construction for the full loop road which is dependent on individual developer intentions. However, it is expected that any upgrades on GNH (including RAV 10 classification) would be managed within the current 40-50 road reserve of the GNH.

4.2 Integration with Surrounding Area

The proposed rezoning area is located within precinct 2. According to DMIPSP *“this precinct forms the central-most area of the industrial park with the least fragmented land ownership, and is the most suited area within the industrial park for general industry”*.

Accordingly, the proposed SPDC area will provide about 171 ha of developable Lot area for general industry land uses.

The road network of the SPDC will connect to the surrounding road network including GNH and Muchea East Road via a number of proposed intersections.

5.0 Analysis of the Movement Network

5.1 Assessment Period

The assessment year that has been adopted for this analysis is 2031, with the assumption of full development of the proposed SPDC area by this time.

5.2 Traffic generation and distribution

The Road and Traffic Authority of NSW document “*Guide to Traffic Generating Developments (October 2002)*” and the information available to Transcore for industrial projects have been sourced to estimate the trip generation for anticipated land uses for the SPDC area.

The proposed land uses for the SPDC area are predominantly general industry uses. Accordingly, a trip rate of 5 vehicles per day (VPD) per 100m² Gross Floor Area (GFA) was adopted and it was assumed that the GFA would be about 20% of the total efficient land area (total land minus public open space and roads).

Table 1 summarises the assumptions, trip rates and trip generation for the proposed SPDC area. Accordingly, the total trip generation of the anticipated land uses for the subject site is estimated to be about 16,840vpd.

Table 1: Daily Trip Generation Calculation

Efficient Land Area (ha)	Build Up Area Factor	Daily Trip Rate per 100m ² GFA	Daily Trip Generation
171	0.20	5	17,100

The estimated trip generation of the proposed SPDC area was distributed on the surrounding areas based on the following assumptions:

- 30% of trips travelling east;
- 19% of trips travelling west;
- 30% of trips travelling north; and,
- 21% of trips travelling south.

5.3 Traffic Flow Forecasts

Figure 7 illustrates the SPDC area traffic flows on internal and external roads. It should be noted that the reported figures do not include the background traffic on the external roads.

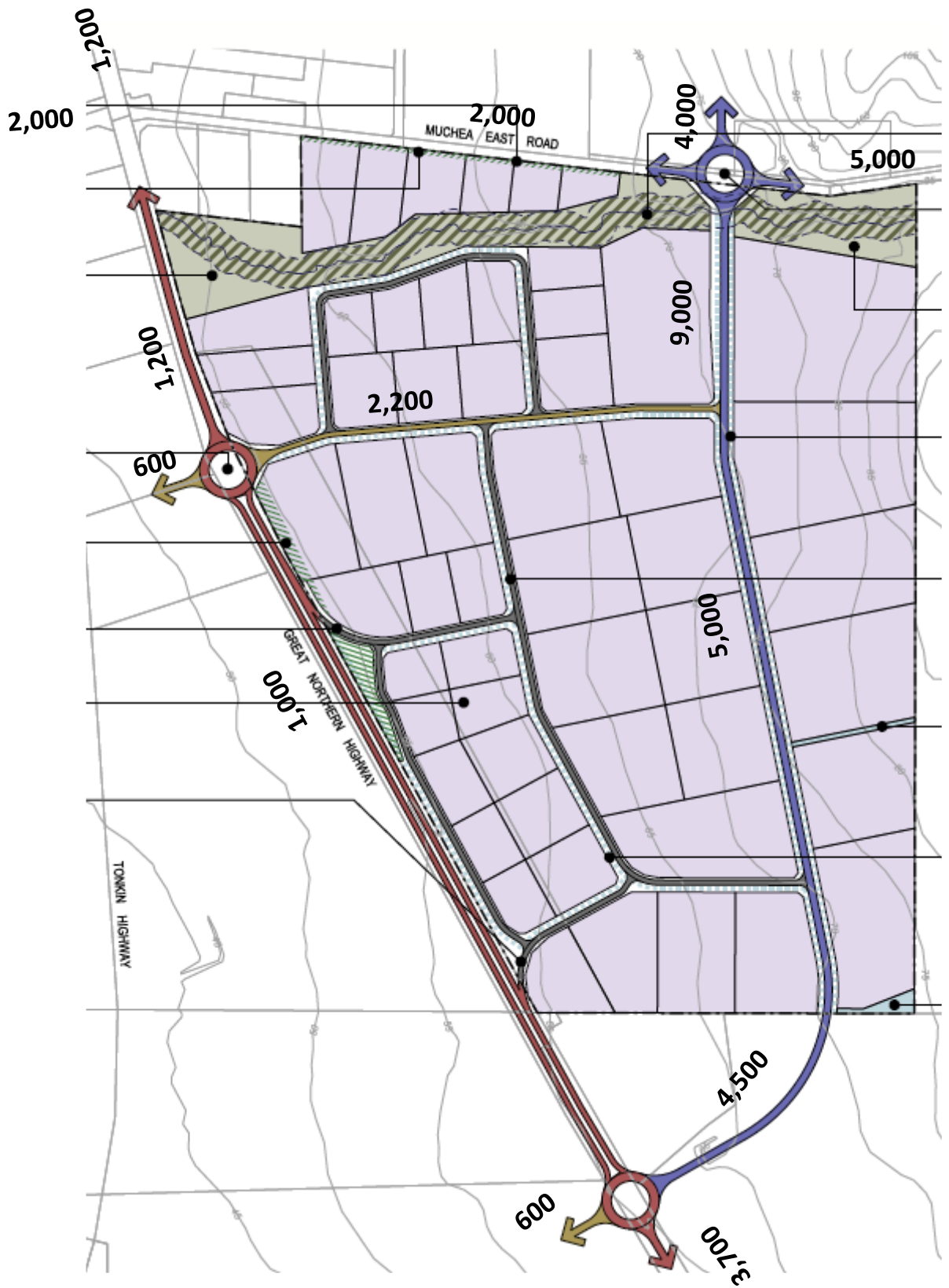


Figure 7: SPDC projected traffic volumes (vpd)

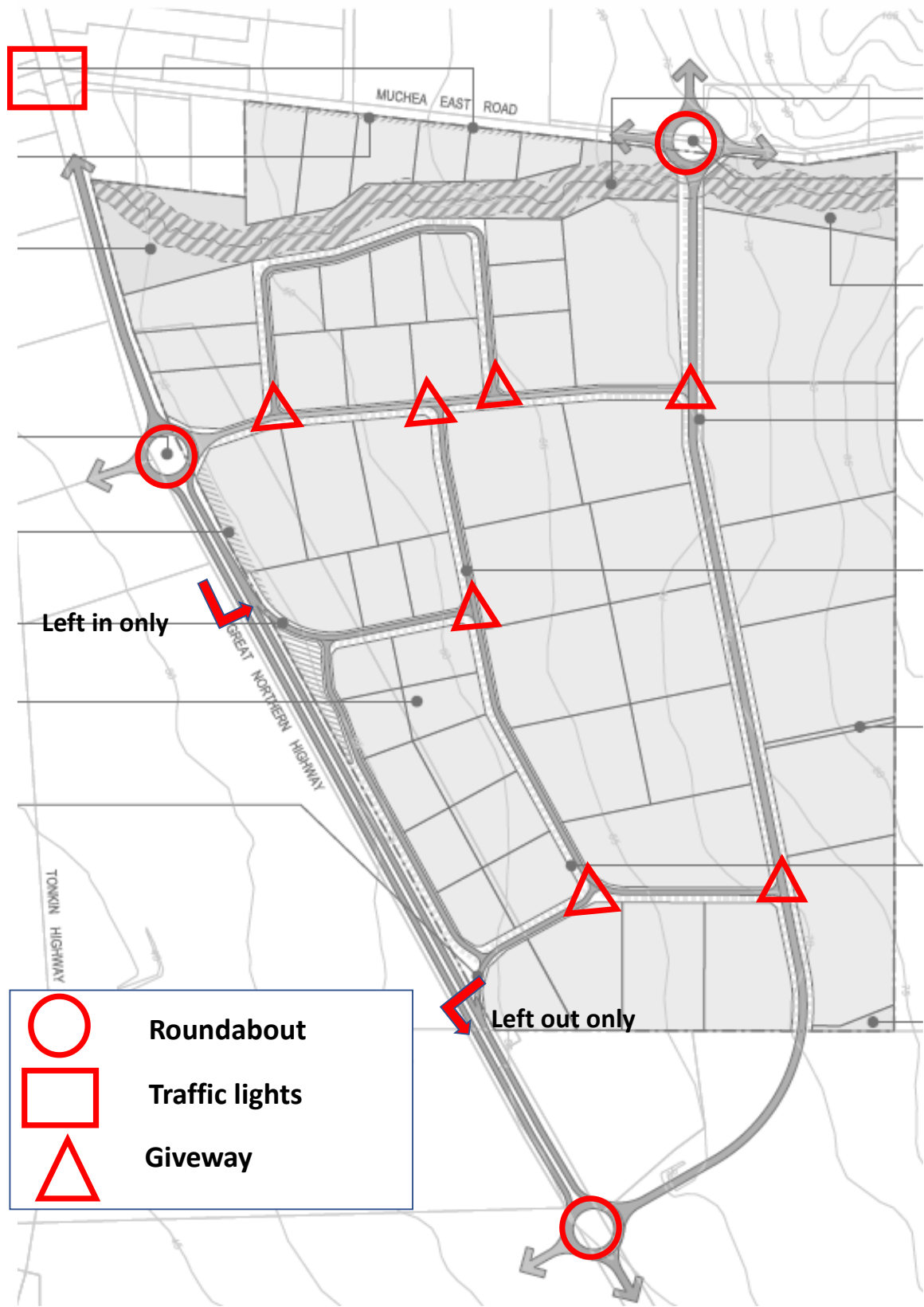
5.4 Roads and Intersections

Figure 8 details the proposed intersection controls for key intersections of the SPDC area.

According to DMIPSP for loop roads and GNH, a typical priority-controlled T-intersection shall feature auxiliary turn lanes and typical four leg intersection shall be a roundabout with an indicative 40m radius.

Appropriate left turn lane is also proposed to be provided for the proposed left in intersection on GNH to improve traffic operations and safety and to satisfy Austroad requirements. The details of the layout of the SPDC area internal and external intersections will be confirmed through further detailed traffic modelling and analysis during subsequent stages of the project.

The intersection of GNH/ Muchea East Road is currently operating as traffic signals.



	Roundabout
	Traffic lights
	Giveaway

Figure 8: Intersection Control & Treatments

5.5 Intersection Analysis

The operation of the existing signalised intersection GNH/ Muchea East Road has been assessed in SIDRA for the weekday AM and PM peak hours for existing and 2031 scenarios.

SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

- ✚ **Degree of Saturation (DoS):** is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for varied traffic flow up to one for saturated flow or capacity.
- ✚ **Level of Service (LoS):** is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- ✚ **Average Delay:** is the average of all travel time delays for vehicles through the intersection.
- ✚ **95% Queue:** is the queue length below which 95% of all observed queue lengths fall.

The results of the SIDRA analysis are attached in **Appendix B**. The estimated 2031 AM and PM peak hour volumes at the signalised intersection are shown in **Figure 9**. The peak hour traffic projections were established using the daily traffic projections in **Figure 7** and assuming the in/ out traffic split of about 80% / 20% for the AM and reverse for the PM peak hour. A conservative 2% annual traffic growth was also applied to all the turning movements of the intersection for year 2031.

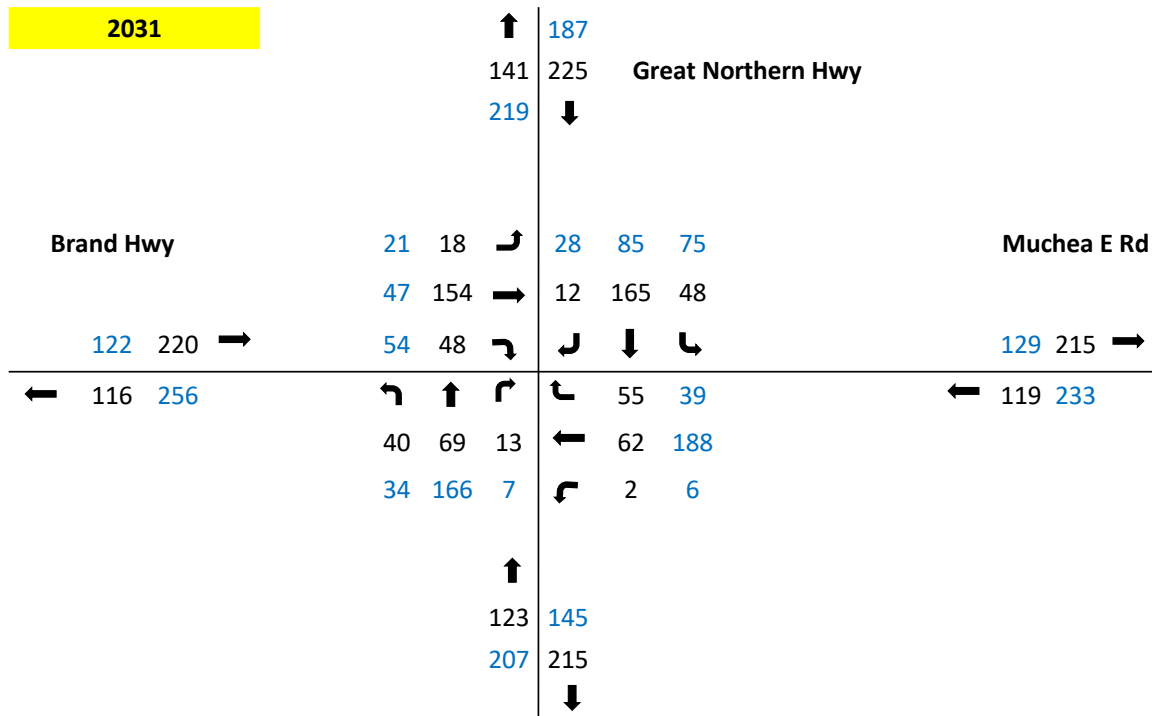


Figure 9: 2031 AM and PM peak hour traffic projections

The SIDRA analysis results indicate that the signalised intersection of GNH/ Muecha East Road presently operates satisfactorily and with an overall LoS B with minimum queues and delays during both weekday peak hours.

The addition of the SPDC area traffic to the intersection resulted in negligible increases in overall queues and delays. No significant change in overall LoS for the intersection is reported and ample spare capacity remains available after full development of the SPDC area.

6.0 Conclusions

The subject of this TIA is the proposed Amendment to the Shire of Chittering's Town Planning Scheme No. 6 for Lots 50 & M1456 Great Northern Highway, Muchea. The proposed amendment includes rezoning of the subject site from "Agricultural Resource" to 'Industrial'.

As part of the proposed rezoning a Preliminary Structure Plan Development Concept (SPDC) has also been prepared by Taylor Burrell Barnett for the site consistent with Draft Muchea Industrial Park Structure Plan (DMIPSP).

The proposed SPDC is located within Precinct 2 of the DMIPSP. According to DMIPSP *"this is the most suited area within the industrial park for general industry"*. Accordingly, the proposed SPDC area will provide about 171 ha of developable Lot area for general industry land uses which would generate about 17,100vpd.

The road network of the proposed SPDC area has been established in line with the proposed road network for the DMIPSP. The SPDC area distributor road network will be designed to accommodate RAV10 vehicles which integrates with the DMIPSP RAV 10 road network.

Separate left only in and left out only intersections are also proposed on GNH to improve accessibility of the proposed smaller Lots along GNH. The proposed left in intersection will be used by all vehicles including RAV 10 vehicles. Appropriate left turn lane on GNH will be provided at this intersection to improve traffic operations and safety and satisfy Austroads requirements. The left-out intersection on GNH will be used by light vehicles only.

The design of the internal road network of the SPDC area will be in line with WAPC's D.C. 4.1 Policy for industrial estates and Draft Muchea Industrial Park Structure Plan. All roads and intersections accommodating RAV10 vehicles, will need to be designed to safely accommodate RAV10 vehicles and other road users in accordance with Main Roads WA specifications.

Therefore, Loop Road would be designed as single carriageway (two lane two way) standard road within a 40m road reserve as shown in the SPDC. The roundabout intersection of Loop Road/Muchae East Road would also be designed as single lane roundabout intersection.

The projected traffic volumes on GNH are expected to be less than 10,000vpd and therefore GNH is expected to remain as single carriageway standard road. The proposed roundabout intersections on Loop Road and GNH would also be designed as single lane roundabout intersections.

The internal roads are not expected to carry more than 5,000vpd and therefore the 20m road reserve with 10m traffic lanes should be sufficient for all internal roads.

Further detailed traffic modelling and analysis would be required during the local structure planning and subdivision stage of the project to inform the accurate design and cross sections of the key roads within and surrounding the SPDC area.

Intersection analysis undertaken indicates satisfactory traffic operation of the existing signalised intersection of GNH/ Muchea East Road during the AM/ PM peak hours in 2031 and assuming full developemnt of the rezoning area.

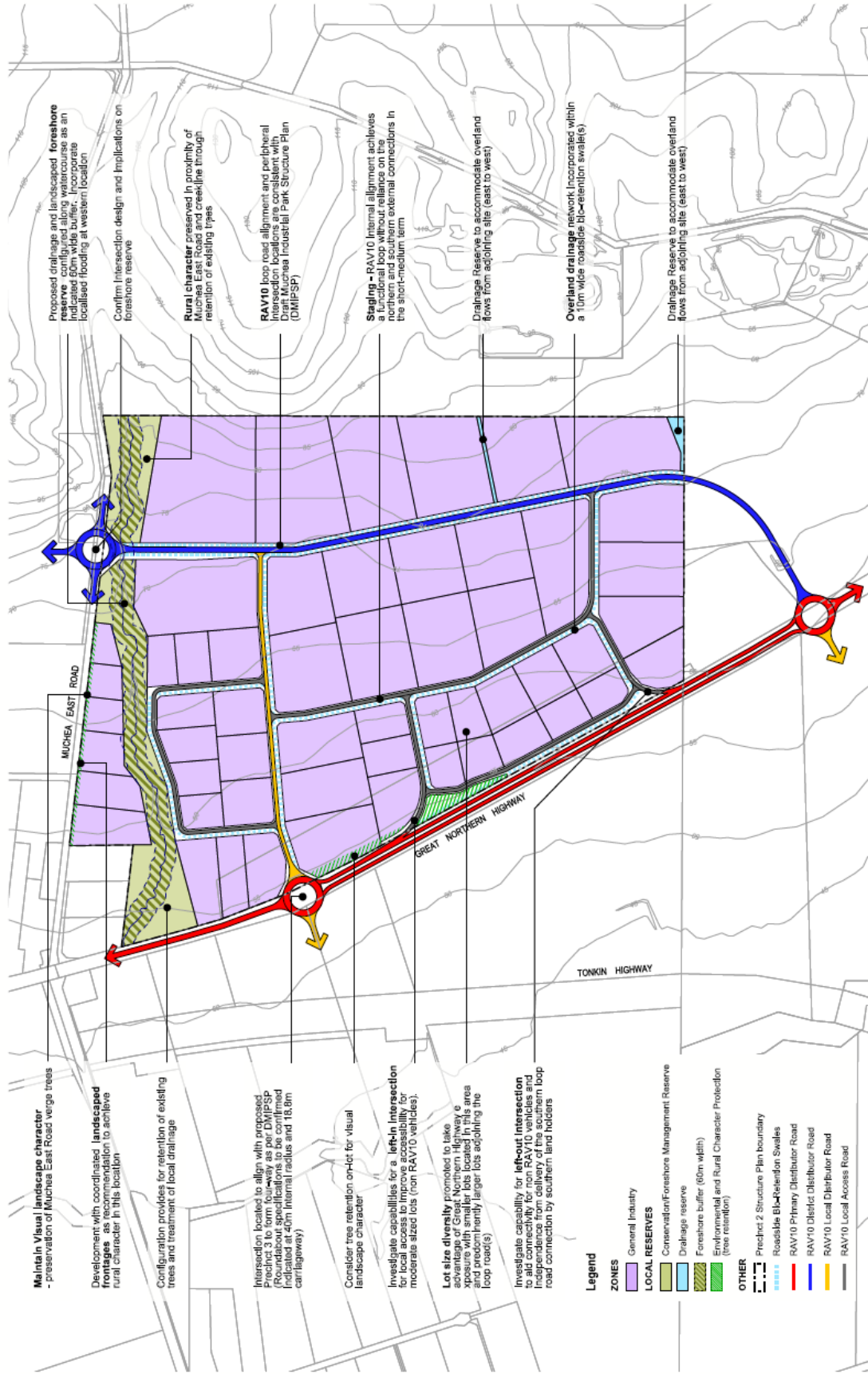
According to DMIPSP for loop road and GNH, a typical priority-controlled T-intersection shall feature auxiliary turn lanes and typical four leg intersection shall be a roundabout with an indicative 40m radius.

Appendix A

PRELIMINARY STRUCTURE PLAN DEVELOPMENT CONCEPT

&

DRAFT MUCHEA INDUSTRIAL PARK STRUCTURE PLAN



Maintain Visual landscape character
- preservation of Muchea East Road verge trees

Development with coordinated **landscaped frontages** as recommendation to achieve rural character in this location

Configuration provides for retention of existing trees and treatment of local drainage

Intersection located to align with proposed Precinct 3 to form four-way as per DMIPSP. This intersection is located on the alignment indicated at 80m internal radius and 18.8m carriageway

Consider tree retention on-plot for visual landscape character

Investigate capabilities for a **left-hand intersection** for access to the site from the highway (moderate sized lots from RAV10 vehicles).

Lot size diversity promoted to take advantage of Great Northern Highway e-roads and predominantly larger lots adjoining the loop road(s)

Investigate capability for **left-hand intersection** to aid connectivity for non-RAV10 vehicles and independence from delivery of the southern loop road connection by southern land holders

- Legend**
- ZONES**
 - General Industry
 - LOCAL RESERVES**
 - Conservation/Foreshore Management Reserve
 - Drainage reserve
 - Foreshore buffer (60m width)
 - Environmental and Rural Character Protection (tree retention)
 - OTHER**
 - Predict 2 Structure Plan boundary
 - Roadside E/Retention Swales
 - RAV10 Primary Distributor Road
 - RAV10 District Distributor Road
 - RAV10 Local Distributor Road
 - RAV10 Local Access Road

Proposed drainage and landscaped **foreshore reserve** configuration along watercourse as an alternative to the existing drainage reserve to avoid localised flooding at western location

Confirm intersection design and implications on foreshore reserve

Rural character preserved in proximity of Muchea East Road and creekline through retention of existing trees

RAV10 loop road alignment and peripheral intersection locations are consistent with Draft Muchea Industrial Park Structure Plan (DMIPSP)

Staging - RAV10 Internal alignment achieves a functional loop without reliance on the highway for external connections in the short-medium term

Drainage Reserve to accommodate overflow flows from adjoining site (east to west)

Overland drainage network incorporated within a 10m wide roadside E/Retention Swale(s)

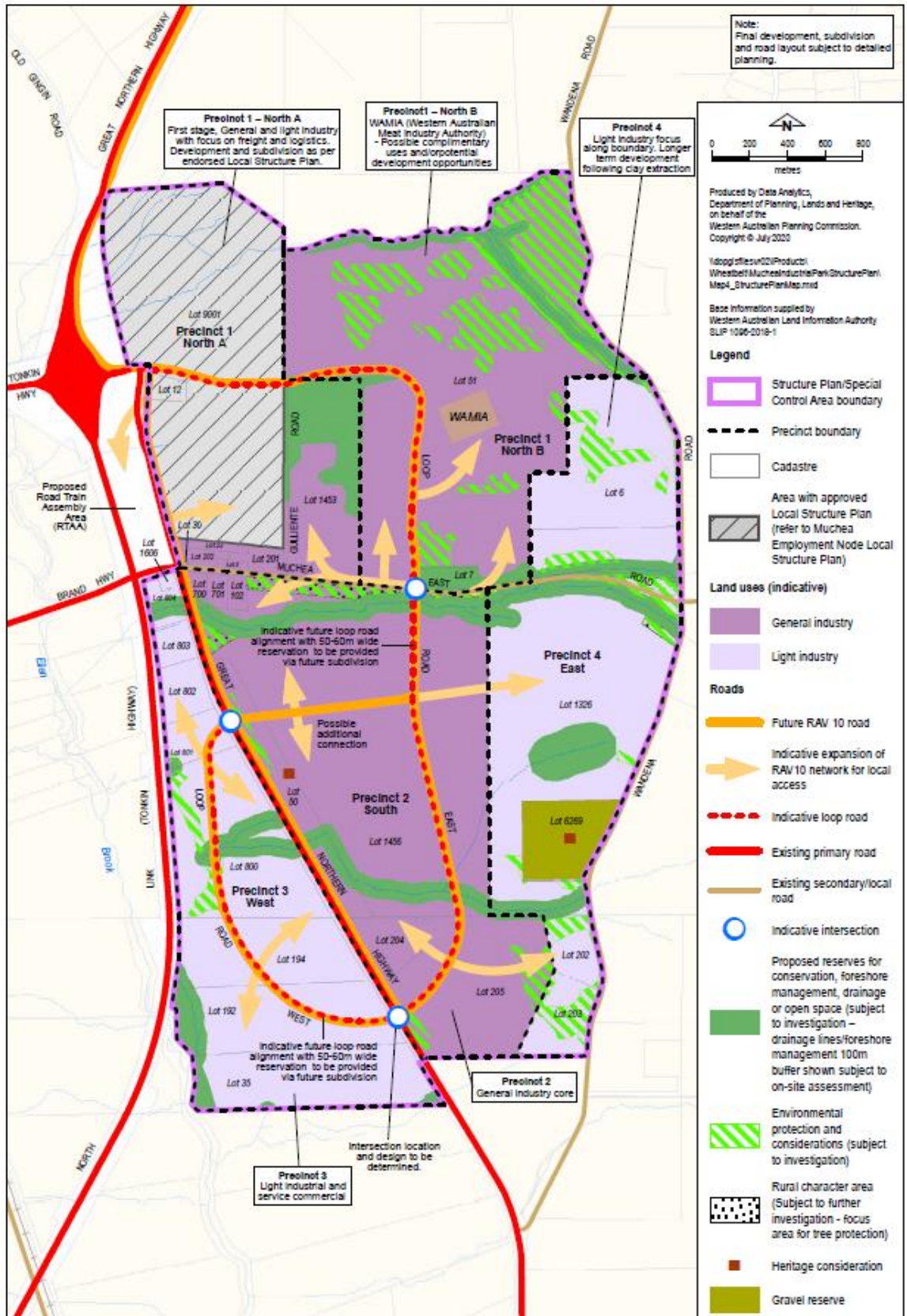
Drainage Reserve to accommodate overflow flows from adjoining site (east to west)



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scale 1:10,000 (not to scale)
date 20/03/2014
sheet 001 of 001

Preliminary Structure Plan Development Concept
LOT 50 & M1456
GREAT NORTHERN HIGHWAY, MUCHEA
An IPWiss Property Group Project



Appendix B

SIDRA RESULTS

MOVEMENT SUMMARY

 Site: [Great Northern Hwy - Muchea E Rd - Brand Hwy - Existing- AM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 57 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand	Flows	Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Great Northern Hwy (S)												
30	L2	33	38.0	0.034	10.9	LOS B	0.1	1.6	0.24	0.68	0.24	56.2
31	T1	41	38.0	0.074	9.0	LOS A	0.6	8.4	0.57	0.44	0.57	86.6
32	R2	12	38.0	0.026	19.6	LOS B	0.2	2.5	0.59	0.70	0.59	48.8
Approach		85	38.0	0.074	11.2	LOS B	0.6	8.4	0.45	0.56	0.45	66.0
East: Muchea E Rd (E)												
21	L2	2	23.1	0.002	8.7	LOS A	0.0	0.1	0.25	0.61	0.25	58.8
22	T1	22	23.1	0.173	16.6	LOS B	1.4	14.4	0.77	0.70	0.77	54.6
6	R2	44	23.1	0.173	24.1	LOS C	1.4	14.4	0.77	0.70	0.77	48.2
Approach		68	23.1	0.173	21.2	LOS C	1.4	14.4	0.76	0.70	0.76	50.4
North: Great Northern Hwy (N)												
7	L2	27	29.6	0.176	18.9	LOS B	1.7	20.9	0.60	0.56	0.60	55.7
25	T1	74	29.6	0.176	9.5	LOS A	1.7	20.9	0.60	0.56	0.60	81.3
26	R2	11	29.6	0.020	18.6	LOS B	0.2	2.1	0.57	0.69	0.57	51.3
Approach		112	29.6	0.176	12.7	LOS B	1.7	20.9	0.60	0.58	0.60	69.6
West: Brand Hwy (W)												
27	L2	16	33.9	0.071	23.8	LOS C	0.5	6.4	0.74	0.66	0.74	36.4
28	T1	8	33.9	0.071	16.0	LOS B	0.5	6.4	0.74	0.66	0.74	55.2
29	R2	27	33.9	0.078	23.9	LOS C	0.6	7.2	0.75	0.71	0.75	45.7
Approach		52	33.9	0.078	22.6	LOS C	0.6	7.2	0.75	0.69	0.75	43.5
All Vehicles		317	31.2	0.176	15.7	LOS B	1.7	20.9	0.62	0.62	0.62	58.3

MOVEMENT SUMMARY

 Site: [Great Northern Hwy - Muchea E Rd - Brand Hwy - Existing- PM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 56 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand	Flows	Deg. Satn	Average Delay	Level of Service	95% Back of Queue	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed	
		Total veh/h	HV %	v/c	sec		Vehicles veh	Distance m			km/h	
South: Great Northern Hwy (S)												
30	L2	21	38.0	0.023	11.1	LOS B	0.1	1.1	0.26	0.67	0.26	56.2
31	T1	68	38.0	0.121	8.8	LOS A	1.1	13.9	0.58	0.46	0.58	87.0
32	R2	6	38.0	0.015	19.7	LOS B	0.1	1.3	0.59	0.68	0.59	48.8
Approach		96	38.0	0.121	10.0	LOS B	1.1	13.9	0.51	0.52	0.51	74.2
East: Muchea E Rd (E)												
21	L2	5	23.1	0.005	8.9	LOS A	0.0	0.2	0.28	0.62	0.28	58.7
22	T1	38	23.1	0.153	16.7	LOS B	1.2	12.5	0.78	0.65	0.78	56.4
6	R2	20	23.1	0.153	24.3	LOS C	1.2	12.5	0.78	0.65	0.78	49.6
Approach		63	23.1	0.153	18.5	LOS B	1.2	12.5	0.74	0.65	0.74	54.2
North: Great Northern Hwy (N)												
7	L2	61	29.6	0.204	18.6	LOS B	1.9	23.8	0.61	0.64	0.61	54.3
25	T1	56	29.6	0.204	9.2	LOS A	1.9	23.8	0.61	0.64	0.61	78.3
26	R2	24	29.6	0.049	18.4	LOS B	0.4	4.7	0.57	0.72	0.57	51.5
Approach		141	29.6	0.204	14.8	LOS B	1.9	23.8	0.60	0.65	0.60	61.1
West: Brand Hwy (W)												
27	L2	18	33.9	0.084	24.2	LOS C	0.6	7.2	0.76	0.67	0.76	36.3
28	T1	9	33.9	0.084	16.4	LOS B	0.6	7.2	0.76	0.67	0.76	54.9
29	R2	43	33.9	0.133	25.4	LOS C	0.9	11.9	0.79	0.73	0.79	44.8
Approach		71	33.9	0.133	23.9	LOS C	0.9	11.9	0.78	0.71	0.78	43.3
All Vehicles		371	31.5	0.204	15.9	LOS B	1.9	23.8	0.63	0.63	0.63	58.0

MOVEMENT SUMMARY

 Site: [Great Northern Hwy - Muchea E Rd - Brand Hwy - 2031 - AM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 57 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
30	L2	42	47.2	0.052	11.9	LOS B	0.2	3.2	0.30	0.69	0.30	53.0
31	T1	73	47.2	0.153	9.5	LOS A	1.2	19.1	0.60	0.48	0.60	85.6
32	R2	14	47.2	0.046	23.1	LOS C	0.3	4.1	0.67	0.71	0.67	44.6
Approach		128	47.2	0.153	11.7	LOS B	1.2	19.1	0.51	0.57	0.51	65.8
East: Muchea E Rd (E)												
21	L2	2	23.1	0.002	9.8	LOS A	0.0	0.1	0.36	0.62	0.36	58.0
22	T1	65	23.1	0.437	21.7	LOS C	3.1	31.8	0.90	0.76	0.90	51.7
6	R2	58	23.1	0.437	29.2	LOS C	3.1	31.8	0.90	0.76	0.90	46.0
Approach		125	23.1	0.437	25.0	LOS C	3.1	31.8	0.89	0.76	0.89	49.0
North: Great Northern Hwy (N)												
7	L2	13	39.4	0.380	20.6	LOS C	3.5	54.5	0.68	0.59	0.68	52.7
25	T1	174	39.4	0.380	10.8	LOS B	3.5	54.5	0.68	0.59	0.68	82.0
26	R2	51	39.4	0.120	20.4	LOS C	0.9	13.6	0.62	0.74	0.62	47.6
Approach		237	39.4	0.380	13.4	LOS B	3.5	54.5	0.67	0.62	0.67	69.3
West: Brand Hwy (W)												
27	L2	19	33.9	0.511	26.7	LOS C	4.4	56.1	0.88	0.74	0.88	36.8
28	T1	162	33.9	0.511	18.9	LOS B	4.4	56.1	0.88	0.74	0.88	56.0
29	R2	51	33.9	0.151	26.0	LOS C	1.1	14.3	0.80	0.74	0.80	44.5
Approach		232	33.9	0.511	21.1	LOS C	4.4	56.1	0.86	0.74	0.86	51.0
All Vehicles		722	36.2	0.511	17.6	LOS B	4.4	56.1	0.74	0.67	0.74	57.9

MOVEMENT SUMMARY

 Site: [Great Northern Hwy - Muchea E Rd - Brand Hwy - 2031 - PM]

Site Category: (None)

Signals - Fixed Time Isolated Cycle Time = 57 seconds (Site User-Given Phase Times)

Movement Performance - Vehicles												
Mov ID	Turn	Demand Total veh/h	Flows HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Great Northern Hwy (S)												
30	L2	36	47.2	0.049	12.8	LOS B	0.3	4.1	0.38	0.69	0.38	52.3
31	T1	175	47.2	0.367	10.7	LOS B	3.2	52.1	0.68	0.57	0.68	83.2
32	R2	7	47.2	0.024	22.9	LOS C	0.1	2.2	0.66	0.69	0.66	44.8
Approach		218	47.2	0.367	11.5	LOS B	3.2	52.1	0.63	0.59	0.63	73.8
East: Muchea E Rd (E)												
21	L2	6	23.1	0.007	9.3	LOS A	0.0	0.3	0.33	0.63	0.33	58.4
22	T1	198	23.1	0.594	19.5	LOS B	6.0	60.8	0.90	0.78	0.92	55.1
6	R2	41	23.1	0.594	27.0	LOS C	6.0	60.8	0.90	0.78	0.92	48.6
Approach		245	23.1	0.594	20.5	LOS C	6.0	60.8	0.89	0.77	0.90	54.0
North: Great Northern Hwy (N)												
7	L2	79	39.4	0.354	20.5	LOS C	3.1	48.6	0.67	0.67	0.67	50.4
25	T1	89	39.4	0.354	10.6	LOS B	3.1	48.6	0.67	0.67	0.67	76.6
26	R2	29	39.4	0.095	23.2	LOS C	0.6	8.9	0.68	0.73	0.68	46.0
Approach		198	39.4	0.354	16.4	LOS B	3.1	48.6	0.67	0.68	0.67	58.6
West: Brand Hwy (W)												
27	L2	22	33.9	0.205	24.7	LOS C	1.6	19.8	0.78	0.66	0.78	37.0
28	T1	49	33.9	0.205	16.9	LOS B	1.6	19.8	0.78	0.66	0.78	56.5
29	R2	57	33.9	0.269	30.7	LOS C	1.5	18.5	0.89	0.76	0.89	42.2
Approach		128	33.9	0.269	24.3	LOS C	1.6	19.8	0.83	0.70	0.83	45.5
All Vehicles		789	35.6	0.594	17.6	LOS B	6.0	60.8	0.75	0.69	0.76	57.7